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Dean S. Hartley III

An Ontology for Unconventional Conflict

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Understanding Complex Systems

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Dean S. Hartley III

An Ontology for Unconventional Conflict

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Dean S. Hartley III
Hartley Consulting
Oak Ridge, TN, USA

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Foreword

This book represents a certain amount of work in its compilation; however, for me, it was more of a pleasure than a chore. Those I asked to review it and make comments are the ones who did the real work.

I thank Paul Works and the US Army's Training and Doctrine Command (TRADOC) Analysis Center (TRAC) for providing the initial opportunity to develop an ontology that applied to unconventional conflict. Thanks are also due to Lee Lacy who taught me about ontologies and was my coworker on the TRAC projects. Finally, I thank Mike McCurdy, Andreas Tolk, and John Rather who reviewed this book and made comments. Their efforts have made this book much better than it would otherwise have been. Errors and omissions are my responsibility, as I do not always accept the advice I am given.

Oak Ridge, TN, USA

Dean S. Hartley III

Preface

An ontology of unconventional conflict supports the understanding of unconventional conflict in general. It also provides a tool for understanding and investigating a particular unconventional conflict. Such an ontology does these things by providing a structure that exposes the things that are known about unconventional conflict and the relationships among these things. And it exposes significant things that are not known.

The simplest thing that can be said about unconventional conflict is that it is not conventional war. It may include combat operations; it may include multiple opposing parties; it may have a time span measured in years; and it may be confined to a single country or span a continent. It certainly includes social and cultural behavior issues, and the parties to the conflict may not all play by the same set of rules. Regardless of the details, unconventional conflict is real and messy and appears to be here to stay. Some unconventional conflicts may be optional. That is, your country may choose not to be engaged. However, some are not optional, at least not for all parties. The current crop of Islamist terrorists has chosen to include a large part of the globe in their conflict, waging terror campaigns in the United States, Europe, Asia, and Africa. Whatever it is, unconventional conflict, as a domain of study, is important.

An earlier book (Hartley D. S., 2017) focused on how one would use the ontology – why you want an ontology. In particular, it looked at the modeling uses of the ontology. This required discussions of other approaches for modeling unconventional conflict, which entailed a discussion of the domain being modeled. The book included only a brief description of the ontology.

This book focuses on the ontology, itself. It contains a very detailed discussion of the ontology's structure and contents. It expands the view of the ontology use from just modeling to understanding, including a perspective of the ontology as a means for understanding the complexity and emergent properties of the unconventional conflict domain. It also discusses possible enhancements in structure and expansion of the domain.

The first chapter introduces the concepts of unconventional conflict and ontologies. It defines unconventional conflict, characterizes it, discusses the operations that

may be conducted in such a conflict, and discusses the primary organizing principles. The chapter also defines ontologies, discusses how knowledge is represented in an ontology, and describes the languages used to express ontologies.

The second chapter puts the topics of unconventional conflict and ontologies together and presents an overview of the unconventional conflict ontology. This chapter discusses the sources for the ontology and the organizing concepts of the ontology. It also introduces the division into those parts that can be described independently of a particular situation and those parts that depend on the situation at hand.

Chapters 3, 4, 5, 6, 7, 8, 9, and 10 expand the parts of the ontology that are introduced in Chap. 2. Chapters 3, 4, 5, and 6 present the detailed organization and contents of the core sub-ontologies: actor, action, environment, and metric. Chapters 7 and 8 present the organization and contents of the other two situation-independent ontologies, stocks-and-flows and semantic concept, respectively. Chapter 9 presents the organization of the four situation-dependent structures. Chapter 10 presents the organization and contents of the theories ontology, which is technically not part of the main ontology but is a valuable adjunct.

Chapter 11 discusses how the ontology relates to complexity and emergent properties. It compares this ontology to three other ontologies. The first is the “bestiary” of subatomic particles, the ontology that is still under construction to support understanding the subatomic world. The second is the periodic table of elements, the ontology that is central to chemistry. The third ontology is the biologic taxonomy that describes the living world.

The final chapter consolidates the descriptions of the ontology into a discussion of “what we can know.” It also discusses the uses of the ontology and finishes with some concluding thoughts.

The front matter includes a list of the acronyms used in this book and their definitions. The back matter includes a bibliography of the citations in the text and an index of important terms.

Oak Ridge, TN, USA

Dean S. Hartley III

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Acronyms

AAR	Actor-Action-Result
APSO	Aggravated Peace Support Operations
BFO	Basic Formal Ontology
C4I	Command, Control, Communications, Computers, and Intelligence
CD	Counter-Drug
CI	Counterinsurgency
CMOC	Civil-Military Operations Center
COA	Course of Action
COG	Center of Gravity
COIN	Counter Insurgency
CSS	Cascading Style Sheets
CT	Counterterrorism
DEXES	Deployable Exercise Support System
DIA	Defense Intelligence Agency
DIME	Diplomatic, Informational, Military, Economic
DIMEFIL	DIME plus Financial, Intelligence, Law Enforcement
DM2	DoDAF Meta-Model
DNA	Deoxyribonucleic Acid
DoD	Department of Defense
DoDAF	Department of Defense (DoD) Architecture Framework
DP	Dimensional Parameter
DR	Disaster Relief
DRC	Dynamics Research Corporation
DTD	Document Type Definition
EA	Enterprise Architecture
FASP	Foreign Assistance Standardized Program
FAST	Flexible Asymmetric Simulation Technologies
FEMA	Federal Emergency Management Agency
FID	Foreign Internal Defense
FON	Freedom of Navigation
GFO	General Formal Ontology

GTO	Goal-Task-Owner
GUI	Graphical User Interface
HA	Humanitarian Assistance
HA/DR	Humanitarian Assistance and Disaster Relief
HN	Host Nation
HSCB	Human, Social, Cultural Behavior
HTML	Hyper Text Markup Language
HUMINT	Human Intelligence
ID	Identification
IDEAS	International Defence Enterprise Architecture Specification
IDP	Internally Displaced Population
IED	Improvised Explosive Device
IES	Infrastructure Environment Sustainability
IFOMIS	Institute for Formal Ontology and Medical Information Science
IO	International Organization
IGO	Intergovernmental Organization
ISIS	Islamic State of Iraq and Syria
ISSM	Interim Semi-static Stability Model
IW	Irregular Warfare
JUORS	Japan-US Operations Research Seminar
LIC	Low Intensity Conflict
LOE	Line of Effort
MCO	Military Contingency Operations
MIO	Maritime Intercept Operation
MIS	Management Information System
MOE	Measure of Effectiveness
MoFE	Measure of Force Effectiveness
MoM	Measure of Merit
MoP	Measure of Performance
MoPE	Measure of Political Effectiveness
MPICE	Measuring Progress in Conflict Environments
MSCA	Military Support to (Domestic) Civil Authorities
NDU	National Defense University
NEO	Noncombatant Evacuation Operation
NGO	Non-Governmental Organization
NI	National Integrity
NRL	Naval Research Laboratory
OCRS	Office of the Coordinator for Reconstruction and Stabilization
OE	Operational Environment
OOTW	Operations Other than War
OWL	Web Ontology Language
PE	Peace Enforcement
PK	Peacekeeping
PLU	Price Look Up
PMESII	Political, Military, Economic, Social, Information, Infrastructure

PMESII-KE	PMESII plus Kinetics, Environmental
PMESII-PT	PMESII plus Physical Environment, Time
PO	Peace Operation
PRIME	Probative Rapid Interactive Modeling Environment
RDF	Resource Description Format
RDFS	RDF Schema
RGB	Red, Green, Blue
RNA	Ribonucleic Acid
ROE	Rules of Engagement
SaF	Stocks-and-Flows
SAR	Search and Rescue
SSTR	Stability, Security, Transition, and Reconstruction
SWAG	Scientific Wild-Assed Guess
TEO	Task-Event-Outcome
TRAC	TRADOC Analysis Center
TRADOC	Training and Doctrine Command
TWG	Tactical War Game
UN	United Nations
US	United States
USAID	US Agency for International Development
USPACOM	US Pacific Command
V&V	Verification and Validation
VBA	Visual Basic for Applications
VV&A	Verification, Validation and Accreditation
WAG	Wild-Assed Guess
WMD	Weapons of Mass Destruction
XML	Extensible Markup Language
XMLS	XML Schema
XSLT	eXtensible Stylesheet Language Transformations

Chapter 1

Introduction



An ontology of unconventional conflict supports the understanding of unconventional conflict in general. It also provides a tool for understanding and investigating a particular unconventional conflict. Such an ontology does these things by providing a structure that exposes the things that are known about unconventional conflict and the relationships among these things. And it exposes significant things that are not known.

As this book was being written there were three unconventional conflicts of global importance (North Korea, Iran, and ISIS), each involving a common, seemingly intractable element: the person or persons in charge of one of the parties were variously described as mentally unstable, unpredictable, depraved, and irrational. The inference that might be drawn was that understanding the situations was either essentially impossible or practically inconsequential. However, the ontology described in this book shows how to extract a logical decomposition of the problematic agenda into goals and tasks, leaving the personal or corporate characteristics as an externality with many of the same characteristics as the weather. This example illustrates that understanding even the most complex and challenging situation is possible.

The point of an ontology is to create a structure to contain the knowledge of a domain and then to fill it with that knowledge. The relevant domain of knowledge here is unconventional conflict. In this chapter we introduce unconventional conflict and ontologies. Figure 1.1 illustrates the flow of the book. Chapter 1 introduces concepts from unconventional conflict and ontology. Chapter 2 describes the general structure and content of the ontology. Chapters 3 through 10 discuss each part of the ontology in detail and provide the ontology contents in tables. Chapter 11 discusses how the ontology relates to complexity and emergent properties. Chapter 12 includes a discussion of the uses of the ontology, a review of its contents and how they fit together, and concluding thoughts.

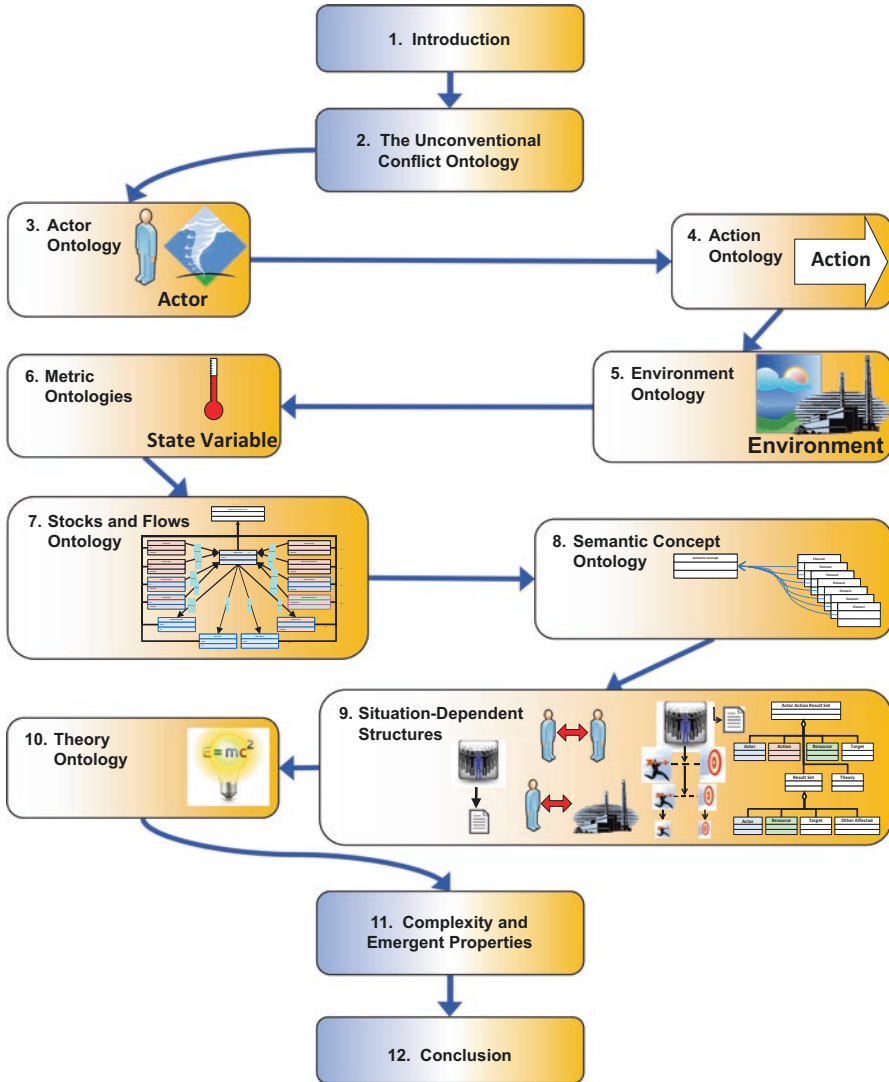


Fig. 1.1 Chapter topics

Introduction to Unconventional Conflict

We start with the understanding that conflict can range from disagreements between two individuals all the way to global thermonuclear war. One implication of this statement is that the conflict is between or among human beings; however, a broader definition allows for situations in which one of the parties of the conflict is a force of nature, perhaps an erupting volcano, which engenders many of the same actions that would take place in some purely human conflicts.

In this book, we will narrow the domain somewhat, omitting conventional and nuclear warfare (although not omitting dirty bombs and stolen nuclear weapons) and omitting conflicts that are not of interest to nation-states. In this domain, military actions of all types often form a large part of the total activity of the conflict. National militaries may or may not be in charge (often the national diplomats, such as the U.S. Department of State, are in charge of the national operations); however, in many cases, the “heavy lifting” is accomplished by the military, whether in combat roles or in logistic roles. Accordingly, we will often use military terminology to describe the operations. There have been many unconventional conflicts in which the United States has not participated; however, this book has been written from a U.S. viewpoint. Thus references to the Departments of Defense and State refer to the U.S. departments and “domestic” refers to U.S. domestic issues.

The motivation for an interest in unconventional conflict lies in the prevalence and significance of terrorism with respect to the current world situation. We must understand this form of unconventional conflict if we want to achieve a desirable outcome. The fact that we have been engaged in this conflict for two decades (at the time of this writing, depending on the choice of dates for its beginning) implies that we have not yet figured out how to conclude it satisfactorily. We also have two ongoing unconventional conflicts that are simmering: one with North Korea and one with Iran. The Korean War (1950–1953) (technically a “police action”) did not resolve the Korean conflict. It only marked the beginning of what has proved to be a long unconventional conflict with North Korea, which periodically threatens to become a hot war, whether conventional or nuclear remaining unknown. When the Shah of Iran was overthrown/replaced in late 1979, the new Iranian government began its long unconventional conflict with the U.S. and with other nations in the region. This conflict also has the potential to become a large conventional or nuclear conflict. In both of these latter conflicts, the emphasis has been on avoiding general war. Even absent these unconventional conflicts, there is cause to believe that unconventional conflict, rather than conventional war, will be prevalent in the future. Any party with a serious dispute with another party that has unmatched conventional military forces will seek unconventional means to gain its own ends. Further, two nations with near-parity forces, both having nuclear forces, may engage in proxy conflicts to avoid the catastrophic effects of nuclear war. In the past many similar proxy conflicts have been unconventional conflicts and may be so in the future.

Definition of Unconventional Conflict

The horizontal axis of Fig. 1.2 displays several types of military operations.

- The first type of operation, labeled “OOTW,” refers to Operations Other than War. This is a complex and diverse set of operations that includes everything a military does other than garrison duty and actual warfare.

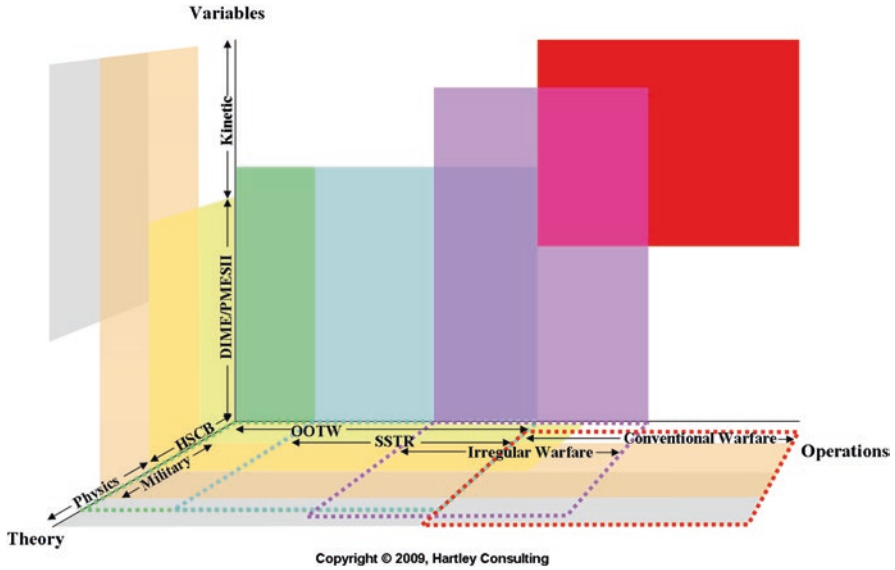


Fig. 1.2 Conflict dimensions

- The second type of operation, labeled “SSTR,” refers to Stability, Security, Transition, and Reconstruction. SSTR is included in OOTW and involves “various military missions, tasks, and activities conducted outside the United States in coordination with other instruments of national power to maintain or reestablish a safe and secure environment, provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief.” (Department of Defense, 2009)
- The third type of operation is “Irregular Warfare (IW).” IW “can include any relevant Department of Defense (DoD) activity and operation such as counterterrorism; unconventional warfare; foreign internal defense; counterinsurgency; and stability operations that, in the context of IW, involve establishing or reestablishing order in a fragile state or territory.” (Department of Defense, 2014)
- IW overlaps both OOTW and the fourth type of operation, “Conventional Warfare,” which includes warfare as it was known from World War I through the Korean War.

The vertical axis relates to the variables that may be used to describe the situation. In this figure, they are divided into kinetic and DIME/PMESII variables.

- Kinetic variables include most of the standard variables used in describing conventional warfare, such as probability of kill, the physical characteristics of vehicles, the numbers of personnel and equipment, logistics descriptors, and physical environment descriptors.

- DIME/PMESII variables will be described in more detail in Chap. 4. At this point the important point is that their focus is on things that are important in OOTW and IW that are generally missed in the kinetic modeling world. DIME variables are Diplomatic, Informational, Military, and Economic actions that can influence the situation. PMESII variables are Political, Military, Economic, Social, Information, and Infrastructure state variables that describe the state of the situation.

The third axis displays the categories of theories that might be used to explain or predict the results of actions.

- The category labeled “physics” includes all that is often called the hard sciences and mathematics (or what educators refers to as STEM – Science, Technology, Engineering, and Mathematics). The theories in this category are generally testable, with fairly well-defined domains of applicability and known degrees of accuracy.
- The category labeled “military,” which overlaps the other two categories, includes the various fields taught as military science, which include some hard science and some “softer” subjects, such as military history and leadership.
- The category labeled “HSCB,” which stands for Human, Social, Cultural Behavior, contains the fields of social science. The theories in this category are the least well-understood and, unfortunately, the most important for explaining or predicting affairs in unconventional conflict.

Each of the operational types has rectangles projected onto the *variables* × *operations* plane (back wall of the figure) and rectangles projected onto the *operations* × *theories* plane (floor of the figure). The combination of these rectangles induces three-dimensional solids for each operational type in the conflict space. **Unconventional conflict could be considered roughly as the union of the IW solid and the OOTW solid.**

Each of the theory categories has rectangles projected onto the *variables* × *theories* plane (left wall of the figure) and rectangles projected onto the *operations* × *theories* plane (floor of the figure). The induced solids reflect the domains of applicability of the theory categories.

The intersections of these two kinds of solids are based on the nature of the theories and the operations. For example, the HSCB solid intersects the Conventional Warfare solid in its lower, left, back corner. This indicates that even conventional war cannot be completely described in terms of physical theories.

We are focusing on unconventional conflict at the theater level. Generally this means that the geographical area under consideration is roughly equivalent to a country. Given a theater perspective, the granularity or level of resolution is restricted by practicality: too fine a granularity requires too many items to enumerate in the ontology. For example, the Host Nation’s legislature (whether in existence or nascent) provides a fairly good standard of impact. Another example is provided by non-governmental organizations (NGOs), such as the International Red Cross, which often play major roles in unconventional conflicts. Any other group or person with approximately equivalent impact would have the same level of resolution or granularity. The amount of time that will have to be addressed is biased toward denominations in

years, rather than days or months. Unconventional conflicts that primarily involved natural disasters have tended to be resolved in months; however, unconventional conflicts that primarily involved cultural conflict among multiple sides have often taken years and sometimes decades to resolve.

Characterization of Unconventional Conflict

Unconventional conflict is complex because of the number of relevant actors, the variety of actions that can be taken, the importance of the passive environment, and the number of relevant metrics. Figure 1.3 illustrates this complexity. A generic situation (or instance of unconventional conflict) will have a Host Nation in which the situation occurs, with its own government, police and military. The intervening external coalition brings its forces and contractors. Frequently, there are other contractors and NGOs. There may be internal troublemakers (insurgents, terrorists, etc.). And there may be an unfriendly external nation. Each group has its own agenda, with goals and tasks aimed at accomplishing the goals. And all actions play out in the same time and space. One of the principal geo-political areas for unconventional conflict is within a failed or failing state. Therefore, having the ability to identify such states and to predict which states might fail would be extremely valuable.

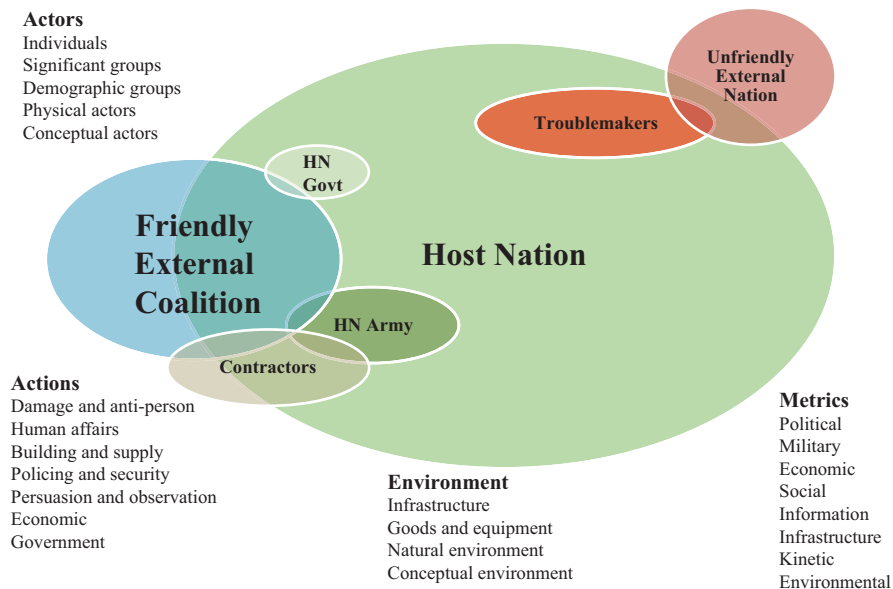


Fig. 1.3 The generic unconventional conflict situation

It is important to understand that while observable facts are important, the opinions or sentiment of the actors are also important. Lt. General Flynn (ex-Director of the Defense Intelligence Agency (DIA)) underlined the criticality of the opinions of the populace in obtaining intelligence and for winning in Iraq (Flynn & Ledeen, 2016).

The situation can be likened to multiple players playing different board games at the same time on the same board, all interacting, as in Fig. 1.4. Two players are playing checkers, a game with simple rules and simple strategy. One player is playing chess, a game with more complex rules and more complex strategies. Two players are playing Go, a game with simple rules and complex strategies. And – multiple players are playing Monopoly, a game with complex rules and complex strategies. The combined game has multiple players with unknown rules and very complex strategies.

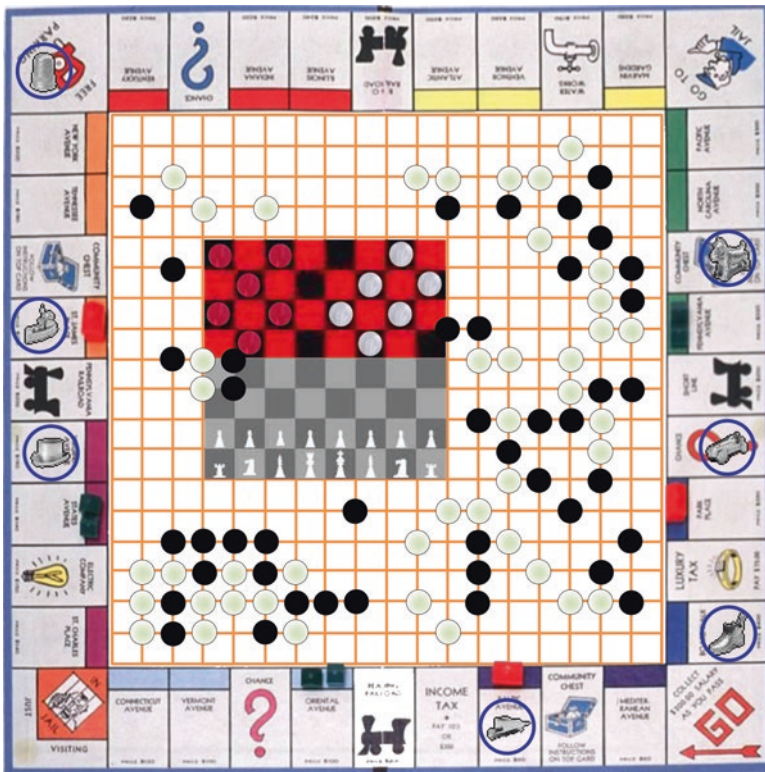


Fig. 1.4 Multiple players, multiple games

Operations Conducted in Unconventional Conflict

In this section we expand on the definition of unconventional conflict given above by enumerating the many types of operations that are contained in this domain. Unconventional conflict is also difficult to grasp because of the large number of types of operations that can be undertaken. It is important to remember the following definitions are for types of operations, not types of situations. A single situation might require several types of operations. For example, a noncombatant evacuation might be required during a peacekeeping operation that also involves humanitarian assistance. On the other hand, a particular situation may only involve one external (e.g., U.S.) operation, such as a noncombatant evacuation conducted to extract civilians during an insurgency. Despite this difference between operations and situations, an understanding of the possible operations helps in understanding the elements of possible situations.

The definitions of the operations given below are not authoritative, as different experts have differing definitions for some of the terms. However, they are all similar enough that these definitions carry the spirit of the concepts. These definitions may also be found in (Hartley, 2017), where citations are included to represent reporting on the particular types of operations.

Two taxonomy diagrams are useful in seeing some of the relationships among these types of operations: OOTW (Fig. 1.5, below) and unconventional war (Fig. 1.6, after the definitions of the OOTW operations).

The definitions of these types of operations follow below.

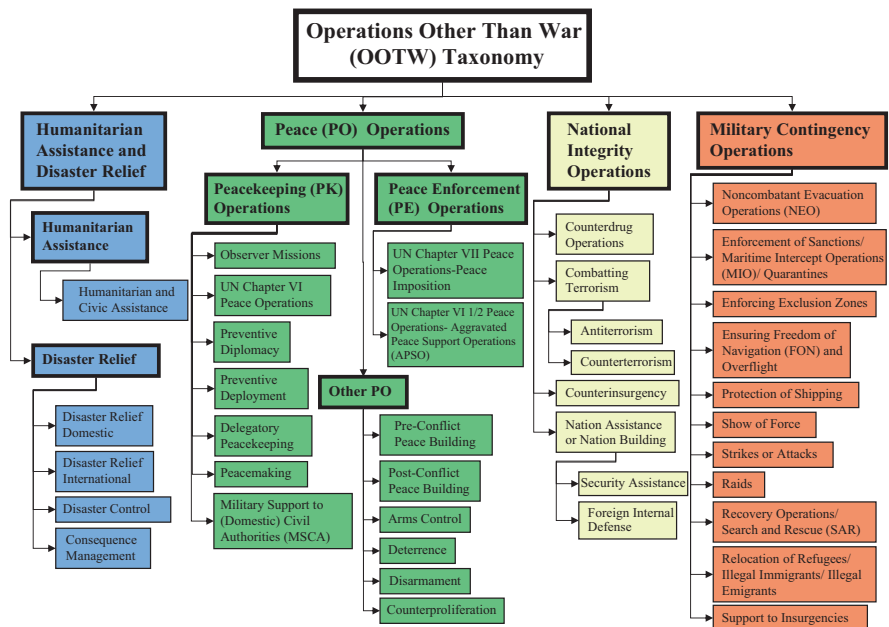


Fig. 1.5 OOTW operations type taxonomy

Humanitarian Assistance and Disaster Relief (HA/DR) Missions to promote human welfare, to reduce pain and suffering, to prevent loss of life or destruction of property in the aftermath of natural or man-made disasters. HA/DR includes refugee problems.

- **Humanitarian Assistance (HA):** Programs conducted to relieve or reduce the results of natural or man-made disasters or other endemic conditions such as human pain, disease, hunger, or privation that might present a serious threat to life or that can result in great damage to or loss of property. In those operations in which governmental structures have broken down, the military may be in charge through the Civil-Military Operations Center (CMOC) to provide essential humanitarian and technical expertise with the goal of containing or mitigating the situation and transitioning to another lead agency.
 - **Humanitarian and Civic Assistance:** Incidental assistance to the local populace provided in conjunction with military operations and exercises.
- **Disaster Relief (DR):** Disaster relief falls within the overall context of humanitarian assistance but is conducted in emergency situations to prevent loss of life and property.
 - **Disaster Relief, Domestic:** United States (U.S.) disaster relief operations; the Federal Emergency Management Agency (FEMA) is in charge; the military is an asset to local and state governments that brings specific capabilities to contain the situation and assist in recovery.
 - **Disaster Relief, International:** The host government is intact and requests assistance to handle a natural or man-made crisis; the military is an asset to local governments or international agencies to bring specific capabilities to contain situation and assist in recovery.
 - **Disaster Control:** Measures taken before, during, or after hostile action or natural or man-made disasters to reduce the probability of damage, minimize its effects, and initiate recovery.
 - **Consequence Management:** Measures taken after a Weapons of Mass Destruction (WMD) attack to alleviate damage, loss, hardship, or suffering, restore essential government services, protect public health and safety, and provide emergency relief to affected governments, businesses, and individuals. FEMA is the designated lead agency for U.S. domestic operations.

Peace Operations (PO) Military operations to support diplomatic efforts to reach a long-term political settlement (includes both peacekeeping and peace enforcement).

- **Peacekeeping Operations (PK):** Military operations undertaken with the consent of all major parties to a dispute, designed to monitor and facilitate implementation of an agreement and support diplomatic efforts to reach a long-term political settlement. Often involves ambiguous situations requiring the peacekeeping force to deal with extreme tension and violence without becoming a participant. This also known as United Nations UN Chapter VI Peace Operations.

- **Observer Missions:** A type of peacekeeping operation – assisting in the observation and maintenance of a cease-fire; acting as a neutral witness for the transfer of personnel or property from one party to another; and other limited operations.
- **Preventive Diplomacy:** A type of peacekeeping operation – diplomatic actions taken in advance of a predictable crisis to prevent or limit violence.
- **Preventive Deployment:** A subset of peacekeeping (consent is assumed) in which (military) forces are deployed in anticipation of potential hostilities with a goal of preventing active conflict.
- **Delegatory Peacekeeping:** Peacekeeping operations led by regional organizations, but sanctioned by the United Nations.
- **Peacemaking:** A type of peacekeeping operation – the process of diplomacy, mediation, negotiation, or other forms of peaceful settlements that arranges an end to a dispute, and resolves issues that led to conflict.
- **Military Support to (Domestic) Civil Authorities (MSCA):** When authorized, armed forces assist in domestic emergencies within the continental U.S.; the Army has primary responsibility. (Under provisions of the *Posse Comitatus Act*, neither the active component nor the U.S. Army Reserve may execute the law in the place of duly-appointed means of law enforcement means without specific Presidential or Congressional approval and direction.)
- **Peace Enforcement Operations (PE):** The authorized application of military force to compel compliance with resolutions or sanctions designed to maintain or restore peace and order.
 - UN Chapter VII Peace Operations: Part of peace enforcement – operations, short of war, requiring use of force to impose peace – also known as peace imposition.
 - UN Chapter VI ½ Peace Operations: Operations having characteristics of both UN Chapter VI and UN Chapter VII operations, and thus often referred to as Chapter VI ½. Operations requiring a show of force, or small tactical operations, to enforce peace - part of peace enforcement, also known as Aggravated Peace Support Operations (APSO).
- **Other Peace Operations:**
 - **Pre-conflict Peace Building:** Longer-term, non-military, economic, social, and political measures that can help states deal with emerging threats and disputes.
 - **Post-conflict Peace Building:** Post-conflict actions, predominantly diplomatic and economic, that strengthen and rebuild governmental infrastructure and institutions in order to avoid a relapse into conflict. May be associated with either peacekeeping or peace enforcement.
 - **Arms Control:** Any plan, arrangement, or process, resting upon explicit or implicit international agreement, governing the numbers, types, and characteristics of weapon systems or the numerical strength, organization, equipment, deployment, or employment of armed forces. Arms control focuses on promoting strategic military stability. Arms Control encompasses

Disarmament. Depending on the situation during implementation, it may be either peacekeeping or peace enforcement.

- **Deterrence:** May consist of either actions or maintenance of a particular situation, such as level of preparedness, that creates negative incentives for another country or group to engage in war.
- **Disarmament:** The reduction of a military establishment to some level set by international agreement. Depending on the implementation situation, may be either peacekeeping or peace enforcement.
- **Counterproliferation:** Efforts to impede the proliferation of weapons of mass destruction (WMD: chemical, biological, and nuclear or radiological weapons).

National Integrity (NI) Operations Operations to promote national integrity.

- **Counter-Drug (CD) Operations:** Support to federal, state, and local law enforcement agencies in their efforts to disrupt the transfer of illegal drugs into the U.S. Those active measures taken to detect, monitor, and counter the production, trafficking, and use of illegal drugs. Support efforts to interdict the flow of illegal drugs at the source, in transit, and during distribution.
- **Combatting Terrorism:** Actions taken to oppose terrorism from wherever the threat.
 - **Antiterrorism:** Those passive defensive measures taken to minimize vulnerability to terrorism.
 - **Counterterrorism (CT):** The full range of offensive measures taken to prevent, deter, and respond to terrorism. Counterterrorism occurs in both unconventional conflict and war.
- **Counterinsurgency (CI or COIN):** Those military, paramilitary, political, economic, psychological, and civic actions taken by a government to defeat insurgency. Or, the use of military resources to provide support to a Host Nation’s counterinsurgency operations in the context of Foreign Internal Defense (FID) through logistical and training support.
- **Nation Assistance or Nation Building:** U.S. support of a Host Nation’s efforts to promote development, ideally through the use of Host Nation resources.
 - **Security Assistance:** Providing defense material, military training, and defense-related services by grant, loan, credit, or cash sales to further U.S. national policies and objectives. May take place in either nation building or counterinsurgency operations.
 - **Foreign Internal Defense (FID):** Programs that encompass the total political, economic, informational, and military support provided to another nation to assist its fight against subversion and insurgency. FID also includes participation by civilian and military agencies of one government in any of the action programs taken by another government to free and protect its society from subversion, lawlessness, and insurgency. It may take place in either nation building or counterinsurgency operations.

- **Stability Operations:** Various military missions, tasks, and activities conducted outside the United States in coordination with other instruments of U.S. national power to maintain or reestablish a safe and secure environment, provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief.

Military Contingency Operations (MCO) Military contingency operations are very like traditional military operations.

- **Noncombatant Evacuation Operations (NEO), Opposed:** Operations to relocate noncombatants from a foreign country where the relocation is opposed with armed force.
- **NEO, Unopposed:** Operations to relocate threatened noncombatants from a foreign country or Host Nation that are not opposed by armed force. It may involve threatened U.S. citizens.
- **Enforcement of Sanctions/Maritime Intercept Operations (MIO):** A type of military contingency operation involving coercive measures to interdict the movement of certain types of designated items into or out of a nation or specified area.
- **Enforcing Exclusion Zones:** A type of military contingency operation to prohibit specified activities in a specific geographic area.
- **Ensuring Freedom of Navigation (FON) and Overflight:** Operations conducted to demonstrate U.S. or international rights to navigate sea or air routes.
- **Protection of Shipping:** U.S. forces providing protection of U.S. flag vessels, U.S. citizens, and their property against unlawful violence (such as piracy) in and over international waters.
- **Show of Force Operations:** A type of military contingency operation carried out to demonstrate U.S. resolve in which U.S. forces deploy to defuse a situation that may be detrimental to U.S. interests or national objectives. Can take the form of combined training exercises, rehearsals, forward deployment of military forces, or introduction and buildup of military forces in a region.
- **Strikes or Attacks:** Offensive operations conducted to inflict damage on, seize, or destroy an objective for political purposes or to demonstrate U.S. capability and resolve to achieve a favorable result.
- **Raids:** Usually a small-scale operation involving swift penetration of hostile territory to secure information, confuse the enemy, temporarily seize an objective, or destroy installations.
- **Recovery Operations / Search and Rescue (SAR):** The search for, location, identification, rescue, and return of personnel or human remains, sensitive equipment, or items critical to national security.
- **Relocation of Refugees / Illegal Immigrants / Illegal Emigrants:** Transporting, and often caring for, refugees or other detained persons.
- **Support to Insurgency:** Support to an organized movement aimed at the overthrow of a constituted government through the use of subversion and armed conflict.

Unconventional Warfare Unconventional *warfare* (as opposed to unconventional *conflict*) is a catch-all category for warfare that doesn't follow mid-twentieth century rules. Figure 1.6 shows the taxonomy of types of unconventional warfare. Most, but not all of these are included in unconventional conflict.

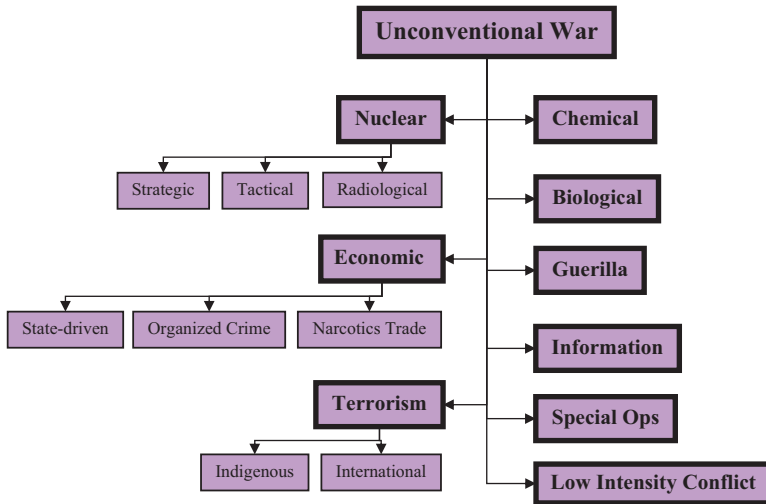


Fig. 1.6 Unconventional war type taxonomy

- **Radiological Warfare:** The use of radioactive materials with the intent to damage an organization or nation by killing or incapacitating humans, animals or plants or by damaging property. Radiological warfare is distinguished from nuclear warfare by the fact that fission of radioactive materials does not occur. Note that neither strategic nor tactical nuclear warfare is included in unconventional conflict.
- **Chemical Warfare:** The use of toxic chemicals (including biological toxins) with the intent to damage an organization or nation by killing or incapacitating humans, animals, or plants or by damaging property.
- **Biological Warfare:** The use of infectious agents, such as bacteria, viruses and fungi, with the intent to damage an organization or nation by killing or incapacitating humans, animals, or plants.
- **Economic Warfare:** The use of any means of which the primary purposes and effects are damage to the economy of an opponent. It can involve physical actions such as blockades, economic actions such as freezing bank accounts, social actions such as supporting organized crime or narcotics trade, etc.
- **Guerrilla Warfare:** Warfare in which a small group of combatants such as paramilitary personnel, armed civilians, or irregulars use military tactics including

ambushes, sabotage, raids, petty warfare, hit-and-run tactics, and mobility to fight a larger and less-mobile traditional military.

- **Information Warfare and Information Operations:** The use and management of information and communications technology in pursuit of a competitive advantage over an opponent. This includes operations directed at military and economic infrastructure and those operations directed at the opinions of populations. It includes propaganda and counterpropaganda and cyber-war, attacks and defenses.
- **Terrorism:** The use of violence, or threatened use of violence, to achieve a political, religious, or ideological aim. It is considered a war crime under the laws of war when used to target non-combatants, such as civilians, neutral military personnel, or enemy prisoners of war.
- **Special Operations:** Military operations that are “special” or unconventional and carried out by dedicated Special Forces units using unconventional methods and resources. These include drone operations.
- **Low Intensity Conflict (LIC):** LIC was coined to describe operations like those early in the Vietnam conflict in which small unit combat took place occasionally, interspersed with periods of tense waiting and maneuvering.

Relative Likelihood of Types of Unconventional Conflict In 1994, in an INFORMS panel discussion, Dave Haut, then Chief of the Research and Analysis Division for the Department of Defense’s U.S. Pacific Command (USPACOM) asked the question, “Suppose there are problems in country *X* and the Ambassador has the choice of having a carrier battle group sail down the country’s coastline in a show of force or playing golf with the country’s Prime Minister; how does he decide which will be more effective?” (Haut, 1994) The combat models of the time provided no way to frame such a question, much less any hope of illuminating the pros and cons of the alternatives. We still are unable to answer this question; however, we are getting closer.

In a presentation to the Japan-U.S. Operations Research Seminar (JUORS) in 1995, Haut presented an estimate of the likelihood of various types of operations across the continuum from peace to nuclear war (Haut, 1995). Figure 1.7 displays a recreation of Haut’s figure, which shows that the various types of OOTW operations are much more likely to occur than are conventional or nuclear combat operations.

Organizing Principles for Unconventional Conflict

The traditional thinking about conventional conflict focused on military actions and military metrics. Clearly, more is needed to organize thinking about unconventional conflict. Figure 1.8, taken from *Joint Operations* (Chairman of the Joint Chiefs of Staff, 2011) shows a figure illustrating this point. The five domains, political, military, economic, social, information (or informational, as shown in the figure), and

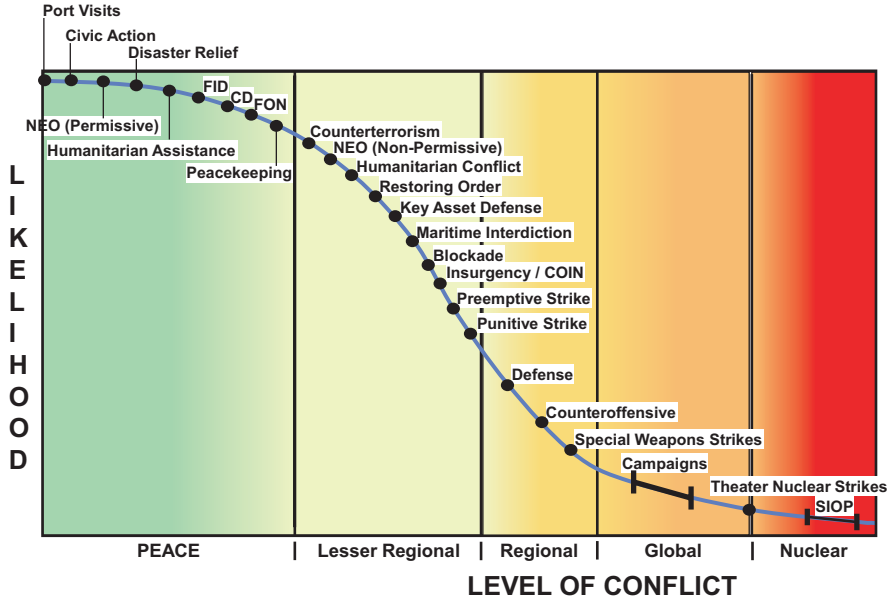


Fig. 1.7 Haut’s continuum of operations

infrastructure (**PMESII**) are shown as parts of the operational environment. Each has its own link and node structure; however, all of the domains are interconnected. The figure emphasizes that the operational center of gravity (COG) may differ from the strategic COG. In the military, the COG of an organization is the source of strength of the organization. The concept was invented by von Clausewitz to describe the location of the cohesive strength of a military force – the point at which an attack should be aimed (Clausewitz, 1993).

Variations to PMESII have been proposed, such as PMESII-PT, which adds physical environment and time to the package. However, the central PMESII construct has proved to be durable and useful and that term will generally be used to refer to all variants. Descriptions of the domains follow.

Political The primary components of the political domain are governance (policies, personnel, organizations, freedom, etc.), the rule of law (judiciary, law enforcement, crime, etc.), and politics (leadership, factions, etc.), as well as some miscellaneous items (intervenor status, stability/peace and legitimacy ratings, etc.). Measuring the status of some of these items is difficult, but obviously necessary.

Military The primary components of the military domain are conflict, government (the relation with, intelligence services, organizational sizes, etc.), and security

The Interconnected Operational Environment

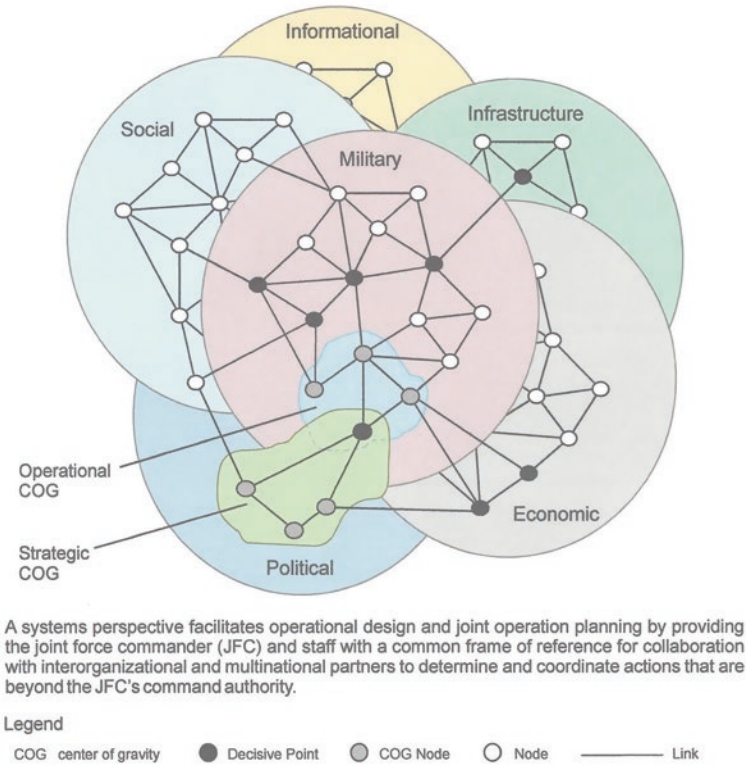


Fig. 1.8 PMESII diagram

(provisions), as well as other items (insurgents, terrorists, paramilitary forces, capacities, etc.). Measuring the status of these items is easier than measuring the political status. (The U.S. military traditionally measures itself in terms of capacity, capability, and readiness.)

Economic The primary components of the economic domain are agriculture, crime, energy, finance, governmental economic actions, jobs, and “other” things. Measuring the status of economic items is a relatively well-defined process compared to some other PMESII items.

Social The primary components of the social domain are basic needs (food, water, shelter, etc.), education, health, movement (freedom of, restrictions on, forced, etc.), safety, and other items. Some of the items are relatively easy to measure, while some of the “other items” that include religious and associational metrics are quite difficult to measure.

Information The primary components of the information domain are general information items (primarily decision-making ratings), media (capacity, freedom, etc.), opinions (of various actors about legitimacy, satisfaction, etc.), and information operations (including gathering and disseminating information in a neutral sense and “information ops” in the military sense).

Infrastructure The primary components of the infrastructure domain are business infrastructure, social infrastructure, energy infrastructure, government infrastructure, transportation infrastructure, and water infrastructure. A very large number of items fall into this domain, including capacities, damage, investments, etc.

The five elements of PMESII, described above, are concerned with describing a situation. On the other hand, DIME is concerned with changing the situation.

DIME Concept The DIME concept rests on the observation that a nation has many instruments of power with which it can attempt to achieve its international goals. These instruments or levers of power can be collected into a small set of categories to make remembering them easier. The most popular set is DIME – Diplomatic, Information (or Informational), Military, and Economic.

- **Diplomatic power** rests in negotiations and agreements. To the extent that a nation regards itself as bound to honor its agreements, diplomacy can result in changes in the actions of one or more nations. However, there are advantages to be had short of binding agreements. Offering to provide or withhold favors among countries can also result in changes of actions.
- **Information power** lies in gaining information from others and in controlling the information desired by others. Differences in what is known between contending parties can be decisive, whether the domain is economic, military, or diplomatic.
- **Military power** is an obvious component. However, the fact that it has limits to its effectiveness and on its use should serve warning that the other levers of power also have limits (both individually and collectively).
- **Economic power** is also an obvious component. Nearly immediate effects can be seen from such actions as freezing bank accounts. Long-term strategies may involve the stronger economic power causing the weaker power to spend itself into defeat.

Variations to DIME have been proposed, such as DIMEFIL, which adds Financial, Intelligence, and Law Enforcement to the DIME package.

Unified DIME/PMESII+ Paradigm As mentioned above, there have been variations of DIME/PMESII that have been argued (including my offering, adding Kinetics and Environment as state vector variables); however, for our purposes, we will use PMESII to refer to all state variables, regardless of taxonomy details. The acronym DIME refers to the levers of power that a (nation) state has to influence the PMESII situation. As with PMESII, we will use DIME to refer to all such interventions, regardless of taxonomy details. Collectively, these will be referred to as DIME/PMESII+ or DIME/PMESII or simply as PMESII for brevity (Hartley, 2015).

Introduction to Ontologies

In philosophy, ontology is the study of the nature of being. However, we are not using that concept, but one that comes from the domain of computer science.

Definition of Ontology

Thomas Gruber defined an ontology as an “explicit specification of a conceptualization” (Gruber, 1993). The Wikipedia definition is almost equally baffling: “an ontology is a formal naming and definition of the types, properties, and interrelationships of entities that really or fundamentally exist for a particular domain of discourse” (Wikipedia, 2016b). In this section we provide a more extensive and concrete definition of ontologies that should make the meaning clear. We then proceed to describe an ontology for unconventional conflict in following chapters.

We start with the goal of ontologies: creating a usable description of what is known about a domain. The adjective “usable” is a key part of this goal. Depending on the proposed use, the description may be envisioned as including everything that is known or some specific subset of what is known about the domain. Further, the proposed use will influence the technical design and implementation of the ontology. Gruber’s “conceptualization” is the mental model of the domain that fits with the proposed use. His “explicit specification” just means that the mental model has been converted to an exact written description. The Wikipedia definition actually expands on this by listing categories of “things” in the mental model: entities and their types, entity properties, and relationships among entities. It also says that the written description includes naming and defining these “things.” In his book on ontologies (Fensel, 2004), Dieter Fensel explains that “formal” in the definition means machine readable. However, this property of an ontology seems more a matter of practicality, rather than an essential part of the definition. Generally, ontologies are implemented as computer files, with both machine-interpretable aspects and human-readable parts. The practicality enters into the implementation when the ontology becomes large enough to be useful for more than providing an example. At this point, the ontology is simply too complex to manipulate manually. However, this is no reason to exclude from the category of ontologies a specification of a conceptualization that is simple enough to display graphically.

Natalya Noy and Deborah McGuinness address “usable” by listing five reasons for developing an ontology (Noy & McGuinness):

1. To share common understanding of the structure of information among people or software agents;
2. To enable reuse of domain knowledge;
3. To make domain assumptions explicit;
4. To separate domain knowledge from operational knowledge; and
5. To analyze domain knowledge.

They go on to say,

6. “Often an ontology of the domain is not a goal in itself. Developing an ontology is akin to defining a set of data and their structure for other programs to use. Problem-solving methods, domain-independent applications, and software agents use ontologies and knowledge bases built from ontologies as data.” What they mean is that sometimes ontologies are employed to do something useful.

Representing Knowledge in an Ontology

Our domain is “unconventional conflict,” a medium-sized domain; however, the domain of an ontology can be small or large. We will use a small part of the *Meal* domain as an example in our discussion. The commercial Amazon Echo device and Apple’s Siri use voice recognition to understand spoken questions and respond with answers or actions (such as playing music). To be successful, they require an extremely large domain.

Before getting into the discussion on how knowledge is represented, a note on terminology is needed. All disciplines need a jargon, or set of words with precisely defined meanings, to ensure that what is meant by some declaration is the same thing that is understood. Naturally, this means that outsiders may have no clue as to what was meant. The field of ontologies has roots in artificial intelligence and computer science (among others). This means that some concepts are expressed by two (or more) different words or phrases, which have the same meaning. Other concepts may have taken two words that had the same meaning and shifted the meanings slightly, so that now there are subtle (to the outsider) differences. (This practice is not unique to scientists. After the Normans conquered the Saxons in England, the Saxon “sheep” and the Norman “mutton” [mouton in French] coexisted. Now, the living animals are “sheep” and the meat that is served from them is “mutton.”) Because we are not trying to create experts in ontologies, we will try to use a minimum of jargon. For example, we will often use “attributes” and “properties” interchangeably.

Figure 1.9 begins the extensional definition of an ontology by showing types of domain knowledge that might be contained in an ontology.

For example, lists of terms or lists of terms with definitions (glossaries) are placed toward the “informal” side of the figure. Thesauri and lists of sub-terms are also on the “informal” side, but closer to the “formal” side. The dashed, vertical line indicates a common dividing line between things that aren’t ontologies (informal) and things that are ontologies (formal).

Lists and definitions certainly contain information about the domain. A definition is a property that restricts a named class (Fig. 1.10). An individual instance (instantiation) of that class must meet the terms of that definition and provides a value for the property.

Thesauri add a relation among elements that is similar to a definition, but looser – more general. Terms are linked that don’t have the same definition, but have

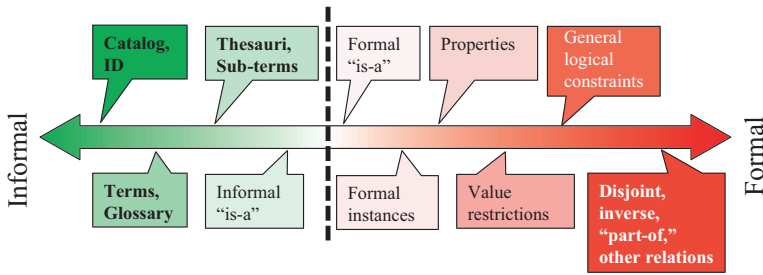
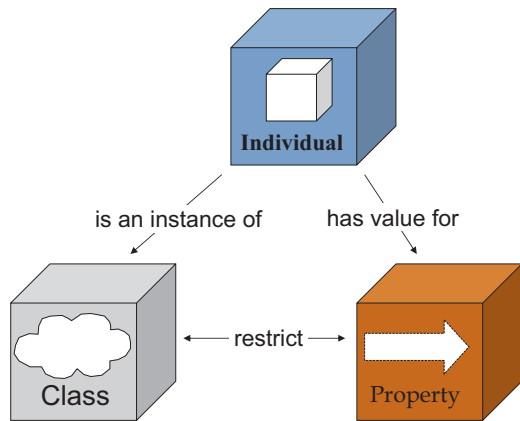


Fig. 1.9 What is an ontology?

Fig. 1.10 Information representation



similarities of meaning. Sub-terms also have a generalization of the definition property, but one that consists of a restriction of the definition, with a different restriction for each sub-term.

The *is-a* Relation The next stage of formality is the introduction of other relations between classes. The first such relation is the *is-a* relation, which is the standard relation in many taxonomies. Figure 1.11 illustrates this by showing that the class *Pie is-a Dessert* and the class *Cake* also *is-a Dessert*. The class *Dessert* has two child classes; however, each of these has only one parent class. This is a property of taxonomies, a type of ontology. Notice that once you get to the stage of drawing taxonomies, you have crossed over from informal *is-a* to formal *is-a*.

Classes The next stage of information capture in an ontology is the formal distinction between classes and instances. This is different from the further decomposition of the taxonomy in Fig. 1.11. The taxonomy decomposition might result in defining a *CherryPie* class and an *ApplePie* class, each a child of the *Pie* class. An instance of the *Pie* class would be a particular pie, so that a bakery might have five instances of pies in its display case.

Fig. 1.11 Is-a relation

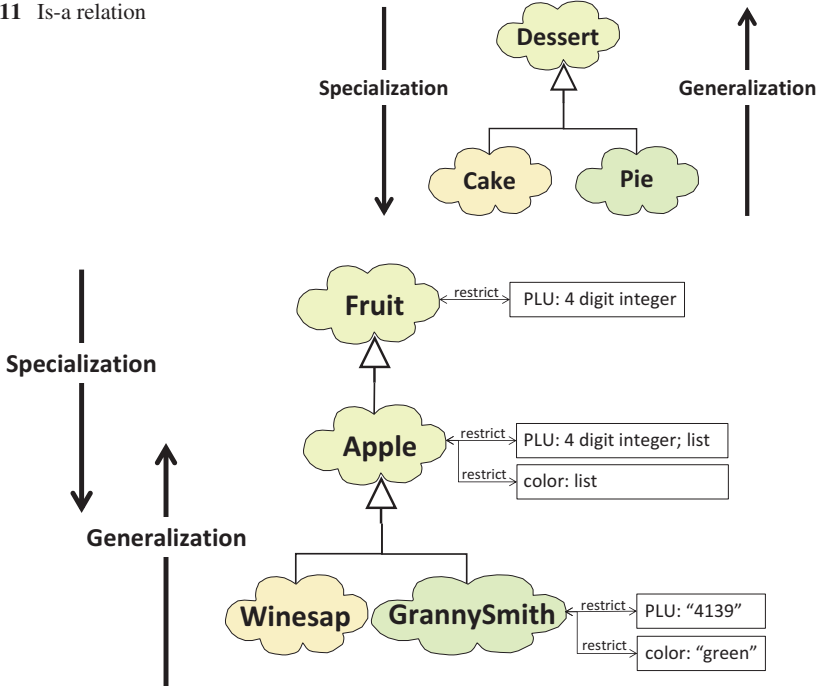


Fig. 1.12 Class properties

Properties The stage shown next in Fig. 1.9 is labeled “properties.” You may have noticed apples in the grocery store with labels on them, each label having a number. Winesap apples might all have the number 4189 and Granny Smith apples might all have the number 4139. These are price look-up (PLU) numbers. In the fruits taxonomy, the parent class would be *Fruit* and one child class would be *Apple*, which would have child classes *Winesap* and *GrannySmith*. As shown in Fig. 1.12, the *PLU* property is associated with and restricts the *Fruit* class. The figure indicates that the property is a four digit integer (minimal restriction). The subclasses inherit the property; however, the restriction becomes successively greater. The *Apple* class is restricted to a certain list of values. The *GrannySmith* class is restricted to the “4139” value. Similarly, the *color* property, with a list of defined color-values is associated with and restricts the *Apple* class. In this example, the only acceptable value for *color* for the *GrannySmith* class is “green.” These properties are extensions of the definition-property concept.

The part-of Relation At the farthest “formal” end of Fig. 1.9 there is a set of additional information types. One of these is *part-of*, which is a relation between classes, as is *is-a*, but differs from it in the nature of the relation. The reverse direction of this relation is *composed-of*. Figure 1.13 illustrates these relations.

Fig. 1.13 Part-of relation

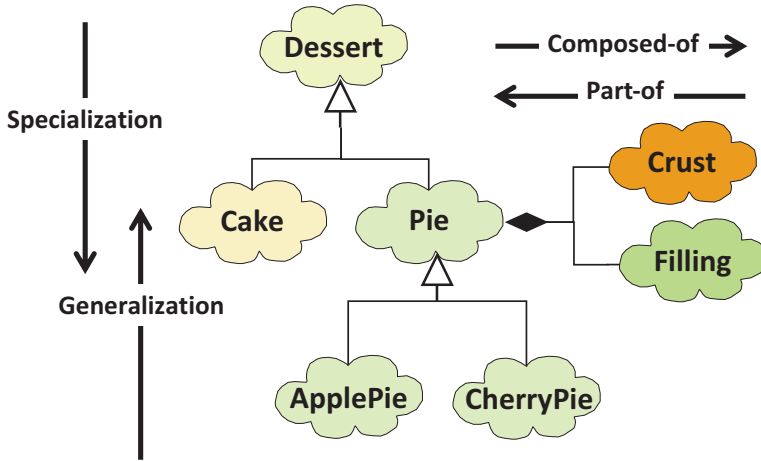
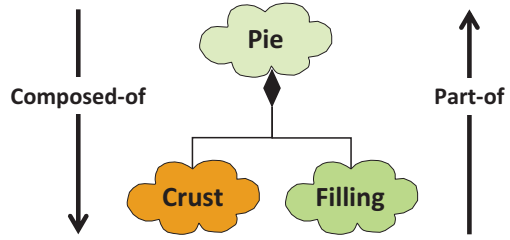


Fig. 1.14 Dessert ontology

The *Pie* class can also be described by what it is composed of. Here it is shown as being composed of a *Crust* class and a *Filling* class. (Reading the diagram in the opposite direction, the *Crust* class is *part-of* the *Pie* class, as is the *Filling* class.

Beyond Taxonomies Notice that this diagram is also a taxonomy; however, if you want to display everything you know about the *Dessert* domain, you now have two separate taxonomies. If you want to combine them (Fig. 1.14), you no longer have a taxonomy because there are two relations being displayed. Now you have an ontology that isn't a taxonomy. Note that the subclasses of *Pie* inherit the composition descriptions of *Pie*. Each will be composed of a *Crust* and a *Filling*, although the composition of each may differ.

To complete this discussion, suppose that the overall domain is not *Dessert*, but is *Food*. Somewhere in the domain is the *Pizza* class. *Pizza is-a Pie*, but *Pizza* is not a *Dessert*. This means that the class *Pie* has to have a parent, such as *MainCourse*, as well as having *Dessert* as a parent (Fig. 1.15). Taxonomies are not allowed to have multiple parents for a child; however, the more general ontology does not have this restriction.

Naturally, Fig. 1.15 doesn't represent the complete ontology for *Meal* or even the complete ontology for the elements described here. The class *Filling* will be

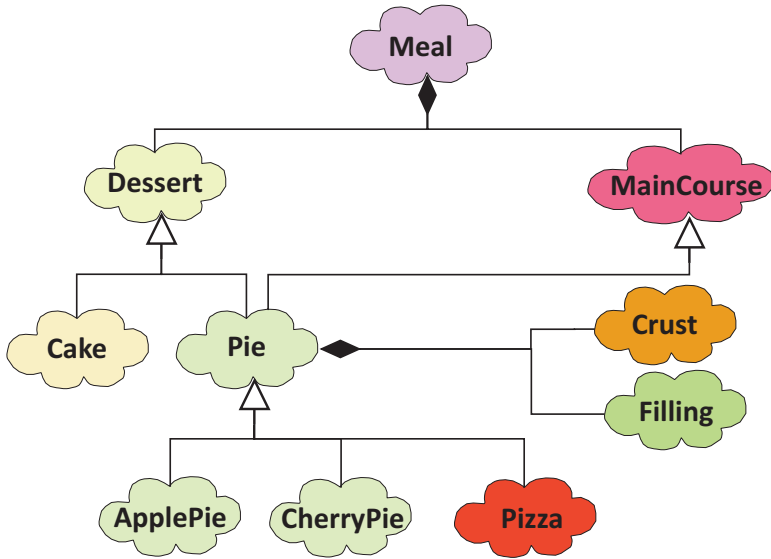


Fig. 1.15 Meal Ontology

composed of several ingredients, such as *GrannySmith* apples for the *ApplePie* class. This implies merging the *Fruit* (and other similar) ontologies with the *Meal* ontology and a means of assigning the proper ingredients for each *Pie* subclass. However, there is a problem with this ontology: *Pizza is-a Pie*, but it is not a *Dessert*, as this figure asserts. The figure is successful in introducing multiple parents, but not in producing a good ontology. This will be corrected in Fig. 1.16.

Inheritance Class inheritance has been mentioned above, but not explained. Inheritance means that a subclass will have the same properties (composition may be thought of as a kind of property) as the parent class, but generally with tighter restrictions. Call this downward inheritance (from parent to child). Upward inheritance applies to instances. That is, an instance of a child class is also an instance of its parent class. Thus, a particular *ApplePie* (an instance of the class *ApplePie*) is also an instance of *Pie* and an instance of *Dessert*. However, note that this pie is not an instance of *Meal*, because *Dessert* is *part-of Meal*, not a subclass of *Meal*.

Completing the Meal Ontology Example The *Meal* ontology, as described above, is small; however, it contains three important elements that are part of ontologies in general. In a verbal description of the domain, nouns usually become classes, verbs become relations, and adjectives become properties. In this example, note that “green” is used as an adjective; however, in some circumstances, “green” is a noun. Similarly, in an ontology with a different use, *Green* might be a class. The two relations in *Meal* are *is-a* and *part-of/composed-of*. These are standard relations, found in almost all ontologies; however, they are not the only possible relations. For example, an ontology might have a relation for ownership, i.e., *Landlord owns Property*.

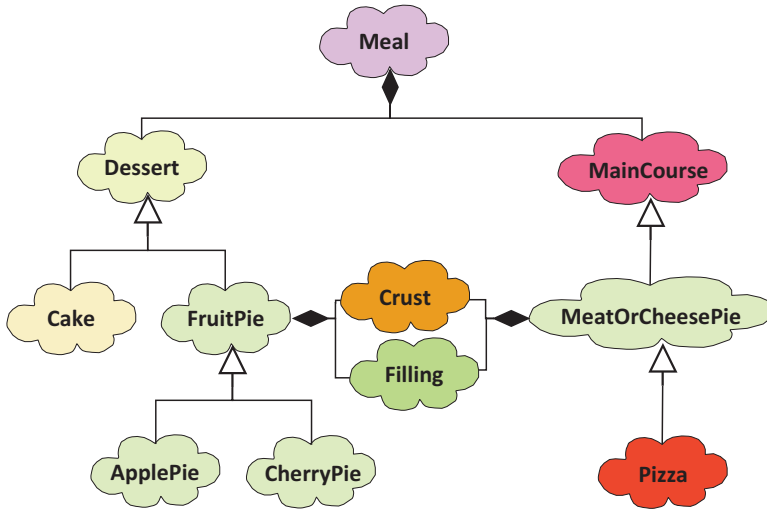






Fig. 1.16 Alternate meal ontology

Ideally, an ontology is consistent, complete, and correct. (Here, “consistent” refers to the “size” of the lowest-level classes). For example, *Pie* is a larger class than *ApplePie* – but *Pie* is not one of the lowest-level classes. *ApplePie*, *CherryPie*, and *Pizza* are roughly the same “size.” If, somewhere in the ontology, there was a class *StarchMolecule*, then we would question the consistency of the ontology. The term “complete” means that all of the classes, relations, and properties that should be in the ontology are in the ontology – based on the use that is envisioned for the ontology. The term “correct” is also based on the intended use, although its determination is less rigorous. Basically, “correct” refers to the validity of the ontology as a model of reality: the classes should refer to the “correct” real-world entities; the relations should match the real-world relations that they represent and connect the proper classes, and the properties and their values should match their real-world counterparts. However, part of the definition of an ontology is an art, rather than a science. The lowest level classes generally refer to concrete or conceptual objects that can be clearly identified, such as *KeyLaborLeader* and *ManmadeDisaster*, respectively. Once a “size” has been chosen for the lowest-level classes, the choices for parent classes are often fairly well set. However, the choices for parent classes are more fluid. For example, *Pie* was chosen in the *Meal* ontology example as a parent class. A more “correct” ontology might have *FruitPie* and *MeatOrCheesePie* as two parent classes instead of the *Pie* class. In that case, *ApplePie* and *CherryPie* would be children of *FruitPie*, which would be a child only of *Dessert* and *Pizza* would be a child of *MeatOrCheesePie*, which would be a child of *MainCourse*. This would require describing the composition of both *FruitPie* and *MeatOrCheesePie* as being composed of *Crust* and *Filling*. This alternate ontology is shown in Fig. 1.16. The alternate ontology is more “correct” than the first ontology; however, the repetition of the same composition for two different classes could lead to practical

Table 1.1 Class relations icons

Description	Icon
Class/subclass, parent/child, arrowhead points to class or parent	
Composition (required components), diamond points to larger class	
Aggregation (grouping of components), diamond points to larger class	
Class relation (type specified by label), arrow points based on label meaning	

problems (forgetting to replicate details) if the ontology were to be expanded. The “art” comes in deciding which ontology should be pursued when both alternatives are equally correct.

In general, ontologies allow you to list and define the concepts of a domain and to describe all of the relations that exist among the concepts. Ontologies also permit distinguishing between the concept classes and the instances (also known as objects) of the classes. Table 1.1 lists the icons that are used for class relations in the figures found throughout the book.

Recognizing Faces On page 83 of *On Intelligence* (Hawkins & Blakeslee, 2004), there is a discussion of how storing patterns in invariant form can be used in predicting things. Hawkins’ use of invariant form for a pattern is closely related to the situation-independent ontology introduced in Chap. 2.

The situation-independent ontology of the human face, *HumanFace*, would have two eyes, a nose, two ears, two eyebrows, a mouth, etc. as component elements. It would have relations like “eyes oriented with long axis of each eye close to being co-linear,” “nose oriented with long axis perpendicular to eye axis, roughly between eyes, nostril end of nose at greatest distance from eyes,” “mouth oriented with long axis roughly parallel to eye axis, with center roughly on nose axis, and farther from eyes than nose,” etc. In addition, each of the elements would have properties, such as color, size, texture, etc. The values of these properties would not be given in the situation-independent ontology; they would be part of the situation-dependent ontology.

Hawkins’ description of recognizing a particular person uses a second step. The *HumanFace* ontology above allows recognizing something as being a human face. Now consider an ontology that is based on the human face ontology. This is the *JanetsFace* Ontology. Janet’s eyes are blue; however, in this ontology the values that would be stored are the relative differences between eye color, hair color, skin color, etc. Her eyes are large and wide-set; what would be stored are the proportions of sizes and distances between features. And so forth. In the *JanetsFace* ontology, we have a situation-independent ontology. The situation-dependent version (the image is seen under certain light, shadow, etc. conditions) puts in the actual perceived red, green, blue (RGB) values of the elements and the pixel sizes and distances (or angular distances for visual perception) of the image. Hawkins says that humans recognize faces by combining the memory of the invariant form (situation-independent ontology) with the particulars of the immediate experience (the situation-dependent ontology).

In addition to suggesting that human information processing is ontology-based, this example tells us that ontologies may be composed. This is a standard ontology practice to avoid reinventing things.

Foundational and Core Ontologies

A foundational (or upper or formal or top-level) ontology is domain neutral. It defines a set of categories and relationships that are general in nature and are thought to represent reality at its most basic level.

Core ontologies are less general than foundational ontologies. For example, the Dublin Core Ontology (Dublin Core Metadata Initiative, 2017), which was used in the creation of the original IW Ontology, defines a set of 15 relations for use in resource description, for example “creator,” “date,” “description,” “format,” and “language.” Other core ontologies introduce relations that are useful for extending a foundational ontology in its application to domain ontologies.

Domain or material ontologies (such as the one depicted in this book) describe a particular domain of knowledge. A domain ontology may import a core ontology and a foundational ontology to aid in interoperability with other domain ontologies and to avoid the problem of defining the contents of the core and foundational ontologies within the domain ontology.

The similarities and difference of the three foundational ontologies briefly described below aid in understanding upper ontologies. Each begins with an undefined Thing as the parent for all classes and uses the *is-a* relation as the basic relation to connect the classes. Each also provides a set of other relations that can be used to connect classes or instances. However, each chooses its own subdivision of Thing, indicating basic differences in world-view among these foundational ontologies. The subdivisions below this top level and the differing relations that are defined by each continue to emphasize these differences. Given that each purports to provide a domain-neutral view of reality, this lack of consensus is troubling.

General Formal Ontology (GFO) GFO is a top-level or foundational ontology, developed by Onto-Med for medicine and the life sciences (Onto-Med, 2010). The top four of the 46 classes in the ontology are shown in Fig. 1.17.

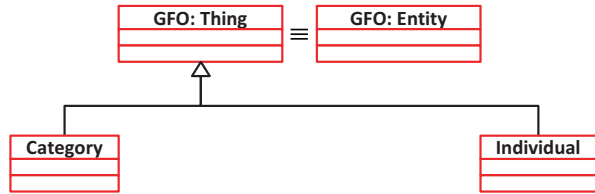
All of the definitions are quoted from the “gfo-basic.owl” file for GFO, available from the Onto-Med website.

Thing: is an undefined term.

Entity: is equivalent to thing. “We use the term entity for everything that exists where existence is understood in the broadest sense.”

Category: A category is a thing. “Categories satisfy the following conditions: (1) Categories can be instantiated; (2) Categories can be predicated of other entities.”
Concept, Symbol_structure, and Universal are the three subclasses of Category.

Fig. 1.17 GFO upper ontology



Individual: “Individuals are entities that are not instantiable.” (Its subclasses are instantiable.) Abstract, Concrete, Property, Relator, Role, and Space_time are the six subclasses of Individual.

In addition to things, the GFO also defines a number of relations. Four of its 41 relations are defined below.

abstract_part_of: “The abstract part-of relation is denoted by $p(x,y)$; the argument-types of this relation are not specified, i.e. we allow arbitrary entities to be arguments. We assume that $p(x,y)$ satisfies the condition of a partial ordering, i.e. the following axioms: reflexivity, antisymmetry and transitivity.”

part_of: Part_of is a sub-relation of abstract_has_part. “The relation between parts and wholes. The union of several domain-specific part-of relationships not contained explicitly in gfo-basic, like spatial part-of or part-of among material structures.”

proper_part_of: Proper_part_of is a sub-relation of part_of. “The irreflexive variant of part-of.”

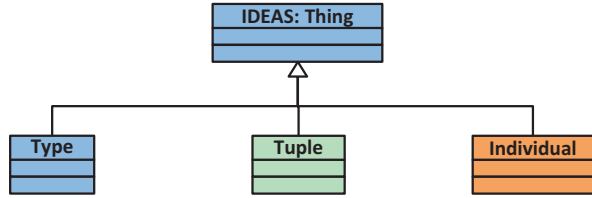
temporal_part_of: Temporal_part_of is a sub-relation of part_of. “A part-of relationship between two time entities. Time-boundaries cannot have parts.”

DoDAF Meta-Model (DM2) The IDEAS top-level or foundational ontology was developed by the International Defence Enterprise Architecture Specification (IDEAS) Group (IDEAS Group). Its purpose was to facilitate interoperability of Enterprise Architecture (EA) models. Several countries were involved in the effort, with each country developing its own architectural framework (domain model). The U.S. domain model was named the Department of Defense (DoD) Architecture Framework (DoDAF) Meta-Model (DM2) (DoD Chief Information Officer, 2010).

These references do not make a clear distinction between what might be considered the top-level ontology and what should be included in the domain ontology. Further, it appears that an entity can be a class with instances and an instance of another class at the same time, something that is not allowed in many other ontologies. In addition, the following statement appears (DoD Chief Information Officer, 2010). “The IDEAS Foundation is a higher-order ontology, so Types may have members that are also Types.” This is given as a distinction between naïve set theory and type theory. The four top classes are shown in Fig. 1.18.

All of the definitions are inferred from the web page for IDEAS Group and from the DoD Chief Information Officer references.

Fig. 1.18 DM2 upper ontology



Thing: is an undefined term.

Individual: An Individual is a Thing with spatiotemporal extent that exists as an indivisible whole or as a single member of a category.

Tuple: A Tuple is a Thing that is a relationship between objects, an ordered set having two or more ordered “places.” Couple is a subclass of Tuple.

Type: A Type is a Thing that is a set of Individuals or classes of other sets or classes. For example the Nimitz Class carrier is a Type. IndividualType, TupleType, and Powertype are subclasses of Type.

In addition to things, the DM2 also defines a number of relations. The six basic relations are described below.

superSubtype: The superSubtype relation connects a child Thing to a parent Thing.

typeInstance: The typeInstance relation connects a Type and one of its instances. This is similar to “element of” in set theory.

wholePart: This relates components to the whole thing (part of).

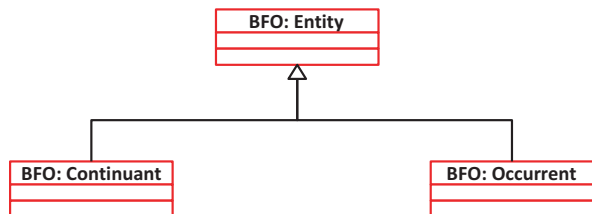
temporalWholePart: This is the analog of wholePart for temporal things, such as processes.

overlap: This relates things that overlap each other.

beforeAfter: This identifies temporal succession.

Basic Formal Ontology (BFO) BFO is a top-level or foundational ontology, developed by the Institute for Formal Ontology and Medical Information Science (IFOMIS) (IFOMIS, 2017). The top three of 35 classes are shown in Fig. 1.19.

Fig. 1.19 BFO upper ontology



All of the definitions are quoted from *Building Ontologies with Basic Formal Ontology* (Arp, Smith, & Spear, 2015) or, if the definition there was entangled in the text, from the *Basic Formal Ontology 2.0: Specification and User’s Guide* (Smith et al., n.d.). The definitions in the first reference are written for

a general audience, while those in the second reference are often written in mathematical format for precision. Despite these differences in style, the definitions are equivalent.

Entity: is an undefined term.

Continuant: “A continuant is an entity that persists, endures, or continues to exist through time while maintaining its identity.” Independent continuant, Specifically dependent continuant, and Generically dependent continuant are the three subclasses of Continuant.

Occurrent: “An occurrent is an entity that unfolds itself in time or it is the instantaneous boundary of such an entity (for example a beginning or an ending) or it is a temporal or spatiotemporal region which such an entity occupies_temporal_region or occupies_spatiotemporal_region.” Process, Process boundary, Spatiotemporal region, and Temporal region are the four subclasses of Occurrent.

In addition to entities, the BFO also defines a number of relations. The BFO distinguishes among relations connecting the entities, the relations connecting instances of the entities with entities, and the relations connecting instances. It also distinguishes between relations connecting continuants from those connecting occurrents. In the latter distinction, if a particular relation, such as *is_a*, is philosophically identical in both cases, the same term is used in both cases. However, where there is a philosophical difference, such as *part_of*, different terms are used: *continuant_part_of* and *occurrent_part_of*.

BFO lists eight relations as core relations. The pattern *A* related_to *B*, *A* and *B* are entities, will be used in each definition below. The three foundational relations are the following:

is_a: Each instance of *A* must be an instance of *B*.

continuant_part_of: For each instance *a* of continuant *A* at time *t*, there is an instance *b* of continuant *B* at time *t* such that *a* is an instance level *continuant_part_of* *b* at time *t*. The instance level relation uses the common definition of “part of,” modified by the requirement that the relation exists at time *t*.

occurrent_part_of: For each instance *a* of occurrent *A*, there is an instance *b* of occurrent *B* such that *a* is an instance level *occurrent_part_of* *b*. The instance level relation uses the common definition of “part of.”

The two spatial relations are the following:

located_in: For each instance *a* and every time *t*, if *a* is an instance of continuant *A* at *t*, there is an instance *b* of continuant *B* at *t* such that *a* is instance-level *located_in* *b* at *t*. The instance level relation uses the common definition of an object being located in a spatial region to define a being located in *b* to mean there is a spatial region in which *b* is located and that *a* is located in a spatial region that is *part_of* *b*’s spatial region.

adjacent_to: For each instance a and every time t , if a is an instance of continuant A at t , there is an instance b of continuant B at t such that a is instance-level adjacent_to b at t . Presumably the instance-level definition uses a similarly complex method of specifying the relation as found in the located_in definition.

The two temporal relations are the following:

derives_from: This relation is expressed in biological terms and refers to the starting (A) and end (B) continuant entities of a process, such as “plasma cell derives_from B lymphocyte.”

preceded_by: This relation expresses the concept that all of the time instants of one occurrent (A) are earlier than all of the time instants of the second occurrent (B).

The single participation relation is the following:

has_participant: This relation is between a process A and a continuant entity B and asserts that B participates in or is involved in the process A .

Ontology Languages

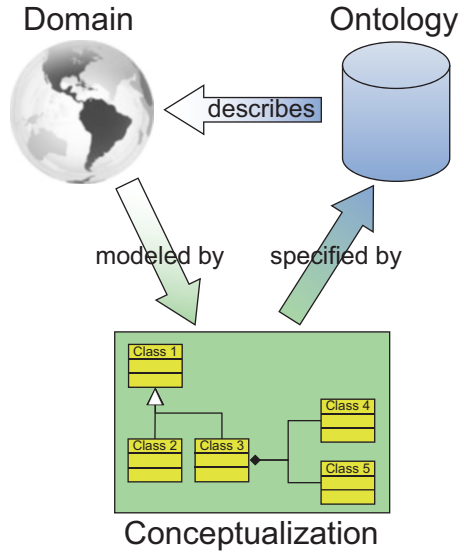
Figure 1.20 illustrates how a domain ontology fits together. The ontology describes the domain. It specifies one or more conceptualizations – techniques for visualizing the ontology – such as a class relationship diagram. This conceptualization is a model of the domain.

In this figure, the ontology itself is a cylinder, which indicates some kind of storage. The question is, “what is stored?” The answer is all of the details of the knowledge. However, the methodology of the storage is not defined by its being an ontology.

The ontology knowledge could be stored as an English language description of all of the classes and their relations; however, this would be cumbersome and subject to misinterpretation and would not support easy computer access. Computer languages that support defining ontologies can be classified in two ways. The first classification scheme is by language syntax, which divides markup languages, such as the Extensible Markup Language (XML), from non-markup languages and from database oriented languages. The second classification scheme is by structure, dividing frame-based languages (the analog of the class-basis of object-oriented languages), first-order logic-based languages (based on the predicate calculus, allowing variables in the sentences, such as X is a man, where X is a variable), and description logic-based languages (less expressive than first-order languages, but focusing on decidability [can all yes-or-no questions be answered with a “yes” or a “no”]).

Specialized Ontology Languages Ontologies can be created using programming languages. Some programming languages have been created specifically for creating ontologies. CycL is one such language. It also provides a user interface for building ontologies and using them. In CycL, the ontology and the instantiated knowledge are combined as a knowledge base.

Fig. 1.20 Domain, ontology and conceptualization



According to Wikipedia (2016a), “The original version of CycL was a frame language, but the modern version is not. Rather, it is a declarative language based on classical first-order logic, with extensions for modal operators and higher order quantification.” A declarative language is a language that expresses the logic of computation without specifying its control flow. Modal operators are expressions that qualify statements, such as “usually” and “possibly.” Quantification includes the prefixes, “for all” and “there exists.” First-order logic only quantifies over individuals, such as *for all X*, where *X* is a single entity. Second-order logic allows for quantification over sets; third-order logic allows for quantification over sets of sets, and so forth. Higher-order logic allows for quantification over sets that are nested arbitrarily deeply.

The Cycorp website includes a tutorial that helps to understand the focus of CycL (Cycorp, 2016). The tutorial sets up a situation in which a user wants to represent information about two 11 week old kittens, Billy and Peter, who are brothers and like each other.

- The first task is to determine constants that are already in the language that will be relevant in describing the kittens. The user finds *DomesticPet* to be the closest existing noun to kitten. Although classes are not conspicuous concepts in CycL, some form of the class concept is implemented. *DomesticPet* is named as a specialization of *DomesticatedAnimal*, which is a specialization of *TameAnimal*, which is a specialization of *NonPersonAnimal*. Brotherhood is not treated as a noun, but as a predicate or relation. The tutorial describes finding *siblings*, a more specific relation than *relatives*, as the closest relation to brothers. It also describes finding *likesAsFriend* as the best relation for the kittens liking each other. Finding a way to express the age is more complicated. Expressing the kittens’ age requires both the *age* relation and a noun *WeeksDuration*, which together with the number “11” and the *UnitOfTime* function will yield a *Time-Quantity* expressing 11 weeks.

- The second task in the tutorial is to create new constants for the required instances (note these kittens are particular instances, not classes). *Billy* and *Peter* are created as constants, which have the same form as the CycL constants that represent classes.
- The third task is to create a microtheory (a sub-knowledge base) that will contain these constants and to create the assertions that will be made concerning them. The tutorial explains how to create *Cats-PracticeMT* (microtheory) within the default *BaseKB* (base knowledge base). It then shows how to enter the following assertions:
 - *isa Peter DomesticPet* (“*isa*” is the CycL-specific implementation of “*is-a*”),
 - *isa Billy DomesticPet*,
 - *isa Peter Animal*,
 - *isa Billy Animal*,
 - *siblings Billy Peter*,
 - *likesAsFriend Billy Peter*,
 - *age Billy (WeeksDuration 11)*, and
 - *age Peter (WeeksDuration 11)*.
- The fourth task is to test the microtheory. The tests consist of typing queries, formed as assertions, into a special area and running the query. The tutorial provides several assertions that illustrate capabilities of the language. One query is *isa Billy SpatialThing*. The result is that the query was “proven True.” The interface provides a facility for “explaining” the result, which provides the logic sequence of assertions that connect the original assertion to *SpatialThing*.

There are several specialized ontology languages, such as CycL, each with its own properties. However, a commonality is that a major function of each language is to draw inferences from the assertions that are made.

XML-Based Ontology Languages Many people have worked on the problem of storing an ontology and how to use the results. Before getting into XML, a short discussion of the Hyper Text Markup Language (HTML) may make the XML discussion easier.

HTML is the basic language used to create web pages. It prescribes the placement (structure) of a web page through tags. Most tags come in pairs consisting of a pair of angle brackets surrounding the name of the tag element, such as `<p> ... </p>`, where the closing tag has the “/” character to indicate the end of the pair. The web browser uses the pair to render the contents (here indicated by “...”). In this case the “p” stands for paragraph. HTML includes formatting elements, such as `` for bold text and `<i>` for italic text. Suppose you want a series of three paragraphs, all formatted as bold and italic. You can specify these in the following way:

```
<p><b><i> ... </i></b></p>,
<p><b><i> ... </i></b></p>, and
<p><b><i> ... </i></b></p>.
```

However, if you have a large number of paragraphs that you want to format as bold and italic, this method becomes tedious. HTML now provides an alternative, called Cascading Style Sheets (CSS). Rather than using the standard paragraph tag, you create a name for the style of this type paragraph:

```
<p id = "p01"> ... </p>.
```

And you create a description for this type of element (perhaps at the beginning of the HTML for the web page or perhaps in a separate .css file) that tells the browser that this paragraph will use the bold and italic formats. As you can see, this allows you to customize your HTML code.

XML code is like this – only more so. XML has tags like HTML; however, the tags in XML are not pre-defined. That means that there must be something to define what should be done when some program encounters them. (The browser is a program that understands what to do when it encounters HTML tags.) XML is more complex than HTML for a reason: it permits separating the data from the presentation description; whereas, in HTML the two are mixed. This separation means that the same data can be displayed differently simply by using a different presentation prescription. More importantly, the data can be used by different programs for different purposes as long as the appropriate presentation prescription is supplied. For a browser, a CSS file could be used with an XML file; however, this is not advised. The recommended analog of the CSS file is the eXtensible Stylesheet Language Transformations (XSLT) language file.

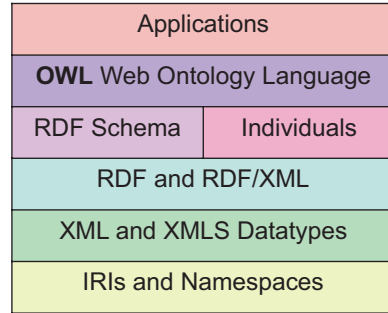
An XML document must have correct syntax (be “well-formed”) and must be “valid.” To be valid, an XML document must conform to a document type definition (DTD), provided by either a DTD file or by an XML Schema (XMLS). Both define the elements that can be used in the XML document; however, the XMLS file provides more functionality, such as providing datatype information, which can be used to check the data contained in the XML document. The conclusion is that XML is a complex language that can encode information about a document and can be used for multiple purposes.

An excellent, short and readable book by Lee Lacy describes ontologies and the Web Ontology Language (OWL) (Lacy, 2005). Briefly, given a desire to draw inferences from instances within a domain (think of the iPhone Siri’s ability to answer questions as one of the applications in the top level of Fig. 1.21), the ontology language creators developed OWL from a series of increasingly basic languages (including XML toward the bottom of the figure).

Lacy explains the structure shown in Fig. 1.21 by describing each, starting at the bottom and describing the shortfall of each layer for use as an ontology language.

- For example, XML and the datatypes provided in XMLS provide the necessary syntax definitions, but do not include semantic information, e.g., what does `<apple>` mean?
- The Resource Description Framework (RDF) provides a content data model that supports simple statements about things, such as, *Person426 favoritePie KeyLimePie*. RDF/XML provides the method of storing RDF statements as XML

Fig. 1.21 XML-based ontology languages



documents. Lacy says, “more complex semantic relationships (e.g., classes) need to be described with a consistent vocabulary. RDF also lacks concepts for enumeration and datatypes (other than typed literals).”

- The RDF Schema (RDFS) provides the description of classes (and subclasses) and properties. RDFS also provides a means for the user to create new classes and properties by specializing the predefined classes and properties. It also includes a formal specification of individuals as instances of classes. RDFS adds vocabulary descriptions to help applications understand how to interpret RDF statements. However, RDFS does not support inferencing.
- OWL was built on the lower layers to support the Semantic Web. Lacy says “[an] OWL ontology is a set of axioms describing classes, properties, and the relationships between them.” OWL is a language for building ontologies – and the Applications of the top layer.

OWL has three variants, OWL Lite, OWL DL, and OWL Full. The three variants are listed in order of increasing ability to express ontologies (with accompanying increase in complexity and decreasing restrictions on the language elements). The basic property in all cases is that the types of knowledge that will be gathered for an ontology can be expressed in the OWL language with no misinterpretations. The Lite and DL variants permit unambiguous inferences to be drawn by computer logic. The expressivity of OWL Full prevents guaranteed inferences. These restrictions in OWL Lite and DL that permit the inferences prevent some of the knowledge about the domain from being expressed. [For a technical description of Decision Logic and OWL, see Ian Horrocks paper (Horrocks, 2010). [This includes definitions of such things as SHOIN, which OWL 1 used, and SROIQ, which OWL 2 uses.] Because OWL is based on XML, the actual OWL files are difficult to read and edit without supporting software. The Protégé tool is a popular method for editing and displaying ontologies (Protégé). Protégé includes support for OWL.

Database OWL and specialized languages such as CycL are not the only ways to store an ontology. A relational database, such as Access, can also serve the purpose. The tables of the database will hold the data and the queries will implement the relations. With the inclusion of Visual Basic for Applications (VBA) modules, most of the desired functionality of an ontology language can be implemented.

This technique requires creation of this functionality and does not supply the transparency of the OWL language; however, it does permit the storage and expression of the knowledge that is not possible in some versions of OWL.

Arp, Smith and Spear (2015) argue that OWL is superior to relational databases for three reasons. First, OWL permits an instance to have more than one name. They cite Venus as an instance of a planet, which can be referred to as “Venus,” “the Morning Star,” or “the Evening Star.” In OWL, a SameAs axiom can be asserted that will ensure that these references will all generate the same results. This would present a non-trivial problem in a database implementation. Second, they assert that a database contains a closed-world assumption. That is, anything not included in the database is not true. Whereas OWL has an open-world assumption, which asserts that anything not known to be true is just *not known*. They give the example of two names, “Fido” and “Rover,” with the attribute “dog” attached to Fido, but not to Rover. A database query asking how many dogs there are would result in the answer “one;” however, an OWL query would result in an answer of at least one, but possibly more. The third reason is one that they regard as the most important. The links in a database are just that, links. They have no properties that support inferences. “For example, if you specify an OWL ontology in which the relation *is_pet_of* is defined to have domain *nonhuman animal* and range *person*, then if you assert the statement *Rover is_pet_of Jim*, you will be able to conclude that Rover is a nonhuman animal and that Jim is a person.” Such reasoning in a database requires creating a query based on knowledge of the meaning of the links that is external to the tables comprising the database.

On the other hand, OWL with Protégé is oriented toward viewing single classes, relations, and properties. Thus, it does not support examination of blocks of classes related to other classes or blocks of classes with their properties. This makes mass comparisons difficult. It is also oriented toward viewing information and does not provide for printing the detailed information.

Comparisons The comparison of the ontology language approaches in Table 1.2 includes the factors discussed above. This comparison supports the decision on the implementation strategy for the Unconventional Conflict Ontology.

- The syntax factor, non-markup, markup, or database, is not a critical deciding factor. Version 2.0 of the ontology (described in Chap. 2) used a markup syntax and the current version (version 3.0) uses a database syntax, which could be converted to a markup syntax.
- The structure factor is more important, as the ontology is thoroughly class-oriented or frame-based. This shifts the focus to the OWL variants and database implementations.
- The expressivity factor is very important. The Unconventional Conflict Ontology contains concepts that were difficult to implement in OWL Lite (version 2.0). This shifts the focus away from OWL Lite.
- The Unconventional Conflict Ontology was not constructed with inferencing in mind. As discussed in the Theories Ontology chapter (Chap. 10), the inferences that would be valuable in using the ontology require theoretical justifications that are not part of the ontology. Thus the inferencing capability is not a deciding factor.

Table 1.2 Comparison of ontology language approaches

	Specialized ontology languages	OWL ontology languages			Database
		Lite	DL	Full	
Syntax	Non-markup	Markup	Markup	Markup	Database
Structure	First-order logic and descriptive logic	Frame-based	Frame-based	Frame-based	Frame-oriented, must be programmed
Expressivity	Varies	Good	Better	Full	Full
Inferencing	Built-in	Yes	Yes	Partial	Must be programmed
Functionality	Built-in	Through Protégé	Through Protégé	Through Protégé	Must be programmed
Classified systems	Probably not	May not be	May not be	May not be	Yes

- Functionality is a factor that depends on the use for the ontology. Both the specialized ontology languages and the OWL implementations (through Protégé) provide built-in functionality; however, whether the built-in functions are sufficient for the intended uses of the Unconventional Conflict Ontology is not clear. The capability for constructing functions in a database implementation should cover these needs; however, the functions must be programmed.
- The comparison table adds another factor that is likely to be important for the Unconventional Conflict Ontology. That point is the need for the system to be stored on classified computers. It is almost certain that any real use of this ontology will require inputs from the intelligence community, which will result in a classified system. In the United States, there are restrictions on which programs can be run on classified computers to make sure that the programs do not compromise the security of the computer.

OWL DL may support the needed expressivity and OWL Full certainly should support it. An OWL DL implementation might be less complex than an OWL Full implementation. A database implementation does support the needed expressivity (as evidenced by the version 3.0 implementation). The OWL choices provide a high level of built-in functionality; however, it is not clear whether the built-in functionality will support all needs. The database implementation can support the needs; however, they must be programmed. The deciding factor may be the question of security permissions to run the implementation on a classified computer. This factor favors the database solution.

Philosophy and Pragmatism

Up to this point, we have treated ontologies as largely divorced from philosophy. However, the differences in the foundational ontologies discussed above (and other foundational ontologies that have not been introduced) derive in part from

philosophical differences. For example, the GFO permits child entities to have multiple parent entities, while the BFO restricts the *is-a* relation so that each child entity has exactly one parent entity. The DM2 blurs the line between instances and classes, which is not the case in either the BFO or the GFO.

The discussion in *Building Ontologies with Basic Formal Ontology* (Arp et al., 2015) makes it clear that its single-parent restriction is based on a philosophical view of the world and of what an ontology should be. Their view is that the terms in an ontology should represent entities in the world, rather than our conceptions of the entities. In this view, the principal terms are the names of *universals*, which have a natural taxonomy with single parenthood. They admit certain additional terms naming *defined classes* for technical reasons; however, they insist that these must also obey the same *is-a* restriction. They spend a number of pages describing the philosophical basis of their approach and provide examples of the problems that others encounter when not following this philosophical approach.

The fact that there is more than one top-level ontology is evidence of differences of opinion at a very basic level about the way that reality should be described. Chapter 2 contains a description of the development of the Unconventional Conflict Ontology. This development did not begin with the selection of a top-level ontology and then proceed with the development of the domain ontology. Rather, it began with the direct development of a domain ontology that would meet the needs of the original sponsor. In looking at the available top-level ontologies discussed here, each has problems in fitting with our domain ontology. For example, the BFO does not admit the multiple parenthood which we have found useful and expends a large amount of effort on occurrents, which are useful for medical and biological science where cause and affect are determinable, yielding well defined processes. However, they are not useful in describing conflict where cause and affect are currently unknowable, meaning that defining a process only hides the problem of stating the result of the process. Similarly, the DM2 presents an unusual philosophical situation through its basis in type theory, which is similar to set theory, but has important differences (Wikipedia, 2017e). Additionally, the distinction between class and instance appears to be situational. This means that DM2 is susceptible to practical issues. The overhead of DM2 also seems to be excessive for the needs of the Unconventional Conflict Ontology.

Accordingly, the Unconventional Conflict Ontology (in its current version) does not subscribe to a predefined top-level ontology. Technically, it might be considered a hybrid of a top-level ontology and a domain ontology; however, the number of terms within the ontology that would be separated out into a top-level ontology is small and such a separation would not materially affect the understanding of the ontology as a whole. One of the possible enhancements mentioned in the concluding chapter, Chap. 12, is to find an appropriate top-level ontology and bring the Unconventional Conflict Ontology into compliance with it.

Chapter 2 provides an overview of the implementation of an ontology of unconventional conflict. It describes both the sources for the ontology content and the structure that is required to organize that content.

Chapter 2

Overview of the Unconventional Conflict Ontology



The Unconventional Conflict Ontology has been constructed using a set of real-world conflicts to provide a model of a generic unconventional conflict. Parts of this model/ontology are completely situation-independent. That is, they are “true” for any particular conflict. The word “true” is placed in quotations to emphasize that its meaning may differ from some uses. For example, the ontology contains an element for a non-combatant evacuation (NEO); however, this does not imply that all unconventional conflicts involve NEOs. It implies that if such a conflict involves a NEO, then that NEO will be related to other elements in the situation in the same manner that they are related in the ontology. This chapter provides an overview of the components of the ontology and their relationships.

Object-oriented programming distinguishes between classes and objects. The classes with their methods (control-flow type code) and properties (types of data) provide the overall structure of the program, while objects are the instantiations of the classes, with particular values for the data. Thus, a simulation of the operation of a factory would be built up of various classes representing the components of the factory; however, the execution of the simulation would require introducing specific values for the properties of the classes and exercising the methods on these values, yielding a description of the change in state of the factory over time.

Lacy describes a computer science differentiation between terminological components (Tbox) and assertional components (Abox) of a knowledge base (Lacy, 2005). The Tbox contains the ontology (made up of classes) and the Abox contains assertions that some set of objects corresponds to part of the ontology. This describes the use of an ontology: a particular situation is identified with the ontology, allowing the functionality of the ontology to illuminate the situation. Lacy also indicates that the relation can be thought of in the reverse direction – that is the Tbox is compliant with the set of real-world facts that make up the Abox. This describes the creation of an ontology: it is a model, an abstraction or generalization of reality, with certain parts stripped out and the key parts – those that support the purpose of the model – retained.

The parts of the ontology that are completely situation-independent are referred to as the Situation-Independent Ontology. The Situation-Independent Ontology consists of classes and relations among the classes. This terminology is important because there are parts of the ontology that are situation-dependent. On the other hand, the Situation-Dependent Ontology consists of types of classes and types of relations among these classes that represent general knowledge about unconventional conflict; however, the particulars of the classes and relations depend on the situation – that is, they depend on the instantiations, the particular instances. For example, it is known that people have relationships of various types with other people and that this is important in unconventional conflict. Hence there is a structure Actor – Relation – Actor which involves two classes of a particular type, *Actor*, and a third class of the type *Relation*. In a particular situation, the first *Actor* might be a *KeyPoliticalIndividual*, with instantiation *Joe*, and the second *Actor* might be a *KeyPoliticalIndividual*, with instantiation *Frank*, and the relation might be *isTheSuperiorOf*. Thus this structure permits the assertion that “Joe is the superior of Frank, with both being key political individuals.” The Situation-Dependent Ontology tailors the ontology for a specific unconventional conflict.

As a convention, the words “actor,” “action,” and “environment” will be capitalized if they are being used in an ontology-specific fashion. If they are used in a more general sense, e.g., according to their dictionary definitions, they will not be capitalized. Other words will also follow this convention. The names of classes and ontological relations will be italicized. This is useful because many of these names involve several words that have no spacing between them. The italics indicate that this lack of spacing is deliberate.

Sources for the Unconventional Conflict Ontology

Of all the things we could be discussing, we have reduced our attention to unconventional conflict – that is the domain of discourse – that is our “world.” An ontology is a tool for capturing, retaining and expressing our knowledge of this domain. Further, it is a tool to aid in our understanding of the domain. And, because our knowledge is always incomplete, the ontology will always be incomplete. This means that the ontology is a model. While the ontology as a description of the domain is incomplete, the ontology as a model could be complete. That is, the ontology could include all of the parts of the domain that are germane to its purpose as a model.

In the discussions that follow, some parts describe what has been done; however, some parts discuss the ontologies (parts of the overall ontology) as if they are complete and correct, the ideal situation. In fact, it would be virtually impossible to ascertain that a given ontology is complete and correct.

The ontologies under discussion are set at a certain level of granularity. Theoretically, the level of granularity is consistent throughout the ontology. Practically speaking, this consistency has probably not been achieved. This is partly the case because defining granularity across the entire domain is difficult, if not impossible. Some choices are evident, e.g., the cognitive processes of individuals

occur at a finer level of granularity than is desired for ontologies of theater-level unconventional conflict, and these processes are not included. Other choices are debatable, with some choices resulting in unevenness in the granularity.

The ontology that is described here is the result of two projects for the U.S. Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC) and several independent research and development projects by Hartley Consulting.

- The independent work on the Interim Semi-static Stability Model (ISSM) (during 2003–2006) and the DIME/PMESII VV&A Tool (2007–2008) led to the first TRAC project (2010).
- That project with Lee Lacy of Dynamics Research Corporation (DRC) and Hartley Consulting as a subcontractor resulted in version 1.0 of the ontology, called the IW Metrics Ontology (Hartley & Lacy, 2011).
- Further independent research and development resulted in version 1.5, called the Total IW Ontology (Hartley, 2016).
- The second TRAC project followed in 2012, with Lee Lacy and Hartley Consulting as subcontractors to BMA. This resulted in version 2.0, called the IW Ontology 2 (Hartley & Lacy, 2013a, 2013b).
- More independent research and development by Hartley Consulting resulted in a Graphical User Interface (GUI) and version 2.6 of the ontology (Hartley, 2016, 2017).
- The version described here is version 3.0, called the Unconventional Conflict Ontology. It is the result of additional independent research and development by Hartley Consulting. Changes include removing properties as a separate item and merging properties into the metrics, creating a metric-type ontology to differentiate the metrics along the lines of the previous properties concept, and moving the connection of the old Semantic Thesaurus to concept-connections among the elements rather than the metrics.

Although Lee Lacy and I created the IW Ontology, we drew content from every source that we could find at the time. Two of the sources were lists – an extremely simple form of ontology. Six of the sources were taxonomies – a weak form of ontology. And five of the sources were full-fledged ontologies, containing elements with multiple parents.

Figure 2.1 provides an overview. As discussed in more detail later in this chapter, the Unconventional Conflict Ontology is made up of elements, which have metrics (state variables that describe the states of the elements). These metrics will often be discussed as if they are each comprised of a single variable. However, in practice they are vectors of variables, which together describe the conceptual state in question. The original elements and their associated metrics were derived from one or more of the sources and thus have relations to them. Thus Fig. 2.1 shows an *Element* as having a *Metric* and each of these being related to various sources, with elements being derived from eight sources (including the *HSCBTax3Item*) and metrics being derived from six sources (including the *HSCBTax3Item*). The majority of the elements and metrics were derived from these sources; however, some were added subsequently, as analyses revealed the need for them. Each of the sources is discussed briefly in the following sub-sections.

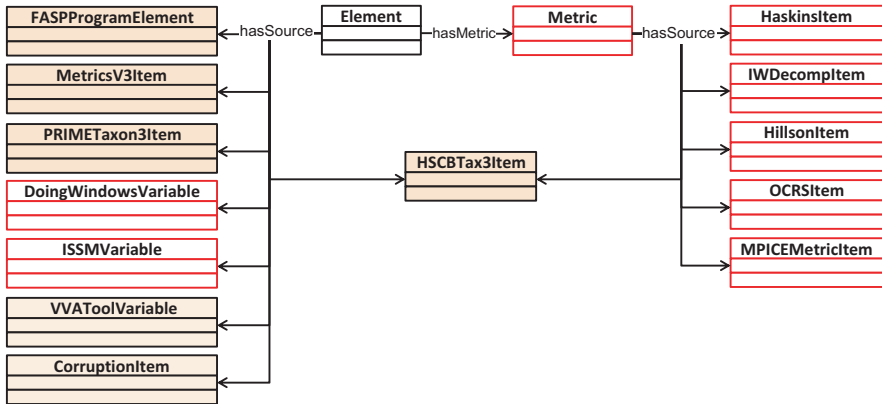
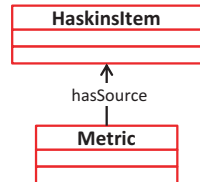


Fig. 2.1 Ontology sources

Haskins List

Figure 2.2 shows the Haskins list as a single class representing each of the items in the list (Haskins, 2010). Colonel Haskins’ article proposed a simple model to help understand a culture. One key to this model was a set of questions. The questions were principally of a cultural nature, such as, “Are there ‘human rights’?” This list produced useful entries, which were related to Unconventional Conflict Ontology metrics, as shown in the figure.

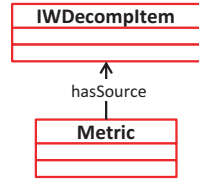
Fig. 2.2 Haskins list design



IW Decomposition List

The TRAC 2009 IW Decomposition Task-Event-Outcome (TEO) source is also a list, shown in Fig. 2.3. The list was taken from a report on a TRAC workshop on IW (TRAC, 2009). The items on the list were tasks that had been defined for a TRAC tactical-level IW wargame, such as “key leader engagement.” The entries were related to Unconventional Conflict Ontology metrics.

Fig. 2.3 IWDecomp list design



FASP Taxonomy

The Department of State and U.S. Agency for International Development (USAID) Foreign Assistance Standardized Program (FASP) Structure and Definitions uses a structure and definitions to encode and describe the various foreign assistance programs. In Fig. 2.4, this structure is illustrated. For example, “Peace and Security” is a program and “Counter-Terrorism” is a program area within this program. The 2006 version of the FASP document was the most current when the ontology was being created. (The current version is the 2016 update (Department of State, 2016)). In the 2006 version, “Deny Terrorist Sponsorship, Support and Sanctuary” was a program element in this program area and “Restrict Travel” was a program subelement. The program element level was determined to most closely match the desired granularity level of the ontology. Accordingly, the Unconventional Conflict Ontology elements were related to this level, as shown in the figure.

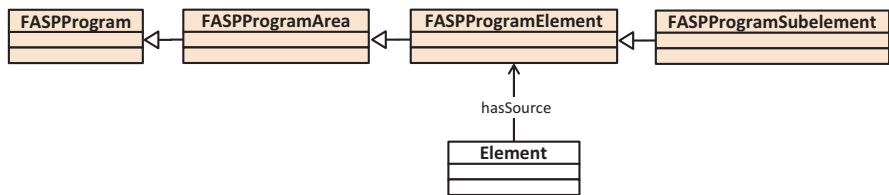


Fig. 2.4 FASP taxonomy design

Hillson Taxonomy

In 2009, Roger Hillson delivered a report for the Naval Research Laboratory (NRL) to the Navy, N81 titled “Requirements for a Government Owned DIME/PMESII Model Suite” (Hillson et al., 2009). Hartley Consulting acted as part of the Technical Advisory Committee for this report. This report included a taxonomy of DIME/PMESII metrics. The top level of the taxonomy consisted of categories, such as “Decision-making and Implementation.” An example of the items within this category was “Decision-making Process.” Submetrics were connected to the

items, such as “How timely was the final decision?” The *HillsonItem* level was determined to most closely match the desired granularity level of the ontology. Accordingly the Unconventional Conflict Ontology metrics were related to this level, as shown in Fig. 2.5.

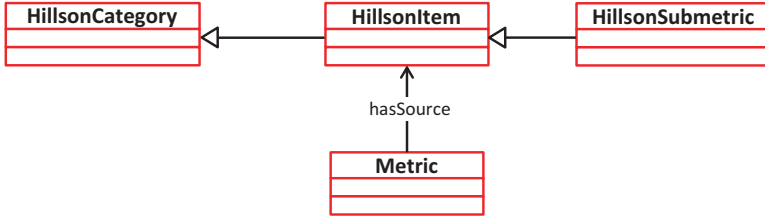


Fig. 2.5 Hillson taxonomy design

HSCB Taxonomy

MITRE’s Human Social Cultural Behavior (HSCB) taxonomy was created to characterize HSCB space and support HSCB modeling programs by allowing the programs to identify the parts of the space that they address (Klein, 2011). As with the Unconventional Conflict ontology, the HSCB taxonomy used a number of sources in its creation (including the Hillson report cited above). At the top level (*HSCBTax0*), there are four categories (“Actions,” “Actors and Events,” “Environment,” and “States”). The second level decomposes the top level (e.g., “Diplomatic Actions” is connected to “Actions”). The third level further decomposes this (e.g., “Participate in negotiations or mediation/conflict resolution”). The fourth level either restates the third level or further decomposes the item (in this example there is no decomposition). The fifth level provides the final decomposition of some of the items into subitems (e.g., “provision of human intelligence (HUMINT) by informants”). The fourth level was determined to most closely match the desired granularity of the ontology. Accordingly, the items on this level were related to Unconventional Conflict Ontology elements or metrics (as appropriate), as shown in Fig. 2.6.

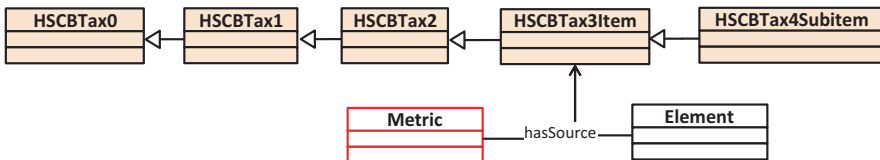


Fig. 2.6 HSCB taxonomy design

Metrics V3 Taxonomy

The TRAC Metrics V3 taxonomy was produced by TRAC in an effort to identify elements needed in DIME/PMESII modeling (TRAC, 2010). At the top level it was divided into two categories: DoD “Lines of Effort” (LOEs) and “PMESII.” The second level decomposes these categories. For example, one of the LOEs is “Restore essential services.” The third level decomposes the second level, e.g., “Restore sewage services” is a child of “Restore essential services.” The items in this last level were related to the Unconventional Conflict Ontology elements as shown in Fig. 2.7.

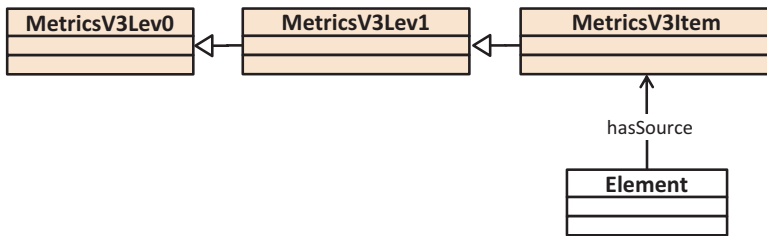


Fig. 2.7 Metrics V3 taxonomy design

OCRS Taxonomy

The Office of the Coordinator for Reconstruction and Stabilization (OCRS) Essential Tasks taxonomy was constructed as an interagency framework for describing the tasks that might be needed in post-conflict reconstruction and stabilization operations (Department of State, 2005). It was divided into technical sectors (OCRS1), such as “Security,” and then into subsectors (OCRS2), such as “Disposition of Armed and Other Security forces, Intelligence Services and Belligerents.” Essential tasks were placed within these subsectors (OCRSItem), such as “Disarmament.” Each of these essential tasks was divided into Initial Response, Transformation, and Fostering Sustainability tasks (not shown in the figure). However, the essential tasks were determined to most closely match the ontology granularity needs. Accordingly, these were related to the Unconventional Conflict Ontology metrics, as shown in Fig. 2.8.

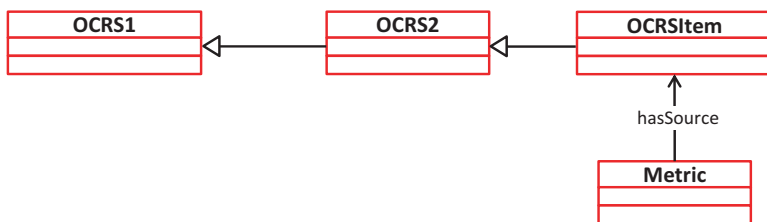


Fig. 2.8 OCRS taxonomy design

PRIME Taxonomy

SRI International’s Probative Rapid Interactive Modeling Environment (PRIME) was built as a model to support Course of Action (COA) development and analysis. A part of this model was a taxonomy of PMESII effects. The top level of the taxonomy (*PRIMETaxon1*) contains the six PMESII categories, which are decomposed into two more levels as shown in Fig. 2.9. An example of the three levels is the following: “Political Effects,” “Leadership,” and “Influence of leadership.” The items at the lowest level were related to the Unconventional Conflict Ontology elements.

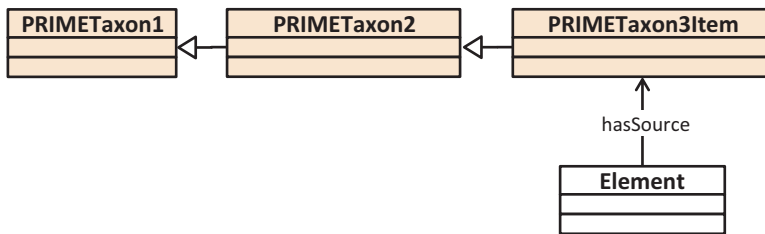


Fig. 2.9 PRIME taxonomy design

Doing Windows Network

The *Doing Windows* book (Hayes & Sands, 1997) was the result of three workshops of OOTW experts, looking for rational indicators of success in prosecuting Operations Other Than War. The variables were not organized as an ontology; rather, they were contained in four related influence nets. The final variable in the network was “Civil stability and durable peace exist.” The variables of the “immediate causal” net, such as “People are tolerant of the status quo,” directly influenced each other and the final variable. The rest of the variables were divided into three networks, such as the “civil unrest” network, with variables such as “Administration of justice is effective and fair” influencing each other and the variables in the top network. The *Doing Windows* network is recast as an ontology of influencing variables in Fig. 2.10, with all variables related to the Unconventional Conflict Ontology elements.

ISSM Network

The Interim Semi-static Stability Model (ISSM) was initially created to reproduce the *Doing Windows* Network in a spreadsheet because the software that supported the *Doing Windows* Network was not available. Later ISSM was enhanced by adding a complete list of DIME actions (and their implied MoPs) and a few metrics of

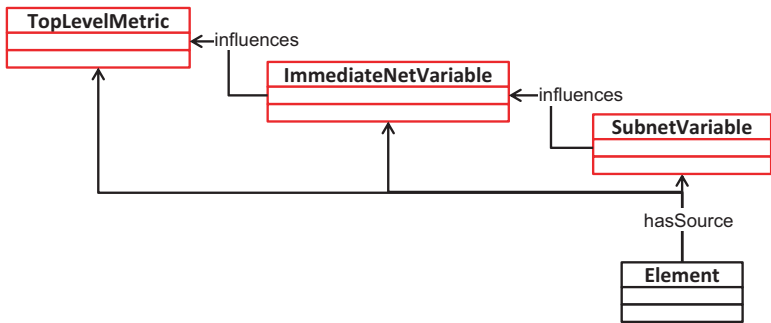


Fig. 2.10 Doing windows network design

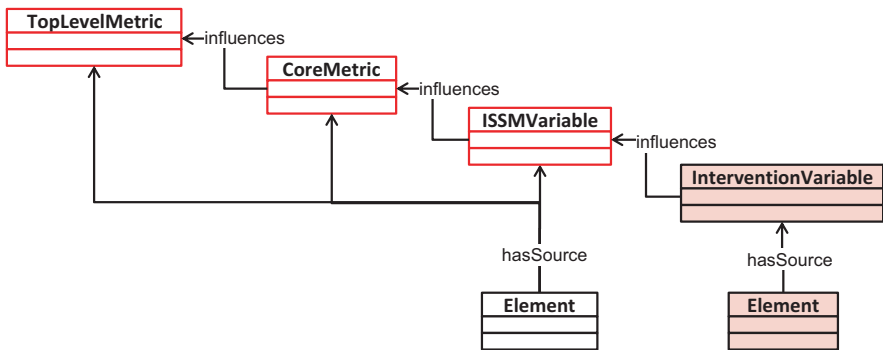


Fig. 2.11 ISSM network design

concern to scenarios that differed from those considered in *Doing Windows* (Hartley 2006a). These DIME actions were derived from numerous reports of activities in OOTWs, such as those in Bosnia and Iraq. The ISSM network is recast as an ontology of influencing variables in Fig. 2.11. The ontology is similar to that of the *Doing Windows* Network, with the additional DIME variables relating to Action elements of the Unconventional Conflict Ontology.

VV&A Tool Ontology

The DIME/PMESII VV&A Tool was constructed to support verification, validation, and accreditation (VV&A) of DIME/PMESII models (Hartley, 2008). Part of this support involved identifying the extent and quality of the coverage of the DIME/PMESII space by the model being assessed. The initial version of the tool used a compressed version of the ISSM variables, linked to the PMESII categories and subcategories. The intervention variables were also linked to a set of DIME categories that were linked to the PMESII categories. Thus the tool variable “Rebuild water lines”

was linked to “Infrastructure-Water” and then to “Infrastructure” as a PMESII state variable, and to “Infrastructure-DIME” and “Infrastructure” as an intervention variable. The tool ontology also expanded the scenario coverage and added kinetic physical environment variables to the list, with the appropriate PMESII and DIME categories. A later version of the tool was enhanced by adding variables from the IW Ontology 2. The tool ontology is shown in Fig. 2.12, with Unconventional Conflict Ontology elements related to the tool variables.

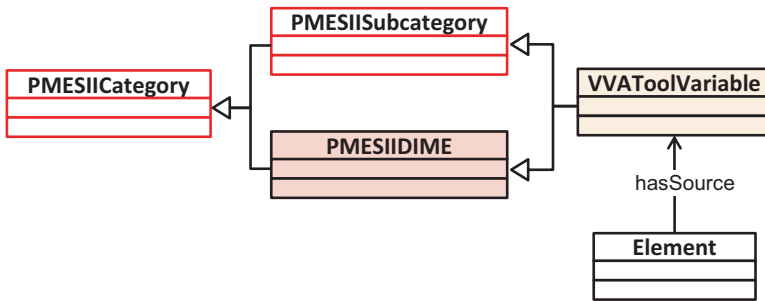


Fig. 2.12 VV&A tool ontology design

Corruption Model Ontology

In 2010, the National Defense University (NDU) held a workshop in which a Corruption Model for Afghanistan was developed (Hartley, 2010). Hartley Consulting derived an ontology from this model, with a set of corruption categories linked to corruption items. For example, the category “Governance” was linked to “Corruption in public office” and the category “Corruption” was also linked to “Corruption in public office.” Similarly, the category “Corruption” was linked to “Corruption in business,” as was the category “Economics.” The Corruption Model Ontology is shown in Fig. 2.13, with corruption items related to Unconventional Conflict Ontology elements.

MPICE Ontology

The Measuring Progress in Conflict Environments (MPICE) was designed as a framework of metrics for assessing conflict transformation and stabilization (Dziedzic, Sotirin, & Agoglia, 2008). MPICE was designed with two upper categories for the subcategories, requiring an ontological framework, rather than a taxonomic one. The first set of categories consisted of desirable states, such as “Sustainable Economy” and “Safe and Secure Environment.” The alternate categories consist of “Drivers of Conflict” and “Institutional Performance.” Thus the subcategory “Political Violence

Fig. 2.13 Corruption model ontology design

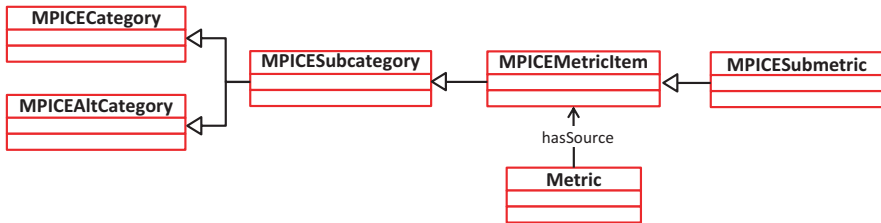
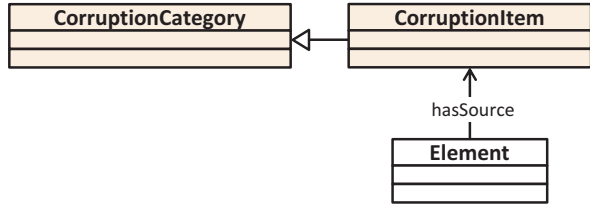


Fig. 2.14 MPICE ontology design

Diminished” has “Safe and Secure Environment” as one parent and “Drivers of Conflict” as the other. Each subcategory has metric items such as “Is there partisan infiltration of military and intelligence services?” Each metric item has a number of measurable submetrics that provide a vector measure for the metric item. The metric item level was determined to most closely match the desired granularity of the ontology. Accordingly the Unconventional Conflict Ontology metrics were related to this level as shown in Fig. 2.14.

Inferences as a Source

The connections of the elements to the metrics (Fig. 2.1) may be thought of as a mathematical relation, r : Elements \rightarrow Metrics. This relation is “onto,” meaning that every metric is related to at least one element. The inverse relation is also “onto,” so that every element has at least one metric. The inclusion of the “at least one” statements implies that neither this relation nor its inverse is a mathematical function, which would require $r(E)$ to be a single metric and $r^{-1}(M)$ to be a single element. Despite this less restrictive status for r , inferences were drawn regarding the contents of both elements and metrics: once the list of elements and metrics had been derived from the sources above, the necessary existence of an element could be inferred from a metric with no element and the necessary existence of a metric could be inferred from an element with no metric.

A second mathematical concept was used in creating additional elements and metrics. The concept of requiring an inverse is one of the axioms of a mathematical group (Wikipedia, 2017c). An Action, such as *IncreasePoliticalPopulation*, requires an inverse, such as *DecreasePoliticalPopulation*, each with corresponding metrics.

Some Actions, such as *ChangePoliticalFactions*, are their own inverses because the direction of change is included in the instantiation. If the inverse was not specified from the sources listed above, one had to be created.

Some elements and metrics were created by analogy. If an element, such as *PoliticalPopulation*, was specified without having an Action to change its size, then either a single “change” Action was created or a pair of “increase” and “decrease” Actions was created. The choice was made by “art” rather than by “science.” Generally, if the required change was a matter of simply a matter of numbers, the “increase/decrease” pair was chosen. If the change was more complex, generally the choice was for a “change” Action.

Some inferences involved the completion of real-world concepts. For example, *AgricultureBusiness* and *ManufacturingBusiness* were specified from the sources above. A business involved in fishing could have been assumed to be included in one of these; however, it seemed like a stretch to do so. Therefore, *FishingBusiness* was added. Both *AgricultureBusiness* and *ManufacturingBusiness* were related to a number of other elements, such as *ConductAgricultureOperations* and *ProduceGoodsOrEquipment*, respectively. This required adding such elements as *OperateFishingBusiness*. Naturally corresponding metrics were also added. The Stocks-and-Flows ontology, described in the next section, was invaluable in discovering the inferences required in this completion process.

Situation-Independent Ontology

In this section, we will briefly describe each of the ontologies that make up the Unconventional Conflict Ontology and describe how they connect to each other. We will address the details of each in subsequent chapters.

Context

The central organizational principle for the development of the Unconventional Conflict Ontology is provided by the context diagram in Fig. 2.15. The Operational Environment that includes everything relevant to unconventional conflict is divided into three parts: Actors, Actions, and the Environment.

Actors are natural entities, including humans, that cause things to change. Actions are the interventions, events, and ongoing processes that are performed by Actors and that directly cause changes. The Environment represents the passive entities in the Operational Environment.

The figure may be understood by following the arrows. Actors perform Actions, which affect the Operational Environment (OE). The state of OE, including any changes, is described by State Variables (also called Metrics). Actors perceive

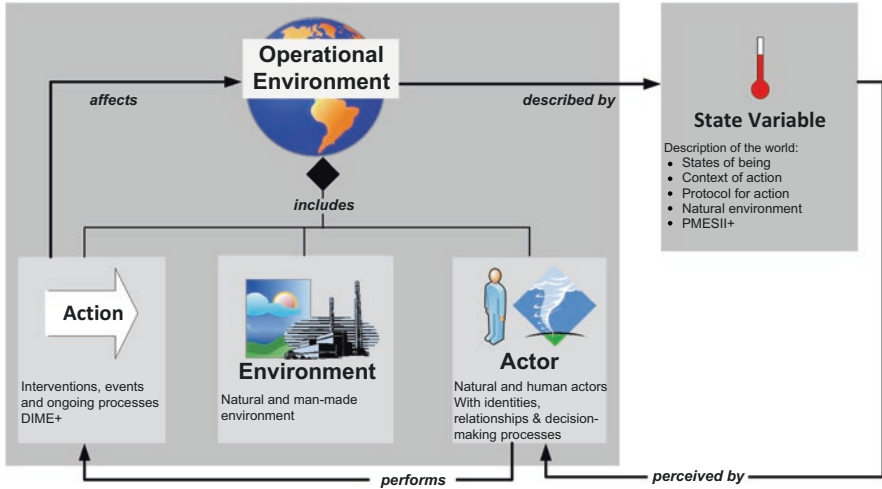


Fig. 2.15 Context diagram

the OE by means of the State Variables. State Variables include both numeric variables (true metrics) and categorical variables (e.g., type of government).

The divisions presented in Fig. 2.15 provide a starting place for building and understanding the ontology. We can construct sub-ontologies for Actors, Actions, Environment, and Metrics. As a matter of terminology, we will call the lowest-level classes of the Actor, Action and Environment ontologies “elements.” Similarly, the lowest-level classes of the Metric ontology are “metrics.”

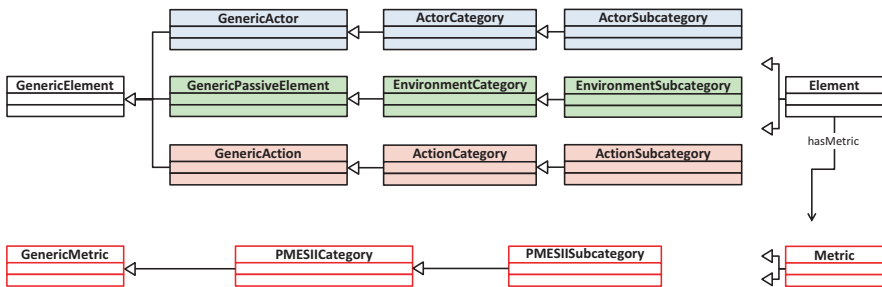


Fig. 2.16 Class diagram expansion

Figure 2.16 shows an expansion of the concepts introduced in Fig. 2.15 using a class diagram. To the left are shown classes for a generic element and a generic metric. The three classes, *GenericActor*, *GenericPassiveElement*, and *GenericAction*, are subclasses of *GenericElement*. (The *is-a* relationship is represented by the hollow arrowhead). Each of these subclasses is decomposed into a set of categories, represented by *ActorCategory*, *EnvironmentCategory*, and *ActionCategory*, in Fig. 2.16. Each of the categories is, in turn, decomposed into a set of subcategories.

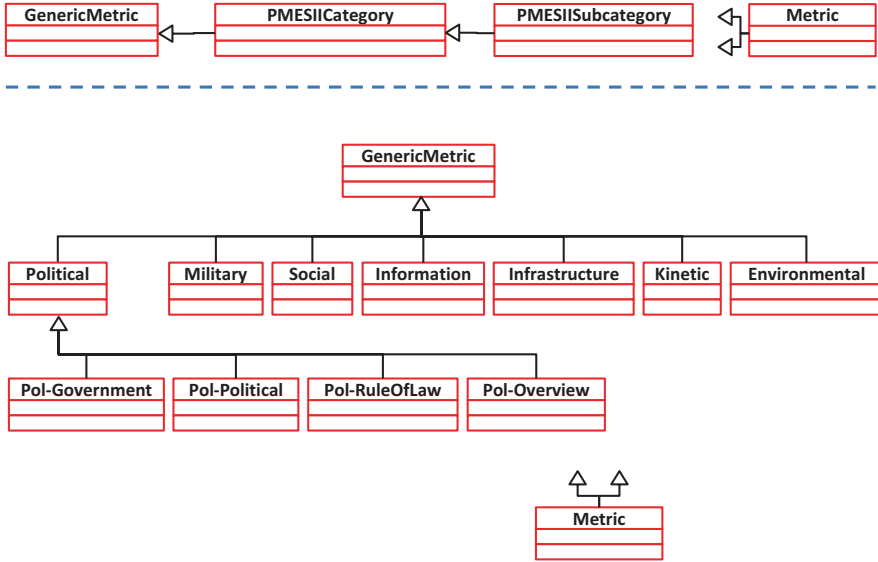


Fig. 2.17 Class structure shorthand

Finally, each element is assigned as a subclass to one or more of these subcategories, represented in Fig. 2.16 by two *is-a* relations. Similarly, the *GenericMetric* class is decomposed into the PMESII+ class categories. Each of these categories is decomposed into a set of PMESII subcategories and each *Metric* class is assigned as a subclass to one or more of the PMESII subcategories. The *hasMetric* relations (different arrowhead from *is-a*) show that each element is related to one or more *Metrics*, which describe the state of the element at a given time.

The diagram in Fig. 2.16 uses a shorthand notation to collapse a view of an ontology into a manageable space. Figure 2.17 explains this shorthand. The bottom row of Fig. 2.16 is repeated as the top row of Fig. 2.17. The *is-a* relations are represented by the arrows with open triangle heads, with the heads next to the parent classes and the tails next to the child classes. This pointing feature permits the equivalence of horizontal and vertical representations.

The bottom part of Fig. 2.17 is a partial expansion of the top row. The ultimate parent class, *GenericMetric*, does not change. However the *PMESIICategory* class is revealed as a place-holder descriptive class. The actual children of the *GenericMetric* class are the categories *PoliticalMetric*, *MilitaryMetric*, *SocialMetric*, etc. (The “Metric” parts of the names were omitted from the figure to allow the text in the figure to be large enough to read). The *PMESIISubcategory* class is also revealed to be a place-holder. The actual children of the categories are subcategory classes such as *Political-GovernmentMetric*, *Political-PoliticalMetric*, etc. (Only a few of these are shown to avoid having too many boxes in the diagram. This is the reason for the shorthand notation). Finally, the actual *Metrics* are represented by a single class, named *Metric*, with two *is-a* arrows, indicating that each *Metric* may have multiple parents.

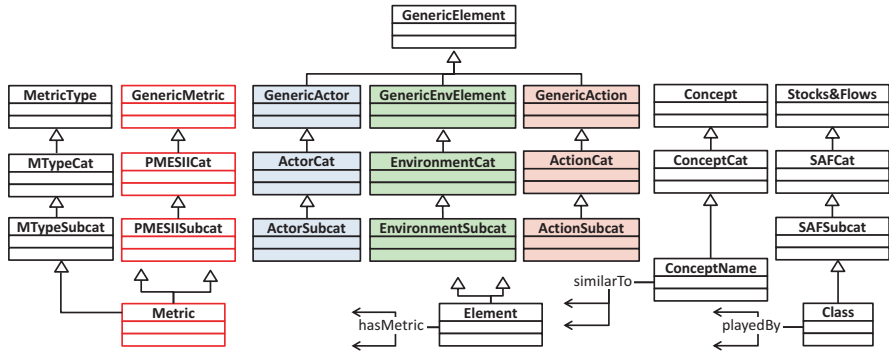


Fig. 2.18 Situation-independent ontology structure

As an aid to understanding the Metrics, the Actor and Environment elements are connected to Metrics ending in “rating.” These Metrics describe the state of being of these elements. Action elements are connected to Metrics ending in “MoP,” which stands for measure of performance. Measures of performance describe the immediate results of an Action, as opposed to a measure of effectiveness that would describe the effectiveness of the Action. All elements are connected to at least one Metric and some are connected to more than one Metric.

A little reflection will show that this connection exposes a profound point. Suppose we were observing a real situation. The values of the set of all Metrics, such as *CentralAuthorityEffectivenessRating*, would describe the current state of affairs (assuming we had some way of knowing the values). The values at a later time would describe the state at that time and the differences in the values would describe the change. The rating of the effectiveness of the central authority does not seem particularly remarkable when looked at this way. However, now consider that we are getting these values from a simulation. The rating value does not change by magic, but rather because of some theory or theories that declare that it should change in a particular way because of the change of some set of other variables. This is a theory-based connection.

This is a Key Part of the Entire Ontology Paradigm If the Metrics tell us the situation has changed, the theories that describe the causes of these changes are the theories of our model. That means the each Metric represents an attachment point of one or more theories, **which are outside of the ontology**. The theories ontology is an associated ontology, rather than being an integral part of the Unconventional Conflict Ontology.

The situation-independent ontology actually contains three additional ontologies (as integral parts of the Unconventional Conflict Ontology). Figure 2.18 recasts Fig. 2.16 with a vertical orientation and adds the three additional ontologies. The ontology to the far left is an additional classification of the Metrics. The basic Metric ontology is based on the place(s) within the PMESII hierarchy that the Metric belongs. The second Metric ontology describes the metric type

(defined in a later subsection) for each Metric. The ontology on the far right represents the stocks-and-flows (SaF) ontology that connects the elements to sets of relations, described later. The ontology to the left of the stocks-and-flows ontology represents semantic similarities of the elements to a set of semantic concepts, also described later.

The Actor, Environment, and Action ontologies connect the elements by their similarities as children of the respective subcategories and categories. The stocks-and-flows ontology and the concept ontology connect the elements by different similarity relationships. The Metrics that are connected to each element describe the data that describe each element and the Metric types describe commonalities in the data among the elements. Together, these ontologies represent the domain knowledge about situation-independent relationships among the elements.

In addition, all of the elements and Metrics are derived from the sources, described earlier in Sources for the Unconventional Conflict Ontology. They are linked to the appropriate sources in order to improve the understanding of each class. These ontological connections are omitted in Fig. 2.18 to avoid excessive complexity.

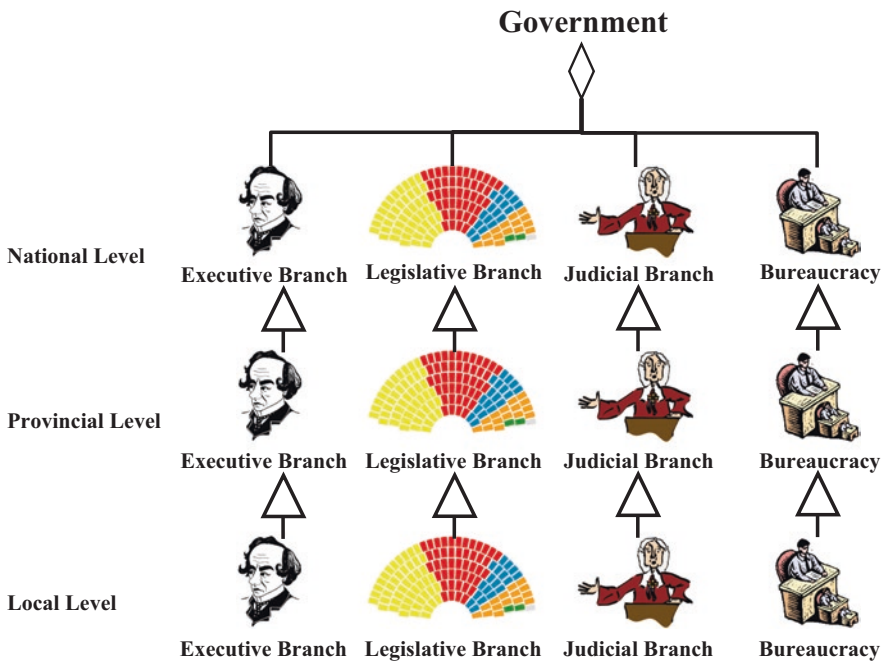


Fig. 2.19 Government structure context diagram

The two lower-level context diagrams will be helpful in understanding the details and as motivators for the discussion of the situation-dependent ontology, discussed later. Figure 2.19 illustrates a government that consists of three branches, executive, legislative, and judicial, plus a bureaucracy. Each of these is represented by an Actor

class. Depending on the needs of the situation, these classes may be instantiated at multiple levels of government, e.g., national, provincial, and local. These instantiations may be connected, as shown in the figure, or not connected, depending on the situation. Also depending on the situation, subclasses can be defined, e.g., a legislative Senate and a legislative House of Representatives or multiple types of court systems.

The government may have functional organs besides those shown in Fig. 2.19. These are shown in Fig. 2.20. In this figure, social services and law enforcement are shown as being provided by government organizations at three levels. Armed forces are shown at both national and provincial levels, as some countries have that situation. The intelligence services are shown only at the national level. As with the government structure diagram, only one class for each type is provided in the ontology, with instantiation depending on the situation.

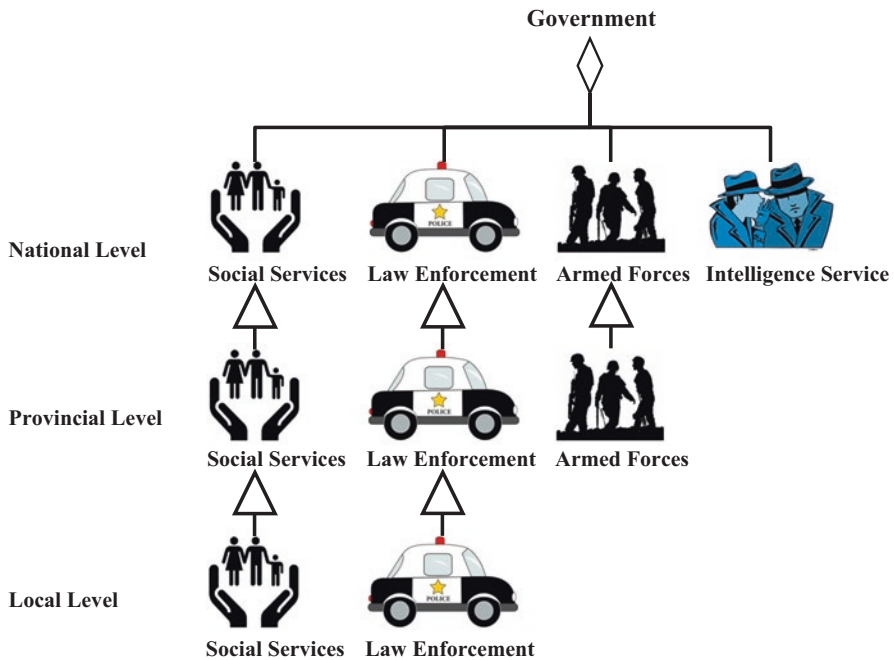
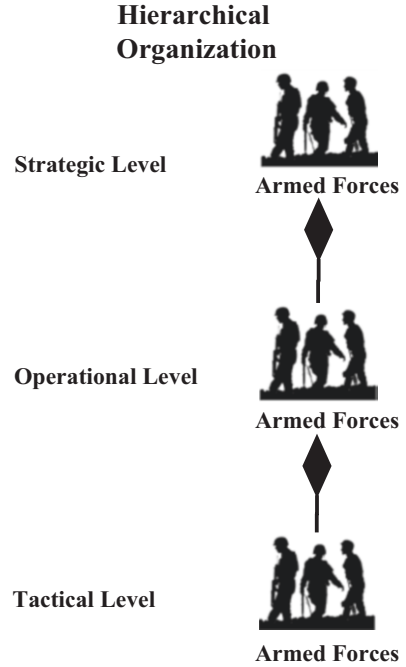


Fig. 2.20 Government functional context diagram

Some organizations are hierarchical in their internal structure. Figure 2.21 illustrates using the single provided class for armed forces to create such a structure. Naturally, the number of levels and their names will depend on the situation. This concept is not restricted to armed forces. It can be applied to businesses and churches or other organizations, as needed.

Fig. 2.21 Hierarchical organization context diagram



Metric PMESII Ontology

The Metric PMESII ontology is based directly on the PMESII+ paradigm, which divides the world into activity domains. This paradigm is meant to support a description of the state of a situation, which is precisely what the state variables (metrics) do in detail. Thus each Metric is related to a PMESII subcategory by an *is-a* relation.

This ontology of the metrics or state variables is useful in supporting an appreciation of the state of the unconventional conflict. The individual Metrics provide a detailed view, whereas various aggregations may be useful in generating various overviews of the situation. For example, one infrastructure Metric provides information on the capacity of an extractive energy production facility (e.g., an oil well or set of oil wells). An aggregation of all of the Metrics of this class would yield a measure of the capacity for all extractive energy production facilities. Because the Metric need not consist of a single number, such as flow rate, it can also include such things as the flow rate before the beginning of the conflict or the desired flow rate after the end of the conflict, allowing for the calculation of percentages. Other combinations are also possible, such as a measure of the current total energy production or an overall measure of the state of the infrastructure.

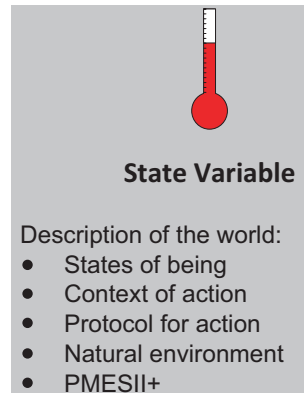
There is a subtle point concerning the relationship of the Metrics to the PMESII ontology. The relationship is more informative when looked at from the Metrics up to the subcategories and categories than the reverse. That is, a Metric may be thought of as relating to several subcategories because it adds information concerning the

state of the subcategory. However, because such relations may not be obvious, decomposing the subcategories might not lead to the inclusion of all of the Metrics that are shown here.

Figure 2.15 shows that the Metrics describe the operational environment, which consists of the Actor, Action, and Environment Elements. Each Element is connected to one or more Metrics and each Metric is connected to one or more Elements. However, in using the ontology to describe a particular situation, each element is instantiated by one or more objects. Thus an Actor might be instantiated by a person named *Frank*. Each Metric that is connected to the Actor is also instantiated by the values that pertain to *Frank*, not the values that describe whatever class *Frank* instantiates. **Because the instantiation of a Metric is connected to the instantiation of an Element, the Metric instantiation refers to a particular (generally singular) object.**

Figure 2.22 shows the icon used in the Context Diagram, Fig. 2.15, to represent the state variables (metrics). The thermometer represents the measurement of quantities, which lies at the heart of Metrics.

Fig. 2.22 The state variable or metric icon



Metric Type Ontology

In addition to the PMESII+ ontology for the Metrics, there is a “type” ontology of the Metrics that yields other benefits. The Metric type ontology identifies the differences and commonalities among the Metrics by the type of information contained in the Metric. In addition to the differentiation of Metrics deriving from Actions and those deriving from Actor or Environment elements by attaching the suffixes “MOP” and “Rating,” respectively, the Metric Type or Property Ontology for the Metrics supports the fact that some types of Metrics are appropriate for some elements and not for others. For example, all elements require an *Identity* type metric; however, only some elements need a *Weaponry* type metric. This is the ontology on the left side of Fig. 2.18, headed by the class labeled *MetricType*.

The generic types and properties are listed in Table 2.1. *Mtype* is the metric property type code. This value will be reported in the tables containing the elements in following chapters, rather than listing all of the property names associated with each element.

Table 2.1 Metric property types

Type	Mtype	Property	Description
<i>Invariant</i>			
	110	<i>Identity</i>	Name or other identification of the entity
<i>Physical</i>			
	210	<i>Location</i>	Current location (defined over one or more points, along a network, as an area, or by density over an area, including elevation/depth if appropriate). Location may be null.
	220	<i>Time</i>	Actions: Event occurrence as point in time (date/time), event duration, event frequency (events per time period); Other: date/time of change of any other metric
	230	<i>Quantity</i>	Number of entities (if single Actor=1; if “group of same”=number of Actors) Number of members (Actor is significant group or demographic group=number of people in group) Environmental entities similar Actions=number of things produced, added, etc. (not damage or capacity)
	240	<i>DisasterOrCondition</i>	Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not (only elements in natural environment)
	250	<i>Movable</i>	Indicator as to whether entity can be moved or not and the current speed of movement, may include maximum speed
	260	<i>CapacityFlowrate</i>	Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume (only Environment element), may include original or desired values
	270	<i>Weaponry</i>	Entity’s current weaponry types and quantities (in general, Actors or tangible things might have weapons); may also include original or desired values
	280	<i>Damage</i>	Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components (only Actions in damage and antiperson)
<i>Relationship</i>			
	310	<i>Affiliation</i>	Name of thing with which entity is affiliated; this is Actor’s organization or parent organization, intensity with which entity holds the affiliation or an entity’s members hold the affiliation
	320	<i>Hierarchy</i>	Actor’s authority level, name of superior, and type of distribution of authority (define hierarchy) (only Actors)
	330	<i>OwnerOriginator</i>	For Environment this is the owner, for Action this is Action’s originator
	340	<i>Activity</i>	Entity activity in terms of coverage, intensity, and number of activities (only Actors)
	350	<i>Availability</i>	Numeric or categorical level of availability of entity, may include original or desired levels
<i>HSCB</i>			
	410	<i>DecisionMaking</i>	Description of the decision-making process and the quality of the decision-making

(continued)

Table 2.1 (continued)

Type	Mtype	Property	Description
	420	<i>Influence</i>	Numeric or categorical level of influence of entity (mostly Actors)
	430	<i>FairnessCorruption</i>	Numeric or categorical level of fairness/corruption of entity
	440	<i>Effectiveness</i>	Numeric or categorical level of effectiveness of entity
	450	<i>Efficiency</i>	Numeric or categorical level of economic efficiency of entity
	460	<i>HealthOrStrength</i>	Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity
	470	<i>Professionalism</i>	Numerical or categorical level of professionalism of the entity (only some Actors)
	480	<i>Transparency</i>	Numerical or categorical level of transparency (some Actors and some Environment elements)
<i>Misc</i>			
	510	<i>Miscellaneous</i>	Text description

Actor Ontology

Actors are the active elements in the Unconventional Conflict Ontology. Most of the Actor classes represent human beings; however, inanimate objects such as vehicles and storms are also represented. The classes representing people are divided into those representing individuals, those representing significant groups of people, and those representing demographic groups. Demographic groups consist of large numbers of people, large enough that the precise number is not important. The numbers in demographic groups are best described by population distributions over geographic areas. On the other hand, significant groups are small enough that the precise number of members may be ascertained. Further, their individual locations may be determined or the group location can be described as the union of a small set of polygons.

Figure 2.23 shows the icon used in the Context Diagram, Fig. 2.15, to represent Actors. The human figure and the tornado indicate that Actors can be humans (or groups of humans) or some natural events.

Action Ontology

Actions are the interventions, events, and ongoing processes that are performed by Actors, which directly cause changes. Action classes cover a wide range, including damage Actions, training Actions, building Actions, policing Actions, persuasion Actions, economic Actions, and organizational Actions.

Unfortunately, the connection between the Action classes and the DIME paradigm is fuzzy at best. A few Actions may be clearly Diplomatic, Informational, Military, or Economic. A few more may be clearly connected to more than one of these, a situation which is easily handled in an ontology. However, most Actions

Fig. 2.23 The actor icon

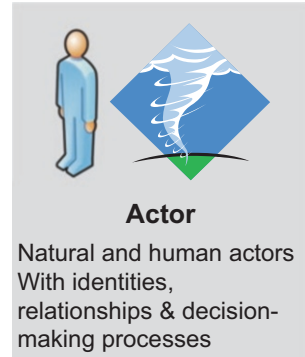
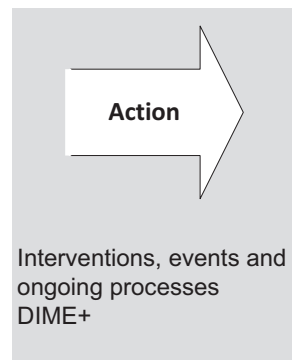


Fig. 2.24 The action icon



have poorly defined connections. For example, a negotiation Action may be handled by a civilian diplomat, a military unit, or a civilian economic organization, depending on the situation. Further, some Actions may be initiated in one D-I-M-E category and carried out in another category.

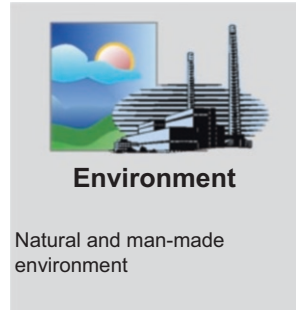
The DIME concept that there are different levers of governmental power is useful. However, decomposing DIME down to the Actions level is essentially meaningless. Creating connections that link almost everything to each of the DIME categories does not clarify (or enhance the understanding of) what is going on. The Action classes and sub-classes do help to clarify this understanding and, for this reason, are used in the ontology.

Figure 2.24 shows the icon used in the Context Diagram, Fig. 2.15, to represent Actions. The arrow indicates that Actions produce changes.

Environment Ontology

The Environment elements are the passive elements in the Unconventional Conflict Ontology. Environment classes cover the many types of infrastructure, things needed by the Actor classes, the natural environment, the conflict environment, and the conceptual environment.

Fig. 2.25 The environment icon



Once the three element ontologies are combined, a second example of the need for a more general ontology, rather than a taxonomy, becomes apparent: some of the elements appear in more than one of the element ontologies. For example, depending on the model, a tornado might be modeled as an Actor, an Action, or merely part of the Environment.

Figure 2.25 shows the icon used in the Context Diagram, Fig. 2.15, to represent Environment. The icon includes both representations of the natural environment and the man-made environment to show that both are included. (Representing the conceptual environment in the icon was too hard to do, so it was omitted from the icon, but not from the ontology).

Stocks-and-Flows Ontology

Recall that the purpose of an ontology is to describe what we know about a domain. In this chapter, we are describing the structure of the ontology, not its contents. However, the structure is driven by the intended and actual contents. We wish to have a structure that allows us to include everything we know about unconventional conflict that is relevant to modeling it.

Upon investigating the contents of the ontology so far, the various elements and metrics, we find that there are connections among these classes that are evident because we know what the classes refer to, but which are not yet expressed in the ontology. One set of these connections has a counterpart in system dynamics – stocks-and-flows. For example there is an Environment element for bridges and tunnels that has a capacity property. There are also two Actions that relate to this, destroy bridges and tunnels and build bridges and tunnels. These two Actions reduce capacity and increase capacity, respectively. These elements are related in the real world and we need to introduce this relation into the ontology.

Figure 2.26 shows the icon that will be used in the complete Context Diagram, Fig. 2.36, to represent Stocks-and-Flows. It shows the most complicated type of stocks-and-flows, the organization-oriented stocks-and-flows category.

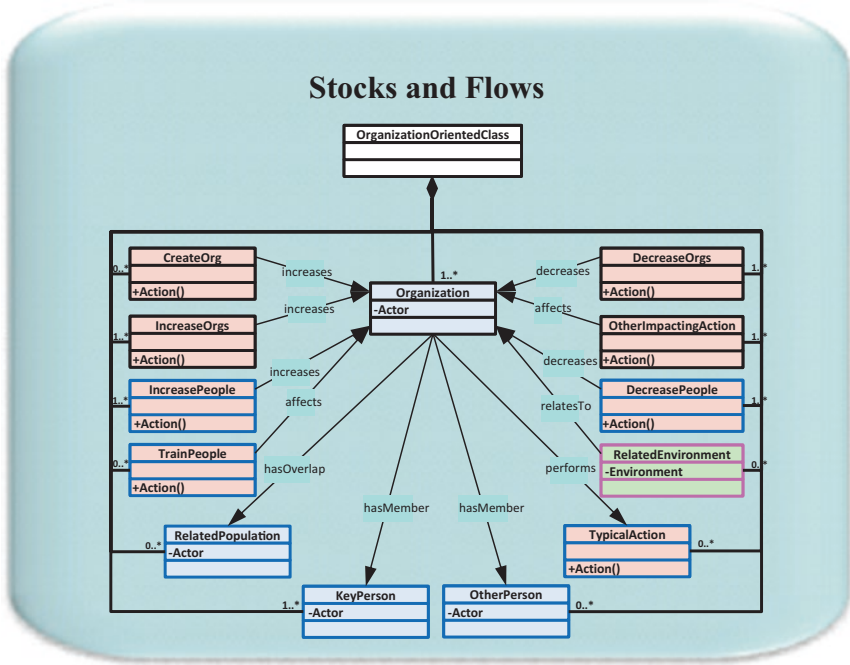


Fig. 2.26 The stocks-and-flows icon

Semantic Concept Ontology

There is one more type of knowledge that is pertinent to the situation that we need to incorporate into the structure of the ontology. This knowledge is obvious to a human examining the elements, but not to a computer. For example, a human knows that roads, bridges and tunnels, and rail lines are all related. An element can be linked to several semantic terms and each semantic term is linked to several elements. Together these linkages result in a semantic thesaurus connecting elements to other elements.

Figure 2.27 shows the icon that will be used in the complete Context Diagram, Fig. 2.36, to represent semantic concepts. It shows several element classes with *similarTo* connections to a semantic concept.

Recap of What We Can Say About What We Know

The structures we have defined up to now allow us to capture a large amount of knowledge about unconventional conflict. Figure 2.28 illustrates some of this.

Figure 2.29 illustrates this with some actual class connections. The Action class *RebuildBridgesAndTunnels* in the center of the figure is connected to a Metric class,

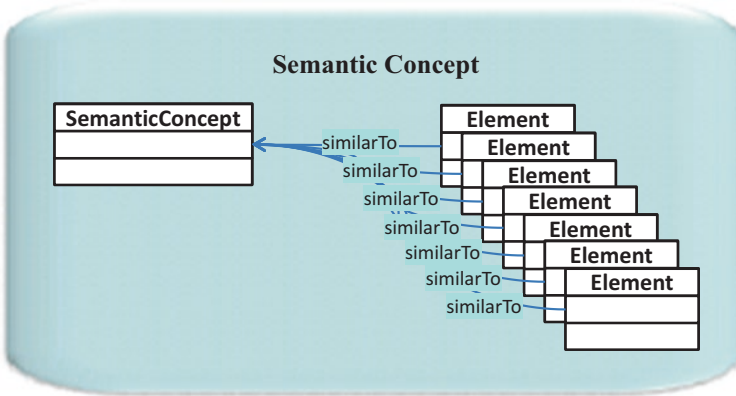


Fig. 2.27 The semantic concept icon

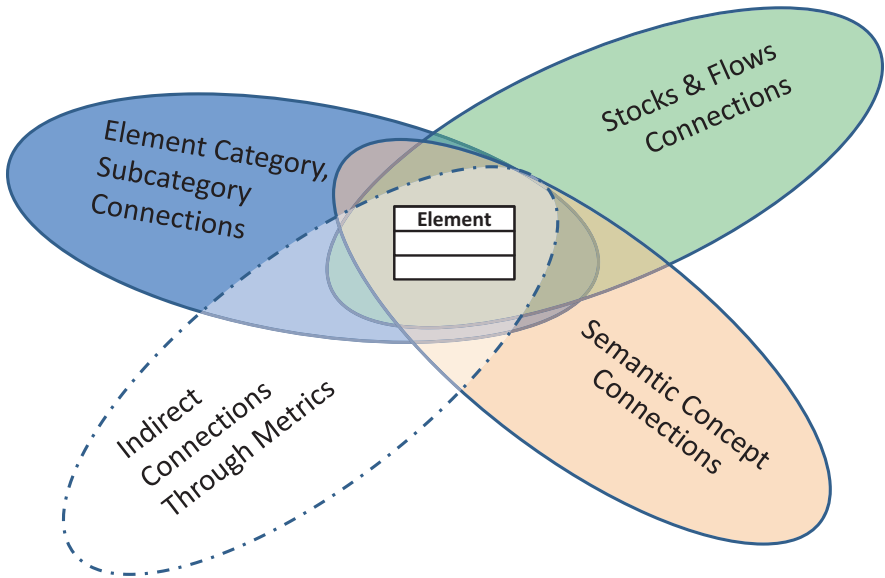


Fig. 2.28 Element connections

BridgeAndTunnelCapacityRebuiltMoP. Both are shown to be connected by *relatedTo* links to sources. The Metric class is connected to two parents in the Metric PMESII ontology and to one parent in the Metric type ontology. The Action class is shown to be connected to one parent in the Action ontology and, through that parent, to a sibling Action class, *RebuildMiningInfrastructure*. The Action class is also connected by an *increases* relation in the Stocks-and-Flows ontology to an Environment class, *BridgeAndTunnelInfrastructure*. Finally, the Action class is connected by a *similarTo* relation in the semantic concept ontology to an Environment class, *RoadInfrastructure*.

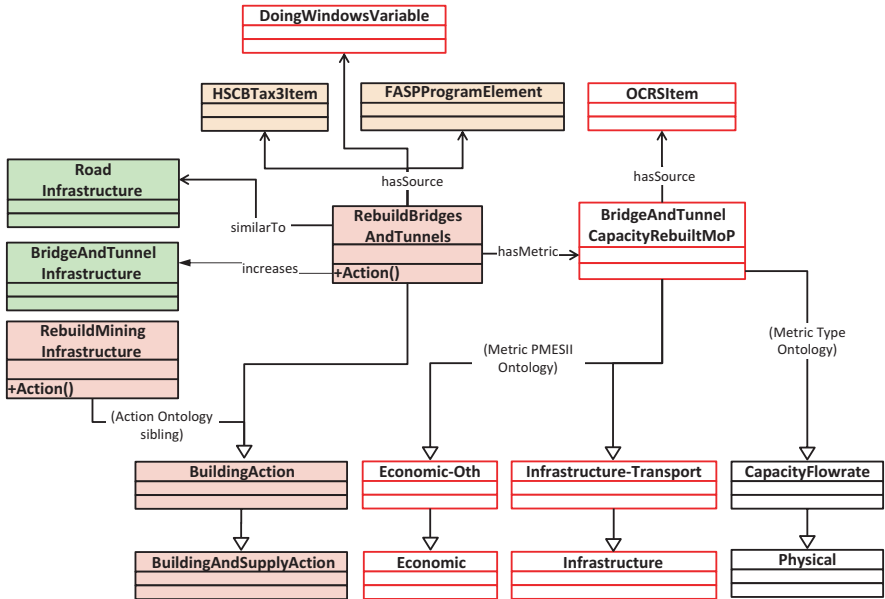


Fig. 2.29 Example connections

The point is that the knowledge contained in the ontology covers a wide range of information about the domain and this knowledge can be recovered by following the relationships.

Situation-Dependent Ontology

Despite the large amount of knowledge that can be encoded in the ontology structure to this point, it is not enough. The structure to this point permits the description of situation-independent knowledge. For example, bridges and tunnels are related to roads no matter what the situation is. However, there are things that depend on the situation that require special structures.

Goal-Task-Owner (GTO) Structures

The parties or sides that are relevant to a particular situation are situation-dependent; however, their existence and certain information about them are already covered at the instantiated object level. For example, the stocks-and-flows *InterventionForce* class allows for multiple countries’ armed forces and associated information. However, each major player in the situation (labeled “owner”) has its own agenda, consisting of goals and tasks that the owner believes will accomplish these goals.



Fig. 2.30 Twelve sides to a conflict

At the lowest levels, the goals will decompose to Metric classes and the tasks will decompose to Action classes while the owner corresponds to an Actor class. A Goal-Task-Owner (GTO) structure can be defined without knowledge of the situation – and will be in this section. However, GTO structures cannot be populated without situation-specific knowledge.

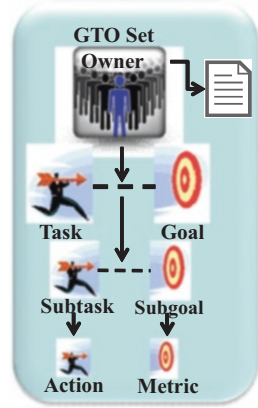
Figure 2.30 illustrates a typical scenario or situation. The Action takes place within a Host Nation, with its geography, resources and populace – and its culture, religions, laws, etc. This arena is represented by the ellipse in the center.

This scenario or situation is an example of unconventional conflict because there are competing Actors, each with its own agenda. The nature of this competition is what makes the situation neither conventional war nor peace. In this figure, the U.S. armed forces are represented as the Coalition. Other U.S. governmental agencies are represented by the State Department. Ideally, the goals of these two, while differing in detail, are in consonance. The tasks, however, definitely differ because the capabilities of these Actors differ.

The Host Nation (HN) is also represented by two Actors, the HN government and the HN armed forces. The goals and tasks of these two Actors may differ significantly. In the typical situation, there are also non-governmental organizations that have significant impacts. Here an international non-governmental organization (NGO) is a fairly benign, apolitical Actor and a political NGO is an Actor that sides with one or more of the opposition forces.

Also, typically, there are commercial interests in the arena. Here a construction company represents contractors hired to implement some of the tasks of the

Fig. 2.31 The GTO set icon



Coalition and State Department. The acquisition company represents external interests that wish to purchase and control HN resources. The regional power represents some external country in an analogous position to the State Department, but with possibly opposing interests.

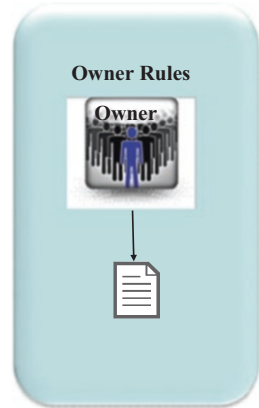
The three opposing forces that are represented here consist of groups with interests in opposition to the HN government. Their goals differ among themselves; however, many of their actions may be related so that they may form temporary alliances.

The quote from Sun-Tzu is apt, “Know the enemy and know yourself; in a hundred battles you will never be in peril.” (Sun-Tzu, 1963) The GTO Set structure, illustrated in Fig. 2.31, formalizes the concept of encoding these competing interests. The figure shows the icon that will be used in the complete Context Diagram, Fig. 2.36, to represent GTO Sets.

The situation or scenario is defined as a model, with a name and a date. The model has a several *GTOSetOwners* (the competing Actors). Each *GTOSetOwner* is identified as an Actor within the Unconventional Conflict Ontology and has a citation that includes the defining metadata for the GTO Set. (The precise terminology should be that GTO structure refers to the way in which elements are related, while GTO Set refers to an instantiation of the structure, with a particular owner and set of tasks, goals, etc. At times we will be somewhat loose in the use of this terminology).

The *GTOSetOwner* owns several *GTOTaskGoalPairs*, consisting of a *Goal* and a *Task* for accomplishing the goal. Each *GTOTaskGoalPair* has several *GTOSubTaskSubGoalPairs*, consisting of *SubGoals* of the *Goal* and *SubTasks* of the *Task* (with the subtask believed to be needed to accomplish a subgoal connected to the subtask). Each *SubGoal* has one or more *Metrics* within the Unconventional Conflict Ontology and each *SubTask* has several *Actions* within the Unconventional Conflict Ontology. Note that these *Actions* and *Metrics* are not paired or directly connected. The set of *Metrics* chosen for a particular *SubGoal* relate to the set of *Actions* chosen for the associated *SubTask* may be related by the *Action-Metric* connections of the ontology; however, some corresponding *Actions* or *Metrics* may be omitted by the owner based on the owner’s belief structure. Together, the GTO Sets in a single model represent a scenario or situation.

Fig. 2.32 The owner rules icon



Each owner has a set of goals and subgoals in his agenda and a set of tasks and subtasks that he believes will lead to the realization of this agenda. Even though the owner’s beliefs do not ensure that accomplishing these tasks will, in fact, lead to achieving the goals, it is important to record in the ontology what each owner believes. These beliefs form the owner’s implicit metric model.

Owner Rules

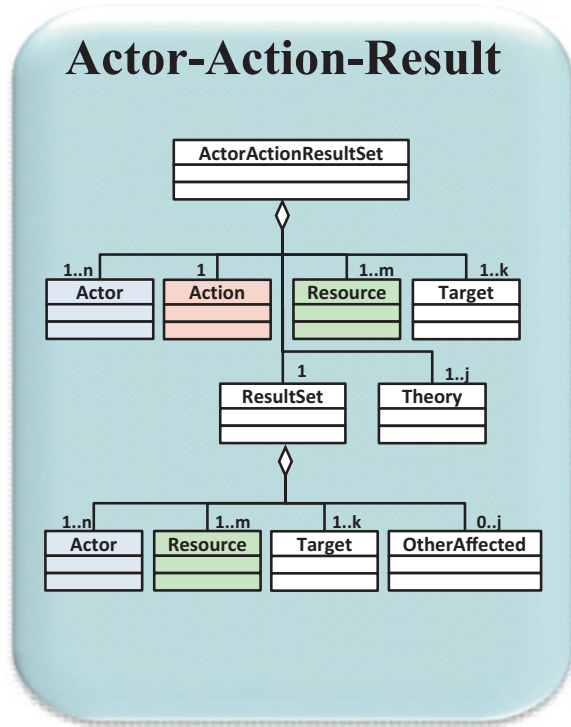
The owner in each GTO Set imposes a set of rules on its agents in executing the GTO Set tasks. (In general, the owner of a GTO Set is an Actor, individual or organizational, with subordinates who carry out the Actions). These rules are called rules of engagement (ROE) in military organizations, but have other names in other organizations. These rules can be constant throughout the time span of a situation and consistent across the entire theater; however, neither is required. Figure 2.32 represents these rules symbolically. The figure shows the icon that will be used in the complete Context Diagram, Fig. 2.36, to represent Owner Rules.

AAR Structures

The Actor-Action-Result (AAR) Sets represent a finer level of detail than the GTO Sets. Where the collection of GTO Sets represents a scenario, an AAR Set represents a vignette within the scenario. An Action from one GTO Set (or perhaps two or three very closely related Actions) and the associated Metric (or Metrics) are instantiated and form the basis for an AAR Set. For example, if the Action is to attack bridges and tunnels, the instantiated Action could be to attack a particular bridge.

Figure 2.33 shows that the Action has several associated elements: Actor, target, and resources needed for the Action. These resources might be physical elements

Fig. 2.33 The actor-action-result set icon



(vehicles, etc.) and might include other Actors. The figure shows the icon that will be used in the complete Context Diagram, Fig. 2.36, to represent AAR Sets.

The Action has a result; it affects the initiating Actor, the resources, the target, and possibly other elements (bystanders, other infrastructure, etc.) and changes the values of their Metrics. The rationale for computing the effects is not included in the Unconventional Conflict Ontology. Rather, the Result acts as a call for one or more social or physical theories that provide this rationale. (If the situation is being modeled on a computer, then “call” is used in the programming sense. If the situation is a real-world situation, the “call” is used in the sense of invoking a theory to provide a rationale).

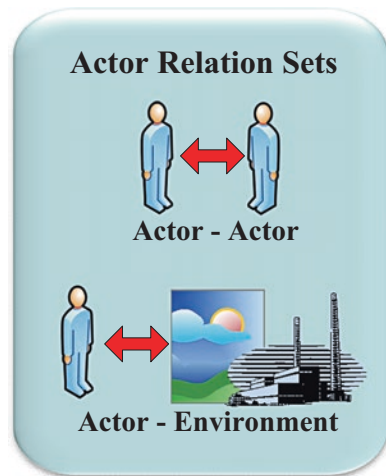
This is a Key Part of the Entire Ontology Paradigm The rest of the ontology structures and contents, including instantiations for a specific situation, is *descriptive* modeling. That is, it involves including a description of what is known and observed about unconventional conflict in general and about a particular conflict. This structure specifically identifies the points where the model must include *causal* modeling or substitute some *empirical substitute*, **which is not contained in the ontology**. Some of the causal modeling will be relatively straightforward, e.g., the effects of a certain amount of explosive force on a bridge. However, some of the causal modeling will require social theories that are not so straightforward, e.g., the changes of opinion and resulting actions that will occur among the affected people.

While errors in the descriptive modeling will affect model validity, identifying and correcting such errors or mitigating their effects is much less difficult than for errors in the causal modeling. The reason is that we know much less about the workings of the real world when it comes to the causes of social effects. However, this ontological structure allows for the specific identification of where such errors may occur in the model.

Actor Relations Structures

The Actor Relation Sets (Fig. 2.34) provide the final piece of the description of the scenario or situation. The figure shows the icon that will be used in the complete Context Diagram, Fig. 2.36, to represent Actor Relations sets. The Actor-Actor and Actor-Environment structures provide for the definition of the relationships (boss/employee, leader/follower, tribe/member, etc.) between Actors and the relationships (owner, controller, occupier, etc.) between an Actor and an Environment element, respectively.

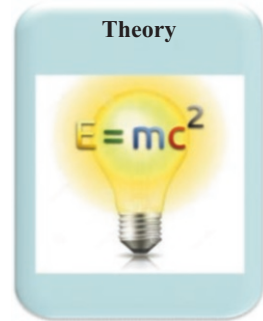
Fig. 2.34 The actor relation sets icon



Theories Ontology

The theories ontology is not part of the Unconventional Conflict Ontology; it is a separate ontology. However, it is useful in the application of the situation-dependent part of the Unconventional Conflict Ontology.

Figure 2.35 shows the icon that will be used to represent the Theories Ontology in the Final Context Diagram (in the concluding chapter). Einstein’s famous theory is shown in the glow of a lightbulb to represent all types of theories.

Fig. 2.35 The theory icon

A Total Ontology

Both the situation-independent and the situation-dependent ontologies are required for a total ontology of unconventional conflict. Despite the efforts to ensure completeness (for modeling at the “theater” level) with consistency (appropriate granularity), it should be expected that further use of the ontology will reveal some additional needs.

New Context Diagram

Figure 2.15 on page 51 provided the context diagram for the discussion of the situation-independent ontology. Figure 2.36 provides a revised context diagram that includes the internal semantic relationships that are part of the situation-independent ontology and adds the new structures that are required to capture the situation-dependent information. This new context diagram omits several connections, such as the ownership link between Actor and GTO Set, to allow for a compact figure; however, these links are implied.

The complete ontology is a holistic description of the domain of unconventional conflict. That is, the ontology is “characterized by comprehension of the parts of something as intimately interconnected and explicable only by reference to the whole.”

Ontology Relationships

Most of the discussion has centered on the classes of the ontology. However, we have mentioned several ontology relationships in this chapter, each of which deserves some explanation.

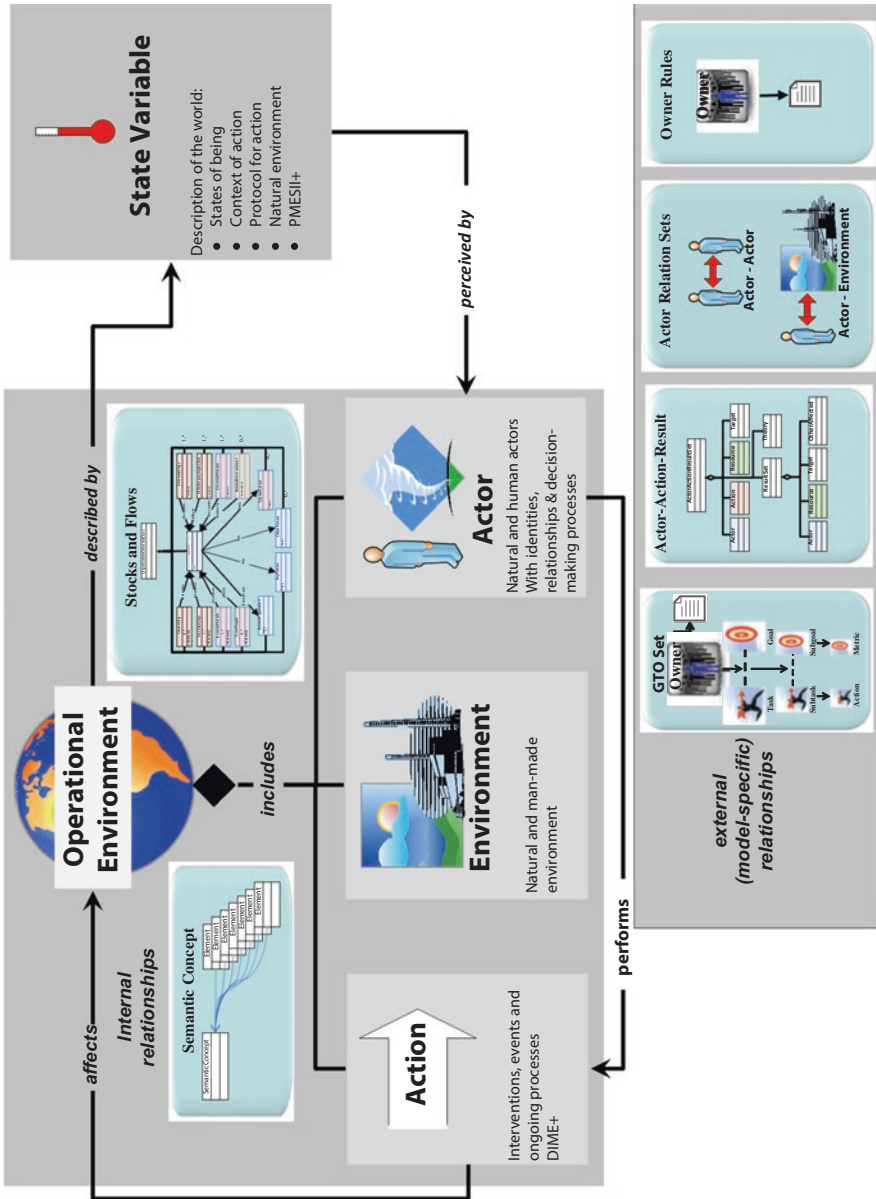


Fig. 2.36 Context diagram including situation-dependent parts

The class relations are as follows:

is-a: Each instance of A is an instance of B and each property of B is a property of A. Its inverse relation is *superClassOf*.

necessaryPartOf: A is a necessary part of B (composition). Its inverse relation is *hasNecessaryPart* (also shown as *includes*).

optionalPartOf: A is an optional part of B (aggregation). Its inverse relation is *hasOptionalPart*.

hasSource: A is an Element or a Metric and has Source B. Its inverse relation is *sourceOf*.

hasMetric: A has Metric B (also shown as *described by*). Its inverse relation is *metricOf*.

influences: A is a Metric and influences Metric or Element B. Its inverse relation is *influencedBy*.

affects: A is an Action and affects Actor, Environment Element, or Metric B. Its inverse relation is *affectedBy*.

increases: A is an Action and increases Actor, Environment Element, or Metric B. Its inverse relation is *increasedBy*.

performs: A is an Actor and performs Action B. Its inverse relation is *performedBy*.

similarTo: A is similar to B. Its inverse relation is *similarTo*.

playsRole: A is an Element and plays role B. Its inverse relation is *playedBy*.

One instance relation was also mentioned.

isTheSuperiorOf: Actor1 is the superior of Actor2 in some organization. Its inverse relation is *isTheSubordinateOf*.

Adding to the Ontology

In the beginning, as new elements or metrics were identified, they were simply added to the appropriate parts of the ontology. Now, the process of adding to the ontology is much more complex due to the inter-relations that have been described above.

For example, suppose a new Actor class is proposed. The first step is to see if that class already exists. There are too many classes to rely on memory of what already exists. Further, there may be a class that is similar that exists and a decision needs to be made about extending it, versus adding a new class. A new Actor may imply the need for a new Action (or vice versa). A review of the existing stocks-and-flows sets may reveal that the new element should be added to one of these. However, it might be that a new stocks-and-flows set is required and, perhaps, additional new elements may be needed to fill the roles in the new set. All the new elements must be checked for cascading connections and all need to be examined for connections to the sources.

If a new element is added, a new metric is going to be required and reviewed for connections to the sources – and the connection between the element and the metric has to be defined. The new element also has to be connected into the semantic thesaurus.

If these additions are made in connection with a particular situation, all of the new elements and metrics need to be considered as entries to the situation-dependent structures.

We are now prepared to present the contents of the Unconventional Conflict Ontology in Chaps. 3 through 9 and the contents of the Theories Ontology in Chap. 10.

Chapter 3

Actor Ontology



Actors are the active elements in the situation-independent part of the Unconventional Conflict Ontology. The Actor Ontology has four Actor categories and 11 Actor subcategories. Each of the 101 Actor classes is connected to at least one Actor subcategory by an *is-a* relation. The categories and subcategories describe types of Actor elements. For example, the distinction among individuals, significant groups, and demographic groups, described in Chap. 2, is made at the category level, with refinements made at the subcategory and class levels. Figure 3.1 provides an illustration of individual actors in conflict. This chapter describes the organization of the Actor ontology and all of its elements, along with the types of Metrics associated with each element.



Fig. 3.1 Two individual Actors

Ontology Organization

The Actor Ontology differentiates the Actor classes and provides similarity linkages among the classes. Figure 3.2 provides a diagram of the Actor ontology, showing the categories and subcategories and adding connections. As an example, *Actor-Individual* is a category; *KeyLeader* is a subcategory (of that category); and *KeyPoliticalIndividual* (shown in Table 3.1, below) is a class of that subcategory. Saddam Hussein would have been an instantiation of that class. The single class to the right of the taxonomy part stands for all of the Actor classes (such as those shown in Table 3.1), each of which may have multiple parents.

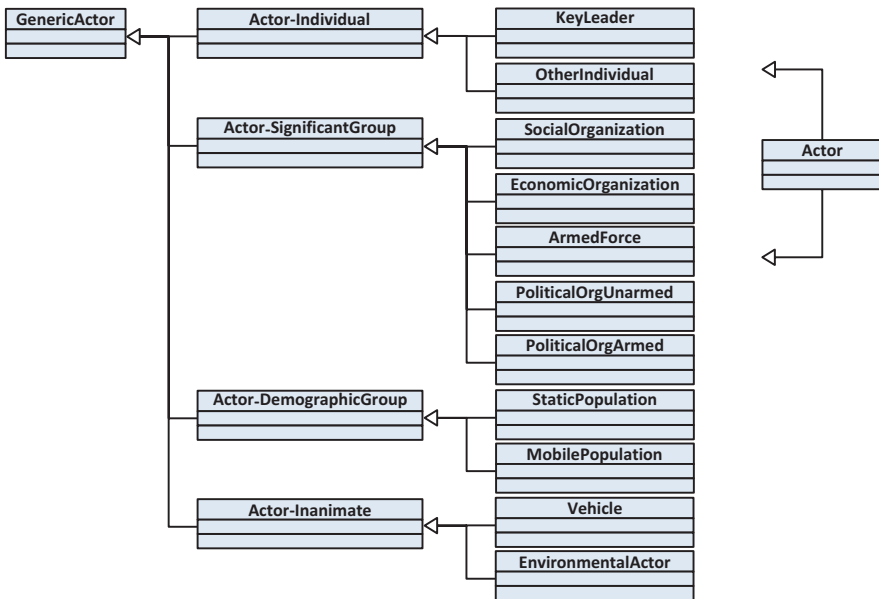


Fig. 3.2 Actor ontology

Each Actor class is linked to several Metrics. The full list of generic types of the Metrics is found in Table 2.1 in Chap. 2. All Actor classes are linked to a Metric of each of the following types (which instantiations will inherit, for example, the Saddam Hussein instantiation would have “Saddam Hussein” as the *Identity* value.):

- **110 Identity** Name or other identification of the entity.
- **210 Location** Current location (defined over one or more points, along a network, as an area, or by density over an area, including elevation/depth if appropriate). Location may be null.

- **220 *Time*** Action elements: event occurrence as point in time (date/time), event duration, event frequency (events per time period); Other elements: date/time of change of any other metric.
- **230 *Quantity*** Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).
- **250 *Movable*** Indicator as to whether entity can be moved or not and the current speed of movement; may include maximum speed.
- **310 *Affiliation*** Name of thing with which entity is affiliated (this is Actor’s organization or parent organization); intensity with which entity holds the affiliation or an entity’s members hold the affiliation.
- **320 *Hierarchy*** Actor’s authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy. See the Actor-Actors Relations in Chap. 9 for a direct method of identifying these Actors.)
- **340 *Activity*** Entity activity in terms of coverage, intensity, and number of activities.
- **420 *Influence*** Numeric or categorical level of influence of entity.

The Actor classes are listed in tables following their subcategories. Each entry contains the unique element identification (ID) number, the element name, the element description, and the identifying numbers for any Metric types that are not required by Actor class membership (the list above), category membership (a similar list in the category section), or subcategory membership (a similar list in the subcategory section).

Part of the definition deserves a remark. Many definitions will begin with the description of the class and will include the phrase, “or group of same.” This means that the class may represent a single entity or a group of entities of the defined type.

Individual Actors

The individual Actor is a class that represents an important person. Within the individual category, the subcategories distinguish between key leaders and other individuals. There are different Actor classes for key leaders of various types of groups. The “other individual” subcategory exists to allow for modeling “bit players” who are temporarily important, such as a suicide bomber. All individual Actor classes are linked to a Metric of the following type:

- **410 *DecisionMaking*** Description of the decision-making process and the quality of the decision-making.

Key Leader Actors

The key leader Actor classes are shown in Table 3.1 and are similar because each represents an important individual. They differ in the type of organization of which they are leaders. However, there is still room for further differentiation. For example, all business leaders are represented by a single class and all military leaders are represented by a (different) single class. All key leader Actor classes are linked to a Metric of the following type:

- **440 Effectiveness** Numeric or categorical level of effectiveness of entity.

Table 3.1 Key leader Actor classes

ID	Actor class	Definition	Mtype
39	<i>KeyLeaderAdvocatingPeaceAndStability</i>	An important pro-peace political leader or group of same	
40	<i>KeyLeaderAdvocatingConflictAndDissension</i>	An important anti-peace political leader or group of same	
42	<i>KeyPoliticalIndividual</i>	An important political leader or group of same	
105	<i>KeyIntervenorDiplomaticPerson</i>	An important diplomat or group of same	
142	<i>KeyMilitaryIndividual</i>	An important military leader or group of same	
190	<i>KeyNonGovtArmedOfficial</i>	An important non-government armed group leader or group of same	
248	<i>KeyCriminalLeader</i>	An important criminal leader or group of same	
296	<i>KeyLaborLeader</i>	An important labor leader or group of same	
309	<i>KeyBusinessIndividual</i>	An important business leader or group of same	
344	<i>KeyNGOIndividual</i>	An important nongovernmental organization (NGO), international organization (IO) or intergovernmental organization (IGO) leader or group of same	
381	<i>KeyEducationIndividual</i>	An important education leader or group of same	
435	<i>KeySocialIndividual</i>	An important social leader or group of same	
436	<i>KeySpiritualIndividual</i>	An important spiritual leader or group of same	
464	<i>KeyMediaIndividual</i>	An important local media leader or group of same	
1889	<i>KeyContractorLeader</i>	An important contractor leader, internal or external or group of same	

(continued)

Table 3.1 (continued)

ID	Actor class	Definition	Mtype
1894	<i>KeyInternationalMediaLeader</i>	An important international media leader or group of same	
1927	<i>KeyLawEnforcementLeader</i>	An important law enforcement leader or group of same	
1928	<i>KeyBureaucrat</i>	An important bureaucrat or group of same	
1931	<i>KeyJudicialLeader</i>	An important judicial leader or group of same	
1932	<i>KeyLegislator</i>	An important legislator or group of same	
1933	<i>KeyGovtExecutive</i>	An important government executive or group of same	
1934	<i>KeyHealthcareLeader</i>	An important healthcare leader or group of same	
1935	<i>KeyFirstResponderLeader</i>	An important first responder leader or group of same	
1936	<i>KeyIntelligenceServiceLeader</i>	An important intelligence service leader or group of same	

Other Individual Actors

The other individual Actor classes (Table 3.2) are similar to the key leader classes in composition; however, the difference lies in the role that is represented by the class. These classes are provided to support knowledge about people who are not leaders, but may become important for some other reason, if only temporarily.

Table 3.2 Other individual Actor classes

ID	Actor class	Definition	Mtype
1797	<i>Worker</i>	A worker or group of same	
1877	<i>LawEnforcementPerson</i>	A law enforcement person or group of same	
1879	<i>IntelligenceServicePerson</i>	An intelligence service person or group of same	
1881	<i>GovtPerson</i>	A general government person or group of same	
1884	<i>ContractorPerson</i>	A contractor person or group of same	
1890	<i>IntervenorSupportPerson</i>	An advisor to government or proto-government and judicial system and to intervenor organizations: economists, computer experts, agronomists, etc., or group of same	
1893	<i>LocalOrInternationalMediaPerson</i>	A member of the local or international media or group of same	

(continued)

Table 3.2 (continued)

ID	Actor class	Definition	Mtype
1897	<i>NGOWorker</i>	An NGO, IO or IGO worker or group of same	
1919	<i>Educator</i>	An educator or other education-related person or group of same	
1924	<i>HealthcarePerson</i>	A healthcare-related person or group of same	
1925	<i>FirstResponderPerson</i>	A first responder (fire, MEDICAL, local police, etc.) or group of same	
1926	<i>NonGovtArmedIndividual</i>	A terrorist, insurgent, private security force-, or regime-sponsored non-military armed person or group of same	
1929	<i>InterventionForcePerson</i>	An intervention force (military affiliation) person or group of same	
1930	<i>GovtMilitaryPerson</i>	A government military person or group of same	
2033	<i>IntervenorDiplomaticPerson</i>	An intervenor diplomatic person or group of same	

Significant Group Actors

The second category of Actors is composed of organizations, factions, and other groups that are judged to have significant influence on the situation. The subcategories divide significant groups into five types: social organizations, economic organizations, armed forces, unarmed political organizations, and armed political organizations. All significant group Actor classes are linked to Metrics of the following types:

- **410** *DecisionMaking* Description of the decision-making process and the quality of the decision-making.
- **430** *FairnessCorruption* Numeric or categorical level of fairness/corruption of entity.
- **440** *Effectiveness* Numeric or categorical level of effectiveness of entity.
- **470** *Professionalism* Numerical or categorical level of professionalism of the entity.

Social Organization Actors

Social organizations (Table 3.3) are groups that perform principally social functions or that are organized around social relationships or functions.

Table 3.3 Social organization Actor classes

ID	Actor class	Definition	Mtype
343	<i>NGOOrganization</i>	An NGO, IO or IGO or group of same	
430	<i>SocialFaction</i>	An important social faction or group of same	
431	<i>ReligiousFaction</i>	A religious faction, sect, or organization or group of same	
432	<i>Family</i>	An important family or group of same	
1937	<i>HealthcareOrganization</i>	A healthcare organization, public or private or group of same	
1938	<i>EducationOrganization</i>	An educational organization, public and private, at all levels (including technical schools and religious schools) or group of same	

Economic Organization Actors

Economic organizations (Table 3.4) are groups that perform economic functions, such as businesses, unions, and criminals. All economic organization Actor classes are linked to Metrics of the following types:

- **450 Efficiency** Numeric or categorical level of economic efficiency of entity.
- **460 HealthOrStrength** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Table 3.4 Economic organization Actor classes

ID	Actor class	Definition	Mtype
230	<i>AgricultureBusiness</i>	An agricultural business or group of same	
247	<i>CriminalOrganization</i>	A criminal organization or group of same	
259	<i>EnergyBusiness</i>	An energy business or group of same	
267	<i>FinancialServicesIndustry Business</i>	A financial business or group of same	
295	<i>WorkerOrganization</i>	A workers organization (labor union, labor pool, etc.) or group of same	
312	<i>MediaBusiness</i>	A media business or group of same	
313	<i>ManufacturingBusiness</i>	A manufacturing business or group of same	
314	<i>ServiceBusiness</i>	A service business or group of same (e.g., shops in a town or chain such as McDonald’s)	
315	<i>TransportationBusiness</i>	A transportation business or group of same	
316	<i>TourismIndustryBusiness</i>	A tourism industry company or group of same	
1900	<i>MiningBusiness</i>	A mining or associated business or group of same	
1906	<i>FishingBusiness</i>	A fishing or other aquaculture business or group of same	
1909	<i>TimberBusiness</i>	A timber or other associated business or group of same	
1912	<i>CulturalBusiness</i>	A cultural (for example, theater, museum, or Cultural) business or group of same	
1939	<i>ContractorBusiness</i>	A contractor business, internal or external, or group of same	

Armed Force Actors

Armed force organizations are various types of armed forces from private security organizations to national armies. All armed force Actor classes are linked to a Metric of the following type:

- **270 *Weaponry*** Entity's current weaponry types and quantities; may also include original or desired values.

Any links to Metric types besides those required by Actor class membership, category membership, or subcategory membership are listed in the fourth column in Table 3.5.

Table 3.5 Armed force Actor classes

ID	Actor class	Definition	Mtype
144	<i>InterventionForceOrganization</i>	An intervention force (military-related) or group of same	
145	<i>GovtMilitaryForceOrganization</i>	A Host Nation military force organization or group of same	
147	<i>RegimeSponsoredNonMilitaryArmedForceOrganization</i>	A regime-sponsored, non-military armed force organization or group of same	
148	<i>DemobilizedArmedForce</i>	A demobilized force (ex-armed force) as Actor or as Environmental description or group of same	240, 330, 460, 480
194	<i>ParamilitaryForceOrganization</i>	A paramilitary force organization or group of same	
195	<i>PrivateSecurityForceOrganization</i>	A private security force organization or group of same	
196	<i>InsurgentOrganization</i>	An insurgent group or group of same	
197	<i>TerroristOrganization</i>	A terrorist group or group of same	

The additional links are defined below:

- **240 *DisasterOrCondition*** Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not.

- **330 *OwnerOriginator*** For Environment this is the owner, for Action this is Action’s originator.
- **460 *HealthOrStrength*** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.
- **480 *Transparency*** Numerical or categorical level of transparency.

Political Organization-Unarmed Actors

Unarmed political organizations are groups that are organized to serve government or political needs and that are not armed. Note that some of these organizations may include armed individuals; however, the organization itself is not armed. A police *FirstResponderOrganization* may be an exception. Such an organization should also be represented as an instantiation of the *LawEnforcementOrganization* in the next subcategory. All political organization-unarmed Actor classes are linked to a Metric of the following type:

- **480 *Transparency*** Numerical or categorical level of transparency.

Any links to Metric types besides those required by Actor class membership, category membership, or subcategory membership are listed in the fourth column in Table 3.6.

Table 3.6 Political organization-unarmed Actor classes

ID	Actor class	Definition	Mtype
3	<i>GovtDecisionAuthority</i>	The Actor having power (depends on government type: autocratic, democratic, theocratic, monarchy, warlords, etc.)	510
5	<i>FirstResponderOrganization</i>	A fire fighter, emergency medical, or police responder organization, etc., or group of same	
8	<i>SocialServicesOrganization</i>	A child services, elderly care, etc., organization or group of same	
64	<i>JudicialBranch</i>	A judicial organization, both government and alternative (shadow), or group of same	
1887	<i>ExecutiveBranch</i>	Executive branch at any level of government or alternative (shadow) or group of same	330, 460
1888	<i>LegislativeBranch</i>	Legislative branch at any level of government or part (Senate vs. lower house) or alternative (shadow) or group of same	330, 460
1940	<i>GovtBureaucracyOrganization</i>	A government bureaucracy (any department) or group of same	

The additional links are defined below:

- **330 *OwnerOriginator*** For Environment this is the owner, for Action this is Action's originator.
- **460 *HealthOrStrength*** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.
- **510 *Miscellaneous*** Text description.

Political Organization-Armed Actors

Armed political organizations (Table 3.7) are groups that are organized to serve government or political needs and that are likely to have armed guards or other armed personnel as a part of the organization. All political organization-armed Actor classes are linked to Metrics of the following types:

- **270 *Weaponry*** Entity's current weaponry types and quantities; may also include original or desired values.
- **480 *Transparency*** Numerical or categorical level of transparency.

Table 3.7 Political organization-armed Actor classes

ID	Actor class	Definition	Mtype
41	<i>GovtTypeOrganization</i>	A government, alternative (shadow) government, or intervention (as Host Nation government substitute) organization, including legislature and administration, or group of same	
44	<i>ExternalForceOrganizationAdvocatingConflict</i>	An external force (countries, groups, etc.) advocating conflict or group of same	
45	<i>PoliticalFaction</i>	A political faction or group of same	
65	<i>LawEnforcementOrganization</i>	A law enforcement organization (of all types) or group of same	
103	<i>SideInConflict</i>	A side in the conflict (Host Nation, factions, intervenors, etc.), used to group Actors, such as government, military, law enforcement, or group of same	
104	<i>InterventionOrganization</i>	An intervention organization (in that role), diplomats, advisors, support personnel, or group of same	
146	<i>IntelligenceServiceOrganization</i>	A non-intervention intelligence service or group of same	

Demographic Group Actors

The third category of Actors is composed of groups that are typically large with respect to the entire population and whose membership is best described by a density distribution over a geographic area. All demographic group Actor classes are linked to a Metric of the following type:

- **410 DecisionMaking** Description of the decision-making process and the quality of the decision-making.

Static Population Actors

Static population Actors consist of those for which movement is represented best by changes in the density distribution over a **constant** geographic area. Any links to Metric types besides those required by Actor class membership, category membership, or subcategory membership are listed in the fourth column in Table 3.8.

Table 3.8 Static population Actor classes

ID	Actor class	Definition	Mtype
43	<i>PoliticalPopulation</i>	A politically active population or group of same	
246	<i>CriminalPopulation</i>	Criminals as a demographic group or group of same	
427	<i>GeneralPopulation</i>	General population as a demographic group	
428	<i>CulturalPopulation</i>	A cultural division of the population as demographic group or group of same	
429	<i>ReligiousPopulation</i>	A religious division of the population as demographic group or group of same	
765	<i>GeographicalSubdivision</i>	Geographical subdivision or group of same, has population for members	270, 330, 460
2064	<i>WorkerPopulation</i>	A division of the population as a demographic group, e.g., all workers, workers at a particular trade, etc. or group of same	

The additional links are defined below:

- **270 Weaponry** Entity’s current weaponry types and quantities; may also include original or desired values.
- **330 OwnerOriginator** For Environment this is the owner, for Action this is Action’s originator. (Note that this is included here because the *GeographicalSubdivision* class is also an Environment class.)
- **460 HealthOrStrength** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Mobile Population Actors

Mobile population Actors (Table 3.9) consist of those for whom movement is represented best by changes in the density distribution over a **changing** geographic area.

Table 3.9 Mobile population Actor classes

ID	Actor class	Definition	Mtype
402	<i>InternallyDisplacedPopulation</i>	Internally displaced population (IDPs) or group of same	
403	<i>MigrantPopulation</i>	Migrant population from outside the country (due to pull factors) or group of same	
406	<i>RefugeePopulation</i>	Migrant population from outside the country (due to push factors) or group of same	
407	<i>ExpatriatePopulation</i>	Expatriate, migrant, and refugee population living abroad as a demographic group or group of same	

Inanimate Actors

The fourth category of Actors consists of inanimate Actors, such as vehicles and weather events. All inanimate Actor classes are linked to a Metric of the following type:

- **330** *OwnerOriginator* For Environment this is the owner, for Action this is Action’s originator. (Note that this metric is included because these classes are also Environment classes and if used as Environment elements will require this metric. If the element is used as an Actor, this metric will be present, but will have a blank or “not applicable” value.)

Vehicle Actors

Vehicle Actors (Table 3.10) are divided into military and non-military vehicle classes. Instantiation of either can be by land, sea, or air vehicles. All vehicle Actor classes are linked to Metrics of the following types:

- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **270** *Weaponry* Entity’s current weaponry types and quantities; may also include original or desired values. (Note that even civilian vehicles may be armed.)
- **350** *Availability* Numeric or categorical level of availability of entity; may include original or desired levels.
- **460** *HealthOrStrength* Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Table 3.10 Vehicle Actor classes

ID	Actor class	Definition	Mtype
575	<i>MilitaryVehicle</i>	Military (including intervention) vehicle or group of same	
618	<i>VehicleNonMilitary</i>	Non-military vehicle (autos, planes, ships, etc.) or group of same	

Environmental Actors

The Environmental Actor classes (Table 3.11) consist of element classes that can be treated as Actors, Actions, or Environment elements, depending on the viewpoint. For example, a hurricane could be an instance of the *AirMovementOrStorm* class. When viewed as something causing destruction, it is an Actor. When viewed as the destructive force, it is an Action. And when viewed as just part of the environment, it is an Environmental element. All Environmental Actor classes are linked to Metrics of the following types:

- **240 *DisasterOrCondition*** Indicators as to whether entity is a disaster or a condition, whether it can be caused by man or not, whether it can be caused by nature or not.
- **280 *Damage*** Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **460 *HealthOrStrength*** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Table 3.11 Environmental Actor classes

ID	Actor class	Definition	Mtype
395	<i>ExperienceHealthEmergency</i>	Health emergency: famine, epidemic, etc. As Actor, produce effects; as Environment, show status; as Action - cause damage or group of same	
755	<i>AirMovementOrStorm</i>	Storm: blizzard/heavy snowfall; hurricane/cyclone/tropical storm; thunderstorm/lightning/wind/hail; tornado; as Action - cause damage or group of same	
768	<i>EarthMovement</i>	Earth movement: earthquake; landslide/mudslide/avalanche, volcanic eruptions; as Action - cause damage or group of same	
770	<i>FireOrWildfire</i>	Fire (building or countryside fire); as Action - cause damage or group of same	
772	<i>WaterMovement</i>	Water movement: flood/dam failure, tsunamis, seiche; as Action - cause damage or group of same	
774	<i>ManmadeDisaster</i>	Man-made disaster: nuclear power plant/hazardous materials/chemical emergency; other man-made or technological disaster; as Action - cause damage or group of same	

Actor Ontology Recap

The only relations used in this chapter are the *is-a* and *hasMetric* relations, explained as follows:

is-a: Each instance of A is an instance of B and each property of B is a property of A. Its inverse relation is *superClassOf*.

hasMetric: A has Metric B (also shown as *described by*). Its inverse relation is *metricOf*.

The nouns of the unconventional conflict domain that represent active elements are Actors. (The nouns for inactive elements are represented by the Environmental Elements of Chap. 5). Some Actors represent individuals; some represent groups; some represent demographic populations; and some represent inanimate things. However, all are active, capable of initiating Actions, which are discussed in Chap. 4.

Chapter 4

Action Ontology



Actions are the interventions, events, and ongoing processes in the situation-independent part of the Unconventional Conflict Ontology that are performed by Actors. Actions directly cause changes. The Action Ontology has seven Action categories, 20 subcategories, and 392 Action elements. These Action elements constitute the classes that would be the lowest level of a DIME ontology. Figure 4.1 provides an illustration of an Action: “eat.” This chapter describes the organization of the Action Ontology and all of its elements, along with the types of Metrics associated with each element.



Fig. 4.1 Action: Consumption

Ontology Organization

The Action Ontology differentiates the Action classes and provides similarity linkages among the classes. Figure 4.2 provides a diagram of the Action ontology, showing the categories and subcategories and adding connections. As an example, *DamageAndAntipersonAction* is a category; *DamageAction* is a subcategory (of that category); and *DamageFinancialInfrastructure* (shown in Table 4.1, below) is a class of that subcategory. A denial of service attack on a financial institution would be an instantiation of that class. The single class to the right of the taxonomy part stands for all of the Action classes, each of which may have multiple parents.

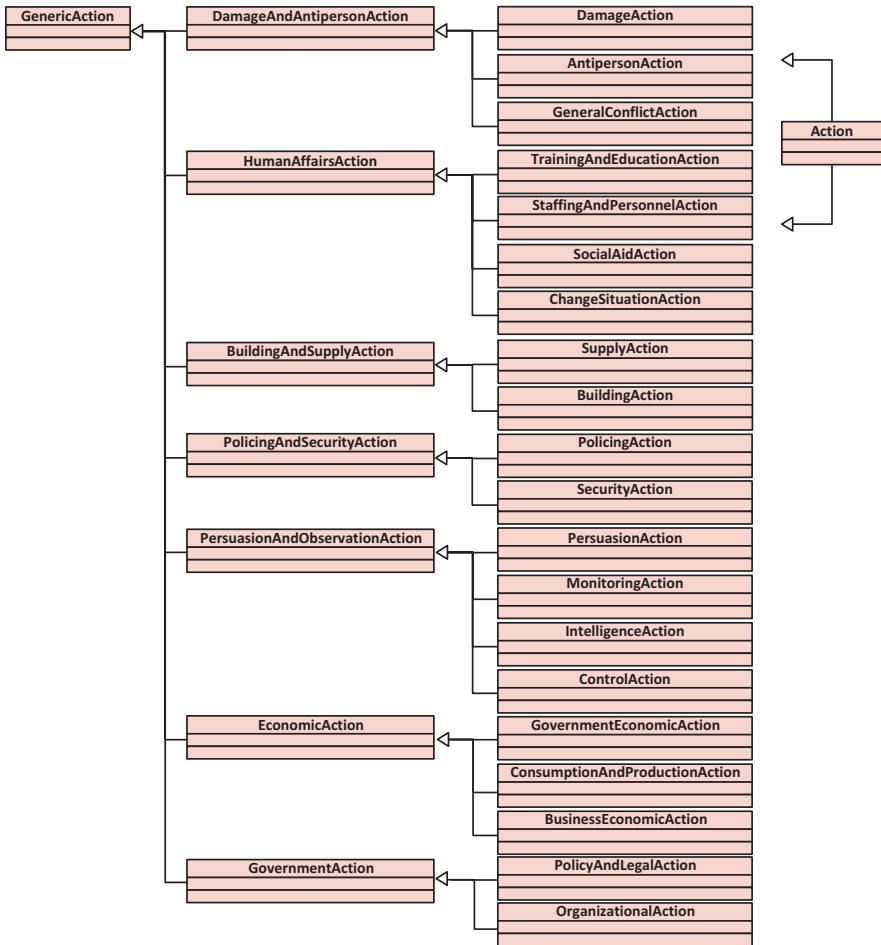


Fig. 4.2 Action ontology

Each Action class is linked to several Metrics. The generic types of the Metrics are listed in Table 2.1 in Chap. 2. All Action classes are linked to a Metric of the following types:

- **110 Identity** Name or other identification of the entity.
- **210 Location** Current location (defined over one or more points, along a network, as an area, or by density over an area, including elevation/depth if appropriate). Location may be null.
- **220 Time** Action elements: event occurrence as point in time (date/time), event duration, event frequency (events per time period); Other elements: date/time of change of any other metric.
- **330 OwnerOriginator** For Environment this is the owner, for Action this is Action's originator.

The Action classes are listed in tables following their subcategories. Each entry contains the unique element identification (ID) number, the element name, the element description, and the identifying numbers for any Metric types that are not required by Actor class membership (the list above), category membership (a similar list in the category section), or subcategory membership (a similar list in the subcategory section).

Part of the definition deserves a remark. Some definitions will begin with the description of the class and will include the phrase, "or group of same." This means that the class may represent a single entity or a group of entities of the defined type.

Damage and Antiperson Actions

The first category of Action consists of Actions that by their nature cause damage and injury. The subcategories divide these Actions into damage to things, injury and death to people, and general conflict Actions that can do both. All damage and antiperson Action classes are linked to a Metric of the following type:

- **280 Damage** Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.

Damage Actions

Damage Actions are those that cause damage and destruction to things. The classes differentiate the things affected or the type of damage (e.g., chemical damage). In some cases the causal agency is included. Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.1.

Table 4.1 Damage Action classes

ID	Action class	Definition	Mtype
331	<i>DamageFinancialInfrastructure</i>	Damage financial infrastructure (in various ways)	
377	<i>DamageCivilianHousing</i>	Damage civilian housing	
445	<i>DamageReligiousFacility</i>	Damage religious facilities	
505	<i>DamageManufacturingInfrastructure</i>	Damage manufacturing structures or equipment	
511	<i>DamageAgricultureInfrastructureLivestock</i>	Damage agricultural structures, equipment or livestock	
517	<i>DamageShopsOrCommercialInfrastructure</i>	Damage shops or commercial structures or equipment	
524	<i>DamageInformationAndMediaInfrastructure</i>	Damage media infrastructure or equipment	
533	<i>DamageSchoolOrEducationalInfrastructure</i>	Damage schools or educational structures, including equipment	
540	<i>DamageHealthcareInfrastructure</i>	Damage health infrastructure, including equipment	
564	<i>DamageElectricityProductionPlant</i>	Damage electricity production plant, including equipment	
566	<i>DamageElectricityDistributionInfrastructure</i>	Damage electricity distribution system, including equipment	
568	<i>DamageExtractiveEnergyProductionInfrastructure</i>	Damage extractive energy (oil, coal, etc.) production, including equipment	
570	<i>DamageExtractiveEnergyTransportationInfrastructure</i>	Damage extractive energy transportation (e.g., oil pipelines), including equipment	
584	<i>DamageGovtInfrastructure</i>	Damage government structure (including police), including equipment	
586	<i>DamageMilitaryInfrastructure</i>	Damage military structure, including equipment	
592	<i>DamageMilitaryVehicle</i>	Damage military vehicle	
647	<i>DamageRoadInfrastructure</i>	Damage roads	
649	<i>DamageRailroadInfrastructure</i>	Damage railroads, including equipment	
651	<i>DamageBridgeOrTunnelInfrastructure</i>	Damage bridges or tunnels including equipment	
653	<i>DamageSeaportInfrastructure</i>	Damage seaports including equipment	
655	<i>DamageAirportInfrastructure</i>	Damage airports including equipment	
657	<i>DamageVehicle</i>	Damage non-military vehicles	
659	<i>DamageWaterwaysInfrastructure</i>	Damage waterways including equipment	
677	<i>DamageWaterDistributionInfrastructure</i>	Damage water distribution including equipment	
679	<i>DamageWaterOrSewageTreatmentFacilities</i>	Damage water or sewage treatment facilities including equipment	
681	<i>DamageDamInfrastructure</i>	Damage dams including equipment	
714	<i>CauseAirSpaceToSubsurfaceSeaDamageAttrition</i>	Cause Air/Space to Subsurface Sea damage/attrition	

(continued)

Table 4.1 (continued)

ID	Action class	Definition	Mtype
716	<i>CauseAirSpaceToGroundSeaSurfaceDamageAttrition</i>	Cause Air/Space to Ground/Sea Surface damage/attrition	
718	<i>CauseAirSpaceToAirSpaceDamageAttrition</i>	Cause Air/Space to Air/Space damage/attrition	
720	<i>CauseGroundSeaSurfaceToSubsurfaceSeaDamageAttrition</i>	Cause Ground/Sea Surface to Subsurface Sea damage/attrition	
722	<i>CauseGroundSeaSurfaceToGroundSeaSurfaceDamageAttrition</i>	Cause Ground/Sea Surface to Ground/Sea Surface damage/attrition	
724	<i>CauseGroundSeaSurfaceToAirSpaceDamageAttrition</i>	Cause Ground/Sea Surface to Air/Space damage/attrition	
726	<i>CauseSubsurfaceSeaToSubsurfaceSeaDamageAttrition</i>	Cause Subsurface Sea to Subsurface Sea damage/attrition	
728	<i>CauseSubsurfaceSeaToGroundSeaSurfaceDamageAttrition</i>	Cause Subsurface Sea to Ground/Sea Surface damage/attrition	
730	<i>CauseSubsurfaceSeaToAirSpaceDamageAttrition</i>	Cause Subsurface Sea to Air/Space damage/attrition	
732	<i>CauseHighYieldExplosivesDamageAttrition</i>	Cause High-yield explosives damage/attrition	
734	<i>CauseChemicalDamageAttrition</i>	Cause Chemical damage/attrition	
736	<i>CauseBiologicalDamageAttrition</i>	Cause Biological damage/attrition	
738	<i>CauseRadiologicalDamageAttrition</i>	Cause Radiological damage/attrition	
740	<i>CauseCollateralDamageAttrition</i>	Cause Collateral damage/attrition	
755	<i>AirMovementOrStorm</i>	Storm: blizzard/heavy snowfall; hurricane/cyclone/tropical storm; thunderstorm/lightning/wind/hail; tornado; as Action - cause damage	230, 240, 250, 310, 320, 340, 420, 460
768	<i>EarthMovement</i>	Earth movement: earthquake; landslide/mudslide/avalanche, volcanic eruptions; as Action - cause damage	230, 240, 250, 310, 320, 340, 420, 460
770	<i>FireOrWildfire</i>	Fire (building or countryside fire); as Action - cause damage	230, 240, 250, 310, 320, 340, 420, 460
772	<i>WaterMovement</i>	Water movement: flood/dam failure, tsunami, seiche; as Action - cause damage or group of same	230, 240, 250, 310, 320, 340, 420, 460

(continued)

Table 4.1 (continued)

ID	Action class	Definition	Mtype
774	<i>ManmadeDisaster</i>	Man-made disaster: nuclear power plant/hazardous materials/chemical emergency; other man-made or technological disaster; as Action - cause damage or group of same	230, 240, 250, 310, 320, 340, 420, 460
1811	<i>DamageSensorProcesses</i>	Damage military sensor equipment or systems or intelligence	
1812	<i>DamageCommunicationsProcesses</i>	Damage military communications equipment or systems	
1813	<i>DamageCommandAndControlProcesses</i>	Damage military command and control processes or computers	
1815	<i>DamagePrisonInfrastructure</i>	Damage prison or jail	
1905	<i>DamageMiningInfrastructure</i>	Damage mining infrastructure	
1918	<i>DamageCulturalInfrastructure</i>	Damage cultural (for example, theater, museum, or Cultural) infrastructure	
2034	<i>DamageRefugeeCampOrTemporaryShelter</i>	Damage temporary shelter/housing/refugee camps (in or near Host Nation)	
2058	<i>DamageMIS</i>	Damage Host Nation or other organization management information systems (MIS), etc., physically or with cyber attacks	460

The additional links are defined below:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).
- **240** *DisasterOrCondition* Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not.
- **250** *Movable* Indicator as to whether entity can be moved or not and the current speed of movement; may include maximum speed.
- **310** *Affiliation* Name of thing with which entity is affiliated (this is Actor’s organization or parent organization); intensity with which entity holds the affiliation or an entity’s members hold the affiliation.
- **320** *Hierarchy* Actor’s authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.)
- **340** *Activity* Entity activity in terms of coverage, intensity, and number of activities.
- **420** *Influence* Numeric or categorical level of influence of entity.
- **460** *HealthOrStrength* Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Antiperson Actions

Antiperson Actions are those that cause death and injury to people. The classes differentiate the things affected or the type of injury (e.g., chemical damage). Note that many of these Actions are also listed in the damage subcategory (e.g., 714 *CauseAirSpaceToSubsurfaceSeaDamageAttrition*). This is because the Action in question can do both – damage things and injure people. (This provides an example of the need for an ontology rather than a taxonomy.) In some cases the causal agency is included. Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.2.

Table 4.2 Antiperson Action classes

ID	Action class	Definition	Mtype
98	<i>Extort_Suppress Population_Opposition</i>	Conduct extortion or suppression actions against the general population or opposition groups	510
100	<i>ConductExtrajudicial Action</i>	Conduct various extrajudicial actions (killings, intimidation, including corrupt activities)	510
255	<i>EngageInCriminalOr CorruptAction</i>	Engage in criminal or corrupt activities (Intimidation, kidnapping, murder, smuggling, drug trafficking, bribery, “protection,” illicit services, self-dealing, prostitution, etc.)	510
395	<i>ExperienceHealth Emergency</i>	Health emergency: famine, epidemic, etc. As Actor, produce effects; as Environment, show status; as Action - cause damage or group of same	230, 240, 250, 310, 320, 340, 420, 460, 480, 510
714	<i>CauseAirSpace ToSubsurfaceSea DamageAttrition</i>	Cause Air/Space to Subsurface Sea damage/attrition	
716	<i>CauseAirSpaceTo GroundSeaSurface DamageAttrition</i>	Cause Air/Space to Ground/Sea Surface damage/attrition	
718	<i>CauseAirSpaceToAir SpaceDamageAttrition</i>	Cause Air/Space to Air/Space damage/attrition	
720	<i>CauseGroundSea SurfaceToSubsurface SeaDamageAttrition</i>	Cause Ground/Sea Surface to Subsurface Sea damage/attrition	
722	<i>CauseGroundSea SurfaceToGroundSea SurfaceDamageAttrition</i>	Cause Ground/Sea Surface to Ground/Sea Surface damage/attrition	
724	<i>CauseGroundSea SurfaceToAirSpace DamageAttrition</i>	Cause Ground/Sea Surface to Air/Space damage/attrition	

(continued)

Table 4.2 (continued)

ID	Action class	Definition	Mtype
726	<i>CauseSubsurfaceSeaToSubsurfaceSeaDamageAttrition</i>	Cause Subsurface Sea to Subsurface Sea damage/attrition	
728	<i>CauseSubsurfaceSeaToGroundSeaSurfaceDamageAttrition</i>	Cause Subsurface Sea to Ground/Sea Surface damage/attrition	
730	<i>CauseSubsurfaceSeaToAirSpaceDamageAttrition</i>	Cause Subsurface Sea to Air/space damage/attrition	
732	<i>CauseHighYieldExplosivesDamageAttrition</i>	Cause High-yield explosives damage/attrition	
734	<i>CauseChemicalDamageAttrition</i>	Cause Chemical damage/attrition	
736	<i>CauseBiologicalDamageAttrition</i>	Cause Biological damage/attrition	
738	<i>CauseRadiologicalDamageAttrition</i>	Cause Radiological damage/attrition	
740	<i>CauseCollateralDamageAttrition</i>	Cause Collateral damage/attrition	
752	<i>Obscurants_FogOrManmade</i>	Fog or man-made obscurant or group of same; as Action - cause effects	230, 240, 250, 420, 460, 510
755	<i>AirMovementOrStorm</i>	Storm: blizzard/heavy snowfall; hurricane/cyclone/tropical storm; thunderstorm/lightning/wind/hail; tornado; as Action - cause damage or group of same	230, 240, 250, 310, 320, 340, 420, 460
768	<i>EarthMovement</i>	Earth movement: earthquake; landslide/mudslide/avalanche, volcanic eruptions; as Action - cause damage or group of same	230, 240, 250, 310, 320, 340, 420, 460
770	<i>FireOrWildfire</i>	Fire (building or countryside fire); as Action - cause damage or group of same	230, 240, 250, 310, 320, 340, 420, 460
772	<i>WaterMovement</i>	Water movement: flood/dam failure, tsunami, seiche; as Action - cause damage or group of same	230, 240, 250, 310, 320, 340, 420, 460
774	<i>ManmadeDisaster</i>	Man-made disaster: nuclear power plant/hazardous materials/chemical emergency; other man-made or technological disaster; as Action - cause damage or group of same	230, 240, 250, 310, 320, 340, 420, 460
1777	<i>ConductDrugTrade</i>	Engage in drug production, movement or trafficking activities	230, 460, 510
1781	<i>ConductFinancialCrimeOrMoneyLaundering</i>	Conduct financial crimes or money laundering	230, 460, 510
1782	<i>ConductIntellectualPropertyTheft</i>	Conduct intellectual property theft, corporate espionage or cybercrimes	230, 460, 510
1784	<i>EngageInOrganizedOrGangRelatedCrime</i>	Create organizations or gangs and engage in crime	510
2055	<i>CreateCivilDisturbance</i>	Create civil disturbances: parades, demonstrations, peaceful protests, riots	460

The additional links are defined below:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).
- **240** *DisasterOrCondition* Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not.
- **250** *Movable* Indicator as to whether entity can be moved or not and the current speed of movement; may include maximum speed.
- **310** *Affiliation* Name of thing with which entity is affiliated (this is Actor’s organization or parent organization); intensity with which entity holds the affiliation or an entity’s members hold the affiliation.
- **320** *Hierarchy* Actor’s authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.)
- **340** *Activity* Entity activity in terms of coverage, intensity, and number of activities.
- **420** *Influence* Numeric or categorical level of influence of entity.
- **460** *HealthOrStrength* Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.
- **480** *Transparency* Numerical or categorical level of transparency.
- **510** *Miscellaneous* Text description.

General Conflict Actions

General conflict Actions are those that are part of general conflict and may cause damage and destruction to things or death and injury to people. In some classes the results are collateral, rather than directly intended. Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.3.

Table 4.3 General conflict Action classes

ID	Action class	Definition	Mtype
126	<i>ConductInterventionPeaceOperation</i>	Conduct general Peace Operations within the Host Nation	510
128	<i>ConductConventionalWarOperation</i>	Conduct conventional war (by the Host Nation against others or against the Host Nation by intervenors)	510
130	<i>ConductIrregularWarOperation</i>	Conduct general Irregular War activities within the Host Nation	510

Table 4.3 (continued)

ID	Action class	Definition	<i>Mtype</i>
165	<i>ConductMilitary Exercise</i>	Conduct military exercise with or without Host Nation military	510
167	<i>ConductIntervention StabilityOperation</i>	Conduct intervention Stability operation within the Host Nation	510
186	<i>ConductPersonnel RecoveryOperation</i>	Conduct personnel recovery operation (search and rescue)	510
199	<i>ConductTerrorismOrAnti OrCounterterrorismOp</i>	Conduct terrorism or anti- or counterterrorism operation within Host Nation (and nearby areas)	510
209	<i>ProvideConsequence ManagementSupport</i>	Provide consequence management support (as a result of use of chemical, biological or radiological weapons)	510
213	<i>ConductPiracyOrAnti PiracyOperation</i>	Conduct Piracy or Anti-Piracy operation	510
215	<i>ConductIntervention HumanitarianAssistance Operation</i>	Conduct intervention Humanitarian Assistance operation within Host Nation	510
217	<i>ConductNonCombatant EvacuationOperation</i>	Conduct Non-combatant Evacuation Operation within Host Nation (and nearby areas)	510
2025	<i>ExecuteCivilDefensePlan</i>	Execute Host Nation civil defense plan	460
2059	<i>MoveSelf</i>	Element changes location or location distribution	460, 510

The additional links are defined below:

- **460** *HealthOrStrength* Numeric or categorical level of health (as in economic health) or strength (such as strength or amount of progress) of entity.
- **510** *Miscellaneous* Text description.

Human Affairs Actions

The second category of Action consists of Actions that affect human affairs. The subcategories divide these Actions into training and education Actions, staffing and personnel Actions, social aid Actions, and Actions that change the situation. There are no common Metric type links for this category beyond the general Action links.

Training and Education Actions

Training and education Actions are those that relate to training and educating people. The classes generally differentiate the type of people affected. All training and education Action classes are linked to a Metric of the following type:

- **230 Quantity** Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).

Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.4.

Table 4.4 Training and education Action classes

ID	Action class	Definition	Mtype
15	<i>EducateGovtPersonnel</i>	Educate governments in how various government processes work	
17	<i>TrainFirstResponders</i>	Train first responders (fire, medical, etc.)	
21	<i>TrainNewPoliticalLeaders</i>	Train new political leaders in responsibilities, processes, etc.	
80	<i>TrainLawEnforcementPersonnel</i>	Train law enforcement personnel	
155	<i>TrainMilitaryForces</i>	Train military forces	280
161	<i>TrainIntelligenceServices</i>	Train intelligence services	
299	<i>ProvideJobTrainingOrEmploymentForDischargedMilitaryPersonnel</i>	Provide job training or employment for discharged military personnel	
386	<i>TrainEducators</i>	Train educators	
389	<i>ProvideJobTraining</i>	Provide general job training	
466	<i>SponsorMediaTrainingOrProfessionalization</i>	Sponsor media training or professionalization (fair, honest and complete reporting, etc.)	460
1977	<i>EducateStudents</i>	Educate students	

The additional links are defined below:

- **280 Damage** Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **460 HealthOrStrength** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Staffing and Personnel Actions

Staffing and personnel Actions are those that relate to increasing or decreasing organization membership. In some cases this relationship is direct, as in *IncreaseWorkers*, and in some cases it is indirect. For instance, *IDIndictOrInterruptRecruitmentByNonNationStateActor* includes interrupting recruitment by non-nation-state Actors (a category that includes general terrorist

organizations), which naturally will affect organization membership. The classes frequently differentiate between increases and decreases and the groups that are affected. All staffing and personnel Action classes are linked to a Metric of the following type:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).

Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.5.

Table 4.5 Staffing and personnel Action classes

ID	Action class	Definition	Mtype
203	<i>IDInderdictOrInterrupt RecruitmentByNonNation StateActor</i>	Identify, interdict or interrupt recruitment by non-nation-state Actor or disrupt it	280, 460
299	<i>ProvideJobTrainingOr EmploymentForDischarged MilitaryPersonnel</i>	Provide job training or employment for discharged military personnel	
302	<i>CreatePublicWorksProgram</i>	Create public works program within Host Nation to generate jobs	460
1792	<i>ProvideProgram OrPersonnelSupport</i>	Provide program design or learning or personnel to support Foreign Assistance Standardized Program (FASP) programs	510
1808	<i>ChangeWorkersJobStatus</i>	Workers get hired, fired, retired, change jobs	
1816	<i>DecreaseFirst RespondersPersonnel</i>	Decrease number or activity of first responders, through all means	
1819	<i>IncreasePoliticalPopulation</i>	Increase the political activity of the population	510
1820	<i>DecreasePoliticalPopulation</i>	Decrease the political activity of the population	510
1824	<i>IncreaseIntervenor DiplomaticPersonnel</i>	Increase the number of diplomats	
1825	<i>DecreaseIntervenor DiplomaticPersonnel</i>	Decrease the number of diplomats	
1826	<i>IncreaseTheIntervention ForcesPersonnel</i>	Increase the number or type of intervention forces personnel	
1827	<i>DecreaseTheIntervention ForcesPersonnel</i>	Decrease the number or type of intervention forces personnel	
1828	<i>DecreaseGovtMilitary ForcesPersonnel</i>	Decrease the size of government military forces personnel by all means	
1830	<i>IncreaseRegime SponsoredNonMilitary ArmedForcesPersonnel</i>	Increase regime-sponsored, non-military armed forces	

(continued)

Table 4.5 (continued)

ID	Action class	Definition	Mtype
1831	<i>DecreaseRegimeSponsored NonMilitaryArmed ForcesPersonnel</i>	Decrease regime-sponsored, non-military armed forces	
1832	<i>IncreaseParamilitary ForcePersonnel</i>	Increase number or activity of paramilitary force personnel	
1833	<i>DecreaseParamilitary ForcePersonnel</i>	Decrease number or activity of paramilitary force personnel	
1834	<i>IncreasePrivateSecurity ForcesPersonnel</i>	Increase number or activity of private security forces	
1835	<i>DecreasePrivateSecurity ForcesPersonnel</i>	Decrease number or activity of private security forces	
1836	<i>IncreaseTerroristPersonnel</i>	Increase number or activity of terrorists	
1837	<i>DecreaseTerroristPersonnel</i>	Decrease number or activity of terrorists	
1838	<i>IncreaseInsurgentPersonnel</i>	Increase number or activity of insurgents	
1839	<i>DecreaseInsurgentPersonnel</i>	Decrease number or activity of insurgents	
1860	<i>IncreaseWorkers</i>	Increase workers	
1861	<i>DecreaseWorkers</i>	Decrease workers	
1864	<i>IncreaseIDPs</i>	Increase internally displaced persons	
1865	<i>DecreaseIDPs</i>	Decrease internally displaced persons	
1866	<i>IncreaseMigrants</i>	Increase migrants from outside the country (due to pull factors)	
1867	<i>DecreaseMigrants</i>	Decrease migrants from outside the country (due to pull factors)	
1868	<i>IncreaseRefugees</i>	Increase refugees from outside the country (due to push factors)	
1869	<i>DecreaseRefugees</i>	Decrease refugees from outside the country (due to push factors)	
1870	<i>IncreaseExpatriates</i>	Increase expatriates	
1871	<i>DecreaseExpatriates</i>	Decrease expatriates	
1872	<i>IncreaseGeneralPopulation</i>	Increase general population	
1873	<i>DecreaseGeneralPopulation</i>	Decrease general population	
1878	<i>DecreaseLaw EnforcementPersonnel</i>	Decrease number or activities of law enforcement personnel	
1880	<i>DecreaseIntelligence ServicePersonnel</i>	Decrease number or activities of intelligence service personnel	
1882	<i>IncreaseGovtPersonnel</i>	Increase number of government personnel	
1883	<i>DecreaseGovtPersonnel</i>	Decrease number of government personnel	
1885	<i>IncreaseContractorPersonnel</i>	Increase number of contractors	
1886	<i>DecreaseContractorPersonnel</i>	Decrease number of contractors	
1891	<i>IncreaseIntervenor SupportPersonnel</i>	Increase intervenor support personnel to intervenors or government or proto-government or judicial systems	
1892	<i>DecreaseIntervenor SupportPersonnel</i>	Decrease intervenor support personnel to intervenors or government or proto-government or judicial systems	

(continued)

Table 4.5 (continued)

ID	Action class	Definition	Mtype
1895	<i>IncreaseInternational OrLocalMediaPersonnel</i>	Increase number of international or local media personnel	
1896	<i>DecreaseInternational OrLocalMediaPersonnel</i>	Decrease number of international or local media personnel	
1898	<i>IncreaseNGOWorkers</i>	Increase number of NGO, 1440 or IGO workers	
1899	<i>DecreaseNGOWorkers</i>	Decrease number of NGO, IO or IGO workers	
1920	<i>DecreaseEducators</i>	Decrease number of educators	
1978	<i>IncreaseHealthcarePersonnel</i>	Increase the number of healthcare workers	
1979	<i>DecreaseHealthcarePersonnel</i>	Decrease the number of healthcare workers	
1980	<i>IncreaseGovtMilitary ForcesPersonnel</i>	Increase the size of government military forces	
1981	<i>IncreaseIntelligence ServicesPersonnel</i>	Increase the size of intelligence services	
1982	<i>IncreaseCriminalPopulation</i>	Increase the size of the criminal population	
1983	<i>DecreaseCriminalPopulation</i>	Decrease the size of the criminal population	
1984	<i>IncreaseEducators</i>	Increase number of educators	
2026	<i>IncreaseFirst RespondersPersonnel</i>	Increase first responder personnel	
2027	<i>IncreaseLaw EnforcementPersonnel</i>	Increase law enforcement personnel	
2039	<i>RecruitFundOrGainSupport ByNonNationStateActor</i>	Gain funding, recruits, or financial, institutional or local support by non-nation-state Actors	460, 510

The additional links are defined below:

- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **460** *HealthOrStrength* Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.
- **510** *Miscellaneous* Text description.

Social Aid Actions

Social aid Actions are those that relate to helping people. The classes generally differentiate the type of aid being provided. All social aid Action classes are linked to a Metric of the following type:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).

Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.6.

Table 4.6 Social aid Action classes

ID	Action class	Definition	Mtype
353	<i>ImportFood</i>	Import food	
355	<i>DistributeFood</i>	Distribute food	
357	<i>DistributeWater</i>	Distribute water	
359	<i>ProvideSanitationOr WasteWaterManagement</i>	Provide sanitation or waste water management	460
361	<i>ReducePollution</i>	Reduce pollution	460
365	<i>DistributeDurable GoodsRelief</i>	Distribute durable goods relief (i.e., other than food and water)	
369	<i>ProvideTemporaryShelter HousingRefugeeCamps</i>	Provide temporary shelter/housing/refugee camps (in or near Host Nation)	260
373	<i>PrepositionHumanitarian ReliefStocks</i>	Preposition humanitarian relief stocks in or near Host Nation	
384	<i>ProvideEducationSupplies</i>	Provide education supplies	
397	<i>ProvideMedicalTreatment</i>	Provide medical treatment	
399	<i>SupportHealthcare</i>	Support health care	460
413	<i>ResettlePeople</i>	Resettle people (both benign or malicious motives)	280
421	<i>ProvideSocial ProtectionProgram</i>	Provide social protection program (of various kinds)	460, 510
699	<i>AcquireEquipment OrMaterial</i>	Acquire equipment or material	
701	<i>WarehouseEquipment OrMaterial</i>	Warehouse equipment or material	
703	<i>DistributeEquipment OrMaterial</i>	Distribute equipment or material	
705	<i>MovePeopleEquipment OrMaterialOnTheGround</i>	Move people, equipment or material on the ground	
707	<i>MovePeopleEquipment OrMaterialThroughTheAir</i>	Move people, equipment or material through the air	
709	<i>MovePeopleEquipment OrMaterialOverTheWater</i>	Move people, equipment or material over the water	
711	<i>MovePeopleEquipmentO rMaterialUnderTheWater</i>	Move people, equipment or material under the water	
1778	<i>ReduceDrugDemand</i>	Reduce use or abuse of or demand for drugs or psychotropic substances	280, 460, 510
1986	<i>RemoveWaste</i>	Remove trash, waste, etc.	510
1990	<i>ProvideHealthcareSupplies</i>	Provide healthcare supplies or equipment	
2035	<i>ProducePotable Water</i>	Produce potable water through reverse osmosis, importation or other means	

The additional links are defined below:

- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **460** *HealthOrStrength* Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.
- **510** *Miscellaneous* Text description.

Change Situation Actions

Change situation Actions are those that change the situation of people, such as changing the sense of community (e.g., *RebuildSenseOfCommunity*) and changing political factions (*ChangePoliticalFactions*). Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.7.

Table 4.7 Change situation Action classes

ID	Action class	Definition	Mtype
375	<i>NegotiateWithBureaucracies ToGetRelief</i>	Negotiate with bureaucracies (Host Nation or international) to get relief for Host Nation populace	460, 510
447	<i>RebuildSenseOfCommunity</i>	Rebuild sense of community within Host Nation	460
1823	<i>ChangePoliticalFactions</i>	Change the composition or activity level of political factions	510
1874	<i>ChangeCulturalPopulation</i>	Change makeup of cultural population	510
1875	<i>ChangeReligiousPopulation</i>	Change makeup of religious population	510
1876	<i>ChangeKeyLeaderIdentities</i>	Add, subtract or change names of various types of key leaders	510
1985	<i>RespondToCivilEmergencies</i>	Respond to emergencies needing fire, MEDICAL, police, etc.	280, 460
1987	<i>DecreaseSenseOfCommunity</i>	Decrease popular sense that there is a community to belong to	460
2037	<i>ChangeSocialFactions</i>	Change the composition or activity level of social factions	510
2038	<i>ChangeReligiousFactions</i>	Change the composition or activity level of religious factions	510
2059	<i>MoveSelf</i>	Element changes location or location distribution	280, 460, 510

The additional links are defined below:

- **280 *Damage*** Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **460 *HealthOrStrength*** Numeric or categorical level of health (as in economic health) or strength (such as strength or amount of progress) of entity.
- **510 *Miscellaneous*** Text description.

Building and Supply Actions

The third category of Action consists of building things and providing supplies. The subcategories divide supply Actions and building Actions. All building and supply Action classes are linked to a Metric of the following type:

- **230 *Quantity*** Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).

Supply Actions

Supply Actions are those that include providing things such as food, fuel, and equipment to people or groups. The classes differentiate among the types of things supplied and the recipients. Some of the classes relate directly to supply (e.g., *SupplyGovt*) and some are indirectly related (e.g., *MovePeopleEquipmentOrMaterialThroughTheAir*). Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.8.

Table 4.8 Supply Action classes

ID	Action class	Definition	<i>Mtype</i>
27	<i>SupplyGovt</i>	Provide supplies needed for governing	
31	<i>EstablishStaffOrFundTransitionGovt</i>	Create transition (substitute Host Nation) government; provide staff for it; fund it; supply it	460
78	<i>RebuildOrMonitorLawEnforcementOrganizations</i>	Create, reform or monitor law enforcement organizations, including provision of staff, funds or supplies	460
153	<i>CreateOrReformOrMonitorMilitary</i>	Create, reform or monitor military or armed group; staff, fund, arm, and/or supply it	460

(continued)

Table 4.8 (continued)

ID	Action class	Definition	Mtype
159	<i>CreateOrReformOrMonitorIntelligenceServices</i>	Create, reform or monitor intelligence services; provide staff for it; fund it; supply it	460
260	<i>ImportEnergy</i>	Import energy into Host Nation (petroleum, electricity, coal, etc.)	510
325	<i>ProduceGoodsOrEquipment</i>	Produce goods or equipment (other than food)	
327	<i>ConsumeGoodsOrEquipment</i>	Consume goods or equipment (other than food)	
353	<i>ImportFood</i>	Import food	
355	<i>DistributeFood</i>	Distribute food	
357	<i>DistributeWater</i>	Distribute water	
359	<i>ProvideSanitationOrWasteWaterManagement</i>	Provide sanitation or waste water management	460
365	<i>DistributeDurableGoodsRelief</i>	Distribute durable goods relief (i.e., other than food and water)	
369	<i>ProvideTemporaryShelterHousingRefugeeCamps</i>	Provide temporary shelter/housing/refugee camps (in or near Host Nation)	260
373	<i>PrepositionHumanitarianReliefStocks</i>	Preposition humanitarian relief stocks in or near Host Nation	
384	<i>ProvideEducationSupplies</i>	Provide education supplies	
699	<i>AcquireEquipmentOrMaterial</i>	Acquire equipment or material	
701	<i>WarehouseEquipmentOrMaterial</i>	Warehouse equipment or material	
703	<i>DistributeEquipmentOrMaterial</i>	Distribute equipment or material	
705	<i>MovePeopleEquipmentOrMaterialOnTheGround</i>	Move people, equipment or material on the ground	
707	<i>MovePeopleEquipmentOrMaterialThroughTheAir</i>	Move people, equipment or material through the air	
709	<i>MovePeopleEquipmentOrMaterialOverTheWater</i>	Move people, equipment or material over the water	
711	<i>MovePeopleEquipmentOrMaterialUnderTheWater</i>	Move people, equipment or material under the water	
1990	<i>ProvideHealthcareSupplies</i>	Provide healthcare supplies or equipment	
2035	<i>ProducePotableWater</i>	Produce potable water through reverse osmosis, importation or other means	

The additional links are defined below:

- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **460** *HealthOrStrength* Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.
- **510** *Miscellaneous* Text description.

Building Actions

Building Actions are those that build or rebuild things. The classes primarily differentiate among the things that are built or rebuilt. All building Action classes are linked to a Metric of the following type:

- **260 CapacityFlowrate** Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.

Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.9.

Table 4.9 Building Action classes

ID	Action class	Definition	Mtype
371	<i>RebuildCivilianHousing</i>	Rebuild civilian housing	
443	<i>RebuildReligiousFacility</i>	Rebuild religious facilities	
501	<i>RebuildManufacturingInfrastructure</i>	Rebuild manufacturing structures or equipment	
507	<i>RebuildAgricultureInfrastructureLivestock</i>	Rebuild agricultural structures, equipment or livestock	
513	<i>RebuildShopsOrCommercialInfrastructure</i>	Rebuild shops, commercial structures or their equipment	
520	<i>RebuildInformationAndMediaInfrastructure</i>	Rebuild media infrastructure or equipment	
529	<i>RebuildSchoolOrEducationalInfrastructure</i>	Rebuild schools or educational structures, including equipment	
536	<i>RepairHealthcareInfrastructure</i>	Repair health infrastructure, including equipment	
548	<i>RebuildElectricityProductionPlant</i>	Rebuild electricity production plants, including equipment	
552	<i>RebuildElectricityDistributionInfrastructure</i>	Rebuild electricity distribution system, including equipment	
556	<i>RebuildExtractiveEnergyProductionInfrastructure</i>	Rebuild extractive energy (oil, coal, etc.) production, including equipment	
560	<i>RebuildExtractiveEnergyTransportationInfrastructure</i>	Rebuild extractive energy transportation (e.g., oil pipeline), including equipment	
576	<i>RebuildGovtInfrastructure</i>	Rebuild government structure (including police), including equipment	
580	<i>RebuildMilitaryInfrastructure</i>	Rebuild military structure, including equipment	
588	<i>Rebuild_ReplaceMilitaryVehicle</i>	Rebuild/replace military vehicle	
619	<i>RebuildRoadInfrastructure</i>	Rebuild road	
623	<i>RebuildRailroadInfrastructure</i>	Rebuild railroad, including equipment	

(continued)

Table 4.9 (continued)

ID	Action class	Definition	Mtype
627	<i>RebuildBridgeOrTunnelInfrastructure</i>	Rebuild bridges or tunnels, including equipment	
631	<i>RebuildSeaportInfrastructure</i>	Rebuild seaports, including equipment	
635	<i>RebuildAirportInfrastructure</i>	Rebuild airports, including equipment	
639	<i>Rebuild_ReplaceVehicle</i>	Rebuild/replace non-military vehicles	
643	<i>RebuildWaterwaysInfrastructure</i>	Rebuild waterways, including equipment	
665	<i>RebuildWaterDistributionInfrastructure</i>	Rebuild water distribution, including equipment	
669	<i>RebuildWaterOrSewageTreatmentFacilities</i>	Rebuild water or sewage treatment facilities, including equipment	
673	<i>RebuildDamInfrastructure</i>	Rebuild dams, including equipment	
1791	<i>AssistInMISOrItsUse</i>	Assist in creating, protecting, or using MIS systems	460, 510
1814	<i>BuildPrisonInfrastructure</i>	Build prison or jail	510
1904	<i>RebuildMiningInfrastructure</i>	Rebuild mining infrastructure	
1917	<i>RebuildCulturalInfrastructure</i>	Rebuild cultural (for example, theater, museum, or cultural) infrastructure	
1991	<i>RebuildFinancialInfrastructure</i>	Rebuild financial infrastructure	460

The additional links are defined below:

- **460** *HealthOrStrength* Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.
- **510** *Miscellaneous* Text description.

Policing and Security Actions

The fourth category of Action consists of Actions involved in policing and security. The subcategories divide policing Actions and security Actions. All policing and security Action classes are linked to Metrics of the following types:

- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **460** *HealthOrStrength* Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Policing Actions

Policing Actions are those that relate to the various types of police work. The classes differentiate the various types of Actions. Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.10.

Table 4.10 Policing Action classes

ID	Action class	Definition	Mtype
76	<i>ConductPolicingOperation</i>	Conduct law enforcement type operation	510
94	<i>ConductWarCrimes Investigation</i>	Conduct war crimes investigations, tribunals, etc.	
138	<i>ConductBorderControl BoundarySecurity FreedomOfMovement</i>	Conduct border control, boundary security or freedom of movement operations	510
201	<i>IDOrInterdictFunding OfNonNationStateActor</i>	Identify or interdict funding of non-nation-state Actor or disrupt it	
203	<i>IDInterdictOrInterrupt RecruitmentByNonNation StateActor</i>	Identify, interdict or interrupt recruitment by non-nation-state Actor or disrupt it	230
205	<i>IDFinancialInstitutional OrLocalSupportFor NonNationStateActor</i>	Identify financial, institutional or local support for non-nation-state Actor or disrupt it	
207	<i>MitigatePoliticalOr SocialInstabilityOr IndividualUnrestAction</i>	Mitigate political or social instability within Host Nation or mitigate individual unrest actions by non-nation-state Actor	510
423	<i>ProvideAnti_Conduct TraffickingInPersons</i>	Provide anti-trafficking in persons (or conduct such trafficking)	510
1776	<i>InterdictDrugs</i>	Prevent, interrupt, capture or eliminate drug production, movement or trafficking activities	510
1779	<i>ReduceFinancialCrimes OrMoneyLaundering</i>	Assist in drafting legislation or implementing regulations or training to reduce financial crimes or money laundering	510
1780	<i>ReduceIntellectual PropertyTheft</i>	Build capacity to detect, investigate, prosecute or prevent intellectual property theft, corporate espionage, or to increase cyber security	510
1783	<i>ReduceOrganized OrGangRelatedCrime</i>	Support activities to reduce organized or gang-related crime	510

The additional links are defined below:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).
- **510** *Miscellaneous* Text description.

Security Actions

Security Actions are those that relate to the various types of what is generally armed forces security work, although some other class of Actor may perform them. The classes differentiate the various types of security Actions. Any links to Metric types besides those required by Action class membership, category membership, or sub-category membership are listed in the fourth column in Table 4.11.

Table 4.11 Security Action classes

ID	Action class	Definition	Mtype
132	<i>EstablishDemilitarizedZoneSanctionArmsEmbargo</i>	Establish demilitarized zone, sanction, or arms embargo/disarmament	
136	<i>ImplementWeaponsControlRegime</i>	Implement weapons control regime, including WMD or disarmament	
138	<i>ConductBorderControlBoundarySecurityFreedomOfMovement</i>	Conduct border control, boundary security or freedom of movement operations	510
170	<i>EstablishConfidenceBuildingOrSecurityMeasure</i>	Establish confidence-building or security measures	
172	<i>SafeguardInstitutionOfGovernanceOrKeyOfficial</i>	Safeguard Host Nation institutions of governance or Host Nation key officials	
174	<i>ProvideSecurityAssistance</i>	Provide Security Assistance to the government or others	
176	<i>ConductSecurityCoordination</i>	Conduct security coordination	
178	<i>ProvideForceSecurity</i>	Provide force security for own forces	
180	<i>ProvideSecurityForHumanitarianAssistanceActivities</i>	Provide security for Humanitarian Assistance activities	
182	<i>ProvideSecurityForPeaceOperationActivities</i>	Provide security for Peace Operation activities	
184	<i>ProvideSecurityForStabilityActivities</i>	Provide security for Stability activities	
207	<i>MitigatePoliticalOrSocialInstabilityOrIndividualUnrestAction</i>	Mitigate political or social instability within Host Nation or mitigate individual unrest actions by non-nation-state Actor	510
211	<i>ClearMines_PlaceMinesIEDs</i>	Clear mines/ place mines (or other similar explosives)	510
419	<i>ProvideRefugeeCampSecurity</i>	Provide refugee camp security	
743	<i>EstablishSensorProcesses</i>	Establish sensor and intelligence processes	260
745	<i>EstablishCommunicationsProcesses</i>	Establish communications processes	260
747	<i>EstablishCommandAndControlProcesses</i>	Establish Command and Control processes or Computers	260
2056	<i>QuellCivilDisturbance</i>	Reduce or stop civil disturbances: parades, demonstrations, peaceful protests, riots	

The additional links are defined below:

- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **510** *Miscellaneous* Text description.

Persuasion and Observation Actions

The fifth category of Action consists of Actions involved in persuasion and observation. The subcategories divide persuasion Actions, monitoring Actions, intelligence Actions, and control Actions. All persuasion and observation Action classes are linked to a Metric of the following type:

- **460 *HealthOrStrength*** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Persuasion Actions

Persuasion Actions are those that relate to persuasion, such as diplomatic Actions, mediation, and supplying advisors. The classes differentiate the various types of Actions. Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.12.

Table 4.12 Persuasion Action classes

ID	Action class	Definition	Mtype
13	<i>ProvideAdvisors ToGovtOfficials</i>	Provide advisors to government (other than judicial organizations)	230
25	<i>ConductElections</i>	Perform elections planning or execution, elections monitoring, elections outreach	
29	<i>ProduceConstitution</i>	Write constitution; establish constitutional reform process	
31	<i>EstablishStaffOrFund TransitionGovt</i>	Create transition (substitute Host Nation) government; provide staff for it; fund it; supply it	230
33	<i>EmployDiplomaticAction</i>	Implement UN actions/resolutions; U.S. diplomacy; Host Nation diplomacy, internal or external, communicate, make alliances, etc.	510
35	<i>DestabilizeGovt</i>	Destabilize Host Nation government	
49	<i>MediateNegotiateOr PersuadeConflictingParties</i>	Mediate, negotiate or persuade or support mediation, negotiation or persuasion of conflicting parties	510
51	<i>MaintainCompliance WithPeaceAccords</i>	Maintain compliance with peace accord milestones or conditions, with all needed tasks	
53	<i>MonitorPowersharing Arrangements</i>	Monitor power-sharing arrangements, with all needed tasks	510
55	<i>TransferControlOfGovt FunctionsToHNOfficials</i>	Transfer control from the transition government to Host Nation officials, in part or <i>in toto</i>	

(continued)

Table 4.12 (continued)

ID	Action class	Definition	Mtype
88	<i>ProvideAdvisors ToJudicialOrganizations</i>	Provide advisors to the police or justice organizations or support establishment of operations	230
205	<i>IDFinancialInstitutional OrLocalSupportForNon NationStateActor</i>	Identify financial, institutional or local support for non-nation-state Actor or disrupt it	280
207	<i>MitigatePoliticalOr SocialInstability OrIndividualUnrestAction</i>	Mitigate political or social instability within Host Nation or mitigate individual unrest actions by non-nation-state Actor	280. 510
367	<i>CoordinateNGOActivities</i>	Coordinate NGO, IO or IGO activities within Host Nation	
375	<i>NegotiateWith BureaucraciesToGetRelief</i>	Negotiate with bureaucracies (Host Nation or international) to get relief for Host Nation populace	510
382	<i>PromoteCivicEducation</i>	Promote civic education (e.g., “civics” classes)	230
415	<i>Reduce_IncreaseLikelihood OfPopulationMovements</i>	Reduce likelihood of population movements (or the negative - increase likelihood)	280, 510
447	<i>RebuildSenseOfCommunity</i>	Rebuild sense of community within Host Nation	
466	<i>SponsorMediaTraining OrProfessionalization</i>	Sponsor media training or professionalization (fair, honest and complete reporting, etc.)	230
478	<i>EstablishLiaison ProgramsWithGovt</i>	Establish liaison program with government	
480	<i>ControlOrDisseminate Information</i>	Control or disseminate information (of all kinds)	510
482	<i>ConductBenignPublic InformationOperation</i>	Conduct benign public information operation	510
484	<i>ConductNegative InformationOperation</i>	Conduct negative information operation	510
1793	<i>DeLegitimizeTerrorist Ideology</i>	De-legitimize terrorist ideology or terrorists in eyes of populace or media	
1794	<i>DeLegitimizeInsurgents</i>	De-legitimize insurgents in eyes of populace or media	
1795	<i>DeLegitimizeHNGovt</i>	De-legitimize Host Nation government in eyes of populace or media	
1987	<i>DecreaseSenseOfCommunity</i>	Decrease popular sense that there is a community to belong to	
1992	<i>ConductLaborStrikes</i>	Conduct labor strikes against business or government organizations	230, 280
2039	<i>RecruitFundOrGainSupport ByNonNationStateActor</i>	Gain funding, recruits, or financial, institutional or local support by non-nation-state Actors	230, 510
2055	<i>CreateCivilDisturbance</i>	Create civil disturbances: parades, demonstrations, peaceful protests, riots	280
2056	<i>QuellCivilDisturbance</i>	Reduce or stop civil disturbances: parades, demonstrations, peaceful protests, riots	280

The additional links are defined below:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).
- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **510** *Miscellaneous* Text description.

Monitoring Actions

Monitoring Actions are those that relate to monitoring such things as compliance with peace accords, election fairness, and human rights standards, either directly or as part of the Action. For example, *ConductElections* includes monitoring elections as part of its definition. The classes differentiate the types of monitoring Actions. Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.13.

Table 4.13 Monitoring Action classes

ID	Action class	Definition	Mtype
25	<i>ConductElections</i>	Perform elections planning or execution, elections monitoring, elections outreach	
51	<i>MaintainCompliance WithPeaceAccords</i>	Maintain compliance with peace accord milestones or conditions, with all needed tasks	
53	<i>MonitorPowersharing Arrangements</i>	Monitor power-sharing arrangements, with all needed tasks	510
90	<i>MonitorOrReportOn CorruptionByGovtOfficials</i>	Monitor or report corruption by government officials	510
92	<i>MonitorHumanRightsPractice</i>	Monitor human rights practices	510
132	<i>EstablishDemilitarized ZoneSanctionArmsEmbargo</i>	Establish demilitarized zone, sanction, or arms embargo/disarmament	280
134	<i>EstablishObserverMission OrInterposeForces</i>	Establish observer mission or interpose forces	280, 510
136	<i>ImplementWeapons ControlRegime</i>	Implement weapons control regime, including WMD or disarmament	280
153	<i>CreateOrReform OrMonitorMilitary</i>	Create, reform or monitor military or armed group; staff, fund, arm, and/or supply it	230
159	<i>CreateOrReformOrMonitor IntelligenceServices</i>	Create, reform or monitor intelligence services; provide staff for it; fund it; supply it	230

The additional links are defined below:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).
- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **510** *Miscellaneous* Text description.

Intelligence Actions

Intelligence Actions are those that relate to intelligence operations, such as identification of non-state Actor operations, collection and dissemination of information, and production of propaganda. The classes differentiate various types of intelligence Actions. Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.14.

Table 4.14 Intelligence Action classes

ID	Action class	Definition	Mtype
201	<i>IDOrInterdictFundingOfNonNationStateActor</i>	Identify or interdict funding of non-nation-state Actor or disrupt it	280
203	<i>IDInterdictOrInterruptRecruitmentByNonNationStateActor</i>	Identify, interdict or interrupt recruitment by non-nation-state Actor or disrupt it	230, 280
205	<i>IDFinancialInstitutionalOrLocalSupportForNonNationStateActor</i>	Identify financial, institutional or local support for non-nation-state Actor or disrupt it	280
476	<i>CollectInformation</i>	Collect information (on infrastructure, economics, government effectiveness, perceptions, refugees, etc.); plan information operations; conduct defensive information operations	510
478	<i>EstablishLiaisonProgramsWithGovt</i>	Establish liaison program with government	
480	<i>ControlOrDisseminateInformation</i>	Control or disseminate information (of all kinds)	510
482	<i>ConductBenignPublicInformationOperation</i>	Conduct benign public information operation	510
484	<i>ConductNegativeInformationOperation</i>	Conduct negative information operation	510
1791	<i>AssistInMISOrItsUse</i>	Assist in creating, protecting, or using MIS systems	230, 260, 510
2058	<i>DamageMIS</i>	Damage Host Nation or other organization MIS, etc., physically or with cyber attacks	280

The additional links are defined below:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).
- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **510** *Miscellaneous* Text description.

Control Actions

Control Actions are those that relate to moving and changing oneself and changing and controlling another element. Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.15.

Table 4.15 Control Action classes

ID	Action class	Definition	Mtype
2059	<i>MoveSelf</i>	Element changes location or location distribution	280, 510
2060	<i>ChangeSelf</i>	Element changes its own status	510
2061	<i>ChangeElement</i>	Element changes the status of another element	510
2062	<i>ControlElement</i>	Element exerts control (up to full ownership) of another element	510

The additional links are defined below:

- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **510** *Miscellaneous* Text description.

Economic Actions

The sixth category of Action consists of economic Actions. The subcategories divide these Actions into government economic Actions, consumption and production Actions, and business economic Actions. There are no common Metric type links for this category beyond the general Action links.

Government Economic Actions

Government economic Actions are government Actions with economic consequences. The classes differentiate the various types of economic Actions. All government economic Action classes are linked to a Metric of the following type:

- **460 HealthOrStrength** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.16.

Table 4.16 Government economic Action classes

ID	Action class	Definition	Mtype
31	<i>EstablishStaffOrFundTransitionGovt</i>	Create transition (substitute Host Nation government; provide staff for it; fund it; supply it)	230
78	<i>RebuildOrMonitorLawEnforcementOrganizations</i>	Create, reform or monitor law enforcement organizations, including provision of staff, funds or supplies	230
153	<i>CreateOrReformOrMonitorMilitary</i>	Create, reform or monitor military or armed group; staff. fund, arm, and/or supply it	230
159	<i>CreateOrReformOrMonitorIntelligenceServices</i>	Create, reform or monitor intelligence services; provide staff for it; fund it; supply it	230
201	<i>IDOrInterdictFundingOfNonNationStateActor</i>	Identify or interdict funding of non-nation-state Actor or disrupt it	280
205	<i>IDFinancialInstitutionalOrLocalSupportForNonNationStateActor</i>	Identify financial, institutional or local support for non-nation-state Actor or disrupt it	280
237	<i>SupportAgricultureDirectly</i>	Support agriculture directly (buy or sell produce/food, support planting or conduct agriculture support programs, etc.)	230, 510
241	<i>ChangeAgriculturalPolicy</i>	Change agricultural policy	
243	<i>SupportReductionOfDrugCrops</i>	Support reduction of drug crops (eradication, replacement crops, etc.)	280, 510
270	<i>CreateInsuranceSystem</i>	Create or change Host Nation insurance system	
272	<i>CreateInterbanksPaymentSystem</i>	Create or change Host Nation interbank payment system	
274	<i>CreateNewCurrency</i>	Create new currency (or other similar currency change actions)	
278	<i>DevelopMicrofinanceSystem</i>	Develop or change microfinance systems in Host Nation	
280	<i>CreateStockMarket</i>	Create or change Host Nation stock market	

(continued)

Table 4.16 (continued)

ID	Action class	Definition	Mtype
284	<i>Privatize_NationalizeBusinesses</i>	Privatize/nationalize Host Nation or external businesses operating in Host Nation	510
286	<i>ChangeGovtEconomicOrFinancialPolicy</i>	Change Host Nation government economic or financial policy	
288	<i>AssistEconomicIntegrationOrCooperation</i>	Assist Host Nation economic integration or cooperation (strategy/assessment, prices or subsidies, debt management, arears clearance) across private, government, international sectors	
290	<i>ChangeCommercialLaw</i>	Strengthen Host Nation commercial law	
292	<i>ChangeTaxOrTradePolicy</i>	Change Host Nation tax or trade policy	
302	<i>CreatePublicWorksProgram</i>	Create public works program within Host Nation to generate jobs	230
305	<i>ChangeSocialSafetyNet</i>	Change Host Nation social safety net	
323	<i>ManageNaturalResources</i>	Manage Host Nation natural resources (energy reserves, water, raw materials, land, etc.)	
329	<i>ParticipateDirectlyInEconomy</i>	Direct external participation in economy (buying or selling commodities, other than agricultural)	230
331	<i>DamageFinancialInfrastructure</i>	Damage financial infrastructure (in various ways)	280
1776	<i>InterdictDrugs</i>	Prevent, interrupt, capture or eliminate drug production, movement or trafficking activities	280, 510
1778	<i>ReduceDrugDemand</i>	Reduce use or abuse of or demand for drugs or psychotropic substances	230, 280, 510
1779	<i>ReduceFinancialCrimesOrMoneyLaundering</i>	Assist in drafting legislation or implementing regulations or training to reduce financial crimes or money laundering	280, 510
1780	<i>ReduceIntellectualPropertyTheft</i>	Build capacity to detect, investigate, prosecute or prevent intellectual property theft, corporate espionage or increase cyber security	280, 510
1791	<i>AssistInMISOrItsUse</i>	Assist in creating, protecting, or using MIS systems	230, 260, 510
1993	<i>ChangeTransportationPolicy</i>	Change Host Nation transportation policy	
1994	<i>ChangeEnergyPolicy</i>	Change Host Nation energy policy	
1995	<i>ChangeNaturalResourcesPolicy</i>	Change Host Nation natural resources policy	
1996	<i>ChangeLaborPolicy</i>	Change Host Nation labor policy	
1997	<i>ConductTradeInGoodsOrServices</i>	Import or export goods or services	510
2039	<i>RecruitFundOrGainSupportByNonNationStateActor</i>	Gain funding, recruits, or financial, institutional or local support by non-nation-state Actors	230, 510
2058	<i>DamageMIS</i>	Damage Host Nation or other organization MIS, etc., physically or with cyber attacks	280

The additional links are defined below:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).
- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **510** *Miscellaneous* Text description.

Consumption and Production Actions

Consumption and production Actions are Actions that relate to the production or consumption of some item. The classes differentiate the nature of the Actions and the type of item consumed or produced. All consumption and production Action classes are linked to a Metric of the following type:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).

Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.17.

Table 4.17 Consumption and production Action classes

ID	Action class	Definition	Mtype
229	<i>ConductAgricultureOperation</i>	Produce food and other agricultural products	
235	<i>ConsumeFood</i>	Consume food	
325	<i>ProduceGoodsOrEquipment</i>	Produce goods or equipment (other than food)	
327	<i>ConsumeGoodsOrEquipment</i>	Consume goods or equipment (other than food)	
361	<i>ReducePollution</i>	Reduce pollution	460
363	<i>ProduceWaste</i>	Produce waste (trash, garbage, human waste, etc.)	
699	<i>AcquireEquipmentOrMaterial</i>	Acquire equipment or material	
701	<i>WarehouseEquipmentOrMaterial</i>	Warehouse equipment or material	

(continued)

Table 4.17 (continued)

ID	Action class	Definition	Mtype
703	<i>DistributeEquipment OrMaterial</i>	Distribute equipment or material	
705	<i>MovePeopleEquipment OrMaterialOnTheGround</i>	Move people, equipment or material on the ground	
707	<i>MovePeopleEquipment OrMaterialThroughTheAir</i>	Move people, equipment or material through the air	
709	<i>MovePeopleEquipment OrMaterialOverTheWater</i>	Move people, equipment or material over the water	
711	<i>MovePeopleEquipment OrMaterialUnderTheWater</i>	Move people, equipment or material under the water	
1986	<i>RemoveWaste</i>	Remove trash, waste, etc.	510
2003	<i>ConsumeNaturalResources</i>	Consume natural resources	
2065	<i>ProduceEnergy</i>	Produce energy of all types	
2066	<i>OperateFishingBusiness</i>	Produce food and other fishing related products	
2067	<i>ProvideServices</i>	Provide services of various kinds	

The additional links are defined below:

- **460 *HealthOrStrength*** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.
- **510 *Miscellaneous*** Text description.

Business Economic Actions

Business economic Actions are business Actions with economic consequences. The classes differentiate the types of Action and the type of business affected. All business economic Action classes are linked to a Metric of the following type:

- **230 *Quantity*** Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).

Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.18.

Table 4.18 Business economic Action classes

ID	Action class	Definition	Mtype
276	<i>Seek_InhibitInvestmentCapital</i>	Seek or inhibit investment capital for use in Host Nation from within Host Nation or from foreign sources	460
1777	<i>ConductDrugTrade</i>	Engage in drug production, movement or trafficking activities	280, 460, 510
1781	<i>ConductFinancialCrime OrMoneyLaundering</i>	Conduct financial crimes or money laundering	280, 460, 510
1782	<i>ConductIntellectual PropertyTheft</i>	Conduct intellectual property theft, corporate espionage or cybercrimes	280, 460, 510
1840	<i>IncreaseEnergyBusinesses</i>	Increase energy businesses	
1841	<i>DecreaseEnergyBusinesses</i>	Decrease energy businesses	
1842	<i>IncreaseFinancial ServicesIndustryBusinesses</i>	Increase size of financial services industry	
1843	<i>DecreaseFinancial ServicesIndustryBusinesses</i>	Decrease size of financial services industry	
1844	<i>IncreaseWorkerOrganizations</i>	Increase size, number or activity of worker organizations	
1845	<i>DecreaseWorkerOrganizations</i>	Decrease size, number or activity of worker organizations	
1846	<i>IncreaseMarkets</i>	Increase number or effectiveness of markets	510
1847	<i>DecreaseMarkets</i>	Decrease number or effectiveness of markets	510
1848	<i>IncreaseCommercialSector</i>	Increase commercial sector	510
1849	<i>DecreaseCommercialSector</i>	Decrease commercial sector	510
1850	<i>IncreaseMediaBusinesses</i>	Increase number of media businesses	
1851	<i>DecreaseMediaBusinesses</i>	Decrease number of media businesses	
1852	<i>IncreaseManufacturing Businesses</i>	Increase manufacturing businesses	
1853	<i>DecreaseManufacturing Businesses</i>	Decrease manufacturing businesses	
1854	<i>IncreaseServiceBusinesses</i>	Increase number or diversity of service businesses	
1855	<i>DecreaseServiceBusinesses</i>	Decrease number or diversity of service businesses	
1856	<i>IncreaseTransportation Businesses</i>	Increase transport businesses	
1857	<i>DecreaseTransportation Businesses</i>	Decrease transport businesses	
1858	<i>IncreaseTourismIndustry Businesses</i>	Increase tourism industry	
1859	<i>DecreaseTourism IndustryBusinesses</i>	Decrease tourism industry	

(continued)

Table 4.18 (continued)

ID	Action class	Definition	Mtype
1901	<i>IncreaseMiningBusinesses</i>	Increase mining businesses	
1902	<i>DecreaseMiningBusinesses</i>	Decrease mining businesses	
1907	<i>IncreaseFishingBusinesses</i>	Increase fishing businesses	
1908	<i>DecreaseFishingBusinesses</i>	Decrease fishing businesses	
1910	<i>IncreaseTimberBusinesses</i>	Increase timber businesses	
1911	<i>DecreaseTimberBusinesses</i>	Decrease timber businesses	
1913	<i>IncreaseCulturalBusinesses</i>	Increase cultural (for example, theater, museum, or sports) businesses	
1914	<i>DecreaseCulturalBusinesses</i>	Decrease cultural (for example, theater, museum, or sports) businesses	
1921	<i>IncreaseAgricultureBusinesses</i>	Increase agriculture businesses	
1922	<i>DecreaseAgricultureBusinesses</i>	Decrease agriculture businesses	
1992	<i>ConductLaborStrikes</i>	Conduct labor strikes against business or government organizations	280, 460
1998	<i>ConductCulturalEvent</i>	Conduct cultural (for example, theater, museum, or sports) event	460
1999	<i>IncreaseCriminalOrganizations</i>	Increase criminal organizations	
2000	<i>DecreaseCriminalOrganizations</i>	Decrease criminal organizations	
2001	<i>IncreaseContractorBusinesses</i>	Increase contractor businesses	
2002	<i>DecreaseContractorBusinesses</i>	Decrease contractor businesses	
2028	<i>ConductBusinessManagement</i>	Identify companies to purchase; reorganize companies; obtain financing; manage operations	460, 510
2029	<i>ObtainOrDisperseFunds</i>	Acquire funds in various ways or spend them for various purposes	460

The additional links are defined below:

- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **460** *HealthOrStrength* Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.
- **510** *Miscellaneous* Text description.

Government Actions

The seventh category of Action consists of government (non-economic) Actions. The subcategories divide these Actions into policy and legal Actions and organizational Actions. There are no common Metric type links for this category beyond the general Action links.

Policy and Legal Actions

Policy and legal Actions are Actions that relate to government laws and policies. The classes differentiate the type of Action and the organization affected. All policy and legal Action classes are linked to a Metric of the following type:

- **460 HealthOrStrength** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.19.

Table 4.19 Policy and legal Action classes

ID	Action class	Definition	Mtype
23	<i>CreateGovt</i>	Create or reform government organizations or whole government	230
29	<i>ProduceConstitution</i>	Write constitution; establish constitutional reform process	
31	<i>EstablishStaffOrFund TransitionGovt</i>	Create transition (substitute Host Nation) government; provide staff for it; fund it; supply it	230
55	<i>TransferControlOfGovt FunctionsToHNOfficials</i>	Transfer control from the transition government to Host Nation officials, in part or <i>in toto</i>	
78	<i>RebuildOrMonitorLaw EnforcementOrganizations</i>	Create, reform or monitor law enforcement organizations, including provision of staff, funds or supplies	230
84	<i>ChangeThePenalSystem</i>	Create or change the penal systems	
86	<i>ChangeTheLegalSystem</i>	Create or change the legal system	
94	<i>ConductWarCrimes Investigation</i>	Conduct war crimes investigations, tribunals, etc.	280
96	<i>ChangePropertyProcedure</i>	Change property law, regulations, enforcement, etc.	
153	<i>CreateOrReform OrMonitorMilitary</i>	Create, reform or monitor military or armed group; staff. fund, arm, and/or supply it	230
159	<i>CreateOrReform OrMonitorIntelligence Services</i>	Create, reform or monitor intelligence services; provide staff for it; fund it; supply it	230
241	<i>ChangeAgricultural Policy</i>	Change agricultural policy	
243	<i>SupportReduction OfDrugCrops</i>	Support reduction of drug crops (eradication, replacement crops, etc.)	280. 510
284	<i>Privatize_Nationalize Businesses</i>	Privatize/Nationalize Host Nation or external businesses operating in Host Nation	510
286	<i>ChangeGovtEconomic OrFinancialPolicy</i>	Change Host Nation government economic or financial policy	
290	<i>ChangeCommercialLaw</i>	Strengthen Host Nation commercial law	

(continued)

Table 4.19 (continued)

ID	Action class	Definition	Mtype
292	<i>ChangeTaxOrTradePolicy</i>	Change Host Nation tax or trade policy	
302	<i>CreatePublic WorksProgram</i>	Create public works program within Host Nation to generate jobs	230
305	<i>ChangeSocialSafetyNet</i>	Change Host Nation social safety net	
323	<i>ManageNaturalResources</i>	Manage Host Nation natural resources (energy reserves, water, raw materials, land, etc.)	
399	<i>SupportHealthcare</i>	Support health care	230
421	<i>ProvideSocialProtection Program</i>	Provide social protection program (of various kinds)	230, 510
423	<i>ProvideAnti_Conduct TraffickingInPersons</i>	Provide anti-trafficking in persons (or conduct such trafficking)	280, 510
1778	<i>ReduceDrugDemand</i>	Reduce use or abuse of or demand for drugs or psychotropic substances	230, 280, 510
1779	<i>ReduceFinancialCrimes OrMoneyLaundering</i>	Assist in drafting legislation or implementing regulations or training to reduce financial crimes or money laundering	280, 510
1780	<i>ReduceIntellectual PropertyTheft</i>	Build capacity to detect, investigate, prosecute or prevent intellectual property theft, corporate espionage or increase cyber security	280, 510
1783	<i>ReduceOrganized OrGangRelatedCrime</i>	Support activities to reduce organized or gang-related crime	280, 510
1785	<i>ImproveLegislature OrLegislativePractices</i>	Improve the way the legislature or legislative processes or procedures work	
1786	<i>ImproveExecutiveFunction</i>	Assist executive offices, ministries, or independent governmental bodies to operate more efficiently or effectively or democratically	
1787	<i>PromoteAnti CorruptionReforms</i>	Promote anti-corruption institutions, processes or policies regarding all sources of corruption	
1788	<i>PromoteCivilControl OfSecuritySector</i>	Support civil control of military or other elements of the security sector	
1789	<i>ChangeInformation AndMediaPolicies</i>	Promote policies for media freedom or freedom of information	
1790	<i>AssistInCreating SocialServices</i>	Promote good policies or social service institutions	230
1791	<i>AssistInMISOrItsUse</i>	Assist in creating, protecting, or using MIS systems	230, 260, 510
1802	<i>ConductJudicialAction</i>	Hold courts; hear evidence; make decisions, etc.	510
1803	<i>ConductLegislativeAction</i>	Propose or debate laws; pass some, etc.	510
1804	<i>ConductExecutiveAction</i>	Execute laws, perform administrative tasks, establish regulations, etc.	510
1993	<i>ChangeTransportation Policy</i>	Change Host Nation transportation policy	
1994	<i>ChangeEnergyPolicy</i>	Change Host Nation energy policy	

(continued)

Table 4.19 (continued)

ID	Action class	Definition	Mtype
1995	<i>ChangeNaturalResourcesPolicy</i>	Change Host Nation natural resources policy	
1996	<i>ChangeLaborPolicy</i>	Change Host Nation labor policy	
2004	<i>ChangeEducationPolicy</i>	Change Host Nation education policy	
2005	<i>ChangeHealthcarePolicy</i>	Change Host Nation healthcare policy	
2006	<i>ChangeSocialOrCulturalPolicy</i>	Change Host Nation social or cultural policy	
2058	<i>DamageMIS</i>	Damage Host Nation or other organization MIS, etc., physically or with cyber attacks	280

The additional links are defined below:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).
- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **510** *Miscellaneous* Text description.

Organizational Actions

Organizational Actions are Actions that relate to changes in the organization of governmental or quasi-governmental organizations. The classes differentiate the types of change and the organization affected. All organizational Action classes are linked to a Metric of the following type:

- **230** *Quantity* Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).

Any links to Metric types besides those required by Action class membership, category membership, or subcategory membership are listed in the fourth column in Table 4.20.

Table 4.20 Organizational Action classes

ID	Action class	Definition	Mtype
23	<i>CreateGovt</i>	Create or reform government organizations or whole government	460
27	<i>SupplyGovt</i>	Provide supplies needed for governing	460
31	<i>EstablishStaffOrFund TransitionGovt</i>	Create transition (substitute Host Nation) government; provide staff for it; fund it; supply it	460
78	<i>RebuildOrMonitorLaw EnforcementOrganizations</i>	Create, reform or monitor law enforcement organizations, including provision of staff, funds or supplies	460
151	<i>DemobilizeReduceReintegrate MilitaryOrParamilitaryUnits</i>	Demobilize, reduce, or reintegrate military or paramilitary units	460
153	<i>CreateOrReform OrMonitorMilitary</i>	Create, reform or monitor military or armed group; staff, fund, arm, and/or supply it	460
159	<i>CreateOrReformOrMonitor IntelligenceServices</i>	Create, reform or monitor intelligence services; provide staff for it; fund it; supply it	460
1790	<i>AssistInCreating SocialServices</i>	Promote good policies or social service institutions	460
1821	<i>IncreaseExternalForce OrganizationsAdvocatingConflict</i>	Increase the activity level of external forces advocating conflict	
1822	<i>DecreaseExternalForce OrganizationsAdvocatingConflict</i>	Decrease the activity level of external forces advocating conflict	
1829	<i>DecreaseIntelligence ServicesOrganizations</i>	Decrease the size of intelligence services by all means	
1862	<i>IncreaseNGOOrganizations</i>	Increase number, size or activity of NGOs, IOs or IGOs	
1863	<i>DecreaseNGOOrganizations</i>	Decrease number, size or activity of NGOs, IOs or IGOs	
1988	<i>IncreaseHealthcareOrganizations</i>	Increase number, size or activity of healthcare organizations	
1989	<i>DecreaseHealthcareOrganizations</i>	Increase number, size or activity of healthcare organizations	
2007	<i>IncreaseEducationOrganizations</i>	Increase education organizations	
2008	<i>DecreaseEducationOrganizations</i>	Decrease education organizations	
2009	<i>IncreaseLawEnforcement Organizations</i>	Increase law enforcement organizations	
2010	<i>DecreaseLawEnforcement Organizations</i>	Decrease law enforcement organizations	
2011	<i>IncreaseBureaucracyOrganizations</i>	Increase bureaucracy organizations	
2012	<i>DecreaseBureaucracyOrganizations</i>	Decrease bureaucracy organizations	
2013	<i>IncreaseGovtOrganizations</i>	Increase government organizations	
2014	<i>DecreaseGovtOrganizations</i>	Decrease government organizations	
2015	<i>IncreaseJudicialOrganizations</i>	Increase judicial organizations (including alternative courts)	

(continued)

Table 4.20 (continued)

ID	Action class	Definition	Mtype
2016	<i>DecreaseJudicialOrganizations</i>	Decrease judicial organizations (including alternative courts)	
2017	<i>IncreaseIntervenorOrganizations</i>	Increase Intervenor organizations	
2018	<i>DecreaseIntervenorOrganizations</i>	Decrease Intervenor organizations	
2019	<i>IncreaseFirstResponderOrganizations</i>	Increase first responder organizations	
2020	<i>DecreaseFirstResponderOrganizations</i>	Decrease first responder organizations	
2021	<i>IncreaseIntervenorForceOrganizations</i>	Increase intervenor force organizations	
2022	<i>DecreaseIntervenorForceOrganizations</i>	Decrease intervenor force organizations	
2023	<i>IncreaseIntelligenceServicesOrganizations</i>	Increase intelligence services organizations	
2040	<i>IncreaseMilitaryOrganizations</i>	Increase military organizations	
2041	<i>DecreaseMilitaryOrganizations</i>	Decrease military organizations	
2042	<i>IncreaseRegimeSponsoredNonMilitaryArmedForceOrganizations</i>	Increase regime-sponsored, non-military armed force organizations	
2043	<i>DecreaseRegimeSponsoredNonMilitaryArmedForceOrganizations</i>	Decrease regime-sponsored, non-military armed force organizations	
2044	<i>IncreaseParamilitaryOrganizations</i>	Increase paramilitary organizations	
2045	<i>DecreaseParamilitaryOrganizations</i>	Decrease paramilitary organizations	
2046	<i>IncreasePrivateSecurityOrganizations</i>	Increase private security organizations	
2047	<i>DecreasePrivateSecurityOrganizations</i>	Decrease private security organizations	
2048	<i>IncreaseInsurgentOrganizations</i>	Increase insurgent organizations	
2049	<i>DecreaseInsurgentOrganizations</i>	Decrease insurgent organizations	
2050	<i>IncreaseTerroristOrganizations</i>	Increase terrorist organizations	
2051	<i>DecreaseTerroristOrganizations</i>	Decrease terrorist organizations	
2052	<i>IncreaseSocialServicesOrganizations</i>	Increase social services organizations	
2053	<i>DecreaseSocialServicesOrganizations</i>	Decrease social services organizations	

The additional links are defined below:

- **460 HealthOrStrength** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

Action Ontology Recap

The only relations used in this chapter are the *is-a* and *hasMetric* relations, explained as follows:

is-a: Each instance of A is an instance of B and each property of B is a property of A. Its inverse relation is *superClassOf*.

hasMetric: A has Metric B (also shown as *described by*). Its inverse relation is *metricOf*.

The verbs of the unconventional conflict domain are represented as Actions. These Actions are initiated by the Actors of Chap. 3 and affect the Actors and the Environmental Elements, which are discussed in Chap. 5.

Chapter 5

Environment Ontology



The Environment elements are the passive elements in the situation-independent part of the Unconventional Conflict Ontology. The Environment ontology has five categories, 21 subcategories, and 179 Environment classes. Figure 5.1 provides an illustration of the passive environment. This ontology illustrates the need for an ontology, rather than a taxonomy: one of the natural Environment classes is *FireOrWildfire*, which can be natural or man-made, requiring two parents at the subcategory level. This chapter describes the organization of the Environment Ontology and all of its elements, along with the types of Metrics associated with each element.



Fig. 5.1 Environment: Buildings and volcano

Ontology Organization

The Environment Ontology differentiates the Environment classes and provides similarity linkages among the classes. Figure 5.2 provides a diagram of this ontology showing the categories and subcategories and adding connections. As an example, *NaturalEnvironment* is a category. *Disaster-Manmade* and *Disaster-Natural* are subcategories of that category. *FireOrWildfire* is an Environment class within each of these subcategories (shown in Table 5.11 and Table 5.12). The Topanga Canyon (in California) wildfire of 1993, which burned for 10 days, covered 18,000 acres, consumed 359 homes, and killed three people, would have been an instantiation of *FireOrWildfire*, with a Metric value indicating whether it was naturally caused or caused by a human. The single class to the right of the taxonomy part stands for all of the Environment classes, each of which may have multiple parents.

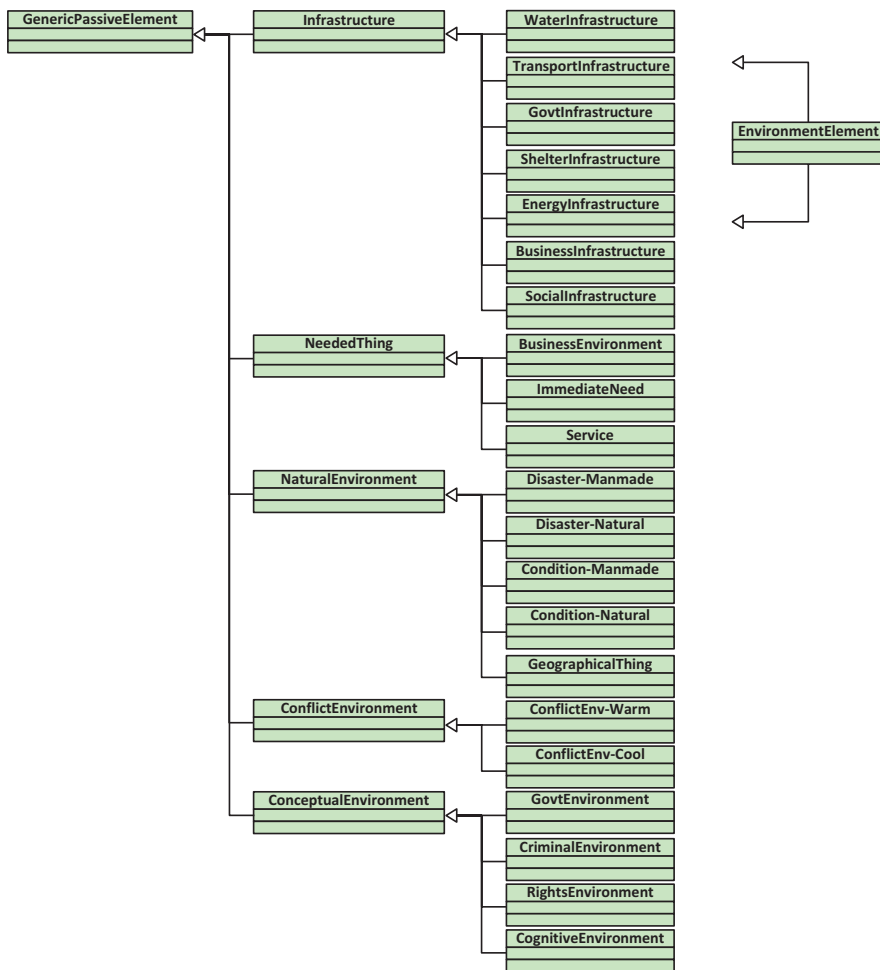


Fig. 5.2 Environment ontology

Each Environment class is linked to several Metrics. The generic types of the Metrics are listed in Table 2.1 in Chap. 2. All Environment classes are linked to a Metric of the following types:

- **110 Identity** Name or other identification of the entity.
- **210 Location** Current location (defined over one or more points, along a network, as an area, or by density over an area, including elevation/depth if appropriate). Location may be null.
- **220 Time** Action elements: event occurrence as point in time (date/time), event duration, event frequency (events per time period); Other elements: date/time of change of any other metric.
- **230 Quantity** Number of entities (if single Actor, *quantity* = 1; if “group of same,” *quantity* = number of Actors). Number of members (if Actor is significant group or demographic group, *quantity* = number of people in group). Environmental entities are similar. For Actions, *quantity* = number of things produced, added, etc. (not damage or capacity number).
- **250 Movable** Indicator as to whether entity can be moved or not and the current speed of movement; may include maximum speed.
- **330 OwnerOriginator** For Environment this is the owner, for Action this is Action’s originator.
- **460 HealthOrStrength** Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity.

The Environment classes are listed in tables according to their subcategories. Each entry contains the unique element identification (ID) number, the element name, the element definition, and the identifying numbers for any Metric types that are not required by Actor class membership (the list above), category membership (a similar list in the category section), or subcategory membership (a similar list in the subcategory section).

Part of the definition deserves a remark. Many definitions will begin with the description of the class and will include the phrase, “or group of same.” This means that the class may represent a single entity or a group of entities of the defined type.

Infrastructure Elements

The first category of Environment classes consists of infrastructure elements. The subcategories are water, transportation, government, shelter, energy, business, and social infrastructure. All infrastructure classes are linked to Metrics of the following types:

- **260 CapacityFlowrate** Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **350 Availability** Numeric or categorical level of availability of entity; may include original or desired levels.

Water Infrastructure Elements

Water infrastructure classes are shown in Table 5.1 and are those that relate to the collection, treatment and distribution of water.

Table 5.1 Water infrastructure classes

ID	Environment classes	Definition	<i>Mtype</i>
662	<i>WaterDistributionInfrastructure</i>	Water distribution infrastructure or group of same	
663	<i>WaterAndSewageTreatmentInfrastructure</i>	Water and sewage treatment infrastructure or group of same	
664	<i>DamInfrastructure</i>	Dam infrastructure or group of same	

Transportation Infrastructure Elements

Transportation infrastructure classes are those that relate to the facilities and vehicles involved in general (non-military) transportation. The classes differentiate among the types of transportation. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.2.

Table 5.2 Transportation infrastructure classes

ID	Environment classes	Definition	<i>Mtype</i>
611	<i>GeneralTransportationInfrastructure</i>	General transportation infrastructure	
612	<i>RoadInfrastructure</i>	Road infrastructure or group of same	
613	<i>RailroadInfrastructure</i>	Railroad infrastructure or group of same	
614	<i>BridgeAndTunnelInfrastructure</i>	Bridge or tunnel infrastructure or group of same	
615	<i>WaterwaysInfrastructure</i>	Waterways infrastructure or group of same	
616	<i>SeaportInfrastructure</i>	Seaport infrastructure or group of same	270
617	<i>AirportInfrastructure</i>	Airport infrastructure or group of same	270
618	<i>VehicleNonMilitary</i>	Non-military vehicle (autos, planes, ships, etc.) or group of same	270, 310, 320, 340, 420

The additional links are defined below:

- **270 *Weaponry*** Entity’s current weaponry types and quantities; may also include original or desired values.
- **310 *Affiliation*** Name of thing with which entity is affiliated (this is Actor’s organization or parent organization); intensity with which entity holds the affiliation or an entity’s members hold the affiliation.
- **320 *Hierarchy*** Actor’s authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.)
- **340 *Activity*** Entity activity in terms of coverage, intensity, and number of activities.
- **420 *Influence*** Numeric or categorical level of influence of entity.

Government Infrastructure Elements

Government infrastructure classes are those that relate to the facilities and vehicles involved in government (including military) operations. The classes differentiate among types of infrastructure. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.3.

Table 5.3 Government infrastructure classes

ID	Environment classes	Definition	Mtype
72	<i>PrisonStructure</i>	Prison infrastructure or group of same	270, 430, 480
573	<i>GovtInfrastructure</i>	Government (including police) infrastructure or group of same	270
574	<i>MilitaryInfrastructure</i>	Military (including intervention) infrastructure or group of same	270
575	<i>MilitaryVehicle</i>	Military (including intervention) vehicle or group of same	270, 310, 320, 340, 420
2057	<i>MIS</i>	Host Nation MIS or other organization: internet, computer systems, etc. or group of same	

The additional links are defined below:

- **270 *Weaponry*** Entity’s current weaponry types and quantities; may also include original or desired values.
- **310 *Affiliation*** Name of thing with which entity is affiliated (this is Actor’s organization or parent organization); intensity with which entity holds the affiliation or an entity’s members hold the affiliation.

- **320 Hierarchy** Actor's authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.)
- **340 Activity** Entity activity in terms of coverage, intensity, and number of activities.
- **420 Influence** Numeric or categorical level of influence of entity.
- **430 FairnessCorruption** Numeric or categorical level of fairness/corruption of entity.
- **480 Transparency** Numerical or categorical level of transparency.

Shelter Infrastructure Elements

Shelter infrastructure classes are those that relate to civilian housing and temporary shelters. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.4.

Table 5.4 Shelter infrastructure classes

ID	Environment classes	Definition	Mtype
350	<i>CivilianHousing</i>	Civilian housing or group of same	430
405	<i>IDP_ RefugeeCampAndTemporaryShelter</i>	Internally displaced persons or refugee camp or other temporary shelter or group of same	340, 430, 480

The additional links are defined below:

- **340 Activity** Entity activity in terms of coverage, intensity, and number of activities.
- **430 FairnessCorruption** Numeric or categorical level of fairness/corruption of entity.
- **480 Transparency** Numerical or categorical level of transparency.

Energy Infrastructure Elements

Energy infrastructure classes (Table 5.5) are those that relate to the production and distribution of energy. The classes differentiate between types of energy and production and distribution.

Table 5.5 Energy infrastructure classes

ID	Environment classes	Definition	Mtype
543	<i>GeneralEnergyInfrastructure</i>	General energy infrastructure	
544	<i>ElectricityProductionPlant</i>	Electricity production infrastructure or group of same	
545	<i>ElectricityDistributionInfrastructure</i>	Electricity distribution infrastructure or group of same	
546	<i>ExtractiveEnergyProductionInfrastructure</i>	Extractive energy (oil, coal, etc.) production infrastructure or group of same	
547	<i>ExtractiveEnergyTransportationInfrastructure</i>	Extractive energy (oil, gas pipelines, etc.) transportation infrastructure or group of same	

Business Infrastructure Elements

Business infrastructure classes (Table 5.6) are those that relate to business (other than Cultural) operations. The classes differentiate among broad types of businesses.

Table 5.6 Business infrastructure classes

ID	Environment classes	Definition	Mtype
496	<i>ShopAndCommercialStructure</i>	Shop or commercial structure or group of same (e.g., in a town or a chain such as McDonald's)	
497	<i>ManufacturingStructure</i>	Manufacturing structure or group of same	
498	<i>AgricultureStructure</i>	Agriculture structure or group of same	
519	<i>GeneralInformationAndMediaInfrastructure</i>	Media and information infrastructure or group of same	
1903	<i>MiningInfrastructure</i>	Mining and associated infrastructure or group of same	
1941	<i>FinancialInfrastructure</i>	Banks, stock exchanges, computer systems, insurance, etc. or group of same	
2057	<i>MIS</i>	Host Nation MIS or other organization: internet, computer systems, etc. or group of same	

Social Infrastructure Elements

Social infrastructure classes (Table 5.7) are those that relate to religious, healthcare, education, and Cultural facilities.

Table 5.7 Social infrastructure classes

ID	Environment classes	Definition	Mtype
438	<i>ReligiousBuilding</i>	Religious building or group of same	
528	<i>GeneralEducationInfrastructure</i>	Education infrastructure or group of same	
535	<i>GeneralHealthcareInfrastructure</i>	Health infrastructure or group of same	
1916	<i>CulturalInfrastructure</i>	Cultural (for example, theater, museum, or sports) infrastructure or group of same	
2057	<i>MIS</i>	Host Nation MIS or other organization: internet, computer systems, etc. or group of same	

Needed Thing Elements

The second category of Environment consists of “needed things.” The subcategories consist of business environment, immediate needs, and services. All needed thing classes are linked to Metrics of the following types:

- **340** *Activity* Entity activity in terms of coverage, intensity, and number of activities.
- **350** *Availability* Numeric or categorical level of availability of entity; may include original or desired levels.
- **430** *FairnessCorruption* Numeric or categorical level of fairness/corruption of entity.
- **480** *Transparency* Numerical or categorical level of transparency.

Business Environment Elements

Business Environment classes are those that relate to the business (including criminal business) environment, including goods, equipment and investment. The classes are related to things that are needed or the production of those things. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.8.

Table 5.8 Business environment classes

ID	Environment classes	Definition	Mtype
250	<i>DrugCultivation</i>	Drug cultivation business environment	260
251	<i>DrugManufacture</i>	Drug manufacture business environment	260
252	<i>DrugTransshipment</i>	Drug transshipment business environment	260
253	<i>BlackAndGrayMarket</i>	Black and gray market business environment	
258	<i>EnergySupplyAndDistribution</i>	Overall energy supply and distribution	260
269	<i>ForeignAndLocalInvestment</i>	Foreign or local investment pool in the country or group of same	

(continued)

Table 5.8 (continued)

ID	Environment classes	Definition	Mtype
499	<i>LivestockAndAgricultureEquipment</i>	Livestock or agricultural equipment or group of same	260
500	<i>CommercialEquipment</i>	Commercial equipment or group of same	260
1923	<i>GoodsAndEquipment</i>	Goods or equipment on hand or group of same	

The additional links are defined below:

- **260 CapacityFlowrate** Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.

Immediate Need Elements

Immediate need classes are those that are related to people’s immediate needs, such as food, water, and shelter. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.9.

Table 5.9 Immediate need classes

ID	Environment classes	Definition	Mtype
249	<i>DrugUse</i>	Drug use environment	
345	<i>FoodSupply</i>	Food supply or group of same	
346	<i>PotableWaterSupply</i>	Potable water supply or group of same	260
352	<i>OverallImmediateNeedsOfThePeople</i>	Satisfaction of the people’s overall immediate needs environment	
405	<i>IDP_RefugeeCampAndTemporaryShelter</i>	Internally displaced persons or refugee camp or other temporary shelter or group of same	260
1942	<i>HealthcareSupplies</i>	Healthcare supplies or equipment or group of same	
1943	<i>EducationSupplies</i>	Education supplies or equipment or group of same	

The additional links are defined below:

- **260 CapacityFlowrate** Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.

Service Elements

Service classes are those that relate to services that supply needs other than immediate needs. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.10.

Table 5.10 Service classes

ID	Environment classes	Definition	Mtype
258	<i>EnergySupplyAndDistribution</i>	Overall energy supply and distribution	260
266	<i>FinancialSystem</i>	Host Nation financial system	260
268	<i>InsuranceSystem</i>	Host Nation insurance system	260
297	<i>AvailabilityOfAcceptableJobs</i>	Acceptable job availability environment (employment from worker point of view)	
298	<i>Employment</i>	Representation of the employment environment (from economic point of view)	
310	<i>Market</i>	A market in goods and services, including stock market or group of same	420, 450
311	<i>CommercialSector</i>	All of or part of the overall commercial sector or group of same	420, 450
317	<i>CriticalIndustries</i>	Host nation critical industries environment	
348	<i>TrashDisposal</i>	Trash disposal environment	260, 440
349	<i>WasteWaterTreatment</i>	Waste water treatment environment	260, 440
380	<i>JobRelatedEducationalSystem</i>	Educational system environment in producing job-worthy graduates (both at the general knowledge and skills level and at the elite/expert knowledge and skills level)	440
392	<i>DeathAndIllnessFromDisease OtherHealthIssues</i>	Death and illness from disease or other health issues or group of same	
394	<i>SatisfactionOfHealthRequirements</i>	Public health requirements satisfaction environment	440
460	<i>InformationAndEntertainment</i>	Public information and entertainment environment	
461	<i>PublicRecords_Transparency</i>	Transparency of government information (records exist and are available, public reporting (push), visibility of actions, etc.)	
1796	<i>BankAccountAndFunds</i>	Money on deposit and available for use and allocations of funding	

(continued)

Table 5.10 (continued)

ID	Environment classes	Definition	Mtype
1950	<i>SocialServicesSystem</i>	Social services system at any level of government or part (child or health services) or group of same	260
1976	<i>Trade</i>	Import and export of goods and services environment	260

The additional links are defined below:

- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **420** *Influence* Numeric or categorical level of influence of entity.
- **440** *Effectiveness* Numeric or categorical level of effectiveness of entity.
- **450** *Efficiency* Numeric or categorical level of economic efficiency of entity.

Natural Environment Elements

The third category of Environment consists of the natural environment. The subcategories consist of man-made disasters, natural disasters, man-made conditions, natural conditions, and geographical things. All natural Environment classes are linked to a Metric of the following type:

- **420** *Influence* Numeric or categorical level of influence of entity.

Disaster-Manmade Elements

Disaster-Manmade classes are those that relate to man-made disasters, such as health emergencies, fires, and other disasters. All Disaster-Manmade classes are linked to Metrics of the following types:

- **240** *DisasterOrCondition* Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not.
- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **340** *Activity* Entity activity in terms of coverage, intensity, and number of activities.

Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.11.

Table 5.11 Disaster-manmade classes

ID	Environment Classes	Definition	Mtype
395	<i>ExperienceHealthEmergency</i>	Health emergency: famine, epidemic, etc. As Actor, produce effects; as Environment, show status; as Action - cause damage or group of same	310, 320, 480, 510
770	<i>FireOrWildfire</i>	Fire (building or countryside fire); as Action - cause damage or group of same	310, 320
774	<i>ManmadeDisaster</i>	Man-made disaster: nuclear power plant/hazardous materials/chemical emergency; other man-made or technological disaster; as Action - cause damage or group of same	310, 320

The additional links are defined below:

- **310 Affiliation** Name of thing with which entity is affiliated (this is Actor's organization or parent organization); intensity with which entity holds the affiliation or an entity's members hold the affiliation.
- **320 Hierarchy** Actor's authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.)
- **480 Transparency** Numerical or categorical level of transparency.
- **510 Miscellaneous** Text description.

Disaster-Natural Elements

Disaster-Natural classes are those that relate to natural disasters, such as epidemics, fires, storms, earthquakes, and floods. All Disaster-Natural classes are linked to Metrics of the following types:

- **240 DisasterOrCondition** Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not.
- **280 Damage** Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **340 Activity** Entity activity in terms of coverage, intensity, and number of activities.

Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.12.

Table 5.12 Disaster-natural classes

ID	Environment classes	Definition	Mtype
395	<i>ExperienceHealthEmergency</i>	Health emergency: famine, epidemic, etc. As Actor, produce effects; as Environment, show status; as Action - cause damage or group of same	310, 320, 480, 510
755	<i>AirMovementOrStorm</i>	Storm: blizzard/heavy snowfall; hurricane/cyclone/tropical storm; thunderstorm/lightning/wind/hail; tornado; as Action - cause damage or group of same	310, 320
768	<i>EarthMovement</i>	Earth movement: earthquake; landslide/mudslide/avalanche, volcanic eruptions; as Action - cause damage or group of same	310, 320
770	<i>FireOrWildfire</i>	Fire (building or countryside fire); as Action - cause damage or group of same	310, 320
772	<i>WaterMovement</i>	Water movement: flood/dam failure, tsunami, seiche; as Action - cause damage or group of same	310, 320

The additional links are defined below:

- **310 Affiliation** Name of thing with which entity is affiliated (this is Actor’s organization or parent organization); intensity with which entity holds the affiliation or an entity’s members hold the affiliation.
- **320 Hierarchy** Actor’s authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.)
- **480 Transparency** Numerical or categorical level of transparency.
- **510 Miscellaneous** Text description.

Condition-Manmade Elements

Condition-Manmade classes are those relating to man-made conditions, such as pollution and civil disturbances. All Condition-Manmade classes are linked to a Metric of the following type:

- **240 DisasterOrCondition** Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not.

Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.13.

Table 5.13 Condition-manmade classes

ID	Environment classes	Definition	Mtype
347	<i>Pollution</i>	Pollution (individual, agricultural, industrial) or group of same	
395	<i>ExperienceHealthEmergency</i>	Health emergency: famine, epidemic, etc. As Actor, produce effects; as Environment, show status; as Action - cause damage or group of same	280, 310, 320, 340, 480, 510
752	<i>Obscurants_FogOrManmade</i>	Fog or man-made obscurant or group of same; as Action - cause effects	280, 510
2054	<i>CivilDisturbance</i>	Civil disturbance environment: parade, demonstration, peaceful protest, riot or group of same	280, 340, 480

The additional links are defined below:

- **280** *Damage* Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **310** *Affiliation* Name of thing with which entity is affiliated (this is Actor's organization or parent organization); intensity with which entity holds the affiliation or an entity's members hold the affiliation.
- **320** *Hierarchy* Actor's authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.)
- **340** *Activity* Entity activity in terms of coverage, intensity, and number of activities.
- **480** *Transparency* Numerical or categorical level of transparency.
- **510** *Miscellaneous* Text description.

Condition-Natural Elements

Condition-Natural classes are those related to natural conditions, such as drought, seasons, fog, and rough water. All Condition-Natural classes are linked to a Metric of the following type:

- **240** *DisasterOrCondition* Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not.

Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.14.

Table 5.14 Condition-natural classes

ID	Environment classes	Definition	Mtype
395	<i>ExperienceHealthEmergency</i>	Health emergency: famine, epidemic, etc. As Actor, produce effects; as Environment, show status; as Action - cause damage or group of same	280, 310, 320, 340, 480, 510
751	<i>Day_Night_Season</i>	Time of day, day/night, season	510
752	<i>Obscurants_FogOrManmade</i>	Fog or man-made obscurant or group of same; as Action - cause effects	280, 510
754	<i>Temperature_HeatOrColdWave</i>	Temperature, heat/cold wave	
757	<i>Precipitation_Drought</i>	Precipitation, drought/flood	
766	<i>Seastate</i>	Seastate	

The additional links are defined below:

- **280 *Damage*** Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **310 *Affiliation*** Name of thing with which entity is affiliated (this is Actor’s organization or parent organization); intensity with which entity holds the affiliation or an entity’s members hold the affiliation.
- **320 *Hierarchy*** Actor’s authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.)
- **340 *Activity*** Entity activity in terms of coverage, intensity, and number of activities.
- **480 *Transparency*** Numerical or categorical level of transparency.
- **510 *Miscellaneous*** Text description.

Geographical Thing Elements

Geographical Thing classes are those that relate to land features and resources. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.15.

Table 5.15 Geographical thing classes

ID	Environment classes	Definition	Mtype
231	<i>ArableLand</i>	Arable land or group of same	260, 350
322	<i>NaturalResourceMgmtEnvironment</i>	Host Nation basic natural resources management environment	260, 430, 480
763	<i>LandCharacterization</i>	Terrain characterization (trafficability, cover, vegetation type, etc.)	510
764	<i>NaturalFeature</i>	Natural feature (river, mountain, etc.) or group of same	510
765	<i>GeographicalSubdivision</i>	Geographical subdivision or group of same, has population for members	270, 310, 320, 340, 410
767	<i>NaturalResource</i>	Natural resource or group of same	350

The additional links are defined below:

- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **310** *Affiliation* Name of thing with which entity is affiliated (this is Actor's organization or parent organization); intensity with which entity holds the affiliation or an entity's members hold the affiliation.
- **320** *Hierarchy* Actor's authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy. See the Actor-Actors Relations in Chap. 9 for a direct method of identifying these Actors.)
- **340** *Activity* Entity activity in terms of coverage, intensity, and number of activities.
- **350** *Availability* Numeric or categorical level of availability of entity; may include original or desired levels.
- **410** *DecisionMaking* Description of the decision-making process and the quality of the decision-making.
- **430** *FairnessCorruption* Numeric or categorical level of fairness/corruption of entity.
- **480** *Transparency* Numerical or categorical level of transparency.
- **510** *Miscellaneous* Text description.

Conflict Environment Elements

The fourth category of Environment consists of the conflict environment. The sub-categories consist of warm conflict environment and cool conflict environment. All conflict Environment classes are linked to Metrics of the following types:

- **240** *DisasterOrCondition* Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not.

- **340 Activity** Entity activity in terms of coverage, intensity, and number of activities.
- **480 Transparency** Numerical or categorical level of transparency.

Conflict Environment: Warm Elements

Conflict Environment - warm classes are those that relate to the conflict environment that may involve danger, such as stress migration and piracy levels. Classes reflect the causes of the environment stressors. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.16.

Table 5.16 Conflict environment-warm classes

ID	Environment classes	Definition	Mtype
46	<i>OppositionPartyUseOfForce</i>	Use of force environment by opposition to Host Nation	
47	<i>FactionalDispute</i>	Factional dispute or group of same	
120	<i>Civil_Internal_Unrest</i>	Civil (internal) unrest environment	
121	<i>DeathAndInjuryOfCiviliansFromConflict</i>	Death and injury of civilians from conflict or group of same	
122	<i>DeathAndInjuryOfCombatantsFromConflict</i>	Death and injury of combatants from conflict or group of same	
123	<i>PropertyDestructionFromConflict</i>	Property destruction from conflict or group of same	
125	<i>ForeignConflict</i>	Foreign conflict environment that involves the Host Nation	
148	<i>DemobilizedArmedForce</i>	A demobilized force (ex-armed force) as Actor or as environmental description or group of same	270, 310, 320, 410, 420, 430, 440, 470
404	<i>StressMigration</i>	Stress migration environment	260
408	<i>ReturnOfExpatriates</i>	Returning of expatriates environment	260
410	<i>ForcedPopulationMovement</i>	Forced population movement (whether into refugee camps or ethnic cleansing) environment	260, 430
1801	<i>MilitaryOperationsEnvironment</i>	Military operations environment	
1805	<i>Terrorism</i>	Terrorism environment	

(continued)

Table 5.16 (continued)

ID	Environment classes	Definition	<i>Mtype</i>
1806	<i>MineAndIED</i>	Minefields and improvised explosive devices (IEDs) environment	
1807	<i>Piracy</i>	Piracy environment	
1975	<i>Violence</i>	Environment of violence in Host Nation	
2054	<i>CivilDisturbance</i>	Civil disturbance environment: parade, demonstration, peaceful protest, riot or group of same	280, 420

The additional links are defined below:

- **260 *CapacityFlowrate*** Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **270 *Weaponry*** Entity's current weaponry types and quantities; may also include original or desired values.
- **280 *Damage*** Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components.
- **310 *Affiliation*** Name of thing with which entity is affiliated (this is Actor's organization or parent organization); intensity with which entity holds the affiliation or an entity's members hold the affiliation.
- **320 *Hierarchy*** Actor's authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.)
- **410 *DecisionMaking*** Description of the decision-making process and the quality of the decision-making.
- **420 *Influence*** Numeric or categorical level of influence of entity.
- **430 *FairnessCorruption*** Numeric or categorical level of fairness/corruption of entity.
- **470 *Professionalism*** Numerical or categorical level of professionalism of the entity.

Conflict Environment: Cool Elements

Conflict Environment - Cool classes are those that relate to the conflict environment that may have low danger levels, such as return of expatriates and compliance with peace accords. Classes reflect the nature of the environmental situation. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.17.

Table 5.17 Conflict environment-cool classes

ID	Environment classes	Definition	Mtype
48	<i>ResolutionOfDifferencesByCompetingGroups</i>	Environment of resolving differences between pairs of groups, ranging from violent conflict to peaceful negotiation	430, 510
109	<i>CivilStabilityAndDurablePeace</i>	Environment of civil stability and durable peace	
191	<i>NonNationStateActorFunding</i>	Non-nation-state Actor funding environment	430
192	<i>NonNationStateActorRecruiting</i>	Non-nation-state Actor recruiting environment	430
193	<i>NonNationStateActorSupport</i>	Non-nation-state Actor popular support environment	430
408	<i>ReturnOfExpatriates</i>	Returning of expatriates environment	260
412	<i>ChangeInPopulationComposition</i>	Change in the relative composition of mobile population categories	
418	<i>PerceptionOfASafeAndSecureEnvironment</i>	Perception of a safety and security of environment	430
459	<i>PositiveAndNegativeImpactOfIntervention</i>	Influence of positive and negative events (rapes, etc.) coming from the intervention or group of same	420
1798	<i>ComplianceWithPeaceAccords</i>	Compliance environment of peace accords and conditions	430
1799	<i>PoliticalPowersharing</i>	Political power-sharing arrangements environment	430
1800	<i>BorderControl</i>	Host Nation border-control environment	430
1809	<i>InterventionC4I</i>	Intervention forces command, control, communications, computers, and intelligence or group of same	260
1810	<i>HNMilitaryC4I</i>	Host Nation's military command, control, communications, computers and intelligence or group of same	260, 430
1973	<i>SecurityInRefugeeCamp</i>	Security environment in refugee camp or temporary shelters or group of same	430
1974	<i>ForceAndOperationsSecurity</i>	Security environment for military forces and for their operations	
2063	<i>OtherC4I</i>	Command, control, communications, computers, and intelligence for non-intervention, non-HN military or group of same	260

The additional links are defined below:

- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **420** *Influence* Numeric or categorical level of influence of entity.
- **430** *FairnessCorruption* Numeric or categorical level of fairness/corruption of entity.
- **510** *Miscellaneous* Text description.

Conceptual Environment Elements

The fifth category of Environment consists of the conceptual environment. The subcategories consist of the government, criminal, rights, and cognitive environments. All conceptual Environment classes are linked to Metrics of the following types:

- **430** *FairnessCorruption* Numeric or categorical level of fairness/corruption of entity.
- **480** *Transparency* Numerical or categorical level of transparency.

Government Environment Elements

Government Environment classes are those that relate to the general government environment. Classes differentiate among the various concepts of government and governance. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.18.

Table 5.18 Government environment classes

ID	Environment classes	Definition	Mtype
4	<i>Governance</i>	Host Nation governance	510
6	<i>ChangeInGovtLeadership</i>	Host Nation leadership change environment	510
9	<i>GovtDecisionMaking</i>	Distribution of power environment	510
10	<i>RelationshipWithIntervenors</i>	Relationship environment between Host Nation and intervenors	
63	<i>LegalSystemTradition</i>	Legal system tradition: common law, civil law (French), religious, Asian, no law, etc.	510

(continued)

Table 5.18 (continued)

ID	Environment classes	Definition	Mtype
70	<i>ConnectionBetweenLawEnforcementAndTheMilitary</i>	Connection environment between law enforcement and the military: law enforcement as part of military or not, multiple levels of police, border guards, etc.	510
72	<i>PrisonStructure</i>	Prison infrastructure or group of same	260, 270, 350
106	<i>DomesticLegitimacyOfGovt</i>	Domestic legitimacy environment of the government	
107	<i>InternationalLegitimacyOfGovt</i>	International legitimacy environment of the government	
108	<i>Government</i>	Entire government as an entity	440
141	<i>CooperationBetweenGovtMilitaryAndIntervenors</i>	Cooperation environment between the Host Nation military and the intervenors	
265	<i>MonetaryHealth</i>	Host Nation money (inflation, deflation, etc.)	
283	<i>GovtEconomicAndFinancialPolicy</i>	Government’s economic and financial policy, including budget	
318	<i>EconomicStatistics</i>	Various economic statistics	
319	<i>GeneralEconomy</i>	Host Nation overall economy	
320	<i>GeneralInfrastructure</i>	Overall infrastructure	
321	<i>EconomicFoundation</i>	Combined economy and infrastructure	
1798	<i>ComplianceWithPeaceAccords</i>	Compliance environment of peace accords and conditions	240, 340
1799	<i>PoliticalPowersharing</i>	Political power-sharing arrangements environment	240, 340
1800	<i>BorderControl</i>	Host Nation border-control environment	240, 340
1810	<i>HNMilitaryC4I</i>	Host Nation’s military command, control, communications, computers, and intelligence or group of same	240, 260, 340

(continued)

Table 5.18 (continued)

ID	Environment classes	Definition	Mtype
1887	<i>ExecutiveBranch</i>	Executive branch at any level of government or alternative (shadow) or group of same	310, 320, 340, 410, 420, 440, 470
1888	<i>LegislativeBranch</i>	Legislative branch at any level of government or part (Senate vs lower house) or alternative (shadow) or group of same	310, 320, 340, 410, 420, 440, 470
1944	<i>TypeGovt</i>	Type of the government	510
1945	<i>Constitution</i>	Host Nation constitution	
1946	<i>TaxationStructuresAndPolicy</i>	Host Nation taxation structure or policy or group of same	
1947	<i>OtherGovtPolicy</i>	Host Nation Health, Education, Labor, Information and Media, Social and Cultural, Energy, Natural Resources, Agriculture, Transportation, or Trade policy or group of same	
1948	<i>GeneralGovtPolicy</i>	General Host Nation government policy	
1949	<i>PenalSystem</i>	Penal system or part	260
1950	<i>SocialServicesSystem</i>	Social services system at any level of government or part (e.g., child or health services) or group of same	260, 340, 350
1952	<i>WaterAndWasteSystem</i>	Host Nation water, sewage, or trash, etc. system or group of same	260
1954	<i>InterventionOrganizationEnvironment</i>	Intervention composition: diplomats, advisors, support personnel, etc.	
1956	<i>Bureaucracy</i>	Bureaucracy at any level of government or part (e.g., executive bureaucracy) or group of same	
2024	<i>CivilDefensePlan</i>	Host Nation civil defense plan	

The additional links are defined below:

- **240 *DisasterOrCondition*** Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not.
- **260 *CapacityFlowrate*** Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **270 *Weaponry*** Entity's current weaponry types and quantities; may also include original or desired values.
- **310 *Affiliation*** Name of thing with which entity is affiliated (this is Actor's organization or parent organization); intensity with which entity holds the affiliation or an entity's members hold the affiliation.
- **320 *Hierarchy*** Actor's authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.)
- **340 *Activity*** Entity activity in terms of coverage, intensity, and number of activities.
- **350 *Availability*** Numeric or categorical level of availability of entity; may include original or desired levels.
- **420 *Influence*** Numeric or categorical level of influence of entity.
- **440 *Effectiveness*** Numeric or categorical level of effectiveness of entity.
- **470 *Professionalism*** Numerical or categorical level of professionalism of the entity.
- **510 *Miscellaneous*** Text description.

Criminal Environment Elements

Criminal Environment classes are those that relate to corruption and the criminal environment. Classes differentiate among types of criminality and corruption. All criminal Environment classes are linked to a Metric of the following type:

- **340 *Activity*** Entity activity in terms of coverage, intensity, and number of activities.

Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.19.

Table 5.19 Criminal environment classes

ID	Environment classes	Definition	Mtype
58	<i>CrimeCommon</i>	Common crime environment	
59	<i>CrimePolitical</i>	“Political” crime environment, as defined by the government	
60	<i>CrimeDrug</i>	Drug crime environment	
61	<i>CrimeOrganized</i>	Organized crime environment	
62	<i>CrimeOverall</i>	Overall crime environment	
66	<i>CorruptionInCulture</i>	Corruption environment in the culture	
67	<i>CorruptionInSocialServices</i>	Corruption environment in the social services	
68	<i>CorruptionInLawEnforcement</i>	Corruption environment in law enforcement organizations	
69	<i>CorruptionInCentralAuthority</i>	Corruption environment in the central authority	
198	<i>CorruptionInMilitary</i>	Corruption environment in the military	
249	<i>DrugUse</i>	Drug use environment	350
250	<i>DrugCultivation</i>	Drug cultivation business environment	260, 350
251	<i>DrugManufacture</i>	Drug manufacture business environment	260, 350
252	<i>DrugTransshipment</i>	Drug transshipment business environment	260, 350
253	<i>BlackAndGrayMarket</i>	Black and gray market business environment	350
254	<i>CorruptionInBusiness</i>	Corruption environment in business	
1957	<i>CorruptionInLocalAndMidLevelAuthority</i>	Corruption environment in the local and mid-level government organizations	

The additional links are defined below:

- **260** *CapacityFlowrate* Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume. It may include original or desired values.
- **350** *Availability* Numeric or categorical level of availability of entity; may include original or desired levels.

Rights Environment Elements

Rights Environment classes are those that relate to the rights of the populace. Classes differentiate among types of rights and freedoms. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.20.

Table 5.20 Rights environment classes

ID	Environment classes	Definition	Mtype
11	<i>RightsAndFreedoms</i>	Rights and freedoms	
73	<i>ProtectionOfHumanRights</i>	Human rights protection environment	
74	<i>PoliticalPersecution</i>	Political persecution environment	340
351	<i>PropertyRightsAndAccess</i>	Property rights and access environment	
409	<i>FreedomOfMovement</i>	Freedom of movement of the populace environment (politically restricted, tied to the land, free to move, etc.)	
426	<i>SocialIssueDecisionMaking</i>	Social decision-making environment	410
437	<i>SatisfactionOfPeoplesSpiritualNeeds</i>	Satisfaction of people’s spiritual needs environment	
439	<i>ObservationOfCulturalAndSocialInterest</i>	Environment of observation of social anniversaries, other cultural events and interests	
463	<i>FreedomOfDomesticMedia</i>	Domestic media freedom environment	
465	<i>FreedomOfInternationalMedia</i>	International media freedom environment within the country	

The additional links are defined below:

- **340 Activity** Entity activity in terms of coverage, intensity, and number of activities.
- **410 DecisionMaking** Description of the decision-making process and the quality of the decision-making.

Cognitive Environment Elements

Cognitive Environment classes are those that relate to ideas, opinions and perceptions. Classes differentiate among the types of cognitive concept and the Actor class involved. Any links to Metric types besides those required by Environment class membership, category membership, or subcategory membership are listed in the fourth column in Table 5.21.

Table 5.21 Cognitive environment classes

ID	Environment classes	Definition	Mtype
9	<i>GovtDecisionMaking</i>	Distribution of power environment	510
426	<i>SocialIssueDecisionMaking</i>	Social decision-making environment	410
433	<i>KeyIdea</i>	Representation of a key idea or group of same	420
434	<i>SocialNorm</i>	Representation of a social norm or group of same	420

(continued)

Table 5.21 (continued)

ID	Environment classes	Definition	Mtype
440	<i>PerceptionByPeopleThatTheirInterestsAreRepresented</i>	Popular perception that their interests are represented	
441	<i>PerceptionByPeopleOfChangesInTheirSocialStatus</i>	Popular perception of change in social status	
442	<i>ToleranceByPeopleOfTheStatusQuo</i>	Tolerance by people of the situation	
469	<i>OpinionOfPopulation</i>	Opinion of a population or group of same	
470	<i>OpinionOfSignificantGroup</i>	Opinions of a significant group or group of same	
471	<i>OpinionOfSignificantLeader</i>	Opinions of a significant leader or group of same	
472	<i>OpinionChangeOfPopulation</i>	Opinion change for the population	
473	<i>OpinionChangeOfSignificantGroup</i>	Representation of opinion changes for significant groups or group of same	
474	<i>OpinionChangeOfSignificantLeader</i>	Opinion change for a significant leader or group of same	
1915	<i>AvailabilityOfCulturalActivity</i>	Cultural (for example, theater, museum, or sports) events and opportunities to participate environment	350
1972	<i>PopularSenseOfCommunity</i>	Sense that there is a community to belong to	

The additional links are defined below:

- **350 Availability** Numeric or categorical level of availability of entity; may include original or desired levels.
- **410 DecisionMaking** Description of the decision-making process and the quality of the decision-making.
- **420 Influence** Numeric or categorical level of influence of entity.
- **510 Miscellaneous** Text description.

Environment Ontology Recap

The only relations used in this chapter are the *is-a* and *hasMetric* relations, explained as follows:

is-a: Each instance of A is an instance of B and each property of B is a property of A. Its inverse relation is *superClassOf*.

hasMetric: A has Metric B (also shown as *described by*). Its inverse relation is *metricOf*.

The nouns of the unconventional conflict domain that are not active elements are represented as Environment Elements. Some of the Environment Elements are concrete things (sometimes literally concrete), such as infrastructure elements. Some are more abstract, such as conceptual environment elements. The others have both concrete and abstract characteristics and include “needed thing” elements, natural environment elements, and conflict environment elements. These elements are affected by the Actions of Chap. 4.

The Metrics of Chap. 6 can be compared to adjectives that modify the nouns (Actors and Environment Elements) and adverbs that modify the verbs (Actions). However, the Metrics provide more information than standard adjectives and adverbs.

Chapter 6

Metric Ontologies



The Element classes, Actor, Action, and Environment, are relatively accessible, corresponding to nouns, verbs, and more nouns, respectively. Many have concrete referents and almost all refer to things or concepts that are part of everyday life. The Metric classes are a little less user-friendly, but are still components of the situation-independent part of the Unconventional Conflict Ontology. They contain the information about the state of the element classes to which they are connected, putting them at a remove from everyday concepts. The Metric classes have similarities to adjectives and adverbs that modify the nouns and verbs that comprise the Elements.

Further, there are two Metric ontologies. The PMESII Metric ontology identifies the differences and commonalities among the Metrics using the PMESII paradigm, which divides the world into activity domains. The Metric PMESII Ontology has eight PMESII+ categories, 38 subcategories, and 791 Metric classes. There are 1231 class entries in the tables because many of the Metrics have multiple parents, for each of which they are displayed in a table of this chapter. On the other hand, the Metric Type Ontology connects the Metric classes to a classification of property types, which identifies the differences and commonalities among the Metrics by the type of information contained in the Metric. This ontology has five type categories, 23 subcategories, and the same 791 Metric classes of the Metric PMESII Ontology.

Despite the more abstract nature of the Metric classes, they are both highly important and not much more difficult to understand than the element classes that they describe. One difference between the tables for the elements and those for the Metrics is derived from an attempt to make the Metrics more accessible. The element classes have a “definition” column in each table to support understanding their intent. The Metric classes have a “defining question” column instead. Thus the values of instantiations of the Metric classes may be thought of as answering the defining questions for the Metrics. **One critical issue arises in the defining questions: because the instantiation of a Metric is connected to the instantiation of an Element, the Metric instantiation refers to a particular (generally singular) object.**

Figure 6.1 provides an illustration of a Metric answering how much damage was done: in this case, how many boards were broken. This chapter describes the organization of the two Metric ontologies and all of the Metric classes.



Fig. 6.1 Kinetic metric: damage (Number of boards broken)

Ontology Organization

There is a subtle point concerning the relationship of the Metrics to the PMESII ontology. The relationship is more informative when looked from the bottom up, that is, from the Metrics up to the subcategories and categories, rather from the top down. Thus, a Metric may be thought of as relating to several subcategories because it adds information concerning the state of the subcategory. However, because such relations may not be obvious, decomposing the subcategories might not lead to the inclusion of all of the Metrics that are shown here.

This organization could be abbreviated as PMESII-KE because of the Kinetic and Environmental categories included in the Metric PMESII ontology; however, we will continue to refer to it as PMESII+ or PMESII, for brevity. A U.S. Department of Army publication indicates that the currently preferred organization is PMESII-PT (HQ Department of the Army, May 2013), where the last “P” stands for Physical Environment and the “T” stands for Time. However, there are 65 Metrics that do not fit into the pure PMESII organization, only two of which are time Metrics: *Time* and *SeasonTimeOfYearIndicator*. This is the reason for the –KE organization, which provides a more even split, which appears to be more useful than the –PT organization.

The Metric Ontologies differentiate the Metric classes and provides similarity linkages among the classes. Figure 6.2 provides a diagram of the Metric PMESII ontology. All of the Metrics are represented by a single class with two horizontal arrows (shown to the right of the taxonomy) representing the possible multiple connections (and thus multiple parents) of the Metric to the PMESII subcategories.

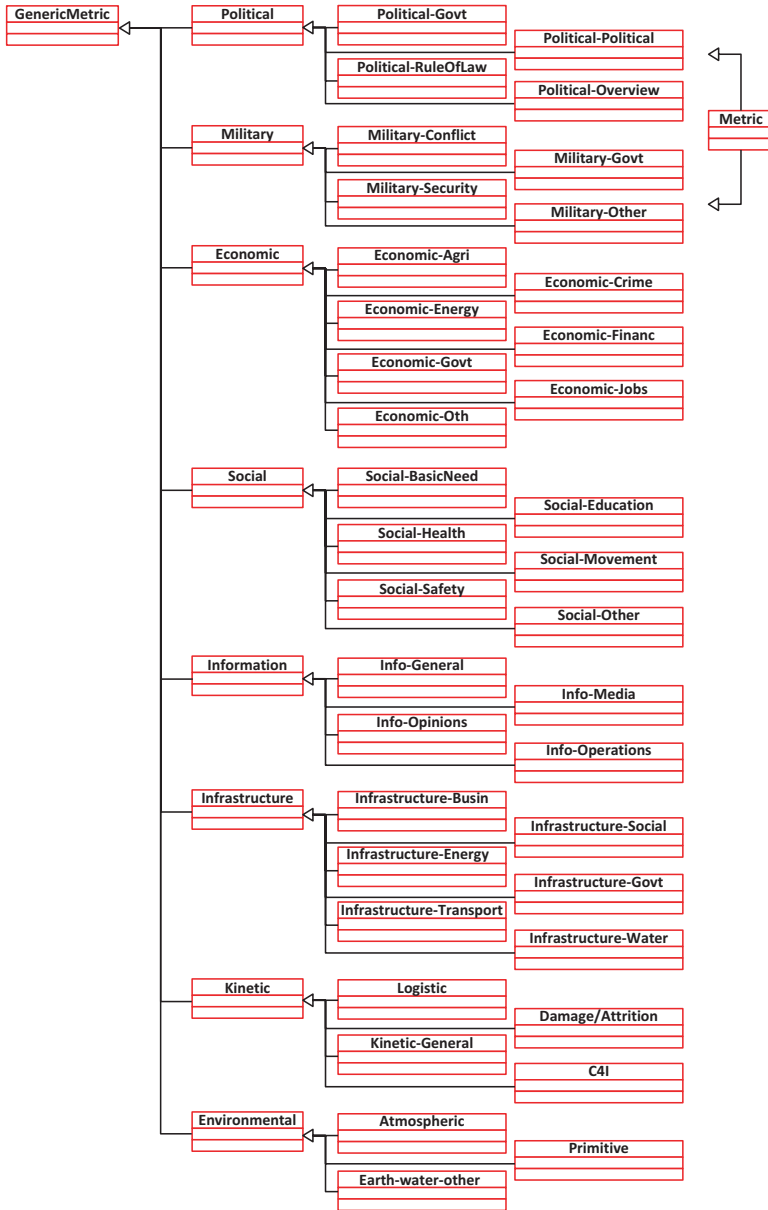


Fig. 6.2 Metric PMESII ontology

Figure 6.3 provides a diagram of the Metric type ontology. All of the Metrics are represented by a single class with two horizontal arrows representing the connection(s) of the Metric to the type subcategories.

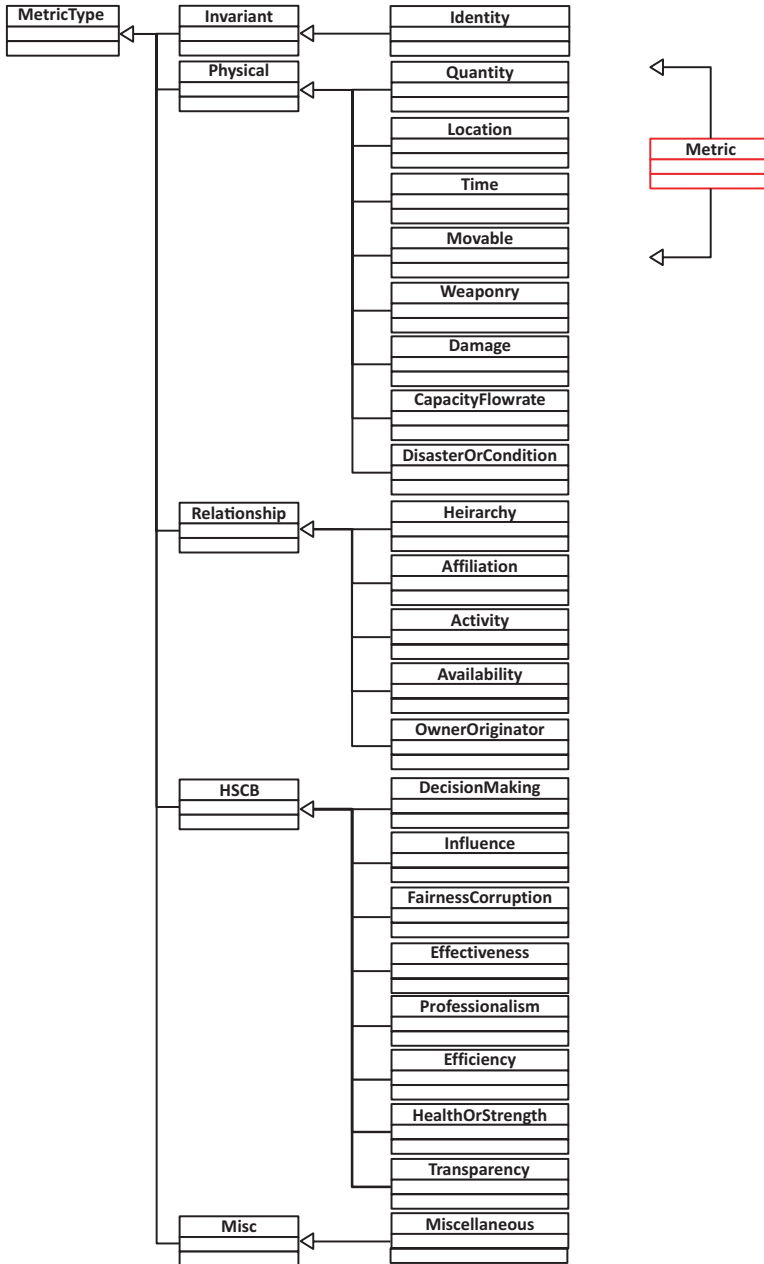


Fig. 6.3 Metric type ontology

The generic types and properties were listed in Table 2.1, in Chap. 2; however, that table is repeated here for accessibility as Table 6.1. *Mtype* is the Metric property type code. The *Mtype* categories are shown in the row divisions. The *Mtype* and Property will be reported in the tables of the Metrics. The *Mtype* value was shown in the Actor, Action and Environment tables of Chaps. 3, 4, and 5, respectively.

Table 6.1 Metric property types

Type	<i>Mtype</i>	Property	Description
<i>Invariant</i>			
	110	<i>Identity</i>	Name or other identification of the entity
<i>Physical</i>			
	210	<i>Location</i>	Current location (defined over one or more points, along a network, as an area, or by density over an area, including elevation/depth if appropriate). <i>Location</i> may be null.
	220	<i>Time</i>	Actions: Event occurrence as point in time (date/time), event duration, event frequency (events per time period); Other: date/time of change of any other metric
	230	<i>Quantity</i>	Number of entities (if single Actor = 1; if “group of same” = number of Actors) Number of members (Actor is significant group or demographic group = number of people in group) Environmental entities similar Actions = number of things produced, added, etc. (not damage or capacity)
	240	<i>DisasterOrCondition</i>	Indicators as to whether entity is a disaster or condition, whether it can be caused by man or not, whether it can be caused by nature or not. (only elements in natural environment)
	250	<i>Movable</i>	Indicator as to whether entity can be moved or not and the current speed of movement; may include maximum speed
	260	<i>CapacityFlowrate</i>	Capacity of entity in terms of flowrates such as number or volume per day and in terms of quantities such as weight, height, volume (only environment element), may include original or desired values
	270	<i>Weaponry</i>	Entity’s current weaponry types and quantities (in general, Actors or tangible things might have weapons); may include original or desired values.
	280	<i>Damage</i>	Damage to entity as a numeric or categorical severity level, quantity in numerical terms, coverage over all components (only Actions in damage and antiperson)
<i>Relationship</i>			
	310	<i>Affiliation</i>	Name of thing with which entity is affiliated; this is Actor’s organization or parent organization, Intensity with which entity holds the affiliation or an entity’s members hold the affiliation
	320	<i>Hierarchy</i>	Actor’s authority level, name of superior, and type of distribution of authority. (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy.) (only Actors)

(continued)

Table 6.1 (continued)

Type	Mtype	Property	Description
	330	<i>OwnerOriginator</i>	For Environment this is the owner, for Action this is Action's originator
	340	<i>Activity</i>	Entity activity in terms of coverage, intensity, and number of activities (only Actors)
	350	<i>Availability</i>	Numeric or categorical level of availability of entity, may include original or desired levels
<i>HSCB</i>			
	410	<i>DecisionMaking</i>	Description of the decision-making process and the quality of the decision-making
	420	<i>Influence</i>	Numeric or categorical level of influence of entity (mostly Actors)
	430	<i>FairnessCorruption</i>	Numeric or categorical level of fairness/corruption of entity
	440	<i>Effectiveness</i>	Numeric or categorical level of effectiveness of entity
	450	<i>Efficiency</i>	Numeric or categorical level of economic efficiency of entity
	460	<i>HealthOrStrength</i>	Numeric or categorical level of health (as in economic health) or strength (such as strength of progress) of entity
	470	<i>Professionalism</i>	Numerical or categorical level of professionalism of the entity (only some Actors)
	480	<i>Transparency</i>	Numerical or categorical level of transparency (some Actors and some environment elements)
<i>Misc</i>			
	510	<i>Miscellaneous</i>	Text description

The Actor, Action, and Environment element classes shown in the tables in previous chapters are connected to the Metric classes through the element IDs (unique within the Elements) listed in those tables and the Metric IDs (unique within the Metrics) listed in the following tables. However, providing links between individual elements to individual Metrics in the element tables would have yielded an unacceptable increase in table size. (The connector table between the elements and the Metrics contains more than 5000 connections.) Therefore, those tables only indicated the *Mtypes* to which the element classes were connected. The Metric class names are sufficiently similar to their corresponding element class names that most of the connections can be easily inferred.

Most Metrics are connected to only one element, while all elements are connected to multiple Metrics. Thus, the classes are generally related to the elements to which they are attached. However, some Metrics are generic in nature and are connected to multiple elements. For example, there is only one *Identity* Metric class (*Mtype* 110) and all elements are connected to it. Some other Metric classes act as “fill-in” classes. This occurs where the particular type of Metric was chosen

as the primary Metric for many elements and, thus, individual Metrics were tailored for those elements, all of that particular type. However, it was later determined that the type should also apply to other elements, for which some other types had been chosen as the primary Metrics. To serve this need, a generic Metric of the particular type was created and connected to these other elements to “fill in” the connection to the type. These generic Metric classes will be highlighted in the Metric class tables.

Political Metrics

The primary components of the political Metrics are governance (policies, personnel, organizations, freedom, etc.), the rule of law (judiciary, law enforcement, crime, etc.), and politics (leadership, factions, etc.), as well as some miscellaneous items (intervenor status, stability/peace and legitimacy ratings, etc.). Measuring the status of some of these items is difficult, but obviously necessary.

Political: Government Metrics

As its name implies, the Political – Government subcategory contains Metric classes that relate to the quality of governance of the entities to which the Metric classes are attached. It should be noted that these entities need not be part of the Host Nation government, although some of them will be. The classes in this subcategory are shown in Table 6.2.

Note that some of the Metrics are relatively clear. For example, *FirstRespondersActivityRating* measures the activity of first responders in terms of coverage (how broad is the activity), intensity, and quantity (some measure of the amount of activity). Some Metrics are descriptive in nature, with the assumption that the description might change over time as a result of some Action or Actions. For example, *GovtDecisionAuthorityRating* answers the question, “Who has power (autocratic, democratic, theocratic, monarchy, warlords, etc.)?”

Table 6.2 Political-government metric classes

ID	Metric classes	Defining questions	Type
3	<i>GovtDecisionAuthority Rating</i>	Who has power (autocratic, democratic, theocratic, monarchy, warlords, etc.)?	510 <i>Miscellaneous</i>
4	<i>GovernanceRating</i>	How well does it govern; what are the checks on its power?	510 <i>Miscellaneous</i>
5	<i>FirstResponders ActivityRating</i>	What is the first responder activity (coverage, intensity, quantity)?	340 <i>Activity</i>
6	<i>GovtLeaderChange Rating</i>	How does leadership change: elections, hereditary succession, coup, revolution?	510 <i>Miscellaneous</i>
7	<i>CentralAuthority EffectivenessRating</i>	How effectively does it govern: political capacity (tax collection capability, etc.)?	440 <i>Effectiveness</i>
8	<i>SocialServices AdequacyRating</i>	How effective is child services, or elderly care, etc., in scope (distribution throughout society) and effectiveness?	440 <i>Effectiveness</i>
9	<i>GovtDecision MakingRating</i>	What is the distribution of power, number of political parties, checks and balances, elections, dispute resolution?	510 <i>Miscellaneous</i>
10	<i>Relationship WithIntervenors Rating</i>	What is the strength of the relationship between the parties, ranging from adversarial to very close?	460 <i>Health OrStrength</i>
11	<i>FreedomRating</i>	What is the freedom rating (use something like the Freedom House scale)?	460 <i>Health OrStrength</i>
14	<i>ExternalGovt AdvisorsMoP</i>	What is the number of external advisors provided to the government (not counting Rule of Law advisors)?	230 <i>Quantity</i>
16	<i>GovtPersonnelEducated ChangeMoP</i>	What is the number of civil service, legislative staff, local government staff, etc. educated?	230 <i>Quantity</i>
18	<i>FirstResponders TrainedMoP</i>	What is the number of first responders trained?	230 <i>Quantity</i>
19	<i>FirstResponders JobsCreatedMoP</i>	How many first responder jobs have been created?	230 <i>Quantity</i>
20	<i>FirstResponders InvestmentMoP</i>	What is the monetary investment in first responders?	230 <i>Quantity</i>
22	<i>PoliticalLeaders TrainedMoP</i>	How many new political leaders are trained in constitutional duties as well as civil politics?	230 <i>Quantity</i>
24	<i>GovtReformChange MoP</i>	What is the strength of progress in reforming all parts and levels of government?	460 <i>Health OrStrength</i>
26	<i>ElectionsConducted ChangeMoP</i>	What is the strength of progress in planning, executing, monitoring, and publicizing elections?	460 <i>Health OrStrength</i>

(continued)

Table 6.2 (continued)

ID	Metric classes	Defining questions	Type
28	<i>GovtSupplies DeliveredMoP</i>	What quantity of government supplies has been delivered for all levels and parts of government?	230 <i>Quantity</i>
30	<i>ConstitutionReform ChangeMoP</i>	What is the strength of progress in constitutional reform?	460 <i>Health OrStrength</i>
32	<i>TransitionGovt CreationChangeMoP</i>	What is the strength of progress in establishing, staffing, and funding a transition government?	460 <i>Health OrStrength</i>
34	<i>DiplomaticActionMoP</i>	What is the direct result of diplomatic actions to and from the Host Nation government, internal and external (communications, making alliances, etc.)?	510 <i>Miscellaneous</i>
36	<i>GovtDestabilization MoP</i>	What is the strength of progress in destabilizing the Host Nation government?	460 <i>Health OrStrength</i>
242	<i>AgPolicyChange MoP</i>	What is the strength of progress in reforming agricultural policy?	460 <i>Health OrStrength</i>
283	<i>GovtEconomic PolicyRating</i>	What is the overall rating on the government's economic and financial policy?	460 <i>Health OrStrength</i>
285	<i>Privatization ChangeMoP</i>	What is the strength of progress in privatizing government-run businesses?	460 <i>Health OrStrength</i>
287	<i>EconomicPolicy ChangeMoP</i>	What is the strength of progress in reforming government economic and financial policy?	460 <i>Health OrStrength</i>
289	<i>EconomicIntegration ChangeMoP</i>	What is the strength of progress in economic integration and cooperation (strategy/assessment, prices and subsidies, debt management, arrears clearance, etc.) across private, government, international sectors?	460 <i>Health OrStrength</i>
291	<i>CommercialLaw ChangeMoP</i>	What is the strength of progress in reforming commercial law?	460 <i>Health OrStrength</i>
293	<i>TaxAndTrade ChangeMoP</i>	What is the strength of progress in reforming tax and trade type policies?	460 <i>Health OrStrength</i>
306	<i>SocialSafetyNet ChangeMoP</i>	What is the strength of progress in reforming the social safety net?	460 <i>Health OrStrength</i>
409	<i>FreedomOfMovement Rating</i>	What is the rating for the freedom of movement of the populace (politically restricted, tied to the land, free to move, etc.)?	460 <i>Health OrStrength</i>
439	<i>ObservationOfSocial AndCulturalInterests Rating</i>	What is the level of observation of social anniversaries and other cultural events and differences?	460 <i>Health OrStrength</i>

(continued)

Table 6.2 (continued)

ID	Metric classes	Defining questions	Type
461	<i>PublicRecords TransparencyRating</i>	What is the transparency rating for government information (records exist, availability, public reporting (push), visibility of actions, etc.)?	480 <i>Transparency</i>
463	<i>FreedomOfDomestic MediaRating</i>	What is the level of freedom of domestic media?	460 <i>Health OrStrength</i>
465	<i>FreedomOfInternational MediaRating</i>	What is the level of freedom of the international media within the country?	460 <i>Health OrStrength</i>
778	<i>Nationalization ChangeMoP</i>	What is the direct result of the government nationalizing privately-run businesses? Number nationalized, etc.	510 <i>Miscellaneous</i>
783	<i>IESControlRating</i>	Who/what/how levels control this Infrastructure environment sustainability (IES) (includes energy, transportation, etc.)?	510 <i>Miscellaneous</i>
788	<i>ReduceIPTheftMoP</i>	What amount of intellectual property theft or cybercrimes has been detected, stopped or prosecuted?	510 <i>Miscellaneous</i>
793	<i>ImproveLegislativeMoP</i>	What is the strength of progress in improving legislative processes?	460 <i>Health OrStrength</i>
794	<i>ImproveExecutiveMoP</i>	What is the strength of progress in improving executive processes?	460 <i>Health OrStrength</i>
796	<i>ImproveHNCivil MilitaryMoP</i>	What is the strength of progress in improving the connection between the Host Nation civil government and the Host Nation military?	460 <i>Health OrStrength</i>
797	<i>ImproveFreeMediaMoP</i>	What is the strength of progress in improving the freedom of media?	460 <i>Health OrStrength</i>
798	<i>ImproveSocial ServicesMoP</i>	What is the strength of progress in improving social services?	460 <i>Health OrStrength</i>
811	<i>LegislativeResultsMoP</i>	How many laws are debated, passed, etc.?	510 <i>Miscellaneous</i>
812	<i>ExecutiveResultsMoP</i>	How many regulations, etc., are considered, implemented?	510 <i>Miscellaneous</i>
824	<i>DecreaseFirst RespondersMoP</i>	How much are first responders decreased?	230 <i>Quantity</i>
884	<i>ChangeKeyLeader IdentitiesMoP</i>	What are the changes in identities of the various key leader types?	510 <i>Miscellaneous</i>
889	<i>GovernmentPersonnel ActivityRating</i>	What is the activity (coverage, intensity, quantity) of government personnel?	340 <i>Activity</i>
890	<i>IncreaseGovernment PersonnelMoP</i>	What is the increase in government personnel?	230 <i>Quantity</i>
891	<i>DecreaseGovernment PersonnelMoP</i>	What is the decrease in government personnel?	230 <i>Quantity</i>

(continued)

Table 6.2 (continued)

ID	Metric classes	Defining questions	Type
895	<i>ExecutiveBranch ActivityRating</i>	What is the activity (coverage, intensity, quantity) level of the executive branch?	340 <i>Activity</i>
896	<i>LegislativeBranch ActivityRating</i>	What is the activity (coverage, intensity, quantity) level of the legislative branch?	340 <i>Activity</i>
898	<i>IntervenorSupport PersonnelActivity Rating</i>	What is the activity (coverage, intensity, quantity) of intervenor support personnel (advisors to government or proto-government and judicial system and to intervenor organizations: economists, computer experts, agronomists, etc.)?	340 <i>Activity</i>
899	<i>IncreaseIntervenor SupportPersonnelMoP</i>	What is the increase in intervenor support personnel?	230 <i>Quantity</i>
900	<i>DecreaseIntervenor SupportPersonnelMoP</i>	What is the decrease in intervenor support personnel?	230 <i>Quantity</i>
956	<i>FirstResponder PersonnelActivityRating</i>	What is the activity (coverage, intensity, quantity) of first responder personnel?	340 <i>Activity</i>
959	<i>KeyBureaucratInfluence Rating</i>	What is the influence of the key bureaucrat?	420 <i>Influence</i>
963	<i>KeyGovtExecutive InfluenceRating</i>	What is the influence of the key government executive office holder?	420 <i>Influence</i>
965	<i>KeyFirstResponder LeaderInfluenceRating</i>	What is the influence of the key first responder leader?	420 <i>Influence</i>
967	<i>KeyLegislatorInfluence Rating</i>	What is the influence of the key legislator?	420 <i>Influence</i>
971	<i>GovernmentBureaucracy ActivityRating</i>	What is the activity (coverage, intensity, quantity) of government bureaucracies?	340 <i>Activity</i>
975	<i>TypeGovtRating</i>	What is the type of government (autocratic, democracy, etc.)?	510 <i>Miscellaneous</i>
976	<i>Constitutional StatusRating</i>	What is the status and rating of the constitution (none, under construction, weak, strong, etc.)?	460 <i>Health OrStrength</i>
977	<i>TaxationRating</i>	What is the rating of the Host Nation taxation structures and policy?	460 <i>Health OrStrength</i>
978	<i>OtherGovtPolicies Rating</i>	What is the rating of other Host Nation policies (Health, Education, Labor, Information and Media, Social and Cultural, Energy, Natural Resources, Agriculture, Transportation, Trade policies)?	460 <i>Health OrStrength</i>
979	<i>GeneralGovt PoliciesRating</i>	What is the rating for overall Host Nation government policies?	460 <i>Health OrStrength</i>

(continued)

Table 6.2 (continued)

ID	Metric classes	Defining questions	Type
981	<i>SocialServices SystemRating</i>	What is the rating of the social services system?	460 <i>Health OrStrength</i>
984	<i>FirstResponders EffectivenessRating</i>	How effective is the first responder organization?	440 <i>Effectiveness</i>
987	<i>BureaucracyRating</i>	What is the health of the bureaucracy?	460 <i>Health OrStrength</i>
990	<i>KeyBureacracyLeader DecisionMakingRating</i>	What is the process and quality of the key bureaucracy leader's decision-making?	410 <i>Decision Making</i>
992	<i>KeyLegislativeLeader DecisionMakingRating</i>	What is the process and quality of the key legislative leader's decision-making?	410 <i>Decision Making</i>
993	<i>KeyGovtExecutive LeaderDecisionMaking Rating</i>	What is the process and quality of the key government executive leader's decision-making?	410 <i>Decision Making</i>
1008	<i>CivilDefensePlan Rating</i>	What is the strength of the civil defense plan for the Host Nation?	460 <i>Health OrStrength</i>
1017	<i>RespondToCivil EmergencyMoP</i>	What is the success level in responding to civil emergency by first responders?	460 <i>Health OrStrength</i>
1025	<i>ChangeTransportation PolicyMoP</i>	What is the strength of progress in changing the Host Nation transportation policies?	460 <i>Health OrStrength</i>
1026	<i>ChangeEnergy PolicyMoP</i>	What is the strength of progress in changing the Host Nation energy policies?	460 <i>Health OrStrength</i>
1027	<i>ChangeNatural ResourcesPolicyMoP</i>	What is the strength of progress in changing the Host Nation natural resources policies?	460 <i>Health OrStrength</i>
1028	<i>ChangeLabor PolicyMoP</i>	What is the strength of progress in changing the Host Nation labor policies?	460 <i>Health OrStrength</i>
1029	<i>ChangeEducation PolicyMoP</i>	What is the strength of progress in changing the Host Nation education policies?	460 <i>Health OrStrength</i>
1030	<i>ChangeHealthcare PolicyMoP</i>	What is the strength of progress in changing the Host Nation healthcare policies?	460 <i>Health OrStrength</i>
1031	<i>ChangeSocialAnd CulturalPolicyMoP</i>	What is the strength of progress in changing the Host Nation social and cultural policies?	460 <i>Health OrStrength</i>
1043	<i>IncreaseBureaucracy OrganizationsMoP</i>	What is the number of bureaucracy organizations added?	230 <i>Quantity</i>
1044	<i>DecreaseBureaucracy OrganizationsMoP</i>	What is the number of bureaucracy organizations subtracted?	230 <i>Quantity</i>

(continued)

Table 6.2 (continued)

ID	Metric classes	Defining questions	Type
1045	<i>IncreaseGovt OrganizationsMoP</i>	What is the number of government organizations added?	230 <i>Quantity</i>
1046	<i>DecreaseGovt OrganizationsMoP</i>	What is the number of government organizations subtracted?	230 <i>Quantity</i>
1051	<i>IncreaseFirstResponder OrganizationsMoP</i>	What is the number of first responder organizations added?	230 <i>Quantity</i>
1052	<i>DecreaseFirstResponder OrganizationsMoP</i>	What is the number of first responder organizations subtracted?	230 <i>Quantity</i>
1056	<i>ExecuteCivilDefense PlanMoP</i>	What is the success of executing the civil defense plan?	460 <i>Health OrStrength</i>
1057	<i>IncreaseFirstResponders PersonnelMoP</i>	What is the number of first responder personnel added?	230 <i>Quantity</i>
1065	<i>KeyFirstResponders DecisionMakingRating</i>	What is the process and quality of the key first responder's decision-making?	410 <i>Decision Making</i>
1085	<i>IncreaseSocialServices OrganizationsMoP</i>	What is the number of social services organizations added?	230 <i>Quantity</i>
1086	<i>DecreaseSocialServices OrganizationsMoP</i>	What is the number of social services organizations subtracted?	230 <i>Quantity</i>
1111	<i>InterventionOrganization InfluenceRating</i>	What is the influence of the intervention organization?	420 <i>Influence</i>
1112	<i>IntervenorDiplomatic PersonInfluenceRating</i>	What is the influence of the intervenor diplomatic person?	420 <i>Influence</i>
1113	<i>IntelligenceService InfluenceRating</i>	What is the influence of the intelligence service?	420 <i>Influence</i>
1115	<i>InsurgentInfluence Rating</i>	What is the influence of the insurgent organization?	420 <i>Influence</i>
1116	<i>TerroristInfluence Rating</i>	What is the influence of the terrorist organization?	420 <i>Influence</i>
1129	<i>Influence*</i>	What is the influence of the entity?	420 <i>Influence</i>
1137	<i>Transparency*</i>	What is the transparency of operations of the entity?	480 <i>Transparency</i>

The highlighted (*) classes are generic classes, each of which is connected to many elements

Political: Political Metrics

The Political – Political subcategory contains Metric classes that relate to politics, as opposed to governing. The classes in this subcategory are shown in Table 6.3.

A decision-making rating is part of a number of Metrics. For example, *KeyLeaderPoliticalDecisionMakingRating* asks about the process and quality of the decision-making of key political leaders. An influence rating is also part of a number of Metrics. Influence is an important part of political life, despite being hard to measure. *KeyLeaderPoliticalProPeaceInfluenceRating* is one such Metric, here regarding the influence of a key political leader Actor of the pro-peace persuasion.

Table 6.3 Political-political metric classes

ID	Metric classes	Defining questions	Type
38	<i>KeyLeaderPoliticalDecisionMakingRating</i>	What is the process and quality of the key political leader's decision-making?	410 <i>DecisionMaking</i>
39	<i>KeyLeaderPoliticalProPeaceInfluenceRating</i>	What is the influence of the pro-peace key political leader?	420 <i>Influence</i>
40	<i>KeyLeaderPoliticalAgitatorInfluenceRating</i>	What is the influence of the anti-peace key political leader?	420 <i>Influence</i>
41	<i>GovtTypeOrganizationActivityRating</i>	For the government, alternative government, or intervention organizations, what is the activity (coverage, intensity, quantity) level (includes administration and legislative organizations)?	340 <i>Activity</i>
42	<i>KeyLeaderPoliticalInfluenceRating</i>	What is the influence of the key political leader?	420 <i>Influence</i>
43	<i>PoliticalPopulationActivityRating</i>	What is the activity (coverage, intensity, quantity) level of the politically active population?	340 <i>Activity</i>
44	<i>ExternalAgitatorForcesInfluenceRating</i>	What is the influence of external forces advocating conflict?	420 <i>Influence</i>
45	<i>PoliticalFactionInfluenceRating</i>	What is the influence of the political faction?	420 <i>Influence</i>
46	<i>OppositionPartyUseOfForceRating</i>	What is the opposition's stance on the use of force and strength of that stance, measured from wholly against to active use of force?	460 <i>Health OrStrength</i>
47	<i>FactionalDisputeRating</i>	How bitter is the factional dispute?	460 <i>Health OrStrength</i>
48	<i>ResolutionOfDifferencesByCompetingGroupsRating</i>	What is the method of resolving differences between pairs of groups, ranging from violent conflict to peaceful negotiation?	510 <i>Miscellaneous</i>
50	<i>MediationNegotiationsPersuasionMoP</i>	What is the direct result of mediation, negotiation and persuasion efforts?	510 <i>Miscellaneous</i>

(continued)

Table 6.3 (continued)

52	<i>ComplianceWithPeaceAccordsMoP</i>	What is the strength of progress in maintaining compliance with peace accords?	460 <i>Health OrStrength</i>
54	<i>PowersharingMonitoringMoP</i>	What is the direct result of monitoring power-sharing arrangements: violations detected, corrected, etc.?	510 <i>Miscellaneous</i>
56	<i>TransferOfControlToHNChangeMoP</i>	What is the strength of progress in transferring control of government functions to the Host Nation government?	460 <i>Health OrStrength</i>
806	<i>ComplianceWithPeaceAccordsRating</i>	What is the level of compliance with peace accords, demilitarized zones, etc.?	460 <i>Health OrStrength</i>
807	<i>PowersharingRating</i>	What is the level of power-sharing?	460 <i>Health OrStrength</i>
827	<i>IncreasePoliticalPopulationActivityMoP</i>	How much is the political population activity (coverage, intensity, quantity) increased?	510 <i>Miscellaneous</i>
828	<i>DecreasePoliticalPopulationActivityMoP</i>	How much is the political population activity (coverage, intensity, quantity) decreased?	510 <i>Miscellaneous</i>
829	<i>IncreaseExternalForcesAdvocatConflictMoP</i>	How much is the increase in external forces advocating conflict?	230 <i>Quantity</i>
830	<i>DecreaseExternalForcesAdvocatConflictMoP</i>	How much is the decrease in external forces advocating conflict?	230 <i>Quantity</i>
831	<i>ChangePoliticalFactionsMoP</i>	How much is the makeup of political factions changed?	510 <i>Miscellaneous</i>
884	<i>ChangeKeyLeaderIdentitiesMoP</i>	What are the changes in identities of the various key leader types?	510 <i>Miscellaneous</i>
1087	<i>CivilDisturbanceRating</i>	What is the level of civil disturbance: parades, demonstrations, peaceful protests, riots?	460 <i>Health OrStrength</i>
1088	<i>CreateCivilDisturbanceMoP</i>	What is the strength of progress in creating civil disturbances: parades, demonstrations, peaceful protests, riots?	460 <i>Health OrStrength</i>
1089	<i>QuellCivilDisturbanceMoP</i>	What is the strength of progress in reducing or stopping civil disturbances: parades, demonstrations, peaceful protests, riots?	460 <i>Health OrStrength</i>
1103	<i>KeyLeaderAdvocatingPeaceAndStabilityDecisionMaking</i>	What is the process and quality of the key individual's decision-making?	410 <i>Decision Making</i>
1104	<i>KeyLeaderAdvocatingConflictAndDissensionDecisionMaking</i>	What is the process and quality of the key individual's decision-making?	410 <i>Decision Making</i>

Political: Rule of Law Metrics

As indicated by its name, the Political – Rule of Law subcategory contains Metric classes that relate to the Rule of Law, that is, the restriction of the exercise of power by subordinating it to well-defined and established laws. As with many other cases, the inclusion of a particular class in this subcategory may be seen as an implication of the meaning of the class, as opposed to a direct focus on the subcategory. On the other hand, the meaning of the subcategory may be looked at as broader than that implied by its name alone. The name is central to understanding the subcategory; however, the true meaning may be found in the union of the questions defining its Metrics. The classes in this subcategory are shown in Table 6.4.

Table 6.4 Political-rule of law metric classes

ID	Metric classes	Defining questions	Type
58	<i>CommonCrimeRating</i>	What is the level of common crime?	460 <i>HealthOrStrength</i>
59	<i>PoliticalCrimeRating</i>	What is the level of "political" crimes as defined by the government?	460 <i>HealthOrStrength</i>
60	<i>DrugCrimeRating</i>	What is the level of drug crime?	460 <i>HealthOrStrength</i>
61	<i>OrganizedCrimeRating</i>	What is the level of organized crime?	460 <i>HealthOrStrength</i>
62	<i>OverallCrimeRating</i>	What is the overall crime level?	460 <i>HealthOrStrength</i>
63	<i>LegalSystemTraditionRating</i>	What is the legal system tradition: common law, civil law (e.g., French, religious, Asian), no law, etc.?	510 <i>Miscellaneous</i>
64	<i>JudicialOrganizationEffectivenessRating</i>	What is the effectiveness of the court type organization, government or alternative?	440 <i>Effectiveness</i>
65	<i>LawEnforcementOrganizationRating</i>	What is the professionalism rating (equipment, manpower, doctrine, training level, resources, leadership, organizational culture, history, civil-military relations) of the law enforcement organization?	470 <i>Professionalism</i>
66	<i>CorruptionInCultureRating</i>	What is the perceived level of corruption that is prevalent in the culture?	430 <i>FairnessCorruption</i>
67	<i>CorruptionInSocialServicesRating</i>	What is the existing level of corruption in the social services?	430 <i>FairnessCorruption</i>
68	<i>CorruptionInLawEnforcementRating</i>	What is the existing level of corruption in law enforcement organizations?	430 <i>FairnessCorruption</i>

(continued)

Table 6.4 (continued)

ID	Metric classes	Defining questions	Type
69	<i>CorruptionInCentral AuthorityRating</i>	What is the existing level of corruption in the central authority?	430 <i>FairnessCorruption</i>
70	<i>ConnectionBetweenLaw EnforcementAnd MilitaryRating</i>	What is the connection between the two: law enforcement as part of military or not, multiple levels of police, border guards, etc.?	510 <i>Miscellaneous</i>
71	<i>GovtLawEnforcement EffectivenessRating</i>	What is the effectiveness of the government law enforcement organizations?	440 <i>Effectiveness</i>
72	<i>PrisonStructure AdequacyRating</i>	What is the strength of the prison structure?	460 <i>HealthOrStrength</i>
73	<i>ProtectionOfHuman RightsRating</i>	What is the strength of human rights protection?	460 <i>HealthOrStrength</i>
74	<i>PoliticalPersecutionRating</i>	What is the level of political persecution?	460 <i>HealthOrStrength</i>
75	<i>AdministrationOfJustice EffectivenessRating</i>	How effective is the administration of justice?	440 <i>Effectiveness</i>
77	<i>PolicingOperationMoP</i>	What is the impact of policing operations: criminals apprehended, area patrolled, etc.?	510 <i>Miscellaneous</i>
79	<i>LawEnforcementChangeMoP</i>	What is the strength of progress in reforming the police force?	460 <i>HealthOrStrength</i>
81	<i>LawEnforcementOfficers TrainedMoP</i>	What is the number of policemen trained and equipped?	230 <i>Quantity</i>
82	<i>LawEnforcementJobs CreatedMoP</i>	How many police jobs have been created?	230 <i>Quantity</i>
83	<i>LawEnforcementOfficer InvestmentMoP</i>	What is the monetary investment in policemen?	230 <i>Quantity</i>
85	<i>PenalSystemChangeMoP</i>	What is the strength of progress in establishing humane penal systems?	460 <i>HealthOrStrength</i>
87	<i>LegalSystemChangeMoP</i>	What is the strength of progress in reforming the legitimate legal system?	460 <i>HealthOrStrength</i>
89	<i>ExternalJusticeAdvisors ActionMoP</i>	What is the number of external advisors provided to police or criminal justice organizations?	230 <i>Quantity</i>
91	<i>GovtCorruption MonitoringMoP</i>	What is the direct result of monitoring for corruption by government officials? Violations detected, corrected, etc.	510 <i>Miscellaneous</i>

(continued)

Table 6.4 (continued)

ID	Metric classes	Defining questions	Type
93	<i>HumanRightsMonitoringMoP</i>	What is the direct result of monitoring for human rights practices? Violations detected, corrected, etc.	510 <i>Miscellaneous</i>
95	<i>WarCrimesMoP</i>	What is the strength of progress on war crimes investigations, tribunals, etc.?	460 <i>HealthOrStrength</i>
97	<i>PropertyLawChangeMoP</i>	What is the strength of progress in reforming property laws and procedures?	460 <i>HealthOrStrength</i>
99	<i>ExtortionMoP</i>	How much money has been extorted; how many people have been suppressed of the population/opposition?	510 <i>Miscellaneous</i>
101	<i>ExtrajudicialActionMoP</i>	How many people have been killed, maimed, intimidated, etc.?	510 <i>Miscellaneous</i>
247	<i>CriminalOrganizationActivityRating</i>	What is the activity (coverage, intensity, quantity) level of criminal organizations?	340 <i>Activity</i>
248	<i>KeyLeaderCriminalInfluenceRating</i>	What is the influence of the key criminal leader?	420 <i>Influence</i>
256	<i>CriminalAndCorruptActionMoP</i>	What is the result (money, etc.) of crime or corrupt action (intimidation, kidnapping, murder, smuggling, drug trafficking, bribery, "protection," illicit services, prostitution, self-dealing, etc.)?	510 <i>Miscellaneous</i>
351	<i>PropertyRightsAccessRating</i>	What is the strength of property rights and access?	460 <i>HealthOrStrength</i>
422	<i>SocialProtectionProgramsActionMoP</i>	What is the result of the Action? Program instituted, relief provided, etc.	510 <i>Miscellaneous</i>
424	<i>AntiTraffickingInPersonsActionMoP</i>	What is the result of anti-trafficking or trafficking in persons Action: number of persons rescued, number trafficked, etc.?	510 <i>Miscellaneous</i>
784	<i>InterdictDrugsMoP</i>	What quantity of drugs has been interdicted?	510 <i>Miscellaneous</i>
787	<i>ReduceFinanceCrimesMoP</i>	What amount of financial crime has been detected, stopped, prosecuted?	510 <i>Miscellaneous</i>
788	<i>ReduceIPTheftMoP</i>	What amount of intellectual property theft or cybercrimes has been detected, stopped or prosecuted?	510 <i>Miscellaneous</i>

(continued)

Table 6.4 (continued)

ID	Metric classes	Defining questions	Type
791	<i>ReduceOrganized CrimeMoP</i>	What amount of organized or gang crime has been detected, stopped, prosecuted?	510 <i>Miscellaneous</i>
795	<i>ReduceCorruptionMoP</i>	What is the strength of progress in reducing corruption in all areas? Amount detected, stopped, prosecuted	460 <i>HealthOrStrength</i>
810	<i>JudicialActionMoP</i>	What is the result of the Action? Conviction, acquittal, successful trial of facts, etc.	510 <i>Miscellaneous</i>
822	<i>BuildPrisonMoP</i>	How much prison infrastructure is built?	510 <i>Miscellaneous</i>
823	<i>DamagePrisonMoP</i>	How much prison infrastructure is damaged? (severity, quantity and coverage)	280 <i>Damage</i>
884	<i>ChangeKeyLeader IdentitiesMoP</i>	What are the changes in identities of the various key leader types?	510 <i>Miscellaneous</i>
885	<i>LawEnforcementPersonnel ActivityRating</i>	What is the activity (coverage, intensity, quantity) of law enforcement personnel?	340 <i>Activity</i>
886	<i>DecreaseLawEnforcement PersonnelMoP</i>	What is the decrease in law enforcement personnel?	230 <i>Quantity</i>
898	<i>IntervenorSupportPersonnel ActivityRating</i>	What is the activity (coverage, intensity, quantity) of intervenor support personnel (advisors to government or proto-government and judicial system and to intervenor organizations: economists, computer experts, agronomists, etc.)?	340 <i>Activity</i>
899	<i>IncreaseIntervenor SupportPersonnelMoP</i>	What is the increase in intervenor support personnel?	230 <i>Quantity</i>
900	<i>DecreaseIntervenorSupport PersonnelMoP</i>	What is the decrease in intervenor support personnel?	230 <i>Quantity</i>
958	<i>KeyLawEnforcementLeader InfluenceRating</i>	What is the influence of the key law enforcement leader?	420 <i>Influence</i>
962	<i>KeyJudicialLeader InfluenceRating</i>	What is the influence of the key judicial leader?	420 <i>Influence</i>
980	<i>PenalSystemRating</i>	What is the rating of the penal system?	460 <i>HealthOrStrength</i>
989	<i>CorruptionInLocalAndMid LevelAuthorityRating</i>	What is the level of corruption at the local and mid-government levels?	430 <i>FairnessCorruption</i>
991	<i>KeyJudicialLeaderDecision MakingRating</i>	What is the process and quality of the key judicial leader's decision-making?	410 <i>DecisionMaking</i>

(continued)

Table 6.4 (continued)

ID	Metric classes	Defining questions	Type
997	<i>KeyLawEnforcementLeader DecisionMakingRating</i>	What is the process and quality of the key law enforcement leader's decision-making?	410 <i>DecisionMaking</i>
1041	<i>IncreaseLawEnforcement OrganizationsMoP</i>	What is the number of law enforcement organizations added?	230 <i>Quantity</i>
1042	<i>DecreaseLawEnforcement OrganizationsMoP</i>	What is the number of law enforcement organizations subtracted?	230 <i>Quantity</i>
1047	<i>IncreaseJudicial OrganizationsMoP</i>	What is the number of judicial organizations added?	230 <i>Quantity</i>
1048	<i>DecreaseJudicial OrganizationsMoP</i>	What is the number of judicial organizations subtracted?	230 <i>Quantity</i>
1058	<i>IncreaseLawEnforcement PersonnelMoP</i>	What is the number of law enforcement personnel added?	230 <i>Quantity</i>
1089	<i>QuellCivilDisturbanceMoP</i>	What is the strength of progress in reducing or stopping civil disturbances: parades, demonstrations, peaceful protests, riots?	460 <i>HealthOrStrength</i>
1118	<i>AdministrationOfJustice FairnessRating</i>	How fair is the administration of justice? Corruption would be one negative component, institutional bias would be another.	430 <i>FairnessCorruption</i>
1130	<i>Fairness/Corruption*</i>	What is the fairness/corruption of the entity?	430 <i>FairnessCorruption</i>

The highlighted (*) class is a generic class that is connected to many elements

Political: Overview Metrics

The Political – Overview subcategory contains Metric classes that provide an overview of the political situation, as well as miscellaneous Metric classes that pertain to the Political category, but don't fit other subcategories. The classes in this subcategory are shown in Table 6.5.

Table 6.5 Political-overview metrics classes

ID	Metric classes	Defining questions	Type
103	<i>SideActivityRating</i>	How active (coverage, intensity, quantity) is the side?	340 <i>Activity</i>
104	<i>InterventionOrganizationActivityRating</i>	How active (coverage, intensity, quantity) is each intervention organization?	340 <i>Activity</i>
105	<i>KeyLeaderDiplomatsInfluenceRating</i>	What is the influence of the key diplomatic leader?	420 <i>Influence</i>
106	<i>GovtDomesticLegitimacyRatingMoFE</i>	What is the domestic legitimacy level of the government?	460 <i>HealthOrStrength</i>
107	<i>GovtInternatnlLegitimacyRating</i>	What is the international legitimacy level of the government?	460 <i>HealthOrStrength</i>
108	<i>InstitutionsOfGovernanceEffectivenessRatingMoFE</i>	How effective are the institutions of governance?	440 <i>Effectiveness</i>
109	<i>CivilStabilityAndDurablePeaceLevelRatingMoPE</i>	What is the level of civil stability and durable peace?	460 <i>HealthOrStrength</i>
573	<i>GovtStructuresCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the government infrastructure?	260 <i>CapacityFlowrate</i>
579	<i>GovtStructuresCapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the government infrastructure has been rebuilt?	260 <i>CapacityFlowrate</i>
585	<i>GovtStructuresCapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the government (including police) infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
799	<i>ImproveMISMoP</i>	How much has the MIS been improved? Capacity (flowrate and absolute quantity) change, etc.	510 <i>Miscellaneous</i>
800	<i>ProvideProgramAndPersonnelMoP</i>	How much support to FASP programs and how many personnel have been provided?	510 <i>Miscellaneous</i>
809	<i>MilitaryOperationsRating</i>	What is the rating of military operations?	460 <i>HealthOrStrength</i>
832	<i>IncreaseKeyIntervenorDiplomatMoP</i>	How much is the increase in key intervenor diplomatic personnel?	230 <i>Quantity</i>
833	<i>DecreaseKeyIntervenorDiplomatMoP</i>	How much is the decrease in key intervenor diplomatic personnel?	230 <i>Quantity</i>
985	<i>InterventionOrganizationsStatusRating</i>	What is the status of the intervention organizations (diplomats, advisors, support personnel, etc.)?	460 <i>HealthOrStrength</i>
1049	<i>IncreaseIntervenorOrganizationsMoP</i>	What is the number of intervenor organizations added?	230 <i>Quantity</i>

(continued)

Table 6.5 (continued)

ID	Metric classes	Defining questions	Type
1050	<i>DecreaseIntervenorOrganizationsMoP</i>	What is the number of intervenor organizations subtracted?	230 <i>Quantity</i>
1063	<i>KeyIntervenorDiplomatsDecisionMakingRating</i>	What is the process and quality of the key intervenor diplomat's decision-making?	410 <i>DecisionMaking</i>
1066	<i>IntervenorDiplomaticPersonnelActivityRating</i>	What is the activity (coverage, intensity, quantity) of intervenor diplomatic personnel?	340 <i>Activity</i>
1090	<i>MISStatusRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the Host Nation or other organization's MIS: computer systems, internet, etc.?	260 <i>CapacityFlowrate</i>
1091	<i>DamageMISMoP</i>	What is the damage to the Host Nation or other organization MIS, etc.? Dollar cost, capacity (flowrate and absolute quantity) loss, etc. (severity, quantity and coverage)	280 <i>Damage</i>
1108	<i>IntervenorSupportPersonInfluenceRating</i>	What is the influence of the intervenor support person?	420 <i>Influence</i>
1109	<i>CriminalOrganizationInfluenceRating</i>	What is the influence of the criminal organization?	420 <i>Influence</i>
1117	<i>ExpatriatesInfluenceLevel</i>	What is the influence of expatriate population?	420 <i>Influence</i>
1119	<i>InstitutionsOfGovernanceFairnessRatingMoFE</i>	How fair are the institutions of governance? Corruption would be one negative component, institutional bias would be another	430 <i>FairnessCorruption</i>

Military Metrics

The primary components of the military Metrics are conflict, government (the relation with, intelligence services, organizational sizes, etc.), and security (provisions), as well as other items (insurgents, terrorists, paramilitary forces, capacities, etc.). Measuring the status of these items is easier than measuring the political status.

Military: Conflict Metrics

The Metric classes of the Military – Conflict subcategory provide measures of the status of the elements related to conflict. The classes in this subcategory are shown in Table 6.6.

Table 6.6 Military-conflict metric classes

ID	Metric classes	Defining questions	Type
120	<i>CivilUnrestLevel RatingMoFE</i>	What is the level of civil (internal) unrest?	460 <i>HealthOrStrength</i>
121	<i>ConflictCivilianDeath AndInjuryRating</i>	What is the death and injury rate for civilians from conflict?	460 <i>HealthOrStrength</i>
122	<i>ConflictCombatant DeathAndInjuryRating</i>	What is the death and injury rate for combatants from conflict?	460 <i>HealthOrStrength</i>
123	<i>ConflictProperty DestructionRating</i>	What is the level of property destruction from conflict?	460 <i>HealthOrStrength</i>
124	<i>DisarmamentMoP</i>	What is the strength of progress of disarmament efforts? Weapons taken, etc.	460 <i>HealthOrStrength</i>
125	<i>ForeignConflict ActivityRating</i>	What is the activity (coverage, intensity, quantity) level of foreign conflict that engages the Host Nation?	340 <i>Activity</i>
127	<i>PeaceOpsActionMoP</i>	What is the direct result of the Peace Operation? For example, NEO: non-combatants evacuated, etc.	510 <i>Miscellaneous</i>
129	<i>ConventionalWar ActionMoP</i>	What is the direct result of the conventional war Action? Enemy killed, captured, friendlies killed, captured, infrastructure damaged, etc.	510 <i>Miscellaneous</i>
131	<i>IWActionMoP</i>	What is the direct result of the irregular war Action? Enemy leader killed, captured, village secured, etc.	510 <i>Miscellaneous</i>
133	<i>DemilZonesEtc ActionMoP</i>	What is the strength of progress in establishing demilitarized zone, sanctions, and arms embargo?	460 <i>HealthOrStrength</i>
135	<i>ObserverMissions ActionMoP</i>	What is the direct result of the Action? Number of observers in place, force size in position, etc.	510 <i>Miscellaneous</i>
137	<i>WeaponsControl ActionMoP</i>	What is the strength of progress in implementing weapons control regimes? WMD controlled, arms recovered, etc.	460 <i>HealthOrStrength</i>
139	<i>BorderControl ActionMoP</i>	What is the direct result of border control, boundary security, and freedom of movement operations? Length of border secured, etc.	510 <i>Miscellaneous</i>
808	<i>BorderControlRating</i>	What is the level of control of the border?	460 <i>HealthOrStrength</i>
809	<i>MilitaryOperations Rating</i>	What is the rating of military operations?	460 <i>HealthOrStrength</i>
1006	<i>ViolenceLevelRating</i>	What is the level of violence in the Host Nation?	460 <i>HealthOrStrength</i>
1056	<i>ExecuteCivilDefense PlanMoP</i>	What is the success of executing the civil defense plan?	460 <i>HealthOrStrength</i>
1113	<i>IntelligenceService InfluenceRating</i>	What is the influence of the intelligence service?	420 <i>Influence</i>
1135	<i>Weaponry*</i>	What are the types and quantities of weapons the entity has?	270 <i>Weaponry</i>

The highlighted (*) class is a generic class that is connected to many elements

Military: Government Metrics

The Military – Government subcategory contains Metric classes concerning the relations between the military and the government. It also includes Metric classes relating to the intelligence services, which may be quasi-military in nature. The classes in this subcategory are shown in Table 6.7.

Table 6.7 Military-government metric classes

ID	Metric classes	Defining questions	Type
141	<i>CooperationBetween HNMilitaryAndIntervenors Rating</i>	What is the level of cooperation between the Host Nation military and the intervenors?	460 <i>HealthOrStrength</i>
142	<i>KeyLeaderMilitary InfluenceRating</i>	What is the influence of the key military leader?	420 <i>Influence</i>
144	<i>InterventionForces ActivityRating</i>	What is the activity (coverage, intensity, quantity) rating of the intervention forces?	340 <i>Activity</i>
145	<i>GovtMilitary ForcesActivity Rating</i>	What is the activity (coverage, intensity, quantity) rating of the Host Nation military forces?	340 <i>Activity</i>
146	<i>Intelligence ServicesActivity Rating</i>	What is the activity (coverage, intensity, quantity) rating of the intelligence services?	340 <i>Activity</i>
147	<i>RegimeSponsoredNon MilitaryArmedForces ActivityRating</i>	What is the activity (coverage, intensity, quantity) rating of the regime-sponsored, non-military armed forces?	340 <i>Activity</i>
148	<i>DemobilizedArmed ForcesActivityRating</i>	What is the activity (coverage, intensity, quantity) rating of the demobilized forces?	340 <i>Activity</i>
149	<i>ArmedForces Professionalism Rating</i>	What is the professionalism rating (equipment, manpower, doctrine, training level, resources, leadership, organizational culture, history, civil-military relations) of the Host Nation military?	470 <i>Professionalism</i>
150	<i>HNMilitaryEffectiveness RatingMoFE</i>	What is the effectiveness (organization, oversight, capacity, training quality, materiel, budget, discipline, recruiting) of the Host Nation military?	440 <i>Effectiveness</i>
152	<i>DemobProcess ChangeMoP</i>	What is the number of personnel demobilized, etc. in reducing and reintegrating military and paramilitary units?	230 <i>Quantity</i>
154	<i>MilitaryChangeMoP</i>	What is the strength of progress in reforming the military? Staffing? Funding? Arming? Supplying?	460 <i>HealthOrStrength</i>
156	<i>MilitaryTrainedMoP</i>	What is the number of military personnel trained?	230 <i>Quantity</i>

(continued)

Table 6.7 (continued)

ID	Metric classes	Defining questions	Type
157	<i>MilitaryJobs CreatedMoP</i>	How many military jobs have been created?	230 <i>Quantity</i>
158	<i>MilitaryInvestmentMoP</i>	What is the monetary investment in military personnel?	230 <i>Quantity</i>
160	<i>IntelServiceChangeMoP</i>	What is the strength of progress in reforming the intelligence service?	460 <i>HealthOrStrength</i>
162	<i>IntelServiceTrainedMoP</i>	What is the number of intelligence service personnel trained?	230 <i>Quantity</i>
163	<i>IntelServiceJobs CreatedMoP</i>	How many intelligence services jobs have been created?	230 <i>Quantity</i>
164	<i>IntelService InvestmentMoP</i>	What is the monetary investment in intelligence personnel?	230 <i>Quantity</i>
166	<i>MilitaryExerciseMoP</i>	What is the direct result of the military exercise? Number of troops trained, popular impressions of exercise, etc.	510 <i>Miscellaneous</i>
168	<i>StabilityOperationMoP</i>	What is the direct result of the stability operation?	510 <i>Miscellaneous</i>
796	<i>ImproveHNCivil MilitaryMoP</i>	What is the strength of progress in improving the connection between the Host Nation civil government and the Host Nation military?	460 <i>HealthOrStrength</i>
799	<i>ImproveMISMoP</i>	How much has the MIS been improved? Capacity (flowrate and absolute quantity) change, etc.	510 <i>Miscellaneous</i>
809	<i>MilitaryOperations Rating</i>	What is the rating of military operations?	460 <i>HealthOrStrength</i>
834	<i>IncreaseIntervention ForcesMoP</i>	How much is the intervention force increased?	230 <i>Quantity</i>
835	<i>DecreaseIntervention ForcesMoP</i>	How much is the intervention force decreased?	230 <i>Quantity</i>
836	<i>DecreaseGovtMilitary ForcesMoP</i>	How much is the government military force decreased?	230 <i>Quantity</i>
837	<i>DecreaseIntelligence ServicesMoP</i>	How much is the intelligence service decreased?	230 <i>Quantity</i>
838	<i>IncreaseRegimeSpons NonMilArmedMoP</i>	What is the increase in regime-sponsored non-military armed forces?	230 <i>Quantity</i>
839	<i>DecreaseRegimeSpons NonMilArmedMoP</i>	What is the decrease in regime-sponsored non-military armed forces?	230 <i>Quantity</i>
884	<i>ChangeKeyLeader IdentitiesMoP</i>	What are the changes in identities of the various key leader types?	510 <i>Miscellaneous</i>
887	<i>IntelServicePersonnel ActivityRating</i>	What is the activity (coverage, intensity, quantity) of intelligence service personnel?	340 <i>Activity</i>
888	<i>DecreaseIntelService PersonnelMoP</i>	What is the decrease in intelligence service personnel?	230 <i>Quantity</i>

(continued)

Table 6.7 (continued)

ID	Metric classes	Defining questions	Type
960	<i>InterventionForce PersonnelActivity Rating</i>	What is the activity (coverage, intensity, quantity) of intervention force personnel?	340 <i>Activity</i>
961	<i>GovtMilitaryPersonnel ActivityRating</i>	What is the activity (coverage, intensity, quantity) of government military personnel?	340 <i>Activity</i>
966	<i>KeyIntelligenceService LeaderInfluenceRating</i>	What is the influence of the key intelligence service leader?	420 <i>Influence</i>
982	<i>IntelligenceServices EffectivenessRating</i>	How effective is the intelligence service?	440 <i>Effectiveness</i>
986	<i>InterventionForces EffectivenessRating</i>	How effective is the intervention force?	440 <i>Effectiveness</i>
998	<i>KeyIntelligenceService LeaderDecisionMaking Rating</i>	What is the process and quality of the key intelligence service leader's decision-making?	410 <i>DecisionMaking</i>
1008	<i>CivilDefensePlanRating</i>	What is the strength of the civil defense plan for the Host Nation?	460 <i>HealthOrStrength</i>
1012	<i>IncreaseGovtMilitary ForcesMoP</i>	What is the number of military personnel added?	230 <i>Quantity</i>
1013	<i>IncreaseIntelligence ServicesPersonnelMoP</i>	What is the number of intelligence services personnel added?	230 <i>Quantity</i>
1053	<i>IncreaseIntervenor ForceOrganizationsMoP</i>	What is the number of intervenor force organizations added?	230 <i>Quantity</i>
1054	<i>DecreaseIntervenor ForceOrganizationsMoP</i>	What is the number of intervenor force organizations subtracted?	230 <i>Quantity</i>
1055	<i>IncreaseIntelligence ServicesMoP</i>	What is the number of intelligence services organizations added?	230 <i>Quantity</i>
1073	<i>IncreaseMilitary OrganizationsMoP</i>	What is the number of military organizations added?	230 <i>Quantity</i>
1074	<i>DecreaseMilitary OrganizationsMoP</i>	What is the number of military organizations subtracted?	230 <i>Quantity</i>
1075	<i>IncreaseRegimeSponsored NonMilitaryArmed OrganizationsMoP</i>	What is the number of regime-sponsored non-military armed organizations added?	230 <i>Quantity</i>
1076	<i>DecreaseRegimeSponsored NonMilitaryArmed OrganizationsMoP</i>	What is the number of regime-sponsored non-military armed organizations subtracted?	230 <i>Quantity</i>
1090	<i>MISStatusRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the Host Nation or other organization's MIS: computer systems, internet, etc.?	260 <i>CapacityFlowrate</i>
1091	<i>DamageMISMOP</i>	What is the damage to the Host Nation or other organization MIS, etc.? Dollar cost, capacity (flowrate and absolute quantity) loss, etc. (severity, quantity and coverage)	280 <i>Damage</i>

Military: Security Metrics

The Military – Security subcategory contains Metric classes that concern security issues. The classes in this subcategory are shown in Table 6.8.

Table 6.8 Military-security metric classes

ID	Metric classes	Defining questions	Type
171	<i>ConfidenceBuilding ActionMoP</i>	What is the strength of progress in confidence-building and security measures?	460 <i>HealthOrStrength</i>
173	<i>SafeguardingGovernance ActionMoP</i>	What is the strength of progress in safeguarding of the institutions of governance and key officials?	460 <i>HealthOrStrength</i>
175	<i>SecurityForceAssistance ActionMoP</i>	What is the strength of progress in security assistance (freedom of movement, border security, public safety, civil defense, etc.)?	460 <i>HealthOrStrength</i>
177	<i>SecurityCoordination ActionMoP</i>	What is the strength of progress in security coordination by the intervenors?	460 <i>HealthOrStrength</i>
179	<i>ForceSecurity ActionMoP</i>	What is the strength of progress in force security provided to allow prosecuting other operations safely?	460 <i>HealthOrStrength</i>
181	<i>SecurityForHA ActionMoP</i>	What is the strength of progress in security provided for the various ongoing Humanitarian Assistance operations?	460 <i>HealthOrStrength</i>
183	<i>SecurityForPO ActionMoP</i>	What is the strength of progress in security provided for the various ongoing peace operations?	460 <i>HealthOrStrength</i>
185	<i>SecurityForStability ActionMoP</i>	What is the strength of progress in security provided for the various ongoing stability operations?	460 <i>HealthOrStrength</i>
187	<i>PersonnelRecovery ActionMoP</i>	What is the direct result of personnel recovery Action? Number of personnel found, recovered, etc.	510 <i>Miscellaneous</i>
420	<i>RefugeeCampSecurity ActionMoP</i>	What is the strength of progress in security provided for refugee camps?	460 <i>HealthOrStrength</i>
1005	<i>ForceAndOperations SecurityRating</i>	What is the level of force security and security for military operations?	460 <i>HealthOrStrength</i>
1067	<i>RefugeeCampCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the refugee camp and temporary shelter infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>

The highlighted (*) class is a generic class that is connected to many elements

Military: Other Metrics

The Military – Other subcategory contains Metric classes that are related to the military but do not fit well into the other military subcategories. This includes such things as military decision-making ratings, the status of terrorist and insurgent organizations, etc. The classes in this subcategory are shown in Table 6.9.

Note that there are several groups of Metrics that have similarities, yet have separate classes. For example, *TerrorismLevelRating* has the question, “What is the level of terrorism?” *IncreaseTerroristOrganizationsMoP* has the question, “What is the number of Terrorist organizations added?” And *IncreaseTerroristsMoP* has the question, “What is the increase in terrorists?” The level of terrorism is certainly likely to be higher when there are more terrorist organizations and more terrorists; however, this is not necessarily the case. The Metric classes are related, but different.

Table 6.9 Military-other metric classes

ID	Metric classes	Defining questions	Type
189	<i>KeyLeaderMilitary DecisionMaking Rating</i>	What is the process and quality of the key military leader’s decision-making?	410 <i>Decision Making</i>
190	<i>KeyLeaderNonGovt ArmedInfluenceRating</i>	What is the influence of the key non-government armed group leader?	420 <i>Influence</i>
191	<i>NonNationStateActors FundingRating</i>	What is the level of funding for each non-nation-state Actor?	460 <i>Health OrStrength</i>
192	<i>NonNationState ActorsRecruiting Rating</i>	What is the level of recruiting for each non-nation-state Actor?	460 <i>Health OrStrength</i>
193	<i>NonNationStateActors PopulationSupport Rating</i>	What is the level of popular support for each non-nation-state Actor?	460 <i>Health OrStrength</i>
194	<i>ParamilitaryForces ActivityRating</i>	What is the activity (coverage, intensity, quantity) rating of the paramilitary forces?	340 <i>Activity</i>
195	<i>PrivateSecurityForces ActivityRating</i>	What is the activity (coverage, intensity, quantity) rating of the private security forces?	340 <i>Activity</i>
196	<i>InsurgentsActivity Rating</i>	What is the activity (coverage, intensity, quantity) rating of the insurgents?	340 <i>Activity</i>
197	<i>TerroristsActivity Rating</i>	What is the activity (coverage, intensity, quantity) rating of the terrorists?	340 <i>Activity</i>
198	<i>CorruptionInMilitary Rating</i>	What is the existing level of corruption in the military?	430 <i>Fairness Corruption</i>
200	<i>TerrorismMoP</i>	What are the direct results of terrorism and anti- and counterterrorism operation? Civilians killed, terrorists discovered, killed, etc.	510 <i>Miscellaneous</i>

(continued)

Table 6.9 (continued)

ID	Metric classes	Defining questions	Type
202	<i>NonNationStateActors FundingChangeMoP</i>	What is the level of change in funding of non-nation-state Actors?	460 <i>Health OrStrength</i>
204	<i>NonNationStateActors RecruitingChangeMoP</i>	What is the level of change in recruitment by non-nation-state Actors?	460 <i>Health OrStrength</i>
206	<i>NonNationStateActors PopulationSupport ChangeMoP</i>	What is the level of change in financial, institutional and local support for non-nation-state Actors?	460 <i>Health OrStrength</i>
208	<i>PoliticalInstability MitigationActionMoP</i>	What is the direct result of Action to mitigate non-nation-state political instability and individual unrest actions?	510 <i>Miscellaneous</i>
210	<i>ConsequenceManagement ActionMoP</i>	What is the direct result of consequence management support being provided? Lives saved, lost, etc.	510 <i>Miscellaneous</i>
212	<i>MineActionMoP</i>	What is the direct result of mine (mines, unexploded ordinance, IEDs) clearance/placement Action? Number placed, cleared, etc.	510 <i>Miscellaneous</i>
214	<i>PiracyActionMoP</i>	What is the direct result of piracy and anti-piracy operation? Value of pirated goods, lives lost, pirates captured, killed, etc.	510 <i>Miscellaneous</i>
216	<i>HAActionMoP</i>	What is the direct result of Humanitarian Assistance operation? Supplies delivered, lives saved, etc.	510 <i>Miscellaneous</i>
218	<i>NEOActionMoP</i>	What is the direct result of Non-combatant Evacuation Operation? Non-combatants evacuated, etc.	510 <i>Miscellaneous</i>
574	<i>MilitaryStructures CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the military infrastructure?	260 <i>Capacity Flowrate</i>
575	<i>MilitaryVehicles CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the military vehicles?	260 <i>Capacity Flowrate</i>
583	<i>MilitaryStructures CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the military infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
587	<i>MilitaryStructures CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the military infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
591	<i>MilitaryVehicles CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the military vehicles has been rebuilt/replaced?	260 <i>Capacity Flowrate</i>
593	<i>MilitaryVehicles CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the military vehicles has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>

(continued)

Table 6.9 (continued)

ID	Metric classes	Defining questions	Type
777	<i>SocialInstabilityMitigation ActionMoP</i>	What is the direct result of Action to mitigate non-nation-state Actor social instability and individual unrest actions?	510 <i>Miscellaneous</i>
809	<i>MilitaryOperationsRating</i>	What is the rating of military operations?	460 <i>Health OrStrength</i>
813	<i>TerrorismLevelRating</i>	What is the level of terrorism?	460 <i>Health OrStrength</i>
814	<i>MineIEDRating</i>	What is the level of minefields, IEDs, etc.?	460 <i>Health OrStrength</i>
815	<i>PiracyRating</i>	What is the level of piracy?	460 <i>Health OrStrength</i>
840	<i>IncreaseParamilitary ForcesMoP</i>	What is the increase in paramilitary forces?	230 <i>Quantity</i>
841	<i>DecreaseParamilitary ForcesMoP</i>	What is the decrease in paramilitary forces?	230 <i>Quantity</i>
842	<i>IncreasePrivateSecurity ForcesMoP</i>	What is the increase in private security forces?	230 <i>Quantity</i>
843	<i>DecreasePrivateSecurity ForcesMoP</i>	What is the decrease in private security forces?	230 <i>Quantity</i>
844	<i>IncreaseTerroristsMoP</i>	What is the increase in terrorists?	230 <i>Quantity</i>
845	<i>DecreaseTerroristsMoP</i>	What is the decrease in terrorists?	230 <i>Quantity</i>
846	<i>IncreaseInsurgentsMoP</i>	What is the increase in insurgents?	230 <i>Quantity</i>
847	<i>DecreaseInsurgentsMoP</i>	What is the decrease in insurgents?	230 <i>Quantity</i>
884	<i>ChangeKeyLeader IdentitiesMoP</i>	What are the changes in identities of the various key leader types?	510 <i>Miscellaneous</i>
957	<i>NonGovtArmedIndividuals ActivityRating</i>	What is the activity (coverage, intensity, quantity) of non-government armed individuals?	340 <i>Activity</i>
994	<i>KeyNonGovtArmed LeaderDecisionMaking Rating</i>	What is the process and quality of the key non-government armed leader's decision-making?	410 <i>Decision Making</i>
1072	<i>NonNationStateActors RecruitingFunding SupportIncreaseMoP</i>	What is the increase in recruiting, funding, and financial, institutional and local support for non-nation-state Actors?	510 <i>Miscellaneous</i>
1077	<i>IncreaseParamilitary OrganizationsMoP</i>	What is the number of paramilitary organizations added?	230 <i>Quantity</i>
1078	<i>DecreaseParamilitary OrganizationsMoP</i>	What is the number of paramilitary organizations subtracted?	230 <i>Quantity</i>
1079	<i>IncreasePrivateSecurity OrganizationsMoP</i>	What is the number of private security organizations added?	230 <i>Quantity</i>
1080	<i>DecreasePrivateSecurity OrganizationsMoP</i>	What is the number of private security organizations subtracted?	230 <i>Quantity</i>
1081	<i>IncreaseInsurgent OrganizationsMoP</i>	What is the number of insurgent organizations added?	230 <i>Quantity</i>

(continued)

Table 6.9 (continued)

ID	Metric classes	Defining questions	Type
1082	<i>DecreaseInsurgent OrganizationsMoP</i>	What is the number of insurgent organizations subtracted?	230 <i>Quantity</i>
1083	<i>IncreaseTerrorist OrganizationsMoP</i>	What is the number of terrorist organizations added?	230 <i>Quantity</i>
1084	<i>DecreaseTerrorist OrganizationsMoP</i>	What is the number of terrorist organizations subtracted?	230 <i>Quantity</i>

Economic Metrics

The primary components of the economic Metrics are agriculture, crime, energy, finance, governmental economic Actions, jobs, and “other” things. Measuring the status of economic items is a relatively well-defined process compared to some other PMESII items.

Economic: Agriculture Metrics

The Economic – Agriculture subcategory contains Metric classes that concern the economics of agriculture, fishing and timber. The classes in this subcategory are shown in Table 6.10.

Table 6.10 Economic-agriculture metric classes

ID	Metric classes	Defining questions	Type
229	<i>AgProductionMoP</i>	What is the quantity of agricultural products produced?	230 <i>Quantity</i>
230	<i>AgBusinessRating</i>	What is the health of agricultural businesses?	460 <i>Health OrStrength</i>
231	<i>ArableLand CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of arable land?	260 <i>Capacity Flowrate</i>
236	<i>AgProduction ConsumptionMoP</i>	What is the quantity of livestock and produce consumed?	230 <i>Quantity</i>
238	<i>AgProductTransactions LevelMoP</i>	What is the level of purchases/sales of agricultural products (food, seed, etc.)?	230 <i>Quantity</i>
239	<i>AgSupportActivityMoP</i>	What is the direct result of agricultural support program? Change in agriculture activity, etc.	510 <i>Miscellaneous</i>
240	<i>AgInvestmentMoP</i>	What is the monetary investment in agricultural support programs and other agricultural transactions?	230 <i>Quantity</i>
242	<i>AgPolicyChangeMoP</i>	What is the strength of progress in reforming agricultural policy?	460 <i>Health OrStrength</i>

(continued)

Table 6.10 (continued)

ID	Metric classes	Defining questions	Type
244	<i>DrugCropReductionMoP</i>	What is the reduction in drug crops?	510 <i>Miscellaneous</i>
498	<i>AgricultureInfraCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of agriculture structures?	260 <i>Capacity</i> <i>Flowrate</i>
499	<i>LivestockAgricultureEquipmentCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of livestock and agricultural equipment?	260 <i>Capacity</i> <i>Flowrate</i>
510	<i>AgricultureInfraCapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of agriculture structures has been rebuilt?	260 <i>Capacity</i> <i>Flowrate</i>
512	<i>AgricultureInfraCapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of agriculture structures has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
919	<i>FishingBusinessRating</i>	What is the health of fishing and associated businesses?	460 <i>Health</i> <i>OrStrength</i>
920	<i>IncreaseFishingBusinessesMoP</i>	What is the increase in fishing businesses?	230 <i>Quantity</i>
921	<i>DecreaseFishingBusinessesMoP</i>	What is the decrease in fishing businesses?	230 <i>Quantity</i>
922	<i>TimberBusinessRating</i>	What is the health of timber and associated businesses?	460 <i>Health</i> <i>OrStrength</i>
923	<i>IncreaseTimberBusinessesMoP</i>	What is the increase in timber businesses?	230 <i>Quantity</i>
924	<i>DecreaseTimberBusinessesMoP</i>	What is the decrease in timber businesses?	230 <i>Quantity</i>
936	<i>IncreaseAgricultureBusinessesMoP</i>	What is the increase in agriculture businesses?	230 <i>Quantity</i>
937	<i>DecreaseAgricultureBusinessesMoP</i>	What is the decrease in agriculture businesses?	230 <i>Quantity</i>
978	<i>OtherGovtPoliciesRating</i>	What is the rating of other Host Nation policies (health, education, labor, information and media, social and cultural, energy, natural resources, agriculture, transportation, trade)?	460 <i>Health</i> <i>OrStrength</i>
1143	<i>FishingProductionMoP</i>	What quantity of fishing products has been produced?	230 <i>Quantity</i>

Economic: Crime Metrics

The Economic – Crime subcategory contains Metric classes that concern the economics of crime. Many of these classes are found in other subcategories because they impinge on many parts of the situation. However, there are definitely economic impacts of crime, resulting in the need for this subcategory. The classes in this subcategory are shown in Table 6.11.

Table 6.11 Economic-crime metric classes

ID	Metric classes	Defining questions	Type
66	<i>CorruptionInCultureRating</i>	What are the perceived and actual levels of corruption that is prevalent in the culture?	430 <i>Fairness Corruption</i>
67	<i>CorruptionInSocialServicesRating</i>	What is the existing level of corruption in the social services?	430 <i>Fairness Corruption</i>
68	<i>CorruptionInLawEnforcementRating</i>	What is the existing level of corruption in law enforcement organizations?	430 <i>Fairness Corruption</i>
69	<i>CorruptionInCentralAuthorityRating</i>	What is the existing level of corruption in the central authority?	430 <i>Fairness Corruption</i>
91	<i>GovtCorruptionMonitoringMoP</i>	What is the direct result of monitoring for corruption by government officials? Violations detected, corrected, etc.	510 <i>Miscellaneous</i>
99	<i>ExtortionMoP</i>	How much money has been extorted; how many people have been suppressed in the population or opposition?	510 <i>Miscellaneous</i>
101	<i>ExtrajudicialActionMoP</i>	How many people have been killed, maimed, intimidated, etc.)?	510 <i>Miscellaneous</i>
198	<i>CorruptionInMilitaryRating</i>	What is the existing level of corruption in the military?	430 <i>Fairness Corruption</i>
244	<i>DrugCropReductionMoP</i>	What is the reduction in drug crops?	510 <i>Miscellaneous</i>
246	<i>CriminalsActivityRating</i>	What is the activity level (coverage, intensity, quantity) of criminals?	340 <i>Activity</i>
247	<i>CriminalOrganizationActivityRating</i>	What is the activity level (coverage, intensity, quantity) of the criminal organization?	340 <i>Activity</i>
248	<i>KeyLeaderCriminalInfluenceRating</i>	What is the influence of the key criminal leader?	420 <i>Influence</i>
249	<i>DrugUseRating</i>	What is the drug use level?	460 <i>Health OrStrength</i>
250	<i>DrugCultivationRating</i>	What is the drug cultivation level?	460 <i>Health OrStrength</i>
251	<i>DrugManufactureRating</i>	What is the drug manufacture level?	460 <i>Health OrStrength</i>
252	<i>DrugTransshipmentRating</i>	What is the drug transshipment level?	460 <i>Health OrStrength</i>
253	<i>BlackMarketActivityRating</i>	How active (coverage, intensity, quantity) are the black and gray markets?	340 <i>Activity</i>
254	<i>CorruptionInBusinessRating</i>	What is the existing level of corruption in business?	430 <i>Fairness Corruption</i>
256	<i>CriminalAndCorruptActionMoP</i>	What is the result (money, etc.) of the criminal or corrupt Action (intimidation, kidnapping, murder, smuggling, drug trafficking, bribery, "protection," illicit services, prostitution, self-dealing, etc.)?	510 <i>Miscellaneous</i>
784	<i>InterdictDrugsMoP</i>	What quantity of drugs has been interdicted?	510 <i>Miscellaneous</i>

(continued)

Table 6.11 (continued)

ID	Metric classes	Defining questions	Type
785	<i>TradeDrugsMoP</i>	What quantity of drugs has been traded?	510 <i>Miscellaneous</i>
786	<i>ReduceDrugDemand ActionMoP</i>	What is the reduction of drug demand?	510 <i>Miscellaneous</i>
787	<i>ReduceFinance CrimesMoP</i>	What amount of financial crime has been detected, stopped, prosecuted?	510 <i>Miscellaneous</i>
788	<i>ReduceIPTheftMoP</i>	What amount of intellectual property theft or cyber crimes has been detected, stopped or prosecuted?	510 <i>Miscellaneous</i>
789	<i>ConductFinance CrimesMoP</i>	What amount of financial crime has been committed?	510 <i>Miscellaneous</i>
790	<i>ConductIPTheftMoP</i>	What amount of intellectual property theft has been committed?	510 <i>Miscellaneous</i>
791	<i>ReduceOrganized CrimeMoP</i>	What amount of organized or gang crime has been detected, stopped, prosecuted?	510 <i>Miscellaneous</i>
792	<i>ConductOrganized CrimeMoP</i>	What amount of organized and gang crime has been committed?	510 <i>Miscellaneous</i>
884	<i>ChangeKeyLeader IdentitiesMoP</i>	What are the changes in identities of the various key leader types?	510 <i>Miscellaneous</i>
989	<i>CorruptionInLocal AndMidLevel AuthorityRating</i>	What is the level of corruption at the local and mid-government levels?	430 <i>Fairness Corruption</i>
1002	<i>KeyCriminalLeader DecisionMaking Rating</i>	What is the process and quality of the key criminal leader's decision-making?	410 <i>Decision Making</i>
1014	<i>IncreaseCriminal PopulationMoP</i>	What is the number of criminal personnel added?	230 <i>Quantity</i>
1015	<i>DecreaseCriminal PopulationMoP</i>	What is the number of criminal personnel subtracted?	230 <i>Quantity</i>
1034	<i>IncreaseCriminal OrganizationsMoP</i>	What is the number of criminal organizations added?	230 <i>Quantity</i>
1035	<i>DecreaseCriminal OrganizationsMoP</i>	What is the number of criminal organizations subtracted?	230 <i>Quantity</i>

Economic: Energy Metrics

The Economic – Energy subcategory contains Metric classes that concern the economics of energy. The classes in this subcategory are shown in Table 6.12.

Table 6.12 Economic-energy metric classes

ID	Metric classes	Defining questions	Type
258	<i>EnergySupply AndDistribution LevelRating</i>	What is the overall rating for energy supply and distribution?	460 <i>Health OrStrength</i>
259	<i>EnergyBusinessRating</i>	What is the health of the energy business?	460 <i>Health OrStrength</i>
261	<i>EnergyImportation ChangeMoP</i>	How much energy has been imported?	230 <i>Quantity</i>
543	<i>GeneralEnergy InfraCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the general energy infrastructure?	260 <i>Capacity Flowrate</i>
544	<i>ElectricProduction CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the electricity production infrastructure?	260 <i>Capacity Flowrate</i>
545	<i>ElectricDistribution CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the electricity distribution infrastructure?	260 <i>Capacity Flowrate</i>
546	<i>ExtractiveEnergy ProductionCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the extractive energy production infrastructure?	260 <i>Capacity Flowrate</i>
547	<i>ExtractiveEnergy TransportCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the extractive energy transportation infrastructure?	260 <i>Capacity Flowrate</i>
551	<i>ElectricProduction CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the electricity production infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
555	<i>ElectricDistribution CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the electricity distribution infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
559	<i>ExtractiveEnergy ProductionCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the extractive energy production infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
563	<i>ExtractiveEnergyTransport CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the extractive energy transportation infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
565	<i>ElectricProduction CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the electricity production infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
567	<i>ElectricDistribution CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the electricity distribution infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
569	<i>ExtractiveEnergy ProductionCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the extractive energy production infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>

(continued)

Table 6.12 (continued)

ID	Metric classes	Defining questions	Type
571	<i>ExtractiveEnergy TransportCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the extractive energy transportation infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
848	<i>IncreaseEnergy BusinessesMoP</i>	What is the increase in energy businesses?	230 <i>Quantity</i>
849	<i>DecreaseEnergy BusinessesMoP</i>	What is the decrease in energy businesses?	230 <i>Quantity</i>
978	<i>OtherGovtPolicies Rating</i>	What is the rating of other Host Nation policies (Health, Education, Labor, Information and Media, Social and Cultural, Energy, Natural Resources, Agriculture, Transportation, Trade policies)?	460 <i>Health OrStrength</i>
1026	<i>ChangeEnergy PolicyMoP</i>	What is the strength of progress in changing the Host Nation energy policies?	460 <i>Health OrStrength</i>
1142	<i>EnergyProductionMoP</i>	How much energy has been produced?	230 <i>Quantity</i>

Economic: Finance Metrics

The Economic – Finance subcategory contains Metric classes that concern finances and financial related issues. The classes in this subcategory are shown in Table 6.13.

Table 6.13 Economic-finance metric classes

ID	Metric classes	Defining questions	Type
20	<i>FirstResponders InvestmentMoP</i>	What is the monetary investment in first responders?	230 <i>Quantity</i>
83	<i>LawEnforcementOfficer InvestmentMoP</i>	What is the monetary investment in policemen?	230 <i>Quantity</i>
158	<i>MilitaryInvestmentMoP</i>	What is the monetary investment in military personnel?	230 <i>Quantity</i>
164	<i>IntelService InvestmentMoP</i>	What is the monetary investment in intelligence personnel?	230 <i>Quantity</i>
191	<i>NonNationStateActors FundingRating</i>	What is the level of funding for each non-nation-state Actor?	460 <i>Health OrStrength</i>
202	<i>NonNationStateActors FundingChangeMoP</i>	What is the level of change in funding of non-nation-state Actors?	460 <i>Health OrStrength</i>
240	<i>AgInvestmentMoP</i>	What is the monetary investment in agricultural support programs and other agricultural transactions?	230 <i>Quantity</i>
265	<i>MonetaryHealth Rating</i>	What is the health of the Host Nation money (inflation, deflation, etc.)?	460 <i>Health OrStrength</i>

(continued)

Table 6.13 (continued)

ID	Metric classes	Defining questions	Type
266	<i>FinancialSystem Rating</i>	What is the overall rating for the financial system?	460 <i>Health OrStrength</i>
267	<i>FinancialServices IndustryRating</i>	What is the health of the financial businesses?	460 <i>Health OrStrength</i>
268	<i>InsuranceSystem Rating</i>	What is the health of the insurance system?	460 <i>Health OrStrength</i>
269	<i>InvestmentLevel Rating</i>	What is the level of foreign and local investment in the country?	460 <i>Health OrStrength</i>
271	<i>InsuranceSystem ChangeMoP</i>	What is the strength of progress in reforming the insurance system (and related systems)?	460 <i>Health OrStrength</i>
273	<i>InterbanksPayment SystemChangeMoP</i>	What is the strength of progress in reforming the interbank payment system (and its related pieces)?	460 <i>Health OrStrength</i>
275	<i>CurrencyChangeMoP</i>	What is the strength of progress in reforming the currency?	460 <i>Health OrStrength</i>
277	<i>InvestmentCapital ActionMoP</i>	How much investment capital was obtained or inhibited for the country?	230 <i>Quantity</i>
279	<i>MicrofinanceSystem ChangeMoP</i>	What is the strength of progress in reforming microfinance systems?	460 <i>Health OrStrength</i>
281	<i>StockMarket ChangeMoP</i>	What is the strength of progress in reforming the stock and commodity markets?	460 <i>Health OrStrength</i>
304	<i>PublicWorks InvestmentMoP</i>	What is the monetary investment in public works programs?	230 <i>Quantity</i>
330	<i>Commodity InvestmentMoP</i>	What is the monetary investment in direct external participation in the economy (buying and selling commodities)?	230 <i>Quantity</i>
332	<i>EconomicDamage ActionMoP</i>	What is the amount of damage to the economy or financial infrastructure? (severity, quantity and coverage)	280 <i>Damage</i>
502	<i>ManufacturingInfra InvestmentMoP</i>	What is the monetary investment in rebuilding manufacturing structures?	230 <i>Quantity</i>
508	<i>AgricultureInfra InvestmentMoP</i>	What is the monetary investment in rebuilding agriculture structures?	230 <i>Quantity</i>
514	<i>BusinessInfra InvestmentMoP</i>	What is the monetary investment in rebuilding shops and commercial structures?	230 <i>Quantity</i>
521	<i>MediaInfra InvestmentMoP</i>	What is the monetary investment in rebuilding the media infrastructure?	230 <i>Quantity</i>
530	<i>EducationInfra InvestmentMoP</i>	What is the monetary investment in rebuilding the education infrastructure?	230 <i>Quantity</i>
537	<i>HealthInfra InvestmentMoP</i>	What is the monetary investment in rebuilding the health infrastructure?	230 <i>Quantity</i>
549	<i>ElectricProduction InvestmentMoP</i>	What is the monetary investment in rebuilding the electricity production infrastructure?	230 <i>Quantity</i>

(continued)

Table 6.13 (continued)

ID	Metric classes	Defining questions	Type
553	<i>ElectricDistribution InvestmentMoP</i>	What is the monetary investment in rebuilding the electricity distribution infrastructure?	230 <i>Quantity</i>
557	<i>ExtractiveEnergyProduction InvestmentMoP</i>	What is the monetary investment in rebuilding the extractive energy production infrastructure?	230 <i>Quantity</i>
561	<i>ExtractiveEnergyTransport InvestmentMoP</i>	What is the monetary investment in rebuilding the extractive energy transportation infrastructure?	230 <i>Quantity</i>
577	<i>GovtStructures InvestmentMoP</i>	What is the monetary investment in rebuilding the government (including police) infrastructure?	230 <i>Quantity</i>
581	<i>MilitaryStructures InvestmentMoP</i>	What is the monetary investment in rebuilding the military infrastructure?	230 <i>Quantity</i>
589	<i>MilitaryVehicles InvestmentMoP</i>	What is the monetary investment in rebuilding/replacing the military vehicles?	230 <i>Quantity</i>
620	<i>RoadInvestmentMoP</i>	What is the monetary investment in rebuilding the road infrastructure?	230 <i>Quantity</i>
624	<i>RailroadInvestmentMoP</i>	What is the monetary investment in rebuilding the railroad infrastructure?	230 <i>Quantity</i>
628	<i>BridgeOrTunnel InvestmentMoP</i>	What is the monetary investment in rebuilding the bridge and tunnel infrastructure?	230 <i>Quantity</i>
632	<i>SeaportInvestmentMoP</i>	What is the monetary investment in rebuilding the seaport infrastructure?	230 <i>Quantity</i>
636	<i>AirportInvestmentMoP</i>	What is the monetary investment in rebuilding the airport infrastructure?	230 <i>Quantity</i>
640	<i>NonMilVehicles InvestmentMoP</i>	What is the monetary investment in rebuilding/replacing the non-military vehicles?	230 <i>Quantity</i>
644	<i>WaterwaysInvestmentMoP</i>	What is the monetary investment in rebuilding the waterways infrastructure?	230 <i>Quantity</i>
666	<i>WaterDistributionInfra InvestmentMoP</i>	What is the monetary investment in rebuilding the water distribution infrastructure?	230 <i>Quantity</i>
670	<i>WaterAndSewageTreatment InfraInvestmentMoP</i>	What is the monetary investment in rebuilding the water and sewage treatment infrastructure?	230 <i>Quantity</i>
674	<i>DamsInfraInvestmentMoP</i>	What is the monetary investment in rebuilding the dam infrastructure?	230 <i>Quantity</i>
804	<i>BankAccountRating</i>	How much funding is in bank accounts, allocated for use, or available?	230 <i>Quantity</i>
850	<i>IncreaseFinancialServices IndustryMoP</i>	What is the increase in the financial services industry?	230 <i>Quantity</i>
851	<i>DecreaseFinancialServices IndustryMoP</i>	What is the decrease in the financial services industry?	230 <i>Quantity</i>

(continued)

Table 6.13 (continued)

ID	Metric classes	Defining questions	Type
913	<i>MiningInfrastructure InvestmentMoP</i>	What is the monetary investment in rebuilding the mining infrastructure?	230 <i>Quantity</i>
917	<i>BuildPrison InvestmentMoP</i>	What is the monetary investment in rebuilding the prison infrastructure?	230 <i>Quantity</i>
930	<i>CulturalInfra InvestmentMoP</i>	What is the monetary investment in rebuilding the cultural (for example, theater, museum, or sports) infrastructure?	230 <i>Quantity</i>
972	<i>FinancialInfrastructure Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the financial infrastructure (banks, stock exchanges, computer systems, insurance, etc.)?	260 <i>Capacity Flowrate</i>
977	<i>TaxationRating</i>	What is the rating of the Host Nation taxation structures and policy?	460 <i>Health OrStrength</i>
1024	<i>RebuildFinancial InfrastructureMoP</i>	What is the strength of progress in rebuilding the financial infrastructure?	460 <i>Health OrStrength</i>
1062	<i>FundsObtained AndDispersedMoP</i>	What is the quantity of funds obtained or dispersed?	230 <i>Quantity</i>
1072	<i>NonNationStateActors RecruitingFunding SupportIncreaseMoP</i>	What is the increase in recruiting, funding, and financial, institutional and local support for non-nation-state Actors?	510 <i>Miscellaneous</i>

Economic: Government Metrics

The Economic – Government subcategory contains Metric classes that concern the economics of government. The classes in this subcategory are shown in Table 6.14.

Table 6.14 Economic-government metric classes

ID	Metric classes	Defining questions	Type
283	<i>GovtEconomic PolicyRating</i>	What is the overall rating on the government's economic and financial policy?	460 <i>Health OrStrength</i>
285	<i>Privatization ChangeMoP</i>	What is the strength of progress in privatizing government run-businesses?	460 <i>Health OrStrength</i>
287	<i>EconomicPolicy ChangeMoP</i>	What is the strength of progress in reforming government economic and financial policy?	460 <i>Health OrStrength</i>
289	<i>EconomicIntegration ChangeMoP</i>	What is the strength of progress in economic integration and cooperation (strategy/assessment, prices and subsidies, debt management, arrears clearance, etc.) across private, government, international sectors?	460 <i>Health OrStrength</i>
291	<i>CommercialLaw ChangeMoP</i>	What is the strength of progress in reforming commercial law?	460 <i>Health OrStrength</i>
293	<i>TaxAndTrade ChangeMoP</i>	What is the strength of progress in reforming tax and trade type policies?	460 <i>Health OrStrength</i>
778	<i>Nationalization ChangeMoP</i>	What is the direct result of the government nationalizing privately-run businesses? Number nationalized, etc.	510 <i>Miscellaneous</i>

Economic: Jobs Metrics

The Economic – Jobs subcategory contains Metric classes that concern jobs and employment issues. Many of the classes here are part of trios of classes connected to a single Action element relating to building infrastructure. For example, the Action class, *RebuildRoadInfrastructure*, is connected to the Metric classes, *RoadInvestmentMoP*, *RoadJobsCreatedMoP*, and *RoadCapacityRebuiltMoP*. This is for the simple reason that the action of (re)building something costs money, creates jobs, and increases capacity. The classes in this subcategory are shown in Table 6.15.

Table 6.15 Economic-jobs metric classes

ID	Metric classes	Defining questions	Type
19	<i>FirstRespondersJobsCreatedMoP</i>	How many first responder jobs have been created?	230 <i>Quantity</i>
82	<i>LawEnforcementJobsCreatedMoP</i>	How many police jobs have been created?	230 <i>Quantity</i>
157	<i>MilitaryJobsCreatedMoP</i>	How many military jobs have been created?	230 <i>Quantity</i>
163	<i>IntelServiceJobsCreatedMoP</i>	How many intelligence services jobs have been created?	230 <i>Quantity</i>
192	<i>NonNationStateActorsRecruitingRating</i>	What is the level of recruiting for each non-nation-state Actor?	460 <i>Health OrStrength</i>
204	<i>NonNationStateActorsRecruitingChangeMoP</i>	What is the level of change in recruitment by non-nation-state Actors?	460 <i>Health OrStrength</i>
295	<i>WorkerOrganizationInfluenceRating</i>	What is the influence of the worker organization?	420 <i>Influence</i>
296	<i>KeyLeaderLaborInfluenceRating</i>	What is the influence of the key labor leader?	420 <i>Influence</i>
297	<i>AcceptableJobAvailabilityRating</i>	What is the level of “acceptable job” availability?	350 <i>Availability</i>
298	<i>EmploymentLevelRating</i>	What is the employment level?	460 <i>Health OrStrength</i>
300	<i>DischargedMilitaryTrainedMoP</i>	What is the number of discharged military personnel trained for jobs?	230 <i>Quantity</i>
301	<i>DischargedMilitaryJobsCreatedMoP</i>	What is the number of jobs created for discharged military personnel?	230 <i>Quantity</i>
303	<i>PublicWorksJobsCreatedMoP</i>	What is the number of jobs created by public works programs?	230 <i>Quantity</i>
304	<i>PublicWorksInvestmentMoP</i>	What is the monetary investment in public works programs?	230 <i>Quantity</i>
306	<i>SocialSafetyNetChangeMoP</i>	What is the strength of progress in reforming the social safety net?	460 <i>Health OrStrength</i>
380	<i>JobRelatedEducationalSystemRating</i>	What is the effectiveness of the educational system to produce job-worthy graduates (both at the general knowledge and skills level and at the elite/expert knowledge and skills level)?	440 <i>Effectiveness</i>

Table 6.15 (continued)

ID	Metric classes	Defining questions	Type
388	<i>TeacherJobs CreatedMoP</i>	What is the number of teacher jobs created?	230 <i>Quantity</i>
390	<i>GeneralJobs CreatedMoP</i>	What is the number of jobs created through job help programs (skills training and counseling)?	230 <i>Quantity</i>
503	<i>ManufacturingInfra JobsCreatedMoP</i>	How many jobs have been created in rebuilding manufacturing structures?	230 <i>Quantity</i>
509	<i>AgricultureInfra JobsCreatedMoP</i>	How many jobs have been created in rebuilding agriculture structures?	230 <i>Quantity</i>
515	<i>BusinessInfraJobs CreatedMoP</i>	How many jobs have been created in rebuilding shops and commercial structures?	230 <i>Quantity</i>
522	<i>MediaInfraJobs CreatedMoP</i>	How many jobs have been created in rebuilding the media infrastructure?	230 <i>Quantity</i>
531	<i>EducationInfra JobsCreatedMoP</i>	How many jobs have been created in rebuilding the education infrastructure?	230 <i>Quantity</i>
538	<i>HealthInfraJobs CreatedMoP</i>	How many jobs have been created in rebuilding the health infrastructure?	230 <i>Quantity</i>
550	<i>ElectricProduction JobsCreatedMoP</i>	How many jobs have been created in rebuilding the electricity production infrastructure?	230 <i>Quantity</i>
554	<i>ElectricDistribution JobsCreatedMoP</i>	How many jobs have been created in rebuilding the electricity distribution infrastructure?	230 <i>Quantity</i>
558	<i>ExtractiveEnergy ProductionJobs CreatedMoP</i>	How many jobs have been created in rebuilding the extractive energy production infrastructure?	230 <i>Quantity</i>
562	<i>ExtractiveEnergy TransportJobs CreatedMoP</i>	How many jobs have been created in rebuilding the extractive energy transportation infrastructure?	230 <i>Quantity</i>
578	<i>GovtStructuresJobs CreatedMoP</i>	How many jobs have been created in rebuilding the government infrastructure?	230 <i>Quantity</i>
582	<i>MilitaryStructures JobsCreatedMoP</i>	How many jobs have been created in rebuilding the military infrastructure?	230 <i>Quantity</i>
590	<i>MilitaryVehicles JobsCreatedMoP</i>	How many jobs have been created in rebuilding/ replacing the military vehicles?	230 <i>Quantity</i>
621	<i>RoadJobsCreatedMoP</i>	How many jobs have been created in rebuilding the road infrastructure?	230 <i>Quantity</i>
625	<i>RailroadJobs CreatedMoP</i>	How many jobs have been created in rebuilding the railroad infrastructure?	230 <i>Quantity</i>
629	<i>BridgeOrTunnel JobsCreatedMoP</i>	How many jobs have been created in rebuilding the bridge and tunnel infrastructure?	230 <i>Quantity</i>
633	<i>SeaportJobs CreatedMoP</i>	How many jobs have been created in rebuilding the seaport infrastructure?	230 <i>Quantity</i>
637	<i>AirportJobs CreatedMoP</i>	How many jobs have been created in rebuilding the airport infrastructure?	230 <i>Quantity</i>
641	<i>NonMilVehicles JobsCreatedMoP</i>	How many jobs have been created in rebuilding/ replacing the non-military vehicles?	230 <i>Quantity</i>
645	<i>WaterwaysJobs CreatedMoP</i>	How many jobs have been created in rebuilding the waterways infrastructure?	230 <i>Quantity</i>

(continued)

Table 6.15 (continued)

ID	Metric classes	Defining questions	Type
667	<i>WaterDistribution InfraJobs CreatedMoP</i>	How many jobs have been created in rebuilding the water distribution infrastructure?	230 <i>Quantity</i>
671	<i>WaterAndSewage TreatmentInfra JobsCreatedMoP</i>	How many jobs have been created in rebuilding the water and sewage treatment infrastructure?	230 <i>Quantity</i>
675	<i>DamsInfraJobs CreatedMoP</i>	How many jobs have been created in rebuilding the dam infrastructure?	230 <i>Quantity</i>
816	<i>WorkersChange JobMoP</i>	How many workers get hired, fired, retired, change jobs?	230 <i>Quantity</i>
852	<i>IncreaseWorker OrganizationsMoP</i>	What is the increase in worker organizations?	230 <i>Quantity</i>
853	<i>DecreaseWorker OrganizationsMoP</i>	What is the decrease in worker organizations?	230 <i>Quantity</i>
868	<i>IncreaseWorkersMoP</i>	What is the increase in workers?	230 <i>Quantity</i>
869	<i>DecreaseWorkersMoP</i>	What is the decrease in workers?	230 <i>Quantity</i>
884	<i>ChangeKeyLeader IdentitiesMoP</i>	What are the changes in identities of the various key leader types?	510 <i>Miscellaneous</i>
908	<i>WorkersActivityRating</i>	What is the activity (coverage, intensity, quantity) rating of workers?	340 <i>Activity</i>
914	<i>MiningInfrastructure JobsCreatedMoP</i>	How many jobs have been created in rebuilding the mining infrastructure?	230 <i>Quantity</i>
918	<i>BuildPrisonJobs CreatedMoP</i>	How many jobs have been created in rebuilding the prison infrastructure?	230 <i>Quantity</i>
931	<i>CulturalInfraJobs CreatedMoP</i>	How many jobs have been created in rebuilding the cultural (for example, theater, museum, or sports) infrastructure?	230 <i>Quantity</i>
978	<i>OtherGovtPolicies Rating</i>	What is the rating of other Host Nation policies (health, education, labor, information and media, social and cultural, energy, natural resources, agriculture, transportation, trade)?	460 <i>Health OrStrength</i>
1010	<i>IncreaseHealthcare PersonnelMoP</i>	What is the number of healthcare personnel added?	230 <i>Quantity</i>
1011	<i>DecreaseHealthcare PersonnelMoP</i>	What is the number of healthcare personnel subtracted?	230 <i>Quantity</i>
1024	<i>RebuildFinancial InfrastructureMoP</i>	What is the strength of progress in rebuilding the financial infrastructure?	460 <i>Health OrStrength</i>
1028	<i>ChangeLabor PolicyMoP</i>	What is the strength of progress in changing the Host Nation labor policies?	460 <i>Health OrStrength</i>
1072	<i>NonNationStateActors RecruitingFunding SupportIncreaseMoP</i>	What is the increase in recruiting, funding, and financial, institutional and local support for non-nation-state Actors?	510 <i>Miscellaneous</i>

Economic: Other Metrics

The Economic – Other subcategory contains Metric classes that concern economic issues not in other subcategories. The classes in this subcategory are shown in Table 6.16.

Table 6.16 Economic-other metric classes

ID	Metric classes	Defining questions	Type
308	<i>KeyLeaderEconomic DecisionMakingRating</i>	What is the process and quality of the key economic leader's decision-making?	410 <i>Decision Making</i>
309	<i>KeyLeaderEconomic InfluenceRating</i>	What is the influence of the key economic leader?	420 <i>Influence</i>
310	<i>MarketsRating</i>	What is the (economic) efficiency of the markets in goods and services?	450 <i>Efficiency</i>
311	<i>Commercial SectorRating</i>	What is the economic health of the overall commercial sector?	460 <i>Health OrStrength</i>
312	<i>MediaBusinessRating</i>	What is the health of media businesses?	460 <i>Health OrStrength</i>
313	<i>Manufacturing BusinessRating</i>	What is the health of manufacturing businesses?	460 <i>Health OrStrength</i>
314	<i>ServiceBusiness Rating</i>	What is the health of service businesses?	460 <i>Health OrStrength</i>
315	<i>TransportBusiness Rating</i>	What is the health of the transportation businesses?	460 <i>Health OrStrength</i>
316	<i>TourismIndustry Rating</i>	What is the health of the tourism industry?	460 <i>Health OrStrength</i>
317	<i>CriticalIndustries Rating</i>	What is the health of the country's critical industries?	460 <i>Health OrStrength</i>
318	<i>EconomicStatistics Rating</i>	What are the values of the various economic statistics?	230 <i>Quantity</i>
319	<i>GeneralEconomy RatingMoFE</i>	What is the rating for the overall economy?	460 <i>Health OrStrength</i>
320	<i>GeneralInfrastructure RatingMoFE</i>	What is the rating for the overall infrastructure?	460 <i>Health OrStrength</i>
321	<i>EconomicFoundation RatingMoFE</i>	What is the combined rating for the economy and infrastructure?	460 <i>Health OrStrength</i>
322	<i>BasicNaturalResource CapacityRating</i>	What is the Host Nation basic natural resources carrying capacity (flowrate and absolute quantity)?	260 <i>Capacity Flowrate</i>
324	<i>NaturalResource Management ChangeMoP</i>	How strong is progress in managing the natural resources?	460 <i>Health OrStrength</i>
326	<i>GoodsAndEquipment CapacityProducedMoP</i>	What is the amount of goods and equipment produced?	230 <i>Quantity</i>
328	<i>GoodsAndEquipment CapacityReducedMoP</i>	What is the amount of goods and equipment consumed or worn out?	230 <i>Quantity</i>

(continued)

Table 6.16 (continued)

ID	Metric classes	Defining questions	Type
330	<i>Commodity InvestmentMoP</i>	What is the monetary investment in direct external participation in the economy (buying and selling commodities)?	230 <i>Quantity</i>
332	<i>EconomicDamage ActionMoP</i>	What is the amount of damage to the economy or financial infrastructure? (severity, quantity and coverage)	280 <i>Damage</i>
496	<i>BusinessInfra CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of shops and commercial structures?	260 <i>Capacity Flowrate</i>
497	<i>Manufacturing InfraCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of manufacturing structures?	260 <i>Capacity Flowrate</i>
500	<i>CommercialEquipment CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of commercial equipment?	260 <i>Capacity Flowrate</i>
504	<i>ManufacturingInfra CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of manufacturing structures has been rebuilt?	260 <i>Capacity Flowrate</i>
506	<i>ManufacturingInfra CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of manufacturing structures has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
516	<i>BusinessInfra CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of shops and commercial structures has been rebuilt?	260 <i>Capacity Flowrate</i>
518	<i>BusinessInfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of shops and commercial structures has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
611	<i>TransportInfra CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the general transportation infrastructure?	260 <i>Capacity Flowrate</i>
612	<i>RoadCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the road infrastructure?	260 <i>Capacity Flowrate</i>
613	<i>RailroadCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the railroad infrastructure?	260 <i>Capacity Flowrate</i>
614	<i>BridgeAndTunnel CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the bridge and tunnel infrastructure?	260 <i>Capacity Flowrate</i>
615	<i>WaterwaysCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the waterways infrastructure?	260 <i>Capacity Flowrate</i>
616	<i>SeaportCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the seaport infrastructure?	260 <i>Capacity Flowrate</i>
617	<i>AirportCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the airport infrastructure?	260 <i>Capacity Flowrate</i>
618	<i>NonMilVehicles CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the non-military vehicles?	260 <i>Capacity Flowrate</i>
622	<i>RoadCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the road infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
626	<i>RailroadCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the railroad infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>

(continued)

Table 6.16 (continued)

ID	Metric classes	Defining questions	Type
630	<i>BridgeOrTunnel CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the bridge and tunnel infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
634	<i>SeaportCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the seaport infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
638	<i>AirportCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the airport infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
642	<i>NonMilVehicles Capacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the non-military vehicles has been rebuilt/ replaced?	260 <i>Capacity Flowrate</i>
646	<i>WaterwaysCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the waterways infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
648	<i>RoadCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the road infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
650	<i>RailroadCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the railroad infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
652	<i>BridgeAndTunnel Capacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the bridge and tunnel infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
654	<i>SeaportCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the seaport infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
656	<i>AirportCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the airport infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
658	<i>NonMilVehicles Capacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the non-military vehicles has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
660	<i>WaterwaysCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the waterways infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
781	<i>PositiveImpact OfIntervention InfluenceRating</i>	What is the level of influence of the positive event coming from external intervention?	420 <i>Influence</i>
783	<i>IESControlRating</i>	Who/what/how controls infrastructure environmental stability (IES, includes energy, transportation, etc.)? At what level?	510 <i>Miscellaneous</i>
799	<i>ImproveMISMoP</i>	How much has the MIS been improved? Capacity (flowrate and absolute quantity) change, etc.	510 <i>Miscellaneous</i>
854	<i>IncreaseMarketsMoP</i>	What is the increase in markets?	510 <i>Miscellaneous</i>
855	<i>DecreaseMarketsMoP</i>	What is the decrease in markets?	510 <i>Miscellaneous</i>

(continued)

Table 6.16 (continued)

ID	Metric classes	Defining questions	Type
856	<i>IncreaseCommercial SectorMoP</i>	What is the increase in the commercial sector?	510 <i>Miscellaneous</i>
857	<i>DecreaseCommercial SectorMoP</i>	What is the decrease in the commercial sector?	510 <i>Miscellaneous</i>
858	<i>IncreaseMedia BusinessesMoP</i>	What is the increase in media businesses?	230 <i>Quantity</i>
859	<i>DecreaseMedia BusinessesMoP</i>	What is the decrease in media businesses?	230 <i>Quantity</i>
860	<i>IncreaseManufacturing BusinessesMoP</i>	What is the increase in manufacturing businesses?	230 <i>Quantity</i>
861	<i>DecreaseManufacturing BusinessesMoP</i>	What is the decrease in manufacturing businesses?	230 <i>Quantity</i>
862	<i>IncreaseService BusinessesMoP</i>	What is the increase in service businesses?	230 <i>Quantity</i>
863	<i>DecreaseService BusinessesMoP</i>	What is the decrease in service businesses?	230 <i>Quantity</i>
864	<i>IncreaseTransport BusinessesMoP</i>	What is the increase in transport businesses?	230 <i>Quantity</i>
865	<i>DecreaseTransport BusinessesMoP</i>	What is the decrease in transport businesses?	230 <i>Quantity</i>
866	<i>IncreaseTourism IndustryMoP</i>	What is the increase in the tourism industry?	230 <i>Quantity</i>
867	<i>DecreaseTourism IndustryMoP</i>	What is the decrease in the tourism industry?	230 <i>Quantity</i>
892	<i>ContractorInfluence Rating</i>	What is the influence of the contractor business?	420 <i>Influence</i>
893	<i>IncreaseContractors MoP</i>	What is the increase in contractors?	230 <i>Quantity</i>
894	<i>DecreaseContractors MoP</i>	What is the decrease in contractors?	230 <i>Quantity</i>
897	<i>KeyContractorLeaders InfluenceRating</i>	What is the influence of the key contractor leader?	420 <i>Influence</i>
898	<i>IntervenorSupport PersonnelActivity Rating</i>	What is the activity (coverage, intensity, quantity) of intervenor support personnel (advisors to government or proto-government and judicial system and to intervenor organizations: economists, computer experts, agronomists, etc.)?	340 <i>Activity</i>
899	<i>IncreaseIntervenor SupportPersonnelMoP</i>	What is the increase in intervenor support personnel?	230 <i>Quantity</i>
900	<i>DecreaseIntervenor SupportPersonnelMoP</i>	What is the decrease in intervenor support personnel?	230 <i>Quantity</i>
909	<i>MiningBusinessRating</i>	What is the health of mining and associated businesses?	460 <i>Health OrStrength</i>
910	<i>IncreaseMining BusinessesMoP</i>	What is the increase in mining businesses?	230 <i>Quantity</i>

(continued)

Table 6.16 (continued)

ID	Metric classes	Defining questions	Type
911	<i>DecreaseMining BusinessesMoP</i>	What is the decrease in mining businesses?	230 <i>Quantity</i>
912	<i>MiningInfrastructure CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the mining infrastructure?	260 <i>Capacity Flowrate</i>
915	<i>MiningInfrastructure CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the mining infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
916	<i>MiningInfrastructure CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the mining infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
925	<i>CulturalBusinessRating</i>	What is the health of cultural (for example, theater, museum, or sports) businesses?	460 <i>Health OrStrength</i>
926	<i>IncreaseCultural BusinessesMoP</i>	What is the increase in cultural (for example, theater, museum, or sports) businesses?	230 <i>Quantity</i>
927	<i>DecreaseCultural BusinessesMoP</i>	What is the decrease in cultural (for example, theater, museum, or sports) businesses?	230 <i>Quantity</i>
929	<i>CulturalInfrastructure Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the cultural (for example, theater, museum, or sports) infrastructure?	260 <i>Capacity Flowrate</i>
932	<i>CulturalInfraCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the cultural (for example, theater, museum, or sports) infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
933	<i>CulturalInfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the cultural (for example, theater, museum, or sports) infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
938	<i>GoodsAndEquipment Rating</i>	What is the available quantity of goods or equipment?	230 <i>Quantity</i>
970	<i>ContractorBusinesses ActivityRating</i>	What is the health of contractor businesses?	460 <i>Health OrStrength</i>
978	<i>OtherGovtPolicies Rating</i>	What is the rating of other Host Nation policies (health, education, labor, information and media, social and cultural, energy, natural resources, agriculture, transportation, trade)?	460 <i>Health OrStrength</i>
995	<i>KeyLaborLeader DecisionMaking Rating</i>	What is the process and quality of the key labor leader's decision-making?	410 <i>Decision Making</i>
996	<i>KeyContractorLeader DecisionMakingRating</i>	What is the process and quality of the key contractor leader's decision-making?	410 <i>Decision Making</i>
1007	<i>TradeRating</i>	What is the level of import and export of goods and services in the Host Nation?	460 <i>Health OrStrength</i>
1023	<i>ConductLabor StrikesMoP</i>	What is the strength of progress in conducting labor Actions?	460 <i>Health OrStrength</i>
1025	<i>ChangeTransportation PolicyMoP</i>	What is the strength of progress in changing the Host Nation transportation policies?	460 <i>Health OrStrength</i>
1027	<i>ChangeNatural ResourcesPolicyMoP</i>	What is the strength of progress in changing the Host Nation natural resources policies?	460 <i>Health OrStrength</i>

(continued)

Table 6.16 (continued)

ID	Metric classes	Defining questions	Type
1032	<i>ConductTradeMoP</i>	What is the quantity of imported or exported goods or services?	510 <i>Miscellaneous</i>
1033	<i>ConductCultural EventsMoP</i>	What is the strength of progress in conducting cultural (for example, theater, museum, or sports) events?	460 <i>Health OrStrength</i>
1036	<i>IncreaseContractor BusinessesMoP</i>	What is the number of contractor businesses added?	230 <i>Quantity</i>
1037	<i>DecreaseContractor BusinessesMoP</i>	What is the number of contractor businesses subtracted?	230 <i>Quantity</i>
1038	<i>ConsumeNatural ResourcesMoP</i>	What is the quantity of natural resources consumed?	230 <i>Quantity</i>
1061	<i>BusinessManagement ConductedMoP</i>	What is the number of companies purchased, reorganized, financed, or managed?	510 <i>Miscellaneous</i>
1090	<i>MISStatusRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the Host Nation or other organization's MIS: computer systems, internet, etc.?	260 <i>Capacity Flowrate</i>
1091	<i>DamageMISMoP</i>	What is the damage to the Host Nation or other organization MIS, etc.? Dollar cost, capacity loss (flowrate and absolute quantity), etc. (severity, quantity and coverage)	280 <i>Damage</i>
1133	<i>Efficiency*</i>	What is the economic efficiency of the entity?	450 <i>Efficiency</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>
1144	<i>ServiceProvisionMoP</i>	What is the quantity of services provided?	230 <i>Quantity</i>

The highlighted (*) classes are generic classes that are each connected to many elements

Social Metrics

The primary components of the social Metrics are basic needs (food, water, shelter, etc.), education, health, movement, safety, and other items. Some of the items are relatively easy to measure, while some of the “other items” that include religious and associational Metrics are quite difficult to measure.

Social: Basic Needs Metrics

The Social – Basic Needs subcategory contains Metric classes that concern the basic needs of people. The classes in this subcategory are shown in Table 6.17.

Table 6.17 Social-basic needs metric classes

ID	Metric classes	Defining questions	Type
5	<i>FirstResponders ActivityRating</i>	What is the first responder activity (coverage, intensity, quantity)?	340 <i>Activity</i>
343	<i>NGOActivityRating</i>	What is the activity level (coverage, intensity, quantity) of the Non-Governmental Organization, International Organization or International Governmental Organization?	340 <i>Activity</i>
344	<i>KeyLeaderNGO InfluenceRating</i>	What is the influence of the key NGO, IO and IGO leader?	420 <i>Influence</i>
345	<i>FoodSupplyRating</i>	What is the rating on the available food supply?	350 <i>Availability</i>
346	<i>PotableWater SupplyRating</i>	What is the rating on the availability of potable water?	350 <i>Availability</i>
347	<i>PollutionRating</i>	What is the rating on pollution (individual, agricultural, industrial)?	460 <i>Health OrStrength</i>
348	<i>TrashDisposal Rating</i>	What is the effectiveness of trash disposal?	440 <i>Effectiveness</i>
349	<i>WasteWaterTreatment Rating</i>	What is the effectiveness of wastewater treatment?	440 <i>Effectiveness</i>
350	<i>CivilianHousing CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of civilian housing?	260 <i>Capacity Flowrate</i>
351	<i>PropertyRights AccessRating</i>	What is the strength of property rights and access?	460 <i>Health OrStrength</i>
352	<i>OverallImmediate NeedsOfThePeople SatisfiedMoFE</i>	What is the level of satisfaction of the people's overall immediate needs?	460 <i>Health OrStrength</i>
354	<i>FoodImportedMoP</i>	What is the quantity of food imported?	230 <i>Quantity</i>
356	<i>FoodDistributedMoP</i>	What is the quantity of food distributed?	230 <i>Quantity</i>
358	<i>WaterDistributedMoP</i>	What is the quantity of water distributed?	230 <i>Quantity</i>
360	<i>SanitationAndWaste WaterProjects ChangeMoP</i>	What is the strength of progress on sanitation and waste water projects?	460 <i>Health OrStrength</i>
362	<i>PollutionReduction ProjectsMoP</i>	What is the strength of progress in pollution reduction projects?	460 <i>Health OrStrength</i>
364	<i>WasteProducedMoP</i>	What is the quantity of trash, waste water and pollution produced?	230 <i>Quantity</i>
366	<i>DurableGoods DistributedMoP</i>	What is the quantity of non-food and non-water relief items distributed?	230 <i>Quantity</i>
368	<i>NGOCoordinationMoP</i>	What is the strength of progress in coordination of NGO, IO and IGO activity (coverage, intensity, quantity) (among NGOs, etc. and with intervenors and others)?	460 <i>Health OrStrength</i>
370	<i>TemporaryShelter CapacityProvidedMoP</i>	What is the capacity (flowrate and absolute quantity) of temporary shelter/housing/refugee camps provided?	260 <i>Capacity Flowrate</i>

(continued)

Table 6.17 (continued)

ID	Metric classes	Defining questions	Type
372	<i>CivilianHousingCapacity RebuiltMoP</i>	What is the capacity (flowrate and absolute quantity) of civilian housing that has been rebuilt?	260 <i>Capacity Flowrate</i>
374	<i>HumanitarianReliefStock PrepositionedMoP</i>	What is the quantity of humanitarian relief stocks that have been prepositioned?	230 <i>Quantity</i>
376	<i>NegotiationWBureaucracies ActionMoP</i>	What is the direct result of negotiation with bureaucracies to get relief for people? Money saved, number of people achieving needs, etc.	510 <i>Miscellaneous</i>
378	<i>CivilianHousingCapacity DamagedMoP</i>	What is the capacity (flowrate and absolute quantity) of civilian housing that has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
662	<i>WaterDistributionInfra CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the water distribution infrastructure?	260 <i>Capacity Flowrate</i>
663	<i>WaterAndSewage TreatmentInfra CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the water and sewage treatment infrastructure?	260 <i>Capacity Flowrate</i>
664	<i>DamsCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the dam infrastructure?	260 <i>Capacity Flowrate</i>
668	<i>WaterDistributionInfra CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the water distribution infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
672	<i>WaterAndSewage TreatmentInfraCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the water and sewage treatment infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
676	<i>DamsInfraCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the dam infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
678	<i>WaterDistribution InfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the water distribution infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
680	<i>WaterAndSewage TreatmentInfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the water and sewage treatment infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
682	<i>DamsInfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the dam infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
870	<i>IncreaseNGOsMoP</i>	What is the increase in NGOs, IOs and IGOs?	230 <i>Quantity</i>
871	<i>DecreaseNGOsMoP</i>	What is the decrease in NGOs, IOs and IGOs?	230 <i>Quantity</i>

(continued)

Table 6.17 (continued)

ID	Metric classes	Defining questions	Type
905	<i>NGOWorkersActivityRating</i>	What is the activity (coverage, intensity, quantity) of NGO, IO and IGO workers?	340 <i>Activity</i>
906	<i>IncreaseNGOWorkersMoP</i>	What is the increase in NGO, IO and IGO workers?	230 <i>Quantity</i>
907	<i>DecreaseNGOWorkersMoP</i>	What is the decrease in NGO, IO and IGO workers?	230 <i>Quantity</i>
956	<i>FirstResponder PersonnelActivity Rating</i>	What is the activity (coverage, intensity, quantity) of first responder personnel?	340 <i>Activity</i>
965	<i>KeyFirstResponder LeaderInfluenceRating</i>	What is the influence of the key first responder leader?	420 <i>Influence</i>
983	<i>WaterAndWaste SystemsRating</i>	What is the rating of for the Host Nation water and waste services?	460 <i>Health OrStrength</i>
984	<i>FirstResponders EffectivenessRating</i>	How effective is the first responder organization?	440 <i>Effectiveness</i>
1000	<i>KeyNGOLeaderDecision MakingRating</i>	What is the process and quality of the key NGO, IO and IGO leader's decision-making?	410 <i>Decision Making</i>
1017	<i>RespondToCivil EmergencyMoP</i>	What is the success level in responding to civil emergency by first responders?	460 <i>Health OrStrength</i>
1018	<i>RemoveWasteMoP</i>	What is the success level in removing trash, waste, etc.? Amount removed	510 <i>Miscellaneous</i>
1065	<i>KeyFirstResponder DecisionMakingRating</i>	What is the process and quality of the key first responder's decision-making?	410 <i>Decision Making</i>
1067	<i>RefugeeCampCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the refugee camp and temporary shelter infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
1068	<i>PotableWater ProducedMoP</i>	What quantity of potable water has been produced?	230 <i>Quantity</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>

The highlighted (*) class is a generic class that is connected to many elements

Social: Education Metrics

The Social – Education subcategory contains Metric classes that concern the education needs of people. The classes in this subcategory are shown in Table 6.18.

Table 6.18 Social-education metric classes

ID	Metric classes	Defining questions	Type
8	<i>SocialServices AdequacyRating</i>	How effective is child services, or elderly care, etc., in scope (distribution throughout society) and effectiveness?	440 <i>Effectiveness</i>
380	<i>JobRelatedEducational SystemRating</i>	How effective is the educational system in producing job-worthy graduates (both at the general knowledge and skills level and at the elite/expert knowledge and skills level)?	440 <i>Effectiveness</i>
381	<i>KeyLeaderEducation InfluenceRating</i>	What is the influence of the key education leader?	420 <i>Influence</i>
383	<i>CivicEducationProject ActionMoP</i>	What is the number educated in civic education projects?	230 <i>Quantity</i>
385	<i>EducationSupplies ProvidedMoP</i>	What is the quantity of education supplies provided?	230 <i>Quantity</i>
387	<i>TeachersTrainedMoP</i>	What is the number of teachers trained?	230 <i>Quantity</i>
388	<i>TeacherJobs CreatedMoP</i>	What is the number of teacher jobs created?	230 <i>Quantity</i>
390	<i>GeneralJobs CreatedMoP</i>	What is the number of jobs created through job help programs (skills training and counseling)?	230 <i>Quantity</i>
528	<i>EducationInfra CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the education infrastructure?	260 <i>Capacity Flowrate</i>
532	<i>EducationInfra CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the education infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
534	<i>EducationInfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the education infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
783	<i>IESControlRating</i>	Who/what/how controls infrastructure environmental stability (IES, includes energy, transportation, etc.)? At what level?	510 <i>Miscellaneous</i>
934	<i>EducatorsRating</i>	What is the number of educators?	230 <i>Quantity</i>
935	<i>DecreaseEducatorsMoP</i>	How much has the number of educators been decreased?	230 <i>Quantity</i>
969	<i>EducationOrganizations ActivityRating</i>	What is the activity (coverage, intensity, quantity) of the education organization?	340 <i>Activity</i>
974	<i>EducationSuppliesRating</i>	What is the quantity of education supplies and equipment?	230 <i>Quantity</i>
978	<i>OtherGovtPoliciesRating</i>	What is the rating of other Host Nation policies (health, education, labor, information and media, social and cultural, energy, natural resources, agriculture, transportation, trade)?	460 <i>Health OrStrength</i>

(continued)

Table 6.18 (continued)

ID	Metric classes	Defining questions	Type
988	<i>KeyEducationLeader DecisionMakingRating</i>	What is the process and quality of the key education leader's decision-making?	410 <i>Decision Making</i>
1009	<i>EducateStudentsMoP</i>	What is the number of students educated of all types?	230 <i>Quantity</i>
1016	<i>IncreaseEducatorsMoP</i>	What is the number of education personnel added?	230 <i>Quantity</i>
1029	<i>ChangeEducation PolicyMoP</i>	What is the strength of progress in changing the Host Nation education policies?	460 <i>Health OrStrength</i>
1039	<i>IncreaseEducation OrganizationsMoP</i>	What is the number of education organizations added?	230 <i>Quantity</i>
1040	<i>DecreaseEducation OrganizationsMoP</i>	What is the number of education organizations subtracted?	230 <i>Quantity</i>
1085	<i>IncreaseSocialServices OrganizationsMoP</i>	What is the number of social services organizations added?	230 <i>Quantity</i>
1086	<i>DecreaseSocialServices OrganizationsMoP</i>	What is the number of social services organizations subtracted?	230 <i>Quantity</i>

Social: Health Metrics

The Social – Health subcategory contains Metric classes that concern the health needs of people. The classes in this subcategory are shown in Table 6.19.

Table 6.19 Social-health metric classes

ID	Metric classes	Defining questions	Type
8	<i>SocialServices AdequacyRating</i>	How effective is child services, or elderly care, etc., in scope (distribution throughout society) and effectiveness?	440 <i>Effectiveness</i>
392	<i>DeathAndIllnessFrom HealthIssuesRating</i>	What is the death and illness rate from disease or other health issues?	460 <i>Health OrStrength</i>
394	<i>SatisfactionOfHealth RequirementsRating</i>	What is the effectiveness of meeting the people's health requirements?	440 <i>Effectiveness</i>
396	<i>IllnessCausedBy FamineEpidemicMoP</i>	What is the level of illness caused by health emergencies, such as famine, epidemic, etc.?	510 <i>Miscellaneous</i>
398	<i>MedicalTreatment ProvidedMoP</i>	What is the quantity of medical treatment provided?	230 <i>Quantity</i>
400	<i>HealthCareProjects ChangeMoP</i>	What is the strength of progress in health care projects?	460 <i>Health OrStrength</i>
535	<i>HealthInfra CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the health infrastructure?	260 <i>Capacity Flowrate</i>

(continued)

Table 6.19 (continued)

ID	Metric classes	Defining questions	Type
539	<i>HealthInfraCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the health infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
541	<i>HealthInfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the health infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
783	<i>IESControlRating</i>	Who/what/how controls infrastructure environmental stability (IES, includes energy, transportation, etc.)? At what level?	510 <i>Miscellaneous</i>
786	<i>ReduceDrugDemand ActionMoP</i>	What is the reduction of drug demand?	510 <i>Miscellaneous</i>
955	<i>HealthcarePersonnel ActivityRating</i>	What is the activity (coverage, intensity, quantity) of healthcare personnel?	340 <i>Activity</i>
964	<i>KeyHealthcareLeader InfluenceRating</i>	What is the influence of the key healthcare leader?	420 <i>Influence</i>
968	<i>HealthcareOrganizations ActivityRating</i>	What is the activity (coverage, intensity, quantity) of the healthcare organization?	340 <i>Activity</i>
973	<i>HealthcareSupplies Rating</i>	What is the quantity of healthcare supplies and equipment?	230 <i>Quantity</i>
978	<i>OtherGovtPolicies Rating</i>	What is the rating of other Host Nation policies (health, education, labor, information and media, social and cultural, energy, natural resources, agriculture, transportation, trade)?	460 <i>Health OrStrength</i>
981	<i>SocialServices SystemRating</i>	What is the rating of the social services system?	460 <i>Health OrStrength</i>
1001	<i>KeyHealthcareLeader DecisionMakingRating</i>	What is the process and quality of the key healthcare leader's decision-making?	410 <i>Decision Making</i>
1010	<i>IncreaseHealthcare PersonnelMoP</i>	What is the number of healthcare personnel added?	230 <i>Quantity</i>
1011	<i>DecreaseHealthcare PersonnelMoP</i>	What is the number of healthcare personnel subtracted?	230 <i>Quantity</i>
1020	<i>IncreaseHealthcare OrganizationsMoP</i>	What is the number of healthcare organizations added?	230 <i>Quantity</i>
1021	<i>DecreaseHealthcare OrganizationsMoP</i>	What is the number of healthcare organizations subtracted?	230 <i>Quantity</i>
1022	<i>ProvideHealthcare SuppliesMoP</i>	What is the number of healthcare supplies and equipment provided?	230 <i>Quantity</i>
1030	<i>ChangeHealthcare PolicyMoP</i>	What is the strength of progress in changing the Host Nation healthcare policies?	460 <i>Health OrStrength</i>
1085	<i>IncreaseSocialServices OrganizationsMoP</i>	What is the number of social services organizations added?	230 <i>Quantity</i>
1086	<i>DecreaseSocialServices OrganizationsMoP</i>	What is the number of social services organizations subtracted?	230 <i>Quantity</i>

Social: Movement Metrics

The Social – Movement subcategory contains Metric classes that concern the movement of people. The classes in this subcategory are shown in Table 6.20.

Table 6.20 Social-movement metric classes

ID	Metric classes	Defining questions	Type
139	<i>BorderControl ActionMoP</i>	What is the direct result of border control, boundary security, and freedom of movement operation? Length of border secured, etc.	510 <i>Miscellaneous</i>
402	<i>InternallyDisplaced PopulationActivity Rating</i>	What is the activity (coverage, intensity, quantity) of the internally displaced population?	340 <i>Activity</i>
403	<i>MigrantsActivity Rating</i>	What is the activity (coverage, intensity, quantity) of migrants from outside the country (due to pull factors)?	340 <i>Activity</i>
404	<i>StressMigration ActivityRating</i>	What is the activity (coverage, intensity, quantity) level and significance of stress migration?	340 <i>Activity</i>
405	<i>RefugeeCampsCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of refugee camps and temporary shelters?	260 <i>Capacity Flowrate</i>
406	<i>RefugeesActivity Rating</i>	What is the activity (coverage, intensity, quantity) of migrants from outside the country (due to push factors)?	340 <i>Activity</i>
407	<i>ExpatriatesActivity Rating</i>	What is the activity (coverage, intensity, quantity) of Host Nation expatriates, migrants and refugees living abroad?	340 <i>Activity</i>
408	<i>ReturnOfExpatriates Rating</i>	What is the level of returning of expatriates?	460 <i>Health OrStrength</i>
409	<i>FreedomOfMovement Rating</i>	What is the rating for the freedom of movement of the populace (politically restricted, tied to the land, free to move, etc.)?	460 <i>Health OrStrength</i>
410	<i>ForcedPopulation MovementRating</i>	What is the level of forced population movement (whether into refugee camps or ethnic cleansing)?	460 <i>Health OrStrength</i>
412	<i>ChangesInPopulation CompositionRating</i>	What is the level of change in the relative composition of movement categories?	460 <i>Health OrStrength</i>
414	<i>ResettledPeople ChangeMoP</i>	How many people have been resettled?	230 <i>Quantity</i>
416	<i>Anti_ProPopulation MovementActionMoP</i>	What is the direct result of Action to reduce or increase the likelihood of population movements? Number moving, etc.	510 <i>Miscellaneous</i>
808	<i>BorderControlRating</i>	What is the level of control of the border?	460 <i>Health OrStrength</i>
872	<i>IncreaseIDPsMoP</i>	What is the increase in IDPs?	230 <i>Quantity</i>

(continued)

Table 6.20 (continued)

ID	Metric classes	Defining questions	Type
873	<i>DecreaseIDPsMoP</i>	What is the decrease in IDPs?	230 <i>Quantity</i>
874	<i>IncreaseMigrantsMoP</i>	What is the increase in migrants?	230 <i>Quantity</i>
875	<i>DecreaseMigrantsMoP</i>	What is the decrease in migrants?	230 <i>Quantity</i>
876	<i>IncreaseRefugeesMoP</i>	What is the increase in refugees?	230 <i>Quantity</i>
877	<i>DecreaseRefugeesMoP</i>	What is the decrease in refugees?	230 <i>Quantity</i>
878	<i>IncreaseExpatriatesMoP</i>	What is the increase in expatriates?	230 <i>Quantity</i>
879	<i>DecreaseExpatriatesMoP</i>	What is the decrease in expatriates?	230 <i>Quantity</i>
1004	<i>RefugeeCamp SecurityRating</i>	What is the level of security in refugee camps?	460 <i>Health OrStrength</i>
1067	<i>RefugeeCamp CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the refugee camp and temporary shelter infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
1115	<i>InsurgentInfluenceRating</i>	What is the influence of the insurgent organization?	420 <i>Influence</i>
1116	<i>TerroristInfluenceRating</i>	What is the influence of the terrorist organization?	420 <i>Influence</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>

The highlighted (*) class is a generic class that is connected to many elements

Social: Safety Metrics

The Social – Safety subcategory contains Metric classes that concern the safety needs of people. The classes in this subcategory are shown in Table 6.21.

Table 6.21 Social-safety metric classes

ID	Metric classes	Defining questions	Type
418	<i>PerceptionOfSafe AndSecureEnvironment MoFE</i>	What is the rating on the perception of a safe and secure environment?	460 <i>Health OrStrength</i>
420	<i>RefugeeCampSecurity ActionMoP</i>	What is the strength of progress in security provided for refugee camps?	460 <i>Health OrStrength</i>
422	<i>SocialProtection ProgramsActionMoP</i>	What is the result of the Action? Program instituted, relief provided, etc.	510 <i>Miscellaneous</i>
424	<i>AntiTrafficking InPersonsActionMoP</i>	What is the result of anti-trafficking or trafficking Action? Number of persons rescued, number trafficked, etc.	510 <i>Miscellaneous</i>
1004	<i>RefugeeCamp SecurityRating</i>	What is the level of security in refugee camps?	460 <i>Health OrStrength</i>
1067	<i>RefugeeCampCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the refugee camp and temporary shelter infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>

(continued)

Table 6.21 (continued)

ID	Metric classes	Defining questions	Type
1089	<i>QuellCivil DisturbanceMoP</i>	What is the strength of progress in reducing or stopping civil disturbances: parades, demonstrations, peaceful protests, riots?	460 <i>Health OrStrength</i>
1110	<i>LawEnforcementPerson InfluenceRating</i>	What is the influence of the law enforcement person?	420 <i>Influence</i>
1115	<i>InsurgentInfluenceRating</i>	What is the influence of the insurgent organization?	420 <i>Influence</i>
1116	<i>TerroristInfluenceRating</i>	What is the influence of the terrorist organization?	420 <i>Influence</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>

The highlighted (*) class is a generic class that is connected to many elements

Social: Other Metrics

The Social – Other subcategory contains Metric classes that concern the social Metrics not included in the other subcategories. The classes in this subcategory are shown in Table 6.22.

Table 6.22 Social-other metric classes

ID	Metric classes	Defining questions	Type
8	<i>SocialServices AdequacyRating</i>	How effective is child services, or elderly care, etc., in scope (distribution throughout society) and effectiveness?	440 <i>Effectiveness</i>
38	<i>KeyLeaderPolitical DecisionMakingRating</i>	What is the process and quality of the key political leader’s decision-making?	410 <i>Decision Making</i>
39	<i>KeyLeaderPolitical ProPeaceInfluenceRating</i>	What is the influence of the pro-peace key political leader?	420 <i>Influence</i>
40	<i>KeyLeaderPolitical AgitatorInfluenceRating</i>	What is the influence of the anti-peace key political leader?	420 <i>Influence</i>
42	<i>KeyLeaderPoliticalInfluence Rating</i>	What is the influence of the key political leader?	420 <i>Influence</i>
66	<i>CorruptionInCulture Rating</i>	What is the perceived level of corruption that is prevalent in the culture?	430 <i>Fairness Corruption</i>
67	<i>CorruptionInSocial ServicesRating</i>	What is the existing level of corruption in the social services?	430 <i>Fairness Corruption</i>
105	<i>KeyLeaderDiplomats InfluenceRating</i>	What is the influence of the key diplomatic leader?	420 <i>Influence</i>
142	<i>KeyLeaderMilitary InfluenceRating</i>	What is the influence of the key military leader?	420 <i>Influence</i>
189	<i>KeyLeaderMilitary DecisionMakingRating</i>	What is the process and quality of the key military leader’s decision-making?	410 <i>Decision Making</i>

(continued)

Table 6.22 (continued)

ID	Metric classes	Defining questions	Type
190	<i>KeyLeaderNonGovt ArmedInfluenceRating</i>	What is the influence of the key non-government armed group leader?	420 <i>Influence</i>
246	<i>CriminalsActivityRating</i>	What is the activity (coverage, intensity, quantity) level of criminals?	340 <i>Activity</i>
295	<i>WorkerOrganization InfluenceRating</i>	What is the influence of the worker organization?	420 <i>Influence</i>
296	<i>KeyLeaderLabor InfluenceRating</i>	What is the influence of the key labor leader?	420 <i>Influence</i>
308	<i>KeyLeaderEconomic DecisionMakingRating</i>	What is the process and quality of the key economic leader's decision-making?	410 <i>Decision Making</i>
309	<i>KeyLeaderEconomic InfluenceRating</i>	What is the influence of the key economic leader?	420 <i>Influence</i>
343	<i>NGOActivityRating</i>	What is the activity level (coverage, intensity, quantity) of the Non-Governmental Organization, International Organization or International Governmental Organization?	340 <i>Activity</i>
344	<i>KeyLeaderNGO InfluenceRating</i>	What is the influence of the key NGO, IO and IGO leader?	420 <i>Influence</i>
381	<i>KeyLeaderEducation InfluenceRating</i>	What is the influence of the key education leader?	420 <i>Influence</i>
426	<i>SocialIssueDecision MakingRating</i>	What is the quality and process of social decision-making?	410 <i>Decision Making</i>
427	<i>GeneralPopulation InfluenceRating</i>	What is the influence of the general population?	420 <i>Influence</i>
428	<i>CulturalPopulation InfluenceRating</i>	What is the influence of the cultural division of the population?	420 <i>Influence</i>
429	<i>ReligiousPopulation InfluenceRating</i>	What is the influence of the religious division of the population?	420 <i>Influence</i>
430	<i>SocialGroupInfluence Rating</i>	What is the influence of the social group?	420 <i>Influence</i>
431	<i>ReligiousGroupInfluence Rating</i>	What is the influence of the religious group?	420 <i>Influence</i>
432	<i>FamilyInfluenceRating</i>	What is the influence of the family on the society?	420 <i>Influence</i>
433	<i>KeyIdeaInfluenceRating</i>	What is the influence of the key idea?	420 <i>Influence</i>
434	<i>SocialNormInfluence Rating</i>	What is the influence of the social norm?	420 <i>Influence</i>
435	<i>KeyLeaderSocial InfluenceRating</i>	What is the influence of the key social leader?	420 <i>Influence</i>
436	<i>KeyLeaderSpiritual InfluenceRating</i>	What is the influence of the key spiritual leader?	420 <i>Influence</i>
437	<i>SatisfactionOfPeoples SpiritualNeedsRating</i>	What is the level of satisfaction of people's spiritual needs?	460 <i>Health OrStrength</i>

(continued)

Table 6.22 (continued)

ID	Metric classes	Defining questions	Type
438	<i>ReligiousBuildings CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of religious buildings?	260 <i>Capacity Flowrate</i>
439	<i>ObservationOfSocial AndCulturalInterestsRating</i>	What is the level of observation of social anniversaries and other cultural events and differences?	460 <i>Health OrStrength</i>
440	<i>PerceptionByPeopleThat TheirInterestsAreRepresented Rating</i>	What is the level of belief by people that their interests are represented?	460 <i>Health OrStrength</i>
441	<i>PerceptionByPeople OfChangesInTheirSocial StatusRating</i>	What is the strength of belief by people that changes in their social status is good?	460 <i>Health OrStrength</i>
442	<i>ToleranceByPeople OfTheStatusQuoMoFE</i>	What is the strength of toleration of the people of the status quo?	460 <i>Health OrStrength</i>
444	<i>ReligiousBuildings CapacityRebuildingMoP</i>	What is the capacity (flowrate and absolute quantity) of religious buildings that has been rebuilt?	260 <i>Capacity Flowrate</i>
446	<i>ReligiousBuildings CapacityDamagedMoP</i>	What is the capacity (flowrate and absolute quantity) of religious buildings that has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
448	<i>RebuildSenseOfCommunity ActionMoP</i>	What is the strength of progress in rebuilding a sense of community?	460 <i>Health OrStrength</i>
459	<i>NegativeImpactOfIntervention InfluenceRating</i>	What is the level of influence of the negative event coming from the intervention?	420 <i>Influence</i>
460	<i>InformationAvailability Rating</i>	What is the availability level of information to the public?	350 <i>Availability</i>
464	<i>KeyLeaderMedia InfluenceRating</i>	What is the influence of the key media leader?	420 <i>Influence</i>
469	<i>PopulationOpinionRating</i>	For this issue, what is the popular opinion?	460 <i>Health OrStrength</i>
470	<i>SignificantGroup OpinionRating</i>	For this issue and group, what is the opinion?	460 <i>Health OrStrength</i>
471	<i>KeyLeaderOpinion Rating</i>	For this issue and leader, what is the opinion?	460 <i>Health OrStrength</i>
472	<i>PopulationOpinion ChangeRating</i>	For this issue, what is the change in popular opinion?	460 <i>Health OrStrength</i>
473	<i>SignificantGroup OpinionChangeRating</i>	For this issue and group, what is the change in opinion?	460 <i>Health OrStrength</i>
474	<i>KeyLeaderOpinion ChangeRating</i>	For this issue and leader, what is the change in opinion?	460 <i>Health OrStrength</i>
780	<i>EntertainmentAvailability Rating</i>	What is the availability of entertainment to the public?	350 <i>Availability</i>
781	<i>PositiveImpactOfIntervention InfluenceRating</i>	What is the level of influence of the positive event coming from external intervention?	420 <i>Influence</i>

(continued)

Table 6.22 (continued)

ID	Metric classes	Defining questions	Type
783	<i>IESControlRating</i>	Who/what/how controls infrastructure environmental stability (IES, includes energy, transportation, etc.)? At what level?	510 <i>Miscellaneous</i>
798	<i>ImproveSocialServicesMoP</i>	What is the strength of progress in improving social services?	460 <i>Health OrStrength</i>
799	<i>ImproveMISMoP</i>	How much has the MIS been improved? Capacity (flowrate and absolute quantity) change, etc.	510 <i>Miscellaneous</i>
816	<i>WorkersChangeJobMoP</i>	How many workers get hired, fired, retired, change jobs?	230 <i>Quantity</i>
832	<i>IncreaseKeyIntervenor DiplomatMoP</i>	How much is the increase in key intervenor diplomatic personnel?	230 <i>Quantity</i>
833	<i>DecreaseKeyIntervenor DiplomatMoP</i>	How much is the decrease in key intervenor diplomatic personnel?	230 <i>Quantity</i>
852	<i>IncreaseWorker OrganizationsMoP</i>	What is the increase in worker organizations?	230 <i>Quantity</i>
853	<i>DecreaseWorker OrganizationsMoP</i>	What is the decrease in worker organizations?	230 <i>Quantity</i>
868	<i>IncreaseWorkersMoP</i>	What is the increase in workers?	230 <i>Quantity</i>
869	<i>DecreaseWorkersMoP</i>	What is the decrease in workers?	230 <i>Quantity</i>
870	<i>IncreaseNGOsMoP</i>	What is the increase in NGOs, IOs and IGOs?	230 <i>Quantity</i>
871	<i>DecreaseNGOsMoP</i>	What is the decrease in NGOs, IOs and IGOs?	230 <i>Quantity</i>
880	<i>IncreaseGeneral PopulationMoP</i>	What is the increase in the general population?	230 <i>Quantity</i>
881	<i>DecreaseGeneral PopulationMoP</i>	What is the decrease in the general population?	230 <i>Quantity</i>
882	<i>ChangeCultural PopulationMoP</i>	What is the change in the makeup of cultural populations?	510 <i>Miscellaneous</i>
883	<i>ChangeReligious PopulationMoP</i>	What is the change in the makeup of religious populations?	510 <i>Miscellaneous</i>
884	<i>ChangeKeyLeader IdentitiesMoP</i>	What are the changes in identities of the various key leader types?	510 <i>Miscellaneous</i>
902	<i>KeyInternationalMedia LeaderInfluenceRating</i>	What is the influence of the key international media leader?	420 <i>Influence</i>
905	<i>NGOWorkersActivity Rating</i>	What is the activity (coverage, intensity, quantity) of NGO, IO and IGO workers?	340 <i>Activity</i>
906	<i>IncreaseNGOWorkersMoP</i>	What is the increase in NGO, IO and IGO workers?	230 <i>Quantity</i>
907	<i>DecreaseNGOWorkersMoP</i>	What is the decrease in NGO, IO and IGO workers?	230 <i>Quantity</i>
928	<i>CulturalAvailabilityRating</i>	What is the strength of opportunity to participate in and attend cultural (for example, theater, museum, or sports) events?	460 <i>Health OrStrength</i>

(continued)

Table 6.22 (continued)

ID	Metric classes	Defining questions	Type
957	<i>NonGovtArmedIndividuals ActivityRating</i>	What is the activity (coverage, intensity, quantity) of non-government armed individuals?	340 <i>Activity</i>
978	<i>OtherGovtPoliciesRating</i>	What is the rating of other Host Nation policies (health, education, labor, information and media, social and cultural, energy, natural resources, agriculture, transportation, trade)?	460 <i>Health OrStrength</i>
988	<i>KeyEducationLeader DecisionMakingRating</i>	What is the process and quality of the key education leader’s decision-making?	410 <i>Decision Making</i>
990	<i>KeyBureacracyLeader DecisionMakingRating</i>	What is the process and quality of the key bureaucracy leader’s decision-making?	410 <i>Decision Making</i>
991	<i>KeyJudicialLeaderDecision MakingRating</i>	What is the process and quality of the key judicial leader’s decision-making?	410 <i>Decision Making</i>
992	<i>KeyLegislativeLeader DecisionMakingRating</i>	What is the process and quality of the key legislative leader’s decision-making?	410 <i>Decision Making</i>
993	<i>KeyGovtExecutiveLeader DecisionMakingRating</i>	What is the process and quality of the key government executive leader’s decision-making?	410 <i>Decision Making</i>
994	<i>KeyNonGovtArmedLeader DecisionMakingRating</i>	What is the process and quality of the key non-government armed leader’s decision-making?	410 <i>Decision Making</i>
995	<i>KeyLaborLeaderDecision MakingRating</i>	What is the process and quality of the key labor leader’s decision-making?	410 <i>Decision Making</i>
996	<i>KeyContractorLeader DecisionMakingRating</i>	What is the process and quality of the key contractor leader’s decision-making?	410 <i>Decision Making</i>
997	<i>KeyLawEnforcementLeader DecisionMakingRating</i>	What is the process and quality of the key law enforcement leader’s decision-making?	410 <i>Decision Making</i>
998	<i>KeyIntelligenceService LeaderDecisionMaking Rating</i>	What is the process and quality of the key intelligence service leader’s decision-making?	410 <i>Decision Making</i>
999	<i>KeyMediaLeaderDecision MakingRating</i>	What is the process and quality of the key local media or international media leader’s decision-making?	410 <i>Decision Making</i>
1000	<i>KeyNGOLeaderDecision MakingRating</i>	What is the process and quality of the key NGO, IO or IGO leader’s decision-making?	410 <i>Decision Making</i>
1001	<i>KeyHealthcareLeader DecisionMakingRating</i>	What is the process and quality of the key healthcare leader’s decision-making?	410 <i>Decision Making</i>
1002	<i>KeyCriminalLeader DecisionMakingRating</i>	What is the process and quality of the key criminal leader’s decision-making?	410 <i>Decision Making</i>

(continued)

Table 6.22 (continued)

ID	Metric classes	Defining questions	Type
1003	<i>SenseOfCommunityRating</i>	What is the level of popular sense of belonging to a community?	460 <i>Health OrStrength</i>
1014	<i>IncreaseCriminal PopulationMoP</i>	What is the number of criminal personnel added?	230 <i>Quantity</i>
1015	<i>DecreaseCriminal PopulationMoP</i>	What is the number of criminal personnel subtracted?	230 <i>Quantity</i>
1019	<i>DecreaseSense OfCommunityMoP</i>	What is the strength of progress in decreasing popular sense of community?	460 <i>Health OrStrength</i>
1031	<i>ChangeSocialAndCultural PolicyMoP</i>	What is the strength of progress in changing the Host Nation social and cultural policies?	460 <i>Health OrStrength</i>
1033	<i>ConductCulturalEventsMoP</i>	What is the strength of progress in conducting cultural (for example, theater, museum, or sports) events?	460 <i>Health OrStrength</i>
1063	<i>KeyIntervenorDiplomats DecisionMakingRating</i>	What is the process and quality of the key intervenor diplomat's decision-making?	410 <i>Decision Making</i>
1064	<i>KeySpiritualIndividuals DecisionMakingRating</i>	What is the process and quality of the key spiritual individual's decision-making?	410 <i>Decision Making</i>
1066	<i>IntervenorDiplomatic PersonnelActivityRating</i>	What is the activity (coverage, intensity, quantity) of intervenor diplomatic personnel?	340 <i>Activity</i>
1069	<i>KeySocialIndividuals DecisionMakingRating</i>	What is the process and quality of the key social individual's decision-making?	410 <i>Decision Making</i>
1070	<i>ChangeSocialFactionsMoP</i>	How much is the makeup of social factions changed?	510 <i>Miscellaneous</i>
1071	<i>ChangeReligiousFactionsMoP</i>	How much is the makeup of religious factions changed?	510 <i>Miscellaneous</i>
1085	<i>IncreaseSocialServices OrganizationsMoP</i>	What is the number of social services organizations added?	230 <i>Quantity</i>
1086	<i>DecreaseSocialServices OrganizationsMoP</i>	What is the number of social services organizations subtracted?	230 <i>Quantity</i>
1087	<i>CivilDisturbanceRating</i>	What is the level of civil disturbance: parades, demonstrations, peaceful protests, riots?	460 <i>Health OrStrength</i>
1088	<i>CreateCivilDisturbanceMoP</i>	What is the strength of progress in creating civil disturbances: parades, demonstrations, peaceful protests, riots?	460 <i>Health OrStrength</i>
1090	<i>MISStatusRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the Host Nation or other organization's MIS: computer systems, internet, etc.?	260 <i>Capacity Flowrate</i>

(continued)

Table 6.22 (continued)

ID	Metric classes	Defining questions	Type
1091	<i>DamageMISMOP</i>	What is the damage to the Host Nation or other organization MIS, etc.? Dollar cost, capacity (flowrate and absolute quantity) loss, etc. (severity, quantity and coverage)	280 <i>Damage</i>
1103	<i>KeyLeaderAdvocating PeaceAndStability DecisionMaking</i>	What is the process and quality of the key individual's decision-making?	410 <i>Decision Making</i>
1104	<i>KeyLeaderAdvocating ConflictAndDissension DecisionMaking</i>	What is the process and quality of the key individual's decision-making?	410 <i>Decision Making</i>
1106	<i>WorkerPopulation ActivityRating</i>	What is the activity (coverage, intensity, quantity) level of the worker population?	340 <i>Activity</i>
1107	<i>CentralAuthority InfluenceRating</i>	What is the influence of the central authority?	420 <i>Influence</i>
1113	<i>IntelligenceService InfluenceRating</i>	What is the influence of the intelligence service?	420 <i>Influence</i>
1114	<i>GovtMilitaryPerson InfluenceRating</i>	What is the influence of the government military person?	420 <i>Influence</i>
1125	<i>Hierarchy*</i>	What is the Actor's authority level, name of superior, and type of distribution of authority? (Collectively, these define a hierarchy when combined with the other Actors in the hierarchy. See the Actor-Actors Relations in Chap. 9 for a direct method of identifying these Actors.)	320 <i>Hierarchy</i>
1126	<i>Affiliation*</i>	What is the name of thing with which entity is affiliated? This is Actor's organization or parent organization. What is the intensity with which entity holds the affiliation or an entity's members hold the affiliation?	310 <i>Affiliation</i>
1127	<i>DecisionMaking*</i>	What is the decision-making process and the quality of the decision-making?	410 <i>Decision Making</i>
1128	<i>Activity*</i>	What is the activity (coverage, intensity, quantity) of the entity?	340 <i>Activity</i>
1129	<i>Influence*</i>	What is the influence of the entity?	420 <i>Influence</i>
1134	<i>Availability*</i>	What is the availability of the entity?	350 <i>Availability</i>
1136	<i>HealthOrStrength*</i>	What is the health or strength of the entity?	460 <i>Health OrStrength</i>

The highlighted (*) classes are generic classes that are each connected to many elements

Information Metrics

The primary components of the informational Metrics are general information items (primarily decision-making ratings), media (capacity, freedom, etc.), opinions (of various Actors about legitimacy, satisfaction, etc.), and information operations.

Information: General Metrics

The Information – General subcategory contains Metric classes that concern general information-related Metrics. The classes in this subcategory are shown in Table 6.23.

Table 6.23 Information-general metric classes

ID	Metric classes	Defining questions	Type
9	<i>GovtDecision MakingRating</i>	What is the distribution of power, number of political parties, checks and balances, elections, dispute resolution?	510 <i>Miscellaneous</i>
38	<i>KeyLeaderPolitical DecisionMakingRating</i>	What is the process and quality of the key political leader's decision-making?	410 <i>Decision Making</i>
189	<i>KeyLeaderMilitary DecisionMakingRating</i>	What is the process and quality of the key military leader's decision-making?	410 <i>Decision Making</i>
308	<i>KeyLeaderEconomic DecisionMakingRating</i>	What is the process and quality of the key economic leader's decision-making?	410 <i>Decision Making</i>
426	<i>SocialIssueDecision MakingRating</i>	What is the quality and process of social decision-making?	410 <i>Decision Making</i>
459	<i>NegativeImpact OfIntervention InfluenceRating</i>	What is the level of influence of the negative event coming from the intervention?	420 <i>Influence</i>
460	<i>InformationAvailability Rating</i>	What is the availability level of information to the public?	350 <i>Availability</i>
461	<i>PublicRecords TransparencyRating</i>	What is the transparency rating for government information (records exist, availability, public reporting (push), visibility of actions, etc.)?	480 <i>Transparency</i>
780	<i>EntertainmentAvailability Rating</i>	What is the availability of entertainment to the public?	350 <i>Availability</i>
988	<i>KeyEducationLeader DecisionMakingRating</i>	What is the process and quality of the key education leader's decision-making?	410 <i>Decision Making</i>
990	<i>KeyBureacracyLeader DecisionMakingRating</i>	What is the process and quality of the key bureaucracy leader's decision-making?	410 <i>Decision Making</i>
991	<i>KeyJudicialLeader DecisionMakingRating</i>	What is the process and quality of the key judicial leader's decision-making?	410 <i>Decision Making</i>
992	<i>KeyLegislativeLeader DecisionMakingRating</i>	What is the process and quality of the key legislative leader's decision-making?	410 <i>Decision Making</i>

(continued)

Table 6.23 (continued)

ID	Metric classes	Defining questions	Type
993	<i>KeyGovtExecutiveLeader DecisionMakingRating</i>	What is the process and quality of the key government executive leader’s decision-making?	410 <i>Decision Making</i>
994	<i>KeyNonGovtArmedLeader DecisionMakingRating</i>	What is the process and quality of the key non-government armed leader’s decision-making?	410 <i>Decision Making</i>
995	<i>KeyLaborLeaderDecision MakingRating</i>	What is the process and quality of the key labor leader’s decision-making?	410 <i>Decision Making</i>
996	<i>KeyContractorLeader DecisionMakingRating</i>	What is the process and quality of the key contractor leader’s decision-making?	410 <i>Decision Making</i>
997	<i>KeyLawEnforcement LeaderDecisionMaking Rating</i>	What is the process and quality of the key law enforcement leader’s decision-making?	410 <i>Decision Making</i>
998	<i>KeyIntelligenceService LeaderDecisionMaking Rating</i>	What is the process and quality of the key intelligence service leader’s decision-making?	410 <i>Decision Making</i>
999	<i>KeyMediaLeaderDecision MakingRating</i>	What is the process and quality of the key local media or international media leader’s decision-making?	410 <i>Decision Making</i>
1000	<i>KeyNGOLeaderDecision MakingRating</i>	What is the process and quality of the key NGO, IO or IGO leader’s decision-making?	410 <i>Decision Making</i>
1001	<i>KeyHealthcareLeader DecisionMakingRating</i>	What is the process and quality of the key healthcare leader’s decision-making?	410 <i>Decision Making</i>
1002	<i>KeyCriminalLeader DecisionMakingRating</i>	What is the process and quality of the key criminal leader’s decision-making?	410 <i>Decision Making</i>
1063	<i>KeyIntervenorDiplomats DecisionMakingRating</i>	What is the process and quality of the key intervenor diplomat’s decision-making?	410 <i>Decision Making</i>
1064	<i>KeySpiritualIndividuals DecisionMakingRating</i>	What is the process and quality of the key spiritual individual’s decision-making?	410 <i>Decision Making</i>
1065	<i>KeyFirstResponders DecisionMakingRating</i>	What is the process and quality of the key first responder’s decision-making?	410 <i>Decision Making</i>
1069	<i>KeySocialIndividuals DecisionMakingRating</i>	What is the process and quality of the key social individual’s decision-making?	410 <i>Decision Making</i>
1103	<i>KeyLeaderAdvocating PeaceAndStability DecisionMaking</i>	What is the process and quality of the key individual’s decision-making?	410 <i>Decision Making</i>
1104	<i>KeyLeaderAdvocating ConflictAndDissension DecisionMaking</i>	What is the process and quality of the key individual’s decision-making?	410 <i>Decision Making</i>
1127	<i>DecisionMaking*</i>	What is the decision-making process and the quality of the decision-making?	410 <i>Decision Making</i>
1137	<i>Transparency*</i>	What is the transparency of operations of the entity?	480 <i>Transparency</i>

The highlighted (*) classes are generic classes that are each connected to many elements

Information: Media Metrics

The Information – Media subcategory contains Metric classes related to the information media (television, radio, newspapers, magazines, and internet reporting). The classes in this subcategory are shown in Table 6.24.

Table 6.24 Information-media metric classes

ID	Metric classes	Defining questions	Type
463	<i>FreedomOfDomesticMediaRating</i>	What is the level of freedom of domestic media?	460 <i>Health OrStrength</i>
464	<i>KeyLeaderMediaInfluenceRating</i>	What is the influence of the key media leader?	420 <i>Influence</i>
465	<i>FreedomOfInternationalMediaRating</i>	What is the level of freedom of the international media within the country?	460 <i>Health OrStrength</i>
467	<i>JournalistTrainingAndProfessionalizationActionMoP</i>	How many journalists have been trained in the professionalization project?	230 <i>Quantity</i>
519	<i>MediaInfraCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the media infrastructure?	260 <i>Capacity Flowrate</i>
523	<i>MediaInfraCapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the media infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
525	<i>MediaInfraCapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the media infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
797	<i>ImproveFreeMediaMoP</i>	What is the strength of progress in improving the freedom of media?	460 <i>Health OrStrength</i>
799	<i>ImproveMISMoP</i>	How much has the MIS been improved? Capacity (flowrate and absolute quantity) change, etc.	510 <i>Miscellaneous</i>
901	<i>MediaInfluenceRating</i>	What is the influence of the local or international media person?	420 <i>Influence</i>
902	<i>KeyInternationalMediaLeaderInfluenceRating</i>	What is the influence of the key international media leader?	420 <i>Influence</i>
903	<i>IncreaseMediaMoP</i>	What is the increase in local and international media personnel?	230 <i>Quantity</i>
904	<i>DecreaseMediaMoP</i>	What is the decrease in local and international media personnel?	230 <i>Quantity</i>
978	<i>OtherGovtPoliciesRating</i>	What is the rating of other Host Nation policies (health, education, labor, information and media, social and cultural, energy, natural resources, agriculture, transportation, trade)?	460 <i>Health OrStrength</i>
999	<i>KeyMediaLeaderDecisionMakingRating</i>	What is the process and quality of the key local media or international media leader's decision-making?	410 <i>Decision Making</i>

(continued)

Table 6.24 (continued)

ID	Metric classes	Defining questions	Type
1090	<i>MISStatusRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the Host Nation or other organization's MIS: computer systems, internet, etc.?	260 <i>Capacity Flowrate</i>
1091	<i>DamageMISMoP</i>	What is the damage to the Host Nation or other organization's MIS, etc.? Dollar cost, capacity (flowrate and absolute quantity) loss, etc. (severity, quantity and coverage)	280 <i>Damage</i>
1113	<i>IntelligenceService InfluenceRating</i>	What is the influence of the intelligence service?	420 <i>Influence</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>

The highlighted (*) class is a generic class that is connected to many elements

Information: Opinions Metrics

The Information – Opinions subcategory contains Metric classes related to the opinions of people. The classes in this subcategory are shown in Table 6.25.

Table 6.25 Information-opinions metric classes

ID	Metric classes	Defining questions	Type
106	<i>GovtDomesticLegitimacy RatingMoFE</i>	What is the domestic legitimacy level of the government?	460 <i>Health OrStrength</i>
107	<i>GovtInternatnlLegitimacy Rating</i>	What is the international legitimacy level of the government?	460 <i>Health OrStrength</i>
108	<i>InstitutionsOfGovernance EffectivenessRatingMoFE</i>	How effective are the institutions of governance?	440 <i>Effectiveness</i>
418	<i>PerceptionOfSafeAndSecure EnvironmentMoFE</i>	What is the rating on the perception of a safe and secure environment?	460 <i>Health OrStrength</i>
437	<i>SatisfactionOfPeoples SpiritualNeedsRating</i>	What is the level of satisfaction of people's spiritual needs?	460 <i>Health OrStrength</i>
440	<i>PerceptionByPeopleThat TheirInterestsAreRepresented Rating</i>	What is the level of belief by people that their interests are represented?	460 <i>Health OrStrength</i>
441	<i>PerceptionByPeople OfChangesInTheirSocial StatusRating</i>	What is the strength of belief by people that the change in their social status is good?	460 <i>Health OrStrength</i>
442	<i>ToleranceByPeopleOf TheStatusQuoMoFE</i>	What is the strength of toleration of the people of the status quo?	460 <i>Health OrStrength</i>
469	<i>PopulationOpinionRating</i>	For this issue, what is the popular opinion?	460 <i>Health OrStrength</i>
470	<i>SignificantGroup OpinionRating</i>	For this issue and group, what is the opinion?	460 <i>Health OrStrength</i>

(continued)

Table 6.25 (continued)

ID	Metric classes	Defining questions	Type
471	<i>KeyLeaderOpinionRating</i>	For this issue and leader, what is the opinion?	460 <i>Health OrStrength</i>
472	<i>PopulationOpinion ChangeRating</i>	For this issue, what is the change in popular opinion?	460 <i>Health OrStrength</i>
473	<i>SignificantGroupOpinion ChangeRating</i>	For this issue and group, what is the change in opinion?	460 <i>Health OrStrength</i>
474	<i>KeyLeaderOpinion ChangeRating</i>	For this issue and leader, what is the change in opinion?	460 <i>Health OrStrength</i>
1113	<i>IntelligenceService InfluenceRating</i>	What is the influence of the intelligence service?	420 <i>Influence</i>
1119	<i>InstitutionsOfGovernance FairnessRatingMoFE</i>	How fair are the institutions of governance? Corruption would be one negative component, institutional bias would be another	430 <i>Fairness Corruption</i>
1131	<i>Effectiveness*</i>	What is the effectiveness of the entity?	440 <i>Effectiveness</i>
1132	<i>Professionalism*</i>	What is the professionalism of the entity? (equipment, manpower, doctrine, training level, resources, leadership, organizational culture, history, civil-military relations)	470 <i>Professionalism</i>

The highlighted (*) classes are generic classes that are each connected to many elements

Information: Operations Metrics

The Information – Operations subcategory contains Metric classes that concern information operations (such as may be conducted by intelligence and public relations organizations). The classes in this subcategory are shown in Table 6.26.

Table 6.26 Information-operations metric classes

ID	Metric classes	Defining questions	Type
34	<i>DiplomaticActionMoP</i>	What is the direct result of diplomatic actions to and from the Host Nation government, internal and external (communications, making alliances, etc.)?	510 <i>Miscellaneous</i>
50	<i>MediationNegotiations PersuasionMoP</i>	What is the direct result of mediation, negotiation and persuasion effort?	510 <i>Miscellaneous</i>
368	<i>NGOCoordinationMoP</i>	What is the strength of progress in coordination of NGO, IO and IGO activity (coverage, intensity, quantity) (among NGOs, etc. and with intervenors and others)?	460 <i>Health OrStrength</i>
376	<i>NegotiationWBureaucracies ActionMoP</i>	What is the direct result of negotiation with bureaucracies to get relief for people? Money saved, number of people achieving needs, etc.	510 <i>Miscellaneous</i>

(continued)

Table 6.26 (continued)

ID	Metric classes	Defining questions	Type
477	<i>InformationCollection ActionMoP</i>	What is the direct result of information collection and processing? Quantity and type collected or processed, etc.	510 <i>Miscellaneous</i>
479	<i>GovtLiaisonProgram ActionMoP</i>	What is the strength of progress in liaison with the government?	460 <i>Health OrStrength</i>
481	<i>InformationControl AndDissemination ActivityMoP</i>	What is the direct result of information control and dissemination Action? Amount controlled, disseminated, etc.	510 <i>Miscellaneous</i>
483	<i>PositivePRAActionMoP</i>	What is the direct result of positive public relations Action? Number of popular impressions, etc.	510 <i>Miscellaneous</i>
485	<i>NegativePRAActionMoP</i>	What is the direct result of negative public relations Action? Number of popular impressions, etc.	510 <i>Miscellaneous</i>
801	<i>DeLegitimizeTerrorMoP</i>	What is the strength of progress in de-legitimizing terrorists and their aims?	460 <i>Health OrStrength</i>
802	<i>DeLegitimizeInsurgentMoP</i>	What is the strength of progress in de-legitimizing insurgents and their aims?	460 <i>Health OrStrength</i>
803	<i>DeLegitimizeHNGovtMoP</i>	What is the strength of progress in de-legitimizing Host Nation government?	460 <i>Health OrStrength</i>
1072	<i>NonNationStateActors RecruitingFundingSupport IncreaseMoP</i>	What is the increase in recruiting, funding, and financial, institutional and local support for non-nation-state Actors?	510 <i>Miscellaneous</i>

Infrastructure Metrics

The primary components of the infrastructure Metrics are business infrastructure, social infrastructure, energy infrastructure, government infrastructure, transportation infrastructure, and water infrastructure. There are a very large number of items that fall into this domain, including capacities, damage, investments, etc.

Infrastructure: Business Metrics

The Infrastructure – Business subcategory contains Metric classes that concern business infrastructure. The classes in this subcategory are shown in Table 6.27.

Table 6.27 Infrastructure-business metric classes

ID	Metric classes	Defining questions	Type
123	<i>ConflictProperty DestructionRating</i>	What is the level of property destruction from conflict?	460 <i>Health OrStrength</i>
326	<i>GoodsAndEquipment CapacityProducedMoP</i>	What is the amount of goods and equipment produced?	230 <i>Quantity</i>
328	<i>GoodsAndEquipment CapacityReducedMoP</i>	What is the amount of goods and equipment consumed or worn out?	230 <i>Quantity</i>
496	<i>BusinessInfra CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of shops and commercial structures?	260 <i>Capacity Flowrate</i>
497	<i>Manufacturing InfraCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of manufacturing structures?	260 <i>Capacity Flowrate</i>
498	<i>AgricultureInfra CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of agriculture structures?	260 <i>Capacity Flowrate</i>
499	<i>LivestockAgriculture EquipmentCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of livestock and agricultural equipment?	260 <i>Capacity Flowrate</i>
500	<i>CommercialEquipment CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of commercial equipment?	260 <i>Capacity Flowrate</i>
502	<i>ManufacturingInfra InvestmentMoP</i>	What is the monetary investment in rebuilding manufacturing structures?	230 <i>Quantity</i>
503	<i>ManufacturingInfra JobsCreatedMoP</i>	How many jobs have been created in rebuilding manufacturing structures?	230 <i>Quantity</i>
504	<i>ManufacturingInfra CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of manufacturing structures has been rebuilt?	260 <i>Capacity Flowrate</i>
506	<i>ManufacturingInfra CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of manufacturing structures has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
508	<i>AgricultureInfra InvestmentMoP</i>	What is the monetary investment in rebuilding agriculture structures?	230 <i>Quantity</i>
509	<i>AgricultureInfraJobs CreatedMoP</i>	How many jobs have been created in rebuilding agriculture structures?	230 <i>Quantity</i>
510	<i>AgricultureInfraCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of agriculture structures has been rebuilt?	260 <i>Capacity Flowrate</i>
512	<i>AgricultureInfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of agriculture structures has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
514	<i>BusinessInfra InvestmentMoP</i>	What is the monetary investment in rebuilding shops and commercial structures?	230 <i>Quantity</i>
515	<i>BusinessInfraJobs CreatedMoP</i>	How many jobs have been created in rebuilding shops and commercial structures?	230 <i>Quantity</i>
516	<i>BusinessInfraCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of shops and commercial structures has been rebuilt?	260 <i>Capacity Flowrate</i>
518	<i>BusinessInfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of shops and commercial structures has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>

(continued)

Table 6.27 (continued)

ID	Metric classes	Defining questions	Type
519	<i>MediaInfraCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the media infrastructure?	260 <i>Capacity Flowrate</i>
521	<i>MediaInfraInvestmentMoP</i>	What is the monetary investment in rebuilding the media infrastructure?	230 <i>Quantity</i>
522	<i>MediaInfraJobsCreatedMoP</i>	How many jobs have been created in rebuilding the media infrastructure?	230 <i>Quantity</i>
523	<i>MediaInfraCapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the media infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
525	<i>MediaInfraCapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the media infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
783	<i>IESControlRating</i>	Who/what/how controls infrastructure environmental stability (IES, includes energy, transportation, etc.)? At what level?	510 <i>Miscellaneous</i>
799	<i>ImproveMISMoP</i>	How much has the MIS been improved? Capacity (flowrate and absolute quantity) change, etc.	510 <i>Miscellaneous</i>
912	<i>MiningInfrastructureCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the mining infrastructure?	260 <i>Capacity Flowrate</i>
913	<i>MiningInfrastructureInvestmentMoP</i>	What is the monetary investment in rebuilding the mining infrastructure?	230 <i>Quantity</i>
914	<i>MiningInfrastructureJobsCreatedMoP</i>	How many jobs have been created in rebuilding the mining infrastructure?	230 <i>Quantity</i>
915	<i>MiningInfrastructureCapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the mining infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
916	<i>MiningInfrastructureCapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the mining infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
938	<i>GoodsAndEquipmentRating</i>	What is the available quantity of goods or equipment?	230 <i>Quantity</i>
972	<i>FinancialInfrastructureRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the financial infrastructure (banks, stock exchanges, computer systems, insurance, etc.)?	260 <i>Capacity Flowrate</i>
1024	<i>RebuildFinancialInfrastructureMoP</i>	What is the strength of progress in rebuilding the financial infrastructure?	460 <i>Health OrStrength</i>
1090	<i>MISStatusRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the Host Nation or other organization's MIS: computer systems, internet, etc.?	260 <i>Capacity Flowrate</i>
1091	<i>DamageMISMoP</i>	What is the damage to the Host Nation or other organization's MIS, etc.? Dollar cost, capacity (flowrate and absolute quantity) loss, etc. (severity, quantity and coverage)	280 <i>Damage</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>
1139	<i>Capacity*</i>	What is the carrying capacity of entity in terms of flowrates and in terms of quantities?	260 <i>Capacity Flowrate</i>

The highlighted (*) classes are generic classes that are each connected to many elements

Infrastructure: Social Metrics

The Infrastructure – Social subcategory contains Metric classes that concern infrastructure related to society and social needs. The classes in this subcategory are shown in Table 6.28.

Table 6.28 Infrastructure-social metric classes

ID	Metric classes	Defining questions	Type
350	<i>CivilianHousingCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of civilian housing?	260 <i>Capacity Flowrate</i>
370	<i>TemporaryShelterCapacityProvidedMoP</i>	What is the capacity (flowrate and absolute quantity) of temporary shelter/housing/ refugee camps provided?	260 <i>Capacity Flowrate</i>
372	<i>CivilianHousingCapacityRebuiltMoP</i>	What is the capacity (flowrate and absolute quantity) of civilian housing that has been rebuilt?	260 <i>Capacity Flowrate</i>
378	<i>CivilianHousingCapacityDamagedMoP</i>	What is the capacity (flowrate and absolute quantity) of civilian housing that has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
405	<i>RefugeeCampsCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of refugee camps and temporary shelters?	260 <i>Capacity Flowrate</i>
438	<i>ReligiousBuildingsCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of religious buildings?	260 <i>Capacity Flowrate</i>
444	<i>ReligiousBuildingsCapacityRebuildingMoP</i>	What is the capacity (flowrate and absolute quantity) of religious buildings that has been rebuilt?	260 <i>Capacity Flowrate</i>
446	<i>ReligiousBuildingsCapacityDamagedMoP</i>	What is the capacity (flowrate and absolute quantity) of religious buildings that has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
528	<i>EducationInfraCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the education infrastructure?	260 <i>Capacity Flowrate</i>
530	<i>EducationInfraInvestmentMoP</i>	What is the monetary investment in rebuilding the education infrastructure?	230 <i>Quantity</i>
531	<i>EducationInfraJobsCreatedMoP</i>	How many jobs have been created in rebuilding the education infrastructure?	230 <i>Quantity</i>
532	<i>EducationInfraCapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the education infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
534	<i>EducationInfraCapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the education infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
535	<i>HealthInfraCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the health infrastructure?	260 <i>Capacity Flowrate</i>
537	<i>HealthInfraInvestmentMoP</i>	What is the monetary investment in rebuilding the health infrastructure?	230 <i>Quantity</i>

(continued)

Table 6.28 (continued)

ID	Metric classes	Defining questions	Type
538	<i>HealthInfraJobs CreatedMoP</i>	How many jobs have been created in rebuilding the health infrastructure?	230 <i>Quantity</i>
539	<i>HealthInfraCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the health infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
541	<i>HealthInfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the health infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
783	<i>IESControlRating</i>	Who/what/how controls infrastructure environmental stability (IES, includes energy, transportation, etc.)? At what level?	510 <i>Miscellaneous</i>
799	<i>ImproveMISMoP</i>	How much has the MIS been improved? Capacity (flowrate and absolute quantity) change, etc.	510 <i>Miscellaneous</i>
929	<i>CulturalInfrastructure Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the cultural (for example, theater, museum, or sports) infrastructure?	260 <i>Capacity Flowrate</i>
930	<i>CulturalInfra InvestmentMoP</i>	What is the monetary investment in rebuilding the cultural (for example, theater, museum, or sports) infrastructure?	230 <i>Quantity</i>
931	<i>CulturalInfra JobsCreatedMoP</i>	How many jobs have been created in rebuilding the cultural (for example, theater, museum, or sports) infrastructure?	230 <i>Quantity</i>
932	<i>CulturalInfraCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the cultural (for example, theater, museum, or sports) infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
933	<i>CulturalInfraCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the cultural (for example, theater, museum, or sports) infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
1022	<i>ProvideHealthcare SuppliesMoP</i>	What is the number of healthcare supplies and equipment provided?	230 <i>Quantity</i>
1067	<i>RefugeeCampCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the refugee camp and temporary shelter infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
1090	<i>MISStatusRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the Host Nation or other organization's MIS: computer systems, internet, etc.?	260 <i>Capacity Flowrate</i>
1091	<i>DamageMISMoP</i>	What is the damage to the Host Nation or other organization's MIS, etc.? Dollar cost, capacity (flowrate and absolute quantity) loss, etc. (severity, quantity and coverage)	280 <i>Damage</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>

The highlighted (*) class is a generic class that is connected to many elements

Infrastructure: Energy Metrics

The Infrastructure – Energy subcategory contains Metric classes that concern energy infrastructure. The classes in this subcategory are shown in Table 6.29.

Table 6.29 Infrastructure-energy metric classes

ID	Metric classes	Defining questions	Type
543	<i>GeneralEnergyInfra CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the general energy infrastructure?	260 <i>Capacity Flowrate</i>
544	<i>ElectricProduction CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the electricity production infrastructure?	260 <i>Capacity Flowrate</i>
545	<i>ElectricDistribution CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the electricity distribution infrastructure?	260 <i>Capacity Flowrate</i>
546	<i>ExtractiveEnergyProduction CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the extractive energy production infrastructure?	260 <i>Capacity Flowrate</i>
547	<i>ExtractiveEnergyTransport CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the extractive energy transportation infrastructure?	260 <i>Capacity Flowrate</i>
549	<i>ElectricProduction InvestmentMoP</i>	What is the monetary investment in rebuilding the electricity production infrastructure?	230 <i>Quantity</i>
550	<i>ElectricProduction JobsCreatedMoP</i>	How many jobs have been created in rebuilding the electricity production infrastructure?	230 <i>Quantity</i>
551	<i>ElectricProduction CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the electricity production infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
553	<i>ElectricDistribution InvestmentMoP</i>	What is the monetary investment in rebuilding the electricity distribution infrastructure?	230 <i>Quantity</i>
554	<i>ElectricDistribution JobsCreatedMoP</i>	How many jobs have been created in rebuilding the electricity distribution infrastructure?	230 <i>Quantity</i>
555	<i>ElectricDistribution CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the electricity distribution infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
557	<i>ExtractiveEnergyProduction InvestmentMoP</i>	What is the monetary investment in rebuilding the extractive energy production infrastructure?	230 <i>Quantity</i>
558	<i>ExtractiveEnergyProduction JobsCreatedMoP</i>	How many jobs have been created in rebuilding the extractive energy production infrastructure?	230 <i>Quantity</i>

(continued)

Table 6.29 (continued)

ID	Metric classes	Defining questions	Type
559	<i>ExtractiveEnergyProduction CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the extractive energy production infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
561	<i>ExtractiveEnergyTransport InvestmentMoP</i>	What is the monetary investment in rebuilding the extractive energy transportation infrastructure?	230 <i>Quantity</i>
562	<i>ExtractiveEnergyTransport JobsCreatedMoP</i>	How many jobs have been created in rebuilding the extractive energy transportation infrastructure?	230 <i>Quantity</i>
563	<i>ExtractiveEnergyTransport CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the extractive energy transportation infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
565	<i>ElectricProduction CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the electricity production infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
567	<i>ElectricDistribution CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the electricity distribution infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
569	<i>ExtractiveEnergyProduction CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the extractive energy production infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
571	<i>ExtractiveEnergyTransport CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the extractive energy transportation infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
783	<i>IESControlRating</i>	Who/what/how controls infrastructure environmental stability (IES, includes energy, transportation, etc.)? At what level?	510 <i>Miscellaneous</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>

The highlighted (*) class is a generic class that is connected to many elements

Infrastructure: Government Metrics

The Infrastructure – Government subcategory contains Metric classes that concern government infrastructure. The classes in this subcategory are shown in Table 6.30.

Table 6.30 Infrastructure-government metric classes

ID	Metric classes	Defining questions	Type
72	<i>PrisonStructure AdequacyRating</i>	What is the strength of the prison structure?	460 <i>Health OrStrength</i>
573	<i>GovtStructures CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the government infrastructure?	260 <i>Capacity Flowrate</i>
574	<i>MilitaryStructures CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the military infrastructure?	260 <i>Capacity Flowrate</i>
575	<i>MilitaryVehicles CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the military vehicles?	260 <i>Capacity Flowrate</i>
577	<i>GovtStructures InvestmentMoP</i>	What is the monetary investment in rebuilding the government (including police) infrastructure?	230 <i>Quantity</i>
578	<i>GovtStructures JobsCreatedMoP</i>	How many jobs have been created in rebuilding the government infrastructure?	230 <i>Quantity</i>
579	<i>GovtStructures CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the government infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
581	<i>MilitaryStructures InvestmentMoP</i>	What is the monetary investment in rebuilding the military infrastructure?	230 <i>Quantity</i>
582	<i>MilitaryStructures JobsCreatedMoP</i>	How many jobs have been created in rebuilding the military infrastructure?	230 <i>Quantity</i>
583	<i>MilitaryStructures CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the military infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
585	<i>GovtStructuresCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the government (including police) infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
587	<i>MilitaryStructures CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the military infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
589	<i>MilitaryVehicles InvestmentMoP</i>	What is the monetary investment in rebuilding/replacing the military vehicles?	230 <i>Quantity</i>
590	<i>MilitaryVehicles JobsCreatedMoP</i>	How many jobs have been created in rebuilding/replacing the military vehicles?	230 <i>Quantity</i>
591	<i>MilitaryVehicles CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the military vehicles has been rebuilt/replaced?	260 <i>Capacity Flowrate</i>

(continued)

Table 6.30 (continued)

ID	Metric classes	Defining questions	Type
593	<i>MilitaryVehiclesCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the military vehicles has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
783	<i>IESControlRating</i>	Who/what/how controls infrastructure environmental stability (IES, includes energy, transportation, etc.)? At what level?	510 <i>Miscellaneous</i>
799	<i>ImproveMISMOP</i>	How much has the MIS been improved? Capacity (flowrate and absolute quantity) change, etc.	510 <i>Miscellaneous</i>
822	<i>BuildPrisonMoP</i>	How much prison infrastructure is built?	510 <i>Miscellaneous</i>
823	<i>DamagePrisonMoP</i>	How much prison infrastructure is damaged? (severity, quantity and coverage)	280 <i>Damage</i>
917	<i>BuildPrison InvestmentMoP</i>	What is the monetary investment in rebuilding the prison infrastructure?	230 <i>Quantity</i>
918	<i>BuildPrisonJobs CreatedMoP</i>	How many jobs have been created in rebuilding the prison infrastructure?	230 <i>Quantity</i>
1090	<i>MISStatusRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the Host Nation or other organization's MIS: computer systems, internet, etc.?	260 <i>Capacity Flowrate</i>
1091	<i>DamageMISMOP</i>	What is the damage to the Host Nation or other organization MIS, etc.? Dollar cost, capacity loss (flowrate and absolute quantity), etc. (severity, quantity and coverage)	280 <i>Damage</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>

The highlighted (*) class is a generic class that is connected to many elements

Infrastructure: Transportation Metrics

The Infrastructure – Transportation subcategory contains Metric classes that concern transportation infrastructure. The classes in this subcategory are shown in Table 6.31.

Table 6.31 Infrastructure-transportation metric classes

ID	Metric classes	Defining questions	Type
611	<i>TransportInfra CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the general transportation infrastructure?	260 <i>Capacity Flowrate</i>
612	<i>RoadCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the road infrastructure?	260 <i>Capacity Flowrate</i>
613	<i>RailroadCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the railroad infrastructure?	260 <i>Capacity Flowrate</i>
614	<i>BridgeAndTunnel CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the bridge and tunnel infrastructure?	260 <i>Capacity Flowrate</i>
615	<i>WaterwaysCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the waterways infrastructure?	260 <i>Capacity Flowrate</i>
616	<i>SeaportCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the seaport infrastructure?	260 <i>Capacity Flowrate</i>
617	<i>AirportCapacity Rating</i>	What is the carrying capacity (flowrate and absolute quantity) of the airport infrastructure?	260 <i>Capacity Flowrate</i>
618	<i>NonMilVehicles CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the non-military vehicles?	260 <i>Capacity Flowrate</i>
620	<i>RoadInvestmentMoP</i>	What is the monetary investment in rebuilding the road infrastructure?	230 <i>Quantity</i>
621	<i>RoadJobsCreatedMoP</i>	How many jobs have been created in rebuilding the road infrastructure?	230 <i>Quantity</i>
622	<i>RoadCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the road infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
624	<i>RailroadInvestmentMoP</i>	What is the monetary investment in rebuilding the railroad infrastructure?	230 <i>Quantity</i>
625	<i>RailroadJobs CreatedMoP</i>	How many jobs have been created in rebuilding the railroad infrastructure?	230 <i>Quantity</i>
626	<i>RailroadCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the railroad infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
628	<i>BridgeOrTunnel InvestmentMoP</i>	What is the monetary investment in rebuilding the bridge and tunnel infrastructure?	230 <i>Quantity</i>

(continued)

Table 6.31 (continued)

ID	Metric classes	Defining questions	Type
629	<i>BridgeOrTunnelJobs CreatedMoP</i>	How many jobs have been created in rebuilding the bridge and tunnel infrastructure?	230 <i>Quantity</i>
630	<i>BridgeOrTunnelCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the bridge and tunnel infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
632	<i>SeaportInvestmentMoP</i>	What is the monetary investment in rebuilding the seaport infrastructure?	230 <i>Quantity</i>
633	<i>SeaportJobsCreatedMoP</i>	How many jobs have been created in rebuilding the seaport infrastructure?	230 <i>Quantity</i>
634	<i>SeaportCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the seaport infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
636	<i>AirportInvestmentMoP</i>	What is the monetary investment in rebuilding the airport infrastructure?	230 <i>Quantity</i>
637	<i>AirportJobsCreatedMoP</i>	How many jobs have been created in rebuilding the airport infrastructure?	230 <i>Quantity</i>
638	<i>AirportCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the airport infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
640	<i>NonMilVehicles InvestmentMoP</i>	What is the monetary investment in rebuilding/replacing the non-military vehicles?	230 <i>Quantity</i>
641	<i>NonMilVehicles JobsCreatedMoP</i>	How many jobs have been created in rebuilding/replacing the non-military vehicles?	230 <i>Quantity</i>
642	<i>NonMilVehicles CapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the non-military vehicles has been rebuilt/replaced?	260 <i>Capacity Flowrate</i>
644	<i>WaterwaysInvestmentMoP</i>	What is the monetary investment in rebuilding the waterways infrastructure?	230 <i>Quantity</i>
645	<i>WaterwaysJobs CreatedMoP</i>	How many jobs have been created in rebuilding the waterways infrastructure?	230 <i>Quantity</i>
646	<i>WaterwaysCapacity RebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the waterways infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
648	<i>RoadCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the road infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
650	<i>RailroadCapacity DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the railroad infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
652	<i>BridgeAndTunnel CapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the bridge and tunnel infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>

(continued)

Table 6.31 (continued)

ID	Metric classes	Defining questions	Type
654	<i>SeaportCapacity</i> <i>DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the seaport infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
656	<i>AirportCapacity</i> <i>DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the airport infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
658	<i>NonMilVehiclesCapacity</i> <i>DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the non-military vehicles has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
660	<i>WaterwaysCapacity</i> <i>DamagedMoP</i>	What capacity (flowrate and absolute quantity) of the waterways infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
783	<i>IESControlRating</i>	Who/what/how controls infrastructure environmental stability (IES, includes energy, transportation, etc.)? At what level?	510 <i>Miscellaneous</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>

The highlighted (*) class is a generic class that is connected to many elements

Infrastructure: Water Metrics

The Infrastructure – Water subcategory contains Metric classes that concern water infrastructure. The classes in this subcategory are shown in Table 6.32.

Table 6.32 Infrastructure-water metric classes

ID	Metric classes	Defining questions	Type
662	<i>WaterDistributionInfra</i> <i>CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the water distribution infrastructure?	260 <i>Capacity</i> <i>Flowrate</i>
663	<i>WaterAndSewage</i> <i>TreatmentInfra</i> <i>CapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the water and sewage treatment infrastructure?	260 <i>Capacity</i> <i>Flowrate</i>
664	<i>DamsCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the dam infrastructure?	260 <i>Capacity</i> <i>Flowrate</i>
666	<i>WaterDistribution</i> <i>InfraInvestmentMoP</i>	What is the monetary investment in rebuilding the water distribution infrastructure?	230 <i>Quantity</i>

(continued)

Table 6.32 (continued)

ID	Metric classes	Defining questions	Type
667	<i>WaterDistributionInfraJobsCreatedMoP</i>	How many jobs have been created in rebuilding the water distribution infrastructure?	230 <i>Quantity</i>
668	<i>WaterDistributionInfraCapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the water distribution infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
670	<i>WaterAndSewageTreatmentInfraInvestmentMoP</i>	What is the monetary investment in rebuilding the water and sewage treatment infrastructure?	230 <i>Quantity</i>
671	<i>WaterAndSewageTreatmentInfraJobsCreatedMoP</i>	How many jobs have been created in rebuilding the water and sewage treatment infrastructure?	230 <i>Quantity</i>
672	<i>WaterAndSewageTreatmentInfraCapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the water and sewage treatment infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
674	<i>DamsInfraInvestmentMoP</i>	What is the monetary investment in rebuilding the dam infrastructure?	230 <i>Quantity</i>
675	<i>DamsInfraJobsCreatedMoP</i>	How many jobs have been created in rebuilding the dam infrastructure?	230 <i>Quantity</i>
676	<i>DamsInfraCapacityRebuiltMoP</i>	What capacity (flowrate and absolute quantity) of the dam infrastructure has been rebuilt?	260 <i>Capacity Flowrate</i>
678	<i>WaterDistributionInfraCapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the water distribution infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
680	<i>WaterAndSewageTreatmentInfraCapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the water and sewage treatment infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
682	<i>DamsInfraCapacityDamagedMoP</i>	What capacity (flowrate and absolute quantity) of the dam infrastructure has been damaged? (severity, quantity and coverage)	280 <i>Damage</i>
783	<i>IESControlRating</i>	Who/what/how controls infrastructure environmental stability (IES, includes energy, transportation, etc.)? At what level?	510 <i>Miscellaneous</i>
983	<i>WaterAndWasteSystemsRating</i>	What is the rating of the Host Nation water and waste services?	460 <i>Health OrStrength</i>
1138	<i>Damage*</i>	What is the damage caused (severity, quantity, coverage)?	280 <i>Damage</i>

The highlighted (*) class is a generic class that is connected to many elements

Kinetic Metrics

The primary components of the kinetic Metrics are logistics, damage and attrition, command, control, communications, computers and intelligence (C4I), and some general kinetic items.

Kinetic: Logistic Metrics

The Kinetic – Logistic subcategory contains Metric classes that concern logistics, that is, the processes of acquiring, moving, storing, and distributing goods, equipment, and people. The classes in this subcategory are shown in Table 6.33.

Table 6.33 Kinetic-logistic metric classes

ID	Metric classes	Defining questions	Type
700	<i>LogisticsAcquiredMoP</i>	What quantity has been acquired?	230 <i>Quantity</i>
702	<i>LogisticsWarehousedMoP</i>	What quantity has been warehoused?	230 <i>Quantity</i>
704	<i>LogisticsDistributedMoP</i>	What quantity has been distributed?	230 <i>Quantity</i>
706	<i>LogisticsMoved OnGroundMoP</i>	What quantity has been moved on the ground?	230 <i>Quantity</i>
708	<i>LogisticsMoved InAirMoP</i>	What quantity has been moved in the air?	230 <i>Quantity</i>
710	<i>LogisticsMoved OnWaterMoP</i>	What quantity has been moved on water?	230 <i>Quantity</i>
712	<i>LogisticsMoved UnderWaterMoP</i>	What quantity has been moved under water?	230 <i>Quantity</i>
776	<i>LogisticsExpendedMoP</i>	What quantity has been expended?	230 <i>Quantity</i>

Kinetic: Damage/Attrition Metrics

The Kinetic – Damage/Attrition subcategory contains Metric classes that concern damage and attrition (mainly referring to death and injury of personnel). The classes in this subcategory are shown in Table 6.34.

Table 6.34 Kinetic-damage/attrition metric classes

ID	Metric classes	Defining questions	Type
715	<i>AttritionUnderwater FromAirMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
717	<i>AttritionSurface FromAirMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
719	<i>AttritionAirFromAirMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>

(continued)

Table 6.34 (continued)

ID	Metric classes	Defining questions	Type
721	<i>AttritionUnderwaterFromSurfaceMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
723	<i>AttritionSurfaceFromSurfaceMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
725	<i>AttritionAirFromSurfaceMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
727	<i>AttritionUnderwaterFromUnderwaterMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
729	<i>AttritionSurfaceFromUnderwaterMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
731	<i>AttritionAirFromUnderwaterMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
733	<i>AttritionFromHighYieldExplosivesMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
735	<i>AttritionFromChemicalsMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
737	<i>AttritionFromBiologicalAgentsMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
739	<i>AttritionFromRadiologicalAgentsMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
741	<i>AttritionCollateralMoP</i>	How much damage/attrition resulted? (severity, quantity and coverage)	280 <i>Damage</i>
753	<i>ObscurantsInPlaceMoP</i>	How much obscurant is in place?	510 <i>Miscellaneous</i>
771	<i>FireDamageMoP</i>	What is the damage from fire or wildfire? (severity, quantity and coverage)	280 <i>Damage</i>
775	<i>ManmadeDisasterDamageMoP</i>	What is the damage from man-made disasters (nuclear power plant, hazardous materials, etc.)? (severity, quantity and coverage)	280 <i>Damage</i>

Kinetic: General Metrics

The Kinetic – General subcategory contains Metric classes that concern entity self-movement, changing elements, and controlling elements. The classes in this subcategory are shown in Table 6.35.

Table 6.35 Kinetic-general metric classes

ID	Metric classes	Defining questions	Type
1098	<i>MoveSelfMoP</i>	What is the progress (distance traveled, speed, etc.) of movement?	510 <i>Miscellaneous</i>
1099	<i>ChangeSelfMoP</i>	What is the progress (nature of change, amount of change, etc.) of change process?	510 <i>Miscellaneous</i>
1100	<i>ChangeElementMoP</i>	What is the progress (nature of change, amount of change, etc.) of change to another element?	510 <i>Miscellaneous</i>
1101	<i>ControlElementMoP</i>	What is the amount/type of control of the element?	510 <i>Miscellaneous</i>

Kinetic: C4I Metrics

The Kinetic – C4I subcategory contains Metric classes that concern command, control, communications, computers, and intelligence (C4I). The classes in this subcategory are shown in Table 6.36.

Table 6.36 Kinetic-C4I metric classes

ID	Metric classes	Defining questions	Type
744	<i>SensorsEstablished MoP</i>	What sensor capability has been established?	260 <i>Capacity Flowrate</i>
746	<i>Communications EstablishedMoP</i>	What communications capability has been established?	260 <i>Capacity Flowrate</i>
748	<i>CommandAndControl EstablishedMoP</i>	What command and control processes have been established?	260 <i>Capacity Flowrate</i>
817	<i>InterventionC4IRating</i>	What is the strength of intervention C4I?	460 <i>Health OrStrength</i>
818	<i>HNC4IRating</i>	What is the strength of the Host Nation C4I?	460 <i>Health OrStrength</i>
819	<i>DamageSensorsMoP</i>	How much military sensor processes are damaged? (severity, quantity and coverage)	280 <i>Damage</i>
820	<i>DamageCommunications MoP</i>	How much military communications processes are damaged? (severity, quantity and coverage)	280 <i>Damage</i>
821	<i>DamageC2MoP</i>	How much military command and control is damaged? (severity, quantity and coverage)	280 <i>Damage</i>
1102	<i>OtherC4IRating</i>	What is the carrying capacity (flowrate and absolute quantity) of the C4I for other than Intervention and Host Nation military?	260 <i>Capacity Flowrate</i>

Environmental Metrics

The primary components of the Environmental Metrics concern physical atmospherics, earth, water, and other, and some primitives (such as “identity”).

Environmental: Atmospheric Metrics

The Environmental – Atmospheric subcategory contains Metric classes that relate to the atmosphere, time, and season. The classes in this subcategory are shown in Table 6.37.

Table 6.37 Environmental-atmospheric metric classes

ID	Metric classes	Defining questions	Type
347	<i>PollutionRating</i>	What is the rating on pollution (individual, agricultural, industrial)?	460 <i>Health OrStrength</i>
362	<i>PollutionReduction ProjectsMoP</i>	What is the strength of progress in pollution reduction projects?	460 <i>Health OrStrength</i>
751	<i>Time</i>	What is the date/time group? Additionally for Actions, what is time duration? What is frequency of event?	220 <i>Time</i>
753	<i>ObscurantsInPlaceMoP</i>	How much obscurant is in place?	510 <i>Miscellaneous</i>
754	<i>TemperatureRating</i>	What is the temperature, heat/cold wave status?	230 <i>Quantity</i>
756	<i>AirMovement DamageMoP</i>	What is the damage from air movement (storms, blizzards, hurricanes, thunderstorms, tornados, etc.)? (severity, quantity and coverage)	280 <i>Damage</i>
757	<i>PrecipitationRating</i>	What is the precipitation level, drought/flood status?	230 <i>Quantity</i>
779	<i>SeasonTime OfYearIndicator</i>	What is the season/time of year?	510 <i>Miscellaneous</i>

Environmental: Primitive Metrics

The Environmental – Primitive subcategory contains Metric classes that are primitive element state variables: identity, location, quantity, movability, and owner. The classes in this subcategory are shown in Table 6.38.

Table 6.38 Environmental-primitive metric classes

ID	Metric classes	Defining questions	Type
1105	<i>Location*</i>	What is the current location (one or more points, on a network, as area, or density over area; with elevation/depth)? May be null.	210 <i>Location</i>
1120	<i>Identity*</i>	What is the name or other identification of the entity?	110 <i>Identity</i>
1121	<i>Quantity*</i>	What is the number of entities (if single Actor=1; if "groupofsame"=number of Actors)? What is the number of members (Actor is significantgroup or demographicgroup=number of people in group)? Environmental entities similar. Actions=number of things produced, added, etc.	230 <i>Quantity</i>
1122	<i>Movable*</i>	Can the entity be moved or not? What is its current speed of movement?	250 <i>Movable</i>
1141	<i>OwnerOriginator*</i>	What is the environmental element's owner or the originator of the Action?	330 <i>OwnerOriginator</i>

All of the Metric classes (*) are generic classes that are each connected to many elements

Environmental: Earth-Water-Other Metrics

The Environmental – Earth-Water-Other subcategory contains Metric classes that relate to earth, water, and other things that describe the environment. The classes in this subcategory are shown in Table 6.39.

Table 6.39 Environmental-Earth-water-other metric classes

ID	Metric classes	Defining questions	Type
231	<i>ArableLandCapacityRating</i>	What is the carrying capacity (flowrate and absolute quantity) of arable land?	260 <i>CapacityFlowrate</i>
322	<i>BasicNaturalResourceCapacityRating</i>	What is the Host Nation basic natural resources carrying capacity (flowrate and absolute quantity)?	260 <i>CapacityFlowrate</i>
324	<i>NaturalResourceManagementChangeMoP</i>	What is the strength of progress in managing the natural resources?	460 <i>HealthOrStrength</i>
763	<i>LandCharacterizationRating</i>	What is the terrain characterization (trafficability, cover, vegetation type, etc.)?	510 <i>Miscellaneous</i>
764	<i>NaturalFeaturesRating</i>	What is the natural feature characterization (rivers, mountains, etc.)?	510 <i>Miscellaneous</i>
765	<i>GeographicSubdivisionActivityRating</i>	What is the activity (coverage, intensity, quantity) of the geographical subdivision?	340 <i>Activity</i>
766	<i>SeastateRating</i>	What is the seastate?	230 <i>Quantity</i>
767	<i>NaturalResourcesRating</i>	What is the availability of the natural resource?	350 <i>Availability</i>
769	<i>EarthMovementDamageMoP</i>	What is the damage from earth movement (earthquake, landslide/ avalanche, volcanic eruptions, etc.)? (severity, quantity and coverage)	280 <i>Damage</i>
771	<i>FireDamageMoP</i>	What is the damage from fire or wildfire? (severity, quantity and coverage)	280 <i>Damage</i>
773	<i>WaterMovementDamageMoP</i>	What is the damage from water movement (flood/dam failure, tsunami, seiche, etc.)? (severity, quantity and coverage)	280 <i>Damage</i>
775	<i>ManmadeDisasterDamageMoP</i>	What is the damage from man-made disasters (nuclear power plant, hazardous materials, etc.)? (severity, quantity and coverage)	280 <i>Damage</i>
1038	<i>ConsumeNaturalResourcesMoP</i>	What is the quantity of natural resources consumed?	230 <i>Quantity</i>
1140	<i>DisasterOrCondition*</i>	Is the entity a disaster or a condition; is it man-made or natural?	240 <i>DisasterOrCondition</i>

The highlighted (*) class is a generic class that is connected to many elements

Metric Ontologies Recap

The only relations used in this chapter are the *is-a* and the implied *hasMetric* relations, explained as follows:

is-a: Each instance of A is an instance of B and each property of B is a property of A. Its inverse relation is *superClassOf*.

hasMetric: A has Metric B (also shown as *described by*). Its inverse relation is *metricOf*.

The Metrics correspond (very roughly) to adjectives and adverbs, modifying the nouns (Actors and Environment Elements) and verbs (Actions), respectively. However, the Metrics provide more specific information than do standard adjectives and adverbs by providing current state variable values for the Actors, Environment Elements and Actions. The PMESII ontology and the Type ontology provide meta-data showing different associations of the Metrics.

Chapter 7 provides a new set of associations among the Actors, Environment Elements and Actions. These associations collectively include most, but not all of these elements, defined by the roles that the elements may play in interacting with each other.

Chapter 7

Stocks-and-Flows Ontology



The Stocks-and-Flows (SaF) Ontology contains a set of classes that is composed of element classes from the Actor, Action, and Environment ontologies and is a component of the situation-independent part of the Unconventional Conflict Ontology. These SaF classes contain information about relationships among the element classes that crosses the lines of these ontologies and differs from the *is-a* relationships within these ontologies. The simplest of the SaF classes consist of Actions that increase or decrease a quantity associated with an Environmental class. The Environmental class is the “stock” and the increases and decreases are the “flows.” More complex SaF classes include additional types of relationships and component roles. There are three categories of SaF classes and eight subcategories. The categories are differentiated by the roles of the component classes. The subcategories divide the categories by the type of “stock.” There are 96 SaF classes, each with a single parent subcategory. Figure 7.1 illustrates the connection between rebuilding a building and the building, itself. This chapter describes the organization of the SaF Ontology and all of the SaF classes.

Ontology Organization

The Stocks-and-Flows Ontology differentiates the SaF classes and provides similarity linkages among the classes. Figure 7.2 provides a diagram of the SaF Ontology. When the ontology is viewed down to the SaF class level, it is a taxonomy. However, when the component element classes of the SaF classes are included, it is clear that a taxonomy is not sufficient because of the multiple types of relations connecting the element classes.

The three SaF categories are the *OrganizationOriented*, *PopulationOriented*, and *EnvironmentOriented* categories. It is from these names that *OOClass*, *POClass* and *EOClass* each derives its abbreviated name. These are all described in the following sub-sections.



Fig. 7.1 SaF: rebuilding a building

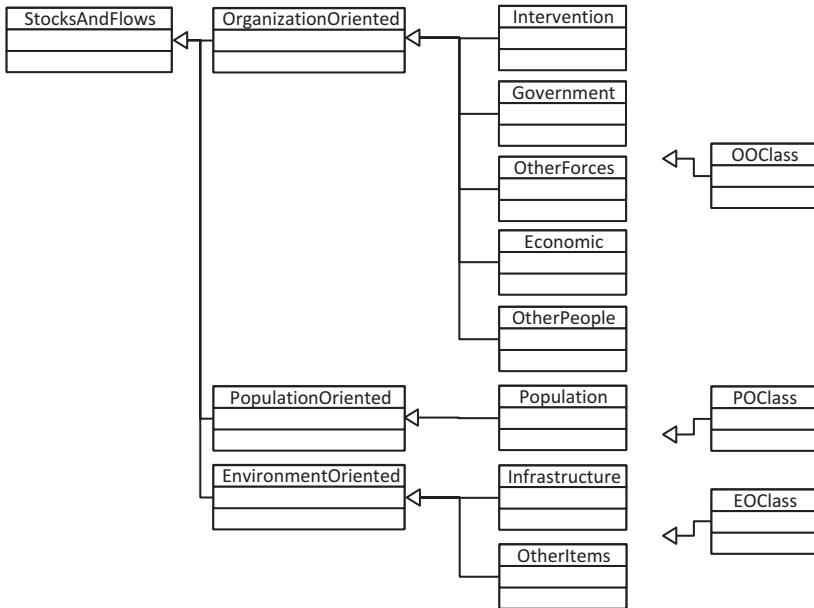


Fig. 7.2 Stocks-and-flows ontology

Environmental-Oriented SaF

The Environment-Oriented SaF classes are the simplest of the stocks-and-flows classes, having only three roles for component classes: Environment element, increasing Action, and decreasing Action. (These are the *EOClasses* in Fig. 7.2.) Figure 7.3 illustrates the structure of this type class. One or more Actions are related to an Environment element as increasing the capacity of the Environment element and one or more Actions are related as decreasing the capacity. Note that the central element is an Environment element class and that Action classes are included with two roles, either *increases* or *decreases* relations. (Some Action classes may serve in both roles. For example, if the Action verb is “change,” that implies the possibility of increasing or decreasing something.) Not all Actions and not all Environment elements are found in the set of all environmental stocks-and-flows classes. For example, the Environment class *NaturalFeature* is not in an SaF class. *EarthMovement*, as an Action could change it; however, creating the appropriate SaF class did not seem to be a significant addition to the ontology.

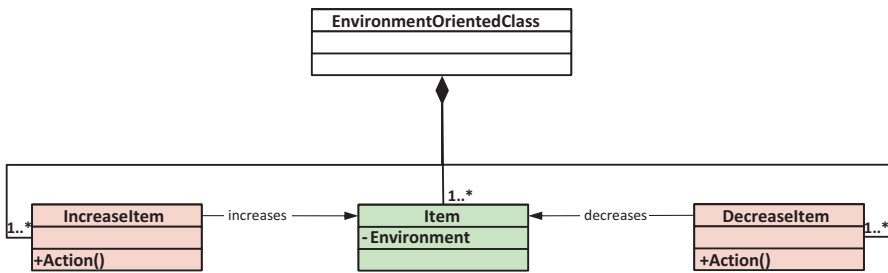


Fig. 7.3 Environmental stocks-and-flows class

Population-Oriented SaF

Population-Oriented SaF classes are more complex than Environmental-Oriented SaF classes, with six roles. (These are the *POClasses* in Fig. 7.2.) Figure 7.4 shows that the central item is an Actor population class. There are four possible roles for Action classes: *increases* (as relates to number of people), *decreases* (as relates to number of people), *affects* (as relates to training people), and *affects* (as relates to some other Action that impacts the population). There is also a possible Environment class role, which *relatesTo* the population. The word “possible” is important because not all SaF classes in this category will be composed of classes in these roles.

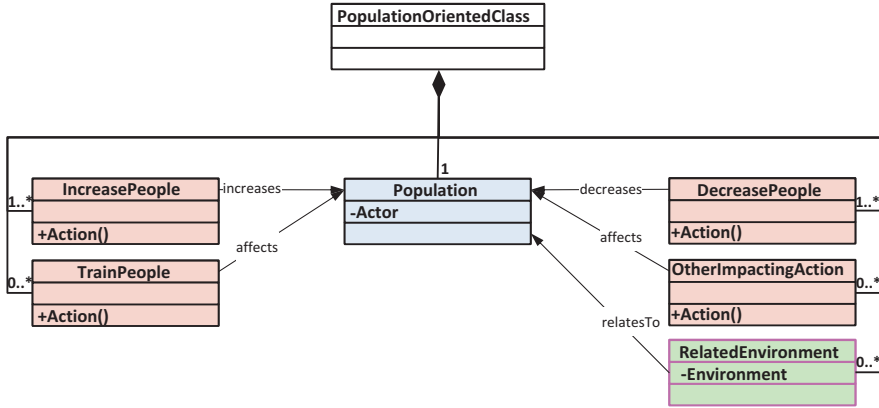


Fig. 7.4 Population stocks-and-flows relations

Organization-Oriented SaF

We also find a similar, but more complex (13 roles), stocks-and-flows relationship that relates to organizations (Fig. 7.5). (These are the *OOClasses* in Fig. 7.2.) The first part is very similar to the environment- and population-oriented SaFs, with an Actor element that is an organization taking the central place. The increase and decrease of the organization refers to increasing or decreasing the structural size of the organization (more or fewer military units, more or fewer businesses of a given type, etc.) The additional Action of creating the organization is a special case of increasing it.

However, organizations are made up of people, Actors that are different from organizations. The number of people can be increased or decreased (additional Actions). In some special cases the people can be trained (Actions that are included in the ontology for certain organizations, such as military units, but not for all organizations, such as private businesses).

In addition, there are other Actions that impact some organizations, which need to be linked. Also, some organizations have related Environmental elements that describe the quality of the organization or its people. These elements are linked, as appropriate.

Some organizations have naturally related populations. For example, an *EducationOrganization* draws its customers from the *GeneralPopulation*. Many significant organizations are related to a *KeyPerson* Actor class and to an *OtherIndividual* class that need to be linked. Finally, among the Action classes there may be several that are typically associated with the organization that can be linked.

Class Roles

Table 7.1 provides a recap of the roles that may be found in each SaF Category. The cardinality or number of classes that fill each role in each category is shown in the associated figures; however, they may be too small to read and are repeated in

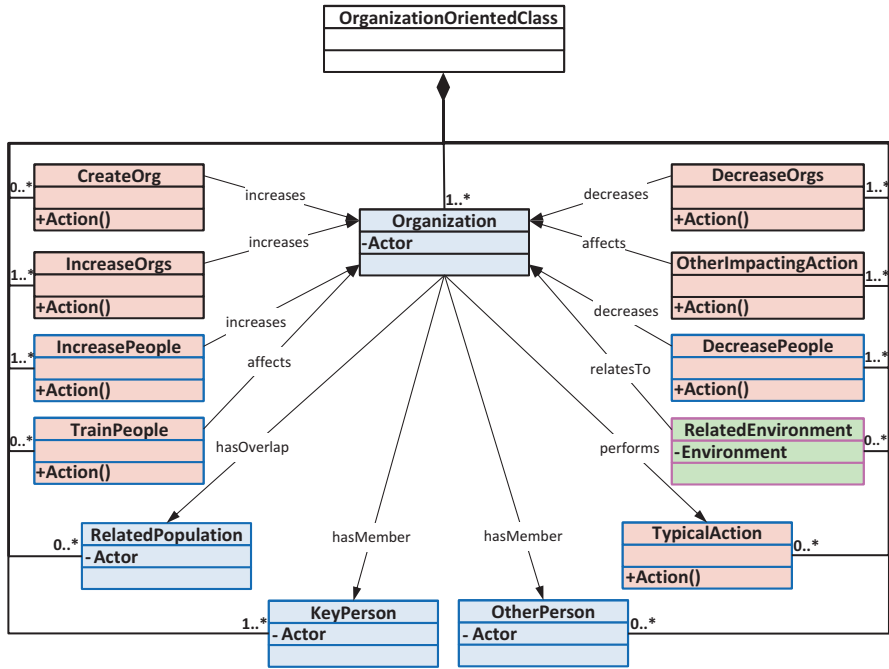


Fig. 7.5 Organizational stocks-and-flows relations

Table 7.1 SaF class roles

SaF category	SaF class role	Type element class	Number of classes
Organization	<i>OrgType</i>	Actor-Significant Group (usually)	1..*
	<i>CreateOrg</i>	Action	0..*
	<i>OrgIncrease</i>	Action	1..*
	<i>OrgDecrease</i>	Action	1..*
	<i>PeopleIncrease</i>	Action	1..*
	<i>PeopleDecrease</i>	Action	1..*
	<i>TrainPeople</i>	Action	0..*
	<i>OtherImpactingAction</i>	Action	1..*
	<i>RelatedPopulation</i>	Actor-DemographicGroup (usually)	0..*
	<i>KeyPerson</i>	Actor-KeyLeader	1..*
	<i>RelatedPerson</i>	Actor-OtherIndividual	0..*
	<i>RelatedEnvironment</i>	Environment	0..*
	<i>TypicalAction</i>	Action	0..*
Population	<i>Population</i>	Actor-DemographicGroup (usually)	1
	<i>PopulationIncrease</i>	Action	1..*
	<i>PopulationDecrease</i>	Action	1..*
	<i>TrainPopulation</i>	Action	0..*
	<i>OtherImpactingAction</i>	Action	0..*
	<i>RelatedEnvironment</i>	Environment	0..*
Environment	<i>Item</i>	Environment	1..*
	<i>IncreaseItem</i>	Action	1..*
	<i>DecreaseItem</i>	Action	1..*

the table above. The entries are defined as follows: “1..*” means that at least one class will fill the role, but more than one is possible; “0..*” means that there may be no class filling the role, but several may; and “1” means that exactly one class will fill the role.

In the tables that describe each SaF Class, the element class components of the class will be identified by the role they play in the class. Note that not all roles are filled in each SaF class. In such a case, the class tables in the next sections list the role, but show no entry for an element class filling the role. In the case where an element class fills a role, the table will show the class ID and the name of the element class. Where multiple classes fill a role, the role name will be repeated for each class.

Organization-Oriented SaF Classes

The organization-oriented SaF class category is divided into intervention, government, other force, economic organization, and other organization subcategories. Note that some roles are not connected to any Element (blank entry in the table), depending on the particular SaF class.

Intervention Organizations

The intervention consists of non-host-nation organizations and personnel. It may consist of a single country, a coalition of countries with a consistent purpose, or a set of countries with differing purposes. For example, a U.N. sponsored intervention would be treated as a coalition intervention. Thus the SaF classes may each have a single instantiation or may have multiple instantiations. SaF classes also may have no instantiation. For example, if there is no intervention, there would be no instantiation of the intervention SaF.

The first SaF class in this subcategory is centered on the intervention force and is shown in Table 7.2. Even with a single country, it may be useful to represent the intervention force as several sub-forces, each with its own SaF class instantiation. The other SaF class in this subcategory is the intervention organization, which is the civilian portion of the intervention. This class is shown in Table 7.3.

Government Organizations

The government subcategory of SaF classes represents the Host Nation government. In simple conflicts there may be only one instantiation of each SaF class; however, more complex situations may require multiple instantiations. For example, in a civil war, there would be competing organizations for each side. The simple case also

Table 7.2 Intervention force SaF class

SaF role	ID	OE element
<i>OrgType</i>	144	<i>InterventionForceOrganization</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	2021	<i>IncreaseIntervenorForceOrganizations</i>
<i>OrgDecrease</i>	2022	<i>DecreaseIntervenorForceOrganizations</i>
<i>PeopleIncrease</i>	1826	<i>IncreaseTheInterventionForcesPersonnel</i>
<i>PeopleDecrease</i>	1827	<i>DecreaseTheInterventionForcesPersonnel</i>
<i>TrainPeople</i>	155	<i>TrainMilitaryForces</i>
<i>TrainPeople</i>	161	<i>TrainIntelligenceServices</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	142	<i>KeyMilitaryIndividual</i>
<i>RelatedPerson</i>	1929	<i>InterventionForcePerson</i>
<i>RelatedEnvironment</i>	10	<i>RelationshipWithIntervenors</i>
<i>RelatedEnvironment</i>	1801	<i>MilitaryOperationsEnvironment</i>
<i>TypicalAction</i>	126	<i>ConductInterventionPeaceOperation</i>
<i>TypicalAction</i>	128	<i>ConductConventionalWarOperation</i>
<i>TypicalAction</i>	130	<i>ConductIrregularWarOperation</i>
<i>TypicalAction</i>	132	<i>EstablishDemilitarizedZoneSanctionArmsEmbargo</i>
<i>TypicalAction</i>	134	<i>EstablishObserverMissionOrInterposeForces</i>
<i>TypicalAction</i>	136	<i>ImplementWeaponsControlRegime</i>
<i>TypicalAction</i>	138	<i>ConductBorderControlBoundarySecurityFreedomOfMovement</i>
<i>TypicalAction</i>	165	<i>ConductMilitaryExercise</i>
<i>TypicalAction</i>	167	<i>ConductInterventionStabilityOperation</i>
<i>TypicalAction</i>	170	<i>EstablishConfidenceBuildingOrSecurityMeasure</i>
<i>TypicalAction</i>	172	<i>SafeguardInstitutionOfGovernanceOrKeyOfficial</i>
<i>TypicalAction</i>	174	<i>ProvideSecurityAssistance</i>
<i>TypicalAction</i>	176	<i>ConductSecurityCoordination</i>
<i>TypicalAction</i>	178	<i>ProvideForceSecurity</i>
<i>TypicalAction</i>	180	<i>ProvideSecurityForHumanitarianAssistanceActivities</i>
<i>TypicalAction</i>	182	<i>ProvideSecurityForPeaceOperationActivities</i>
<i>TypicalAction</i>	184	<i>ProvideSecurityForStabilityActivities</i>
<i>TypicalAction</i>	186	<i>ConductPersonnelRecoveryOperation</i>
<i>TypicalAction</i>	199	<i>ConductTerrorismOrAntiOrCounterterrorismOp</i>
<i>TypicalAction</i>	209	<i>ProvideConsequenceManagementSupport</i>
<i>TypicalAction</i>	211	<i>ClearMines_PlaceMinesIEDs</i>
<i>TypicalAction</i>	213	<i>ConductPiracyOrAntiPiracyOperation</i>
<i>TypicalAction</i>	215	<i>ConductInterventionHumanitarianAssistanceOperation</i>
<i>TypicalAction</i>	217	<i>ConductNonCombatantEvacuationOperation</i>
<i>TypicalAction</i>	476	<i>CollectInformation</i>
<i>TypicalAction</i>	480	<i>ControlOrDisseminateInformation</i>
<i>TypicalAction</i>	482	<i>ConductBenignPublicInformationOperation</i>
<i>TypicalAction</i>	484	<i>ConductNegativeInformationOperation</i>

Table 7.3 Intervention organization SaF class

SaF role	ID	OE element
<i>OrgType</i>	104	<i>InterventionOrganization</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	2017	<i>IncreaseIntervenorOrganizations</i>
<i>OrgDecrease</i>	2018	<i>DecreaseIntervenorOrganizations</i>
<i>PeopleIncrease</i>	1824	<i>IncreaseIntervenorDiplomaticPersonnel</i>
<i>PeopleIncrease</i>	1891	<i>IncreaseIntervenorSupportPersonnel</i>
<i>PeopleDecrease</i>	1825	<i>DecreaseIntervenorDiplomaticPersonnel</i>
<i>PeopleDecrease</i>	1892	<i>DecreaseIntervenorSupportPersonnel</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	105	<i>KeyIntervenorDiplomaticPerson</i>
<i>RelatedPerson</i>	1890	<i>IntervenorSupportPerson</i>
<i>RelatedPerson</i>	2033	<i>IntervenorDiplomaticPerson</i>
<i>RelatedEnvironment</i>	10	<i>RelationshipWithIntervenors</i>
<i>RelatedEnvironment</i>	1954	<i>InterventionOrganizationEnvironment</i>
<i>TypicalAction</i>	13	<i>ProvideAdvisorsToGovtOfficials</i>
<i>TypicalAction</i>	27	<i>SupplyGovt</i>
<i>TypicalAction</i>	31	<i>EstablishStaffOrFundTransitionGovt</i>
<i>TypicalAction</i>	33	<i>EmployDiplomaticAction</i>
<i>TypicalAction</i>	49	<i>MediateNegotiateOrPersuadeConflictingParties</i>
<i>TypicalAction</i>	51	<i>MaintainComplianceWithPeaceAccords</i>
<i>TypicalAction</i>	53	<i>MonitorPowersharingArrangements</i>
<i>TypicalAction</i>	55	<i>TransferControlOfGovtFunctionsToHNOofficials</i>
<i>TypicalAction</i>	88	<i>ProvideAdvisorsToJudicialOrganizations</i>
<i>TypicalAction</i>	92	<i>MonitorHumanRightsPractice</i>
<i>TypicalAction</i>	94	<i>ConductWarCrimesInvestigation</i>
<i>TypicalAction</i>	207	<i>MitigatePoliticalOrSocialInstabilityOrIndividualUnrestAction</i>
<i>TypicalAction</i>	382	<i>PromoteCivicEducation</i>
<i>TypicalAction</i>	478	<i>EstablishLiaisonProgramsWithGovt</i>
<i>TypicalAction</i>	1788	<i>PromoteCivilControlOfSecuritySector</i>

assumes that only government organizations at the national level are represented; however, in more complex cases, provincial or other levels of government may also be represented. The 11 SaF classes that are required are defined as follows:

- The executive branch of the government is shown in Table 7.4.
- The legislative branch is shown in Table 7.5.
- The judicial branch is shown in Table 7.6.
- The bureaucracy is shown in Table 7.7.
- The military is shown in Table 7.8.

- The intelligence services are shown in Table 7.9.
- Law enforcement is shown in Table 7.10.
- First responders are shown in Table 7.11.
- The education organization is shown in Table 7.12.
- The healthcare organization is shown in Table 7.13.
- The social services organization is shown in Table 7.14.

Table 7.4 Executive branch SaF class

SaF role	ID	OE element
<i>OrgType</i>	3	<i>GovtDecisionAuthority</i>
<i>OrgType</i>	41	<i>GovtTypeOrganization</i>
<i>OrgType</i>	1887	<i>ExecutiveBranch</i>
<i>CreateOrg</i>	23	<i>CreateGovt</i>
<i>OrgIncrease</i>	2013	<i>IncreaseGovtOrganizations</i>
<i>OrgDecrease</i>	2014	<i>DecreaseGovtOrganizations</i>
<i>PeopleIncrease</i>	1882	<i>IncreaseGovtPersonnel</i>
<i>PeopleDecrease</i>	1883	<i>DecreaseGovtPersonnel</i>
<i>TrainPeople</i>	21	<i>TrainNewPoliticalLeaders</i>
<i>OtherImpactingAction</i>	13	<i>ProvideAdvisorsToGovtOfficials</i>
<i>OtherImpactingAction</i>	25	<i>ConductElections</i>
<i>OtherImpactingAction</i>	29	<i>ProduceConstitution</i>
<i>OtherImpactingAction</i>	35	<i>DestabilizeGovt</i>
<i>OtherImpactingAction</i>	1786	<i>ImproveExecutiveFunction</i>
<i>OtherImpactingAction</i>	1795	<i>DeLegitimizeHNGovt</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	1933	<i>KeyGovtExecutive</i>
<i>RelatedPerson</i>	1881	<i>GovtPerson</i>
<i>RelatedEnvironment</i>	4	<i>Governance</i>
<i>RelatedEnvironment</i>	9	<i>GovtDecisionMaking</i>
<i>RelatedEnvironment</i>	10	<i>RelationshipWithIntervenors</i>
<i>RelatedEnvironment</i>	106	<i>DomesticLegitimacyOfGovt</i>
<i>RelatedEnvironment</i>	107	<i>InternationalLegitimacyOfGovt</i>
<i>RelatedEnvironment</i>	108	<i>Government</i>
<i>RelatedEnvironment</i>	1944	<i>TypeGovt</i>
<i>RelatedEnvironment</i>	1945	<i>Constitution</i>
<i>RelatedEnvironment</i>	1948	<i>GeneralGovtPolicy</i>
<i>TypicalAction</i>	1804	<i>ConductExecutiveAction</i>

Table 7.5 Legislative branch SaF class

SaF role	ID	OE element
<i>OrgType</i>	41	<i>GovtTypeOrganization</i>
<i>OrgType</i>	1888	<i>LegislativeBranch</i>
<i>CreateOrg</i>	23	<i>CreateGovt</i>
<i>OrgIncrease</i>	2013	<i>IncreaseGovtOrganizations</i>
<i>OrgDecrease</i>	2014	<i>DecreaseGovtOrganizations</i>
<i>PeopleIncrease</i>	1882	<i>IncreaseGovtPersonnel</i>
<i>PeopleDecrease</i>	1883	<i>DecreaseGovtPersonnel</i>
<i>TrainPeople</i>	21	<i>TrainNewPoliticalLeaders</i>
<i>OtherImpactingAction</i>	13	<i>ProvideAdvisorsToGovtOfficials</i>
<i>OtherImpactingAction</i>	25	<i>ConductElections</i>
<i>OtherImpactingAction</i>	29	<i>ProduceConstitution</i>
<i>OtherImpactingAction</i>	35	<i>DestabilizeGovt</i>
<i>OtherImpactingAction</i>	1785	<i>ImproveLegislatureOrLegislativePractices</i>
<i>OtherImpactingAction</i>	1795	<i>DeLegitimizeHNGovt</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	1932	<i>KeyLegislator</i>
<i>RelatedPerson</i>	1881	<i>GovtPerson</i>
<i>RelatedEnvironment</i>	4	<i>Governance</i>
<i>RelatedEnvironment</i>	9	<i>GovtDecisionMaking</i>
<i>RelatedEnvironment</i>	10	<i>RelationshipWithIntervenors</i>
<i>RelatedEnvironment</i>	106	<i>DomesticLegitimacyOfGovt</i>
<i>RelatedEnvironment</i>	107	<i>InternationalLegitimacyOfGovt</i>
<i>RelatedEnvironment</i>	108	<i>Government</i>
<i>RelatedEnvironment</i>	1944	<i>TypeGovt</i>
<i>RelatedEnvironment</i>	1945	<i>Constitution</i>
<i>RelatedEnvironment</i>	1948	<i>GeneralGovtPolicy</i>
<i>TypicalAction</i>	1803	<i>ConductLegislativeAction</i>

Table 7.6 Judicial branch SaF class

SaF role	ID	OE element
<i>OrgType</i>	64	<i>JudicialBranch</i>
<i>CreateOrg</i>	23	<i>CreateGovt</i>
<i>OrgIncrease</i>	2015	<i>IncreaseJudicialOrganizations</i>
<i>OrgDecrease</i>	2016	<i>DecreaseJudicialOrganizations</i>
<i>PeopleIncrease</i>	1882	<i>IncreaseGovtPersonnel</i>
<i>PeopleDecrease</i>	1883	<i>DecreaseGovtPersonnel</i>
<i>TrainPeople</i>	15	<i>EducateGovtPersonnel</i>
<i>OtherImpactingAction</i>	25	<i>ConductElections</i>
<i>OtherImpactingAction</i>	29	<i>ProduceConstitution</i>
<i>OtherImpactingAction</i>	35	<i>DestabilizeGovt</i>
<i>OtherImpactingAction</i>	84	<i>ChangeThePenalSystem</i>

(continued)

Table 7.6 (continued)

SaF role	ID	OE element
<i>OtherImpactingAction</i>	86	<i>ChangeTheLegalSystem</i>
<i>OtherImpactingAction</i>	88	<i>ProvideAdvisorsToJudicialOrganizations</i>
<i>OtherImpactingAction</i>	1795	<i>DeLegitimizeHNGovt</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	1931	<i>KeyJudicialLeader</i>
<i>RelatedPerson</i>	1881	<i>GovtPerson</i>
<i>RelatedEnvironment</i>	10	<i>RelationshipWithIntervenors</i>
<i>RelatedEnvironment</i>	63	<i>LegalSystemTradition</i>
<i>RelatedEnvironment</i>	108	<i>Government</i>
<i>RelatedEnvironment</i>	1944	<i>TypeGovt</i>
<i>RelatedEnvironment</i>	1945	<i>Constitution</i>
<i>TypicalAction</i>	1802	<i>ConductJudicialAction</i>

Table 7.7 Bureaucracy SaF class

SaF role	ID	OE element
<i>OrgType</i>	1940	<i>GovtBureaucracyOrganization</i>
<i>CreateOrg</i>	23	<i>CreateGovt</i>
<i>OrgIncrease</i>	2011	<i>IncreaseBureaucracyOrganizations</i>
<i>OrgDecrease</i>	2012	<i>DecreaseBureaucracyOrganizations</i>
<i>PeopleIncrease</i>	1882	<i>IncreaseGovtPersonnel</i>
<i>PeopleDecrease</i>	1883	<i>DecreaseGovtPersonnel</i>
<i>TrainPeople</i>	15	<i>EducateGovtPersonnel</i>
<i>OtherImpactingAction</i>	375	<i>NegotiateWithBureaucraciesToGetRelief</i>
<i>OtherImpactingAction</i>	1792	<i>ProvideProgramOrPersonnelSupport</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	1928	<i>KeyBureaucrat</i>
<i>RelatedPerson</i>	1881	<i>GovtPerson</i>
<i>RelatedEnvironment</i>	10	<i>RelationshipWithIntervenors</i>
<i>RelatedEnvironment</i>	108	<i>Government</i>
<i>RelatedEnvironment</i>	1944	<i>TypeGovt</i>
<i>RelatedEnvironment</i>	1948	<i>GeneralGovtPolicy</i>
<i>RelatedEnvironment</i>	1956	<i>Bureaucracy</i>
<i>TypicalAction</i>	2067	<i>ProvideServices</i>

Table 7.8 Military SaF class

SaF role	ID	OE element
<i>OrgType</i>	145	<i>GovtMilitaryForceOrganization</i>
<i>CreateOrg</i>	153	<i>CreateOrReformOrMonitorMilitary</i>
<i>OrgIncrease</i>	2040	<i>IncreaseMilitaryOrganizations</i>

(continued)

Table 7.8 (continued)

SaF role	ID	OE element
<i>OrgDecrease</i>	2041	<i>DecreaseMilitaryOrganizations</i>
<i>PeopleIncrease</i>	1980	<i>IncreaseGovtMilitaryForcesPersonnel</i>
<i>PeopleDecrease</i>	1828	<i>DecreaseGovtMilitaryForcesPersonnel</i>
<i>TrainPeople</i>	155	<i>TrainMilitaryForces</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	142	<i>KeyMilitaryIndividual</i>
<i>RelatedPerson</i>	1930	<i>GovtMilitaryPerson</i>
<i>RelatedEnvironment</i>	70	<i>ConnectionBetweenLawEnforcementAndTheMilitary</i>
<i>RelatedEnvironment</i>	125	<i>ForeignConflict</i>
<i>RelatedEnvironment</i>	141	<i>CooperationBetweenGovtMilitaryAndIntervenors</i>
<i>RelatedEnvironment</i>	1801	<i>MilitaryOperationsEnvironment</i>
<i>RelatedEnvironment</i>	1944	<i>TypeGovt</i>
<i>RelatedEnvironment</i>	2024	<i>CivilDefensePlan</i>
<i>TypicalAction</i>	130	<i>ConductIrregularWarOperation</i>
<i>TypicalAction</i>	165	<i>ConductMilitaryExercise</i>
<i>TypicalAction</i>	2025	<i>ExecuteCivilDefensePlan</i>

Table 7.9 Intelligence service SaF class

SaF role	ID	OE element
<i>OrgType</i>	146	<i>IntelligenceServiceOrganization</i>
<i>CreateOrg</i>	159	<i>CreateOrReformOrMonitorIntelligenceServices</i>
<i>OrgIncrease</i>	2023	<i>IncreaseIntelligenceServicesOrganizations</i>
<i>OrgDecrease</i>	1829	<i>DecreaseIntelligenceServicesOrganizations</i>
<i>PeopleIncrease</i>	1981	<i>IncreaseIntelligenceServicesPersonnel</i>
<i>PeopleDecrease</i>	1880	<i>DecreaseIntelligenceServicePersonnel</i>
<i>TrainPeople</i>	161	<i>TrainIntelligenceServices</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	1936	<i>KeyIntelligenceServiceLeader</i>
<i>RelatedPerson</i>	1879	<i>IntelligenceServicePerson</i>
<i>RelatedEnvironment</i>	10	<i>RelationshipWithIntervenors</i>
<i>RelatedEnvironment</i>	1944	<i>TypeGovt</i>
<i>TypicalAction</i>	476	<i>CollectInformation</i>
<i>TypicalAction</i>	480	<i>ControlOrDisseminateInformation</i>
<i>TypicalAction</i>	482	<i>ConductBenignPublicInformationOperation</i>
<i>TypicalAction</i>	484	<i>ConductNegativeInformationOperation</i>

Table 7.10 Law enforcement organization SaF class

SaF role	ID	OE element
<i>OrgType</i>	65	<i>LawEnforcementOrganization</i>
<i>CreateOrg</i>	78	<i>RebuildOrMonitorLawEnforcementOrganizations</i>
<i>OrgIncrease</i>	2009	<i>IncreaseLawEnforcementOrganizations</i>

(continued)

Table 7.10 (continued)

SaF role	ID	OE element
<i>OrgDecrease</i>	2010	<i>DecreaseLawEnforcementOrganizations</i>
<i>PeopleIncrease</i>	2027	<i>IncreaseLawEnforcementPersonnel</i>
<i>PeopleDecrease</i>	1878	<i>DecreaseLawEnforcementPersonnel</i>
<i>TrainPeople</i>	80	<i>TrainLawEnforcementPersonnel</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	1927	<i>KeyLawEnforcementLeader</i>
<i>RelatedPerson</i>	1877	<i>LawEnforcementPerson</i>
<i>RelatedEnvironment</i>	70	<i>ConnectionBetweenLawEnforcementAndTheMilitary</i>
<i>RelatedEnvironment</i>	1944	<i>TypeGovt</i>
<i>TypicalAction</i>	76	<i>ConductPolicingOperation</i>
<i>TypicalAction</i>	1985	<i>RespondToCivilEmergencies</i>

Table 7.11 First responder organization SaF class

SaF role	ID	OE element
<i>OrgType</i>	5	<i>FirstResponderOrganization</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	2019	<i>IncreaseFirstResponderOrganizations</i>
<i>OrgDecrease</i>	2020	<i>DecreaseFirstResponderOrganizations</i>
<i>PeopleIncrease</i>	2026	<i>IncreaseFirstRespondersPersonnel</i>
<i>PeopleDecrease</i>	1816	<i>DecreaseFirstRespondersPersonnel</i>
<i>TrainPeople</i>	17	<i>TrainFirstResponders</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	1935	<i>KeyFirstResponderLeader</i>
<i>RelatedPerson</i>	1925	<i>FirstResponderPerson</i>
<i>RelatedEnvironment</i>		
<i>TypicalAction</i>	1985	<i>RespondToCivilEmergencies</i>

Table 7.12 Education organization SaF class

SaF role	ID	OE Element
<i>OrgType</i>	1938	<i>EducationOrganization</i>
<i>CreateOrg</i>	2004	<i>ChangeEducationPolicy</i>
<i>OrgIncrease</i>	2007	<i>IncreaseEducationOrganizations</i>
<i>OrgDecrease</i>	2008	<i>DecreaseEducationOrganizations</i>
<i>PeopleIncrease</i>	1984	<i>IncreaseEducators</i>
<i>PeopleDecrease</i>	1920	<i>DecreaseEducators</i>
<i>TrainPeople</i>	386	<i>TrainEducators</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	427	<i>GeneralPopulation</i>
<i>KeyPerson</i>	381	<i>KeyEducationIndividual</i>
<i>RelatedPerson</i>	1919	<i>Educator</i>

(continued)

Table 7.12 (continued)

SaF role	ID	OE Element
<i>RelatedEnvironment</i>	380	<i>JobRelatedEducationalSystem</i>
<i>TypicalAction</i>	389	<i>ProvideJobTraining</i>
<i>TypicalAction</i>	1977	<i>EducateStudents</i>

Table 7.13 Healthcare organization SaF class

SaF role	ID	OE element
<i>OrgType</i>	1937	<i>HealthcareOrganization</i>
<i>CreateOrg</i>	2005	<i>ChangeHealthcarePolicy</i>
<i>OrgIncrease</i>	1988	<i>IncreaseHealthcareOrganizations</i>
<i>OrgDecrease</i>	1989	<i>DecreaseHealthcareOrganizations</i>
<i>PeopleIncrease</i>	1978	<i>IncreaseHealthcarePersonnel</i>
<i>PeopleDecrease</i>	1979	<i>DecreaseHealthcarePersonnel</i>
<i>TrainPeople</i>	1977	<i>EducateStudents</i>
<i>OtherImpactingAction</i>	373	<i>PrepositionHumanitarianReliefStocks</i>
<i>OtherImpactingAction</i>	395	<i>ExperienceHealthEmergency</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	427	<i>GeneralPopulation</i>
<i>KeyPerson</i>	1934	<i>KeyHealthcareLeader</i>
<i>RelatedPerson</i>	1924	<i>HealthcarePerson</i>
<i>RelatedEnvironment</i>	121	<i>DeathAndInjuryOfCiviliansFromConflict</i>
<i>RelatedEnvironment</i>	122	<i>DeathAndInjuryOfCombatantsFromConflict</i>
<i>RelatedEnvironment</i>	392	<i>DeathAndIllnessFromDiseaseOtherHealthIssues</i>
<i>RelatedEnvironment</i>	394	<i>SatisfactionOfHealthRequirements</i>
<i>TypicalAction</i>	397	<i>ProvideMedicalTreatment</i>
<i>TypicalAction</i>	399	<i>SupportHealthcare</i>

Table 7.14 Social services organization SaF class

SaF role	ID	OE element
<i>OrgType</i>	8	<i>SocialServicesOrganization</i>
<i>CreateOrg</i>	421	<i>ProvideSocialProtectionProgram</i>
<i>CreateOrg</i>	1790	<i>AssistInCreatingSocialServices</i>
<i>OrgIncrease</i>	2052	<i>IncreaseSocialServicesOrganizations</i>
<i>OrgDecrease</i>	2053	<i>DecreaseSocialServicesOrganizations</i>
<i>PeopleIncrease</i>	1882	<i>IncreaseGovtPersonnel</i>
<i>PeopleDecrease</i>	1883	<i>DecreaseGovtPersonnel</i>
<i>TrainPeople</i>	1977	<i>EducateStudents</i>
<i>OtherImpactingAction</i>	305	<i>ChangeSocialSafetyNet</i>
<i>OtherImpactingAction</i>	375	<i>NegotiateWithBureaucraciesToGetRelief</i>
<i>RelatedPopulation</i>	427	<i>GeneralPopulation</i>
<i>KeyPerson</i>	1928	<i>KeyBureaucrat</i>
<i>RelatedPerson</i>	1881	<i>GovtPerson</i>
<i>RelatedEnvironment</i>	1950	<i>SocialServicesSystem</i>
<i>TypicalAction</i>	2067	<i>ProvideServices</i>

Other Forces

The Other Forces subcategory of SaF classes represents armed forces that are not part of the Host Nation government or of the intervention. In simple conflicts there may be at most one instantiation of each SaF class; however, more complex situations may require multiple instantiations. The six SaF classes that are required are defined as follows:

- An armed, regime-sponsored, non-military force is shown in Table 7.15.
- An armed paramilitary force is shown in Table 7.16.
- An armed private security force is shown in Table 7.17.
- An armed insurgent force is shown in Table 7.18.
- An armed terrorist force is shown in Table 7.19.
- An external force advocating conflict is shown in Table 7.20.

Table 7.15 Armed regime-sponsored non-military force SaF class

SaF role	ID	OE element
<i>OrgType</i>	147	<i>RegimeSponsoredNonMilitaryArmedForceOrganization</i>
<i>CreateOrg</i>	153	<i>CreateOrReformOrMonitorMilitary</i>
<i>OrgIncrease</i>	2042	<i>IncreaseRegimeSponsoredNonMilitaryArmedForceOrganizations</i>
<i>OrgDecrease</i>	2043	<i>DecreaseRegimeSponsoredNonMilitaryArmedForceOrganizations</i>
<i>PeopleIncrease</i>	1830	<i>IncreaseRegimeSponsoredNonMilitaryArmedForcesPersonnel</i>
<i>PeopleDecrease</i>	1831	<i>DecreaseRegimeSponsoredNonMilitaryArmedForcesPersonnel</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	190	<i>KeyNonGovtArmedOfficial</i>
<i>RelatedPerson</i>	1926	<i>NonGovtArmedIndividual</i>
<i>RelatedEnvironment</i>	1801	<i>MilitaryOperationsEnvironment</i>
<i>TypicalAction</i>	174	<i>ProvideSecurityAssistance</i>

Table 7.16 Paramilitary force SaF class

SaF role	ID	OE element
<i>OrgType</i>	194	<i>ParamilitaryForceOrganization</i>
<i>CreateOrg</i>	153	<i>CreateOrReformOrMonitorMilitary</i>
<i>OrgIncrease</i>	2044	<i>IncreaseParamilitaryOrganizations</i>
<i>OrgDecrease</i>	2045	<i>DecreaseParamilitaryOrganizations</i>
<i>PeopleIncrease</i>	1832	<i>IncreaseParamilitaryForcePersonnel</i>
<i>PeopleDecrease</i>	1833	<i>DecreaseParamilitaryForcePersonnel</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		

(continued)

Table 7.16 (continued)

SaF role	ID	OE element
<i>KeyPerson</i>	190	<i>KeyNonGovtArmedOfficial</i>
<i>RelatedPerson</i>	1926	<i>NonGovtArmedIndividual</i>
<i>RelatedEnvironment</i>	1801	<i>MilitaryOperationsEnvironment</i>
<i>TypicalAction</i>	174	<i>ProvideSecurityAssistance</i>

Table 7.17 Private security force SaF class

SaF role	ID	OE element
<i>OrgType</i>	195	<i>PrivateSecurityForceOrganization</i>
<i>CreateOrg</i>	153	<i>CreateOrReformOrMonitorMilitary</i>
<i>OrgIncrease</i>	2046	<i>IncreasePrivateSecurityOrganizations</i>
<i>OrgDecrease</i>	2047	<i>DecreasePrivateSecurityOrganizations</i>
<i>PeopleIncrease</i>	1834	<i>IncreasePrivateSecurityForcesPersonnel</i>
<i>PeopleDecrease</i>	1835	<i>DecreasePrivateSecurityForcesPersonnel</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	190	<i>KeyNonGovtArmedOfficial</i>
<i>RelatedPerson</i>	1926	<i>NonGovtArmedIndividual</i>
<i>RelatedEnvironment</i>	1801	<i>MilitaryOperationsEnvironment</i>
<i>TypicalAction</i>	174	<i>ProvideSecurityAssistance</i>

Table 7.18 Insurgent organization SaF class

SaF role	ID	OE element
<i>OrgType</i>	196	<i>InsurgentOrganization</i>
<i>CreateOrg</i>	153	<i>CreateOrReformOrMonitorMilitary</i>
<i>OrgIncrease</i>	2048	<i>IncreaseInsurgentOrganizations</i>
<i>OrgDecrease</i>	2049	<i>DecreaseInsurgentOrganizations</i>
<i>PeopleIncrease</i>	1838	<i>IncreaseInsurgentPersonnel</i>
<i>PeopleDecrease</i>	1839	<i>DecreaseInsurgentPersonnel</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1794	<i>DeLegitimizeInsurgents</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	190	<i>KeyNonGovtArmedOfficial</i>
<i>RelatedPerson</i>	1926	<i>NonGovtArmedIndividual</i>
<i>RelatedEnvironment</i>	1801	<i>MilitaryOperationsEnvironment</i>
<i>TypicalAction</i>	130	<i>ConductIrregularWarOperation</i>
<i>TypicalAction</i>	2039	<i>RecruitFundOrGainSupportByNonNationStateActor</i>

Table 7.19 Terrorist organization SaF class

SaF role	ID	OE element
<i>OrgType</i>	197	<i>TerroristOrganization</i>
<i>CreateOrg</i>	153	<i>CreateOrReformOrMonitorMilitary</i>
<i>OrgIncrease</i>	2050	<i>IncreaseTerroristOrganizations</i>
<i>OrgDecrease</i>	2051	<i>DecreaseTerroristOrganizations</i>
<i>PeopleIncrease</i>	1836	<i>IncreaseTerroristPersonnel</i>
<i>PeopleDecrease</i>	1837	<i>DecreaseTerroristPersonnel</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1793	<i>DeLegitimizeTerroristIdeology</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	190	<i>KeyNonGovtArmedOfficial</i>
<i>RelatedPerson</i>	1926	<i>NonGovtArmedIndividual</i>
<i>RelatedEnvironment</i>	1801	<i>MilitaryOperationsEnvironment</i>
<i>TypicalAction</i>	130	<i>ConductIrregularWarOperation</i>
<i>TypicalAction</i>	2039	<i>RecruitFundOrGainSupportByNonNationStateActor</i>

Table 7.20 External organization advocating conflict SaF class

SaF role	ID	OE element
<i>OrgType</i>	44	<i>ExternalForceOrganizationAdvocatingConflict</i>
<i>CreateOrg</i>	153	<i>CreateOrReformOrMonitorMilitary</i>
<i>OrgIncrease</i>	1821	<i>IncreaseExternalForceOrganizationsAdvocatingConflict</i>
<i>OrgDecrease</i>	1822	<i>DecreaseExternalForceOrganizationsAdvocatingConflict</i>
<i>PeopleIncrease</i>	1819	<i>IncreasePoliticalPopulation</i>
<i>PeopleDecrease</i>	1820	<i>DecreasePoliticalPopulation</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	43	<i>PoliticalPopulation</i>
<i>KeyPerson</i>	39	<i>KeyLeaderAdvocatingPeaceAndStability</i>
<i>KeyPerson</i>	40	<i>KeyLeaderAdvocatingConflictAndDissension</i>
<i>RelatedPerson</i>		
<i>RelatedEnvironment</i>	46	<i>OppositionPartyUseOfForce</i>
<i>RelatedEnvironment</i>	47	<i>FactionalDispute</i>
<i>RelatedEnvironment</i>	1801	<i>MilitaryOperationsEnvironment</i>
<i>TypicalAction</i>	130	<i>ConductIrregularWarOperation</i>
<i>TypicalAction</i>	2039	<i>RecruitFundOrGainSupportByNonNationStateActor</i>

Economic Organizations

The Economic Organizations subcategory of SaF classes represents businesses and other economic organizations. These organizations may be local to the Host Nation or may be external organizations operating in the Host Nation. In simple conflicts there may be at most one instantiation of each SaF class, representing all similar businesses; however, more complex situations may require multiple instantiations. The 15 SaF classes that are required are defined as follows:

- An agriculture business is represented in Table 7.21.
- A contractor business is represented in Table 7.22.
- An energy business is represented in Table 7.23.
- A financial services business is represented in Table 7.24.
- A fishing business is represented in Table 7.25.
- A manufacturing business is represented in Table 7.26.
- A media business is represented in Table 7.27.
- A mining business is represented in Table 7.28.
- A service business is represented in Table 7.29.
- A Cultural business is represented in Table 7.30.
- A timber business is represented in Table 7.31.
- A tourism business is represented in Table 7.32.
- A transportation business is represented in Table 7.33.
- A labor (worker) organization is represented in Table 7.34.
- A criminal organization is represented in Table 7.35.

Table 7.21 Agriculture business SaF class

SaF role	ID	OE element
<i>OrgType</i>	230	<i>AgricultureBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1921	<i>IncreaseAgricultureBusinesses</i>
<i>OrgDecrease</i>	1922	<i>DecreaseAgricultureBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	237	<i>SupportAgricultureDirectly</i>
<i>OtherImpactingAction</i>	241	<i>ChangeAgriculturalPolicy</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	231	<i>ArableLand</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	229	<i>ConductAgricultureOperation</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>

Table 7.22 Contractor business SaF class

SaF role	ID	OE element
<i>OrgType</i>	1939	<i>ContractorBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	2001	<i>IncreaseContractorBusinesses</i>
<i>OrgDecrease</i>	2002	<i>DecreaseContractorBusinesses</i>
<i>PeopleIncrease</i>	1885	<i>IncreaseContractorPersonnel</i>
<i>PeopleDecrease</i>	1886	<i>DecreaseContractorPersonnel</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	302	<i>CreatePublicWorksProgram</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	1889	<i>KeyContractorLeader</i>
<i>RelatedPerson</i>	1884	<i>ContractorPerson</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	371	<i>RebuildCivilianHousing</i>
<i>TypicalAction</i>	443	<i>RebuildReligiousFacility</i>
<i>TypicalAction</i>	501	<i>RebuildManufacturingInfrastructure</i>
<i>TypicalAction</i>	507	<i>RebuildAgricultureInfrastructureLivestock</i>
<i>TypicalAction</i>	513	<i>RebuildShopsOrCommercialInfrastructure</i>
<i>TypicalAction</i>	520	<i>RebuildInformationAndMediaInfrastructure</i>
<i>TypicalAction</i>	529	<i>RebuildSchoolOrEducationalInfrastructure</i>
<i>TypicalAction</i>	536	<i>RepairHealthcareInfrastructure</i>
<i>TypicalAction</i>	548	<i>RebuildElectricityProductionPlant</i>
<i>TypicalAction</i>	552	<i>RebuildElectricityDistributionInfrastructure</i>
<i>TypicalAction</i>	556	<i>RebuildExtractiveEnergyProductionInfrastructure</i>
<i>TypicalAction</i>	560	<i>RebuildExtractiveEnergyTransportationInfrastructure</i>
<i>TypicalAction</i>	576	<i>RebuildGovtInfrastructure</i>
<i>TypicalAction</i>	580	<i>RebuildMilitaryInfrastructure</i>
<i>TypicalAction</i>	588	<i>Rebuild_ReplaceMilitaryVehicle</i>
<i>TypicalAction</i>	619	<i>RebuildRoadInfrastructure</i>
<i>TypicalAction</i>	623	<i>RebuildRailroadInfrastructure</i>
<i>TypicalAction</i>	627	<i>RebuildBridgeOrTunnelInfrastructure</i>
<i>TypicalAction</i>	631	<i>RebuildSeaportInfrastructure</i>
<i>TypicalAction</i>	635	<i>RebuildAirportInfrastructure</i>
<i>TypicalAction</i>	639	<i>Rebuild_ReplaceVehicle</i>
<i>TypicalAction</i>	643	<i>RebuildWaterwaysInfrastructure</i>
<i>TypicalAction</i>	665	<i>RebuildWaterDistributionInfrastructure</i>
<i>TypicalAction</i>	669	<i>RebuildWaterOrSewageTreatmentFacilities</i>
<i>TypicalAction</i>	673	<i>RebuildDamInfrastructure</i>
<i>TypicalAction</i>	1791	<i>AssistInMISOrItsUse</i>
<i>TypicalAction</i>	1814	<i>BuildPrisonInfrastructure</i>
<i>TypicalAction</i>	1904	<i>RebuildMiningInfrastructure</i>
<i>TypicalAction</i>	1917	<i>RebuildCulturalInfrastructure</i>
<i>TypicalAction</i>	1991	<i>RebuildFinancialInfrastructure</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>

Table 7.23 Energy business SaF class

SaF role	ID	OE element
<i>OrgType</i>	259	<i>EnergyBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1840	<i>IncreaseEnergyBusinesses</i>
<i>OrgDecrease</i>	1841	<i>DecreaseEnergyBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	323	<i>ManageNaturalResources</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>OtherImpactingAction</i>	1994	<i>ChangeEnergyPolicy</i>
<i>OtherImpactingAction</i>	1995	<i>ChangeNaturalResourcesPolicy</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	258	<i>EnergySupplyAndDistribution</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>RelatedEnvironment</i>	322	<i>NaturalResourceMgmtEnvironment</i>
<i>RelatedEnvironment</i>	543	<i>GeneralEnergyInfrastructure</i>
<i>RelatedEnvironment</i>	767	<i>NaturalResource</i>
<i>TypicalAction</i>	260	<i>ImportEnergy</i>
<i>TypicalAction</i>	2003	<i>ConsumeNaturalResources</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>
<i>TypicalAction</i>	2065	<i>ProduceEnergy</i>

Table 7.24 Financial services business SaF class

SaF role	ID	OE element
<i>OrgType</i>	267	<i>FinancialServicesIndustryBusiness</i>
<i>CreateOrg</i>	270	<i>CreateInsuranceSystem</i>
<i>CreateOrg</i>	272	<i>CreateInterbanksPaymentSystem</i>
<i>CreateOrg</i>	278	<i>DevelopMicrofinanceSystem</i>
<i>CreateOrg</i>	280	<i>CreateStockMarket</i>
<i>OrgIncrease</i>	1842	<i>IncreaseFinancialServicesIndustryBusinesses</i>
<i>OrgDecrease</i>	1843	<i>DecreaseFinancialServicesIndustryBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	274	<i>CreateNewCurrency</i>
<i>OtherImpactingAction</i>	286	<i>ChangeGovtEconomicOrFinancialPolicy</i>
<i>OtherImpactingAction</i>	288	<i>AssistEconomicIntegrationOrCooperation</i>

(continued)

Table 7.24 (continued)

SaF role	ID	OE element
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	265	<i>MonetaryHealth</i>
<i>RelatedEnvironment</i>	266	<i>FinancialSystem</i>
<i>RelatedEnvironment</i>	268	<i>InsuranceSystem</i>
<i>RelatedEnvironment</i>	269	<i>ForeignAndLocalInvestment</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	318	<i>EconomicStatistics</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	276	<i>Seek_InhibitInvestmentCapital</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>
<i>TypicalAction</i>	2029	<i>ObtainOrDisperseFunds</i>

Table 7.25 Fishing business SaF class

SaF role	ID	OE element
<i>OrgType</i>	1906	<i>FishingBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1907	<i>IncreaseFishingBusinesses</i>
<i>OrgDecrease</i>	1908	<i>DecreaseFishingBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	269	<i>ForeignAndLocalInvestment</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>
<i>TypicalAction</i>	2066	<i>OperateFishingBusiness</i>

Table 7.26 Manufacturing business SaF class

SaF role	ID	OE element
<i>OrgType</i>	313	<i>ManufacturingBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1852	<i>IncreaseManufacturingBusinesses</i>
<i>OrgDecrease</i>	1853	<i>DecreaseManufacturingBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	325	<i>ProduceGoodsOrEquipment</i>
<i>TypicalAction</i>	327	<i>ConsumeGoodsOrEquipment</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>

Table 7.27 Media business SaF class

SaF role	ID	OE element
<i>OrgType</i>	312	<i>MediaBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1850	<i>IncreaseMediaBusinesses</i>
<i>OrgDecrease</i>	1851	<i>DecreaseMediaBusinesses</i>
<i>PeopleIncrease</i>	1895	<i>IncreaseInternationalOrLocalMediaPersonnel</i>
<i>PeopleDecrease</i>	1896	<i>DecreaseInternationalOrLocalMediaPersonnel</i>
<i>TrainPeople</i>	466	<i>SponsorMediaTrainingOrProfessionalization</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	464	<i>KeyMediaIndividual</i>
<i>KeyPerson</i>	1894	<i>KeyInternationalMediaLeader</i>
<i>RelatedPerson</i>	1893	<i>LocalOrInternationalMediaPerson</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>RelatedEnvironment</i>	460	<i>InformationAndEntertainment</i>
<i>RelatedEnvironment</i>	461	<i>PublicRecords_Transparency</i>
<i>RelatedEnvironment</i>	463	<i>FreedomOfDomesticMedia</i>
<i>RelatedEnvironment</i>	465	<i>FreedomOfInternationalMedia</i>
<i>TypicalAction</i>	476	<i>CollectInformation</i>
<i>TypicalAction</i>	480	<i>ControlOrDisseminateInformation</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>

Table 7.28 Mining business SaF class

SaF role	ID	OE element
<i>OrgType</i>	1900	<i>MiningBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1901	<i>IncreaseMiningBusinesses</i>
<i>OrgDecrease</i>	1902	<i>DecreaseMiningBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	325	<i>ProduceGoodsOrEquipment</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>

Table 7.29 Service business SaF class

SaF role	ID	OE element
<i>OrgType</i>	314	<i>ServiceBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1854	<i>IncreaseServiceBusinesses</i>
<i>OrgDecrease</i>	1855	<i>DecreaseServiceBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>
<i>TypicalAction</i>	2067	<i>ProvideServices</i>

Table 7.30 Cultural business SaF class

SaF role	ID	OE element
<i>OrgType</i>	1912	<i>CulturalBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1913	<i>IncreaseCulturalBusinesses</i>
<i>OrgDecrease</i>	1914	<i>DecreaseCulturalBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	1998	<i>ConductCulturalEvent</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>

Table 7.31 Timber business SaF class

SaF role	ID	OE element
<i>OrgType</i>	1909	<i>TimberBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1910	<i>IncreaseTimberBusinesses</i>
<i>OrgDecrease</i>	1911	<i>DecreaseTimberBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	325	<i>ProduceGoodsOrEquipment</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>

Table 7.32 Tourism business SaF class

SaF role	ID	OE element
<i>OrgType</i>	316	<i>TourismIndustryBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1858	<i>IncreaseTourismIndustryBusinesses</i>
<i>OrgDecrease</i>	1859	<i>DecreaseTourismIndustryBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>
<i>TypicalAction</i>	2067	<i>ProvideServices</i>

Table 7.33 Transportation business SaF class

SaF role	ID	OE element
<i>OrgType</i>	315	<i>TransportationBusiness</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1856	<i>IncreaseTransportationBusinesses</i>
<i>OrgDecrease</i>	1857	<i>DecreaseTransportationBusinesses</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	309	<i>KeyBusinessIndividual</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>RelatedEnvironment</i>	611	<i>GeneralTransportationInfrastructure</i>
<i>TypicalAction</i>	701	<i>WarehouseEquipmentOrMaterial</i>
<i>TypicalAction</i>	705	<i>MovePeopleEquipmentOrMaterialOnTheGround</i>
<i>TypicalAction</i>	707	<i>MovePeopleEquipmentOrMaterialThroughTheAir</i>
<i>TypicalAction</i>	709	<i>MovePeopleEquipmentOrMaterialOverTheWater</i>
<i>TypicalAction</i>	711	<i>MovePeopleEquipmentOrMaterialUnderTheWater</i>
<i>TypicalAction</i>	2028	<i>ConductBusinessManagement</i>

Table 7.34 Labor organization SaF class

SaF role	ID	OE element
<i>OrgType</i>	295	<i>WorkerOrganization</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1844	<i>IncreaseWorkerOrganizations</i>
<i>OrgDecrease</i>	1845	<i>DecreaseWorkerOrganizations</i>
<i>PeopleIncrease</i>	1860	<i>IncreaseWorkers</i>
<i>PeopleDecrease</i>	1861	<i>DecreaseWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1808	<i>ChangeWorkersJobStatus</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	2064	<i>WorkerPopulation</i>
<i>KeyPerson</i>	296	<i>KeyLaborLeader</i>
<i>RelatedPerson</i>	1797	<i>Worker</i>
<i>RelatedEnvironment</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>RelatedEnvironment</i>	297	<i>AvailabilityOfAcceptableJobs</i>
<i>RelatedEnvironment</i>	298	<i>Employment</i>
<i>RelatedEnvironment</i>	319	<i>GeneralEconomy</i>
<i>TypicalAction</i>	1992	<i>ConductLaborStrikes</i>
<i>TypicalAction</i>	2067	<i>ProvideServices</i>

Table 7.35 Criminal organization SaF Class

SaF role	ID	OE element
<i>OrgType</i>	247	<i>CriminalOrganization</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1999	<i>IncreaseCriminalOrganizations</i>
<i>OrgDecrease</i>	2000	<i>DecreaseCriminalOrganizations</i>
<i>PeopleIncrease</i>	1982	<i>IncreaseCriminalPopulation</i>
<i>PeopleDecrease</i>	1983	<i>DecreaseCriminalPopulation</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	246	<i>CriminalPopulation</i>
<i>KeyPerson</i>	248	<i>KeyCriminalLeader</i>
<i>RelatedPerson</i>		
<i>RelatedEnvironment</i>	62	<i>CrimeOverall</i>
<i>RelatedEnvironment</i>	66	<i>CorruptionInCulture</i>
<i>RelatedEnvironment</i>	67	<i>CorruptionInSocialServices</i>
<i>RelatedEnvironment</i>	68	<i>CorruptionInLawEnforcement</i>
<i>RelatedEnvironment</i>	69	<i>CorruptionInCentralAuthority</i>
<i>RelatedEnvironment</i>	198	<i>CorruptionInMilitary</i>
<i>RelatedEnvironment</i>	253	<i>BlackAndGrayMarket</i>
<i>RelatedEnvironment</i>	254	<i>CorruptionInBusiness</i>
<i>RelatedEnvironment</i>	1957	<i>CorruptionInLocalAndMidLevelAuthority</i>
<i>TypicalAction</i>	255	<i>EngageInCriminalOrCorruptAction</i>
<i>TypicalAction</i>	1784	<i>EngageInOrganizedOrGangRelatedCrime</i>

Other Organizations

The Other Organizations subcategory of SaF classes includes NGOs and factions. These organizations may be local to the Host Nation or may be external organizations operating there. In simple conflicts there may be at most one instantiation of each SaF class, representing all similar organizations; however, more complex situations may require multiple instantiations. The four SaF classes that are required are defined as follows:

- An NGO (for this purpose, “NGO” includes NGOs, IOs, and IGOs) is represented in Table 7.36.
- A social faction is represented in Table 7.37.
- A political faction is represented in Table 7.38.
- A religious faction is represented in Table 7.39.

Note that where the appropriate increase/decrease Actions are represented by a single change Action, the change Action is entered in both roles.

Table 7.36 NGO SaF class

SaF role	ID	OE element
<i>OrgType</i>	343	<i>NGOOrganization</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1862	<i>IncreaseNGOOrganizations</i>
<i>OrgDecrease</i>	1863	<i>DecreaseNGOOrganizations</i>
<i>PeopleIncrease</i>	1898	<i>IncreaseNGOWorkers</i>
<i>PeopleDecrease</i>	1899	<i>DecreaseNGOWorkers</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	367	<i>CoordinateNGOActivities</i>
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>		
<i>KeyPerson</i>	344	<i>KeyNGOIndividual</i>
<i>RelatedPerson</i>	1897	<i>NGOWorker</i>
<i>RelatedEnvironment</i>	352	<i>OverallImmediateNeedsOfThePeople</i>
<i>TypicalAction</i>	355	<i>DistributeFood</i>
<i>TypicalAction</i>	357	<i>DistributeWater</i>
<i>TypicalAction</i>	365	<i>DistributeDurableGoodsRelief</i>
<i>TypicalAction</i>	369	<i>ProvideTemporaryShelterHousingRefugeeCamps</i>
<i>TypicalAction</i>	384	<i>ProvideEducationSupplies</i>
<i>TypicalAction</i>	397	<i>ProvideMedicalTreatment</i>
<i>TypicalAction</i>	1990	<i>ProvideHealthcareSupplies</i>
<i>TypicalAction</i>	2035	<i>ProducePotableWater</i>

Table 7.37 Social faction SaF class

SaF role	ID	OE element
<i>OrgType</i>	430	<i>SocialFaction</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	2037	<i>ChangeSocialFactions</i>
<i>OrgDecrease</i>	2037	<i>ChangeSocialFactions</i>
<i>PeopleIncrease</i>	1874	<i>ChangeCulturalPopulation</i>
<i>PeopleDecrease</i>	1874	<i>ChangeCulturalPopulation</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	428	<i>CulturalPopulation</i>
<i>KeyPerson</i>	435	<i>KeySocialIndividual</i>
<i>RelatedPerson</i>		
<i>RelatedEnvironment</i>	47	<i>FactionalDispute</i>
<i>RelatedEnvironment</i>	48	<i>ResolutionOfDifferencesByCompetingGroups</i>
<i>RelatedEnvironment</i>	439	<i>ObservationOfCulturalAndSocialInterest</i>
<i>RelatedEnvironment</i>	440	<i>PerceptionByPeopleThatTheirInterestsAreRepresented</i>
<i>RelatedEnvironment</i>	441	<i>PerceptionByPeopleOfChangesInTheirSocialStatus</i>
<i>RelatedEnvironment</i>	442	<i>ToleranceByPeopleOfTheStatusQuo</i>
<i>RelatedEnvironment</i>	459	<i>PositiveAndNegativeImpactOfIntervention</i>
<i>RelatedEnvironment</i>	469	<i>OpinionOfPopulation</i>
<i>RelatedEnvironment</i>	470	<i>OpinionOfSignificantGroup</i>
<i>RelatedEnvironment</i>	471	<i>OpinionOfSignificantLeader</i>
<i>RelatedEnvironment</i>	472	<i>OpinionChangeOfPopulation</i>
<i>RelatedEnvironment</i>	473	<i>OpinionChangeOfSignificantGroup</i>
<i>RelatedEnvironment</i>	474	<i>OpinionChangeOfSignificantLeader</i>
<i>TypicalAction</i>		

Table 7.38 Political faction SaF class

SaF role	ID	OE element
<i>OrgType</i>	45	<i>PoliticalFaction</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	1823	<i>ChangePoliticalFactions</i>
<i>OrgDecrease</i>	1823	<i>ChangePoliticalFactions</i>
<i>PeopleIncrease</i>	1819	<i>IncreasePoliticalPopulation</i>
<i>PeopleDecrease</i>	1820	<i>DecreasePoliticalPopulation</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	43	<i>PoliticalPopulation</i>
<i>KeyPerson</i>	42	<i>KeyPoliticalIndividual</i>
<i>RelatedPerson</i>		
<i>RelatedEnvironment</i>	47	<i>FactionalDispute</i>

(continued)

Table 7.38 (continued)

SaF role	ID	OE element
<i>RelatedEnvironment</i>	48	<i>ResolutionOfDifferencesByCompetingGroups</i>
<i>RelatedEnvironment</i>	109	<i>CivilStabilityAndDurablePeace</i>
<i>RelatedEnvironment</i>	418	<i>PerceptionOfASafeAndSecureEnvironment</i>
<i>RelatedEnvironment</i>	459	<i>PositiveAndNegativeImpactOfIntervention</i>
<i>RelatedEnvironment</i>	469	<i>OpinionOfPopulation</i>
<i>RelatedEnvironment</i>	470	<i>OpinionOfSignificantGroup</i>
<i>RelatedEnvironment</i>	471	<i>OpinionOfSignificantLeader</i>
<i>RelatedEnvironment</i>	472	<i>OpinionChangeOfPopulation</i>
<i>RelatedEnvironment</i>	473	<i>OpinionChangeOfSignificantGroup</i>
<i>RelatedEnvironment</i>	474	<i>OpinionChangeOfSignificantLeader</i>
<i>TypicalAction</i>		

Table 7.39 Religious faction SaF class

SaF role	ID	OE element
<i>OrgType</i>	431	<i>ReligiousFaction</i>
<i>CreateOrg</i>		
<i>OrgIncrease</i>	2038	<i>ChangeReligiousFactions</i>
<i>OrgDecrease</i>	2038	<i>ChangeReligiousFactions</i>
<i>PeopleIncrease</i>	1875	<i>ChangeReligiousPopulation</i>
<i>PeopleDecrease</i>	1875	<i>ChangeReligiousPopulation</i>
<i>TrainPeople</i>		
<i>OtherImpactingAction</i>	1876	<i>ChangeKeyLeaderIdentities</i>
<i>RelatedPopulation</i>	429	<i>ReligiousPopulation</i>
<i>KeyPerson</i>	436	<i>KeySpiritualIndividual</i>
<i>RelatedPerson</i>		
<i>RelatedEnvironment</i>	47	<i>FactionalDispute</i>
<i>RelatedEnvironment</i>	48	<i>ResolutionOfDifferencesByCompetingGroups</i>
<i>RelatedEnvironment</i>	437	<i>SatisfactionOfPeoplesSpiritualNeeds</i>
<i>RelatedEnvironment</i>	459	<i>PositiveAndNegativeImpactOfIntervention</i>
<i>RelatedEnvironment</i>	469	<i>OpinionOfPopulation</i>
<i>RelatedEnvironment</i>	470	<i>OpinionOfSignificantGroup</i>
<i>RelatedEnvironment</i>	471	<i>OpinionOfSignificantLeader</i>
<i>RelatedEnvironment</i>	472	<i>OpinionChangeOfPopulation</i>
<i>RelatedEnvironment</i>	473	<i>OpinionChangeOfSignificantGroup</i>
<i>RelatedEnvironment</i>	474	<i>OpinionChangeOfSignificantLeader</i>
<i>TypicalAction</i>		

Population-Oriented SaF Classes

The Population-Oriented SaF class category has only one subcategory: population. (The subcategory exists because the structure requires the symmetry.)

Population

The Population subcategory of SaF classes includes demobilized armed forces, four kinds of displaced persons, and four larger population groups. In simple conflicts there may be at most one instantiation of each SaF class; however, more complex situations may require multiple instantiations. For example, it may be useful to instantiate separate Sunni and Shia Muslim religious populations. The nine SaF classes that are required are defined as follows:

- A demobilized armed force population is represented in Table 7.40.
- Table 7.41 represents four displaced persons classes:
 - A migrant population,
 - An IDP population,
 - A refugee population, and
 - An expatriate population.
- Table 7.42 represents four “larger population” classes:
 - The general population,
 - A cultural population,
 - A political population, and
 - A religious population.

Table 7.40 Demobilized armed force SaF class

SaF role	ID	OE element
<i>Population</i>	148	<i>DemobilizedArmedForce</i>
<i>PopulationIncrease</i>	151	<i>DemobilizeReduceReintegrateMilitaryOrParamilitaryUnits</i>
<i>PopulationDecrease</i>	299	<i>ProvideJobTrainingOrEmploymentForDischargedMilitaryPersonnel</i>
<i>TrainPopulation</i>	299	<i>ProvideJobTrainingOrEmploymentForDischargedMilitaryPersonnel</i>
<i>OtherImpactingAction</i>		
<i>RelatedEnvironment</i>		

Table 7.41 Displaced persons SaF classes

SaF role	ID	OE element
Migrant population		
<i>Population</i>	403	<i>MigrantPopulation</i>
<i>PopulationIncrease</i>	1866	<i>IncreaseMigrants</i>
<i>PopulationDecrease</i>	1867	<i>DecreaseMigrants</i>
<i>TrainPopulation</i>		
<i>OtherImpactingAction</i>	413	<i>ResettlePeople</i>
<i>OtherImpactingAction</i>	415	<i>Reduce_IncreaseLikelihoodOfPopulationMovements</i>
<i>OtherImpactingAction</i>	419	<i>ProvideRefugeeCampSecurity</i>
<i>RelatedEnvironment</i>	404	<i>StressMigration</i>
<i>RelatedEnvironment</i>	409	<i>FreedomOfMovement</i>
<i>RelatedEnvironment</i>	410	<i>ForcedPopulationMovement</i>
<i>RelatedEnvironment</i>	412	<i>ChangeInPopulationComposition</i>
<i>RelatedEnvironment</i>	1973	<i>SecurityInRefugeeCamp</i>
IDP population		
<i>Population</i>	402	<i>InternallyDisplacedPopulation</i>
<i>PopulationIncrease</i>	1864	<i>IncreaseIDPs</i>
<i>PopulationDecrease</i>	1865	<i>DecreaseIDPs</i>
<i>TrainPopulation</i>		
<i>OtherImpactingAction</i>	413	<i>ResettlePeople</i>
<i>OtherImpactingAction</i>	415	<i>Reduce_IncreaseLikelihoodOfPopulationMovements</i>
<i>OtherImpactingAction</i>	419	<i>ProvideRefugeeCampSecurity</i>
<i>RelatedEnvironment</i>	404	<i>StressMigration</i>
<i>RelatedEnvironment</i>	409	<i>FreedomOfMovement</i>
<i>RelatedEnvironment</i>	410	<i>ForcedPopulationMovement</i>
<i>RelatedEnvironment</i>	412	<i>ChangeInPopulationComposition</i>
<i>RelatedEnvironment</i>	1973	<i>SecurityInRefugeeCamp</i>
Refugee population		
<i>Population</i>	406	<i>RefugeePopulation</i>
<i>PopulationIncrease</i>	1868	<i>IncreaseRefugees</i>
<i>PopulationDecrease</i>	1869	<i>DecreaseRefugees</i>
<i>TrainPopulation</i>		
<i>OtherImpactingAction</i>	413	<i>ResettlePeople</i>
<i>OtherImpactingAction</i>	415	<i>Reduce_IncreaseLikelihoodOfPopulationMovements</i>
<i>OtherImpactingAction</i>	419	<i>ProvideRefugeeCampSecurity</i>
<i>RelatedEnvironment</i>	404	<i>StressMigration</i>
<i>RelatedEnvironment</i>	409	<i>FreedomOfMovement</i>
<i>RelatedEnvironment</i>	410	<i>ForcedPopulationMovement</i>
<i>RelatedEnvironment</i>	412	<i>ChangeInPopulationComposition</i>
<i>RelatedEnvironment</i>	1973	<i>SecurityInRefugeeCamp</i>
Expatriate population		
<i>Population</i>	407	<i>ExpatriatePopulation</i>
<i>PopulationIncrease</i>	1870	<i>IncreaseExpatriates</i>

(continued)

Table 7.41 (continued)

SaF role	ID	OE element
<i>PopulationDecrease</i>	1871	<i>DecreaseExpatriates</i>
<i>TrainPopulation</i>		
<i>OtherImpactingAction</i>	415	<i>Reduce_IncreaseLikelihoodOfPopulationMovements</i>
<i>OtherImpactingAction</i>	419	<i>ProvideRefugeeCampSecurity</i>
<i>RelatedEnvironment</i>	408	<i>ReturnOfExpatriates</i>
<i>RelatedEnvironment</i>	409	<i>FreedomOfMovement</i>
<i>RelatedEnvironment</i>	410	<i>ForcedPopulationMovement</i>
<i>RelatedEnvironment</i>	412	<i>ChangeInPopulationComposition</i>
<i>RelatedEnvironment</i>	1973	<i>SecurityInRefugeeCamp</i>

Table 7.42 Larger population SaF classes

SaF role	ID	OE element
General population		
<i>Population</i>	427	<i>GeneralPopulation</i>
<i>PopulationIncrease</i>	1872	<i>IncreaseGeneralPopulation</i>
<i>PopulationDecrease</i>	1873	<i>DecreaseGeneralPopulation</i>
<i>TrainPopulation</i>		
<i>OtherImpactingAction</i>		
<i>RelatedEnvironment</i>		
Cultural population		
<i>Population</i>	428	<i>CulturalPopulation</i>
<i>PopulationIncrease</i>	1874	<i>ChangeCulturalPopulation</i>
<i>PopulationDecrease</i>	1874	<i>ChangeCulturalPopulation</i>
<i>TrainPopulation</i>		
<i>OtherImpactingAction</i>		
<i>RelatedEnvironment</i>	412	<i>ChangeInPopulationComposition</i>
Political population		
<i>Population</i>	43	<i>PoliticalPopulation</i>
<i>PopulationIncrease</i>	1819	<i>IncreasePoliticalPopulation</i>
<i>PopulationDecrease</i>	1820	<i>DecreasePoliticalPopulation</i>
<i>TrainPopulation</i>		
<i>OtherImpactingAction</i>	1823	<i>ChangePoliticalFactions</i>
<i>RelatedEnvironment</i>	412	<i>ChangeInPopulationComposition</i>
Religious population		
<i>Population</i>	429	<i>ReligiousPopulation</i>
<i>PopulationIncrease</i>	1875	<i>ChangeReligiousPopulation</i>
<i>PopulationDecrease</i>	1875	<i>ChangeReligiousPopulation</i>
<i>TrainPopulation</i>		
<i>OtherImpactingAction</i>	2038	<i>ChangeReligiousFactions</i>
<i>RelatedEnvironment</i>	412	<i>ChangeInPopulationComposition</i>

Environment-Oriented SaF Classes

The Environment-oriented SaF class category has two subcategories: infrastructure and other items.

Infrastructure

The Infrastructure subcategory of SaF classes includes two kinds of commerce infrastructure, seven kinds of transportation infrastructure, four kinds of energy infrastructure, three kinds of water infrastructure, four kinds of government infrastructure, eight kinds of business infrastructure, and five kinds of social infrastructure. In simple conflicts there may be at most one instantiation of each SaF class; however, more complex situations may require multiple instantiations. The 33 SaF classes that are required are defined as follows:

- Table 7.43 represents two commercial infrastructure classes:
 - Commerce sector infrastructure and
 - Market infrastructure.
- Table 7.44 represents seven transportation infrastructure classes:
 - Airport infrastructure,
 - Bridge and tunnel infrastructure,
 - Railroad infrastructure,
 - Road infrastructure,
 - Seaport infrastructure,
 - Vehicles infrastructure, and
 - Waterways infrastructure.
- Table 7.45 represents four energy infrastructure classes:
 - Extractive energy production infrastructure,
 - Extractive energy transportation infrastructure,
 - Electricity production infrastructure, and
 - Electricity distribution infrastructure.
- Table 7.46 represents three water infrastructure classes:
 - Dam infrastructure,
 - Water and sewage systems infrastructure, and
 - Water distribution infrastructure.
- Table 7.47 represents four government-related infrastructure classes:
 - Government infrastructure,
 - Prison infrastructure,

- Military infrastructure, and
- Military vehicles infrastructure.
- Table 7.48 represents eight business infrastructure classes:
 - Agriculture infrastructure,
 - Financial infrastructure,
 - Manufacturing infrastructure,
 - Media infrastructure,
 - Business and government computer infrastructure,
 - Mining infrastructure,
 - Shops and commercial infrastructure, and
 - Cultural infrastructure.
- Table 7.49 represents five social infrastructure classes:
 - Civilian housing infrastructure,
 - Temporary shelter infrastructure,
 - Education infrastructure,
 - Healthcare infrastructure, and
 - Religious infrastructure.

Table 7.43 Commerce infrastructure SaF classes

SaF role	ID	OE element
Commerce sector		
<i>Item</i>	311	<i>CommercialSector</i>
<i>Item</i>	317	<i>CriticalIndustries</i>
<i>Item</i>	320	<i>GeneralInfrastructure</i>
<i>Item</i>	321	<i>EconomicFoundation</i>
<i>Item</i>	500	<i>CommercialEquipment</i>
<i>IncreaseItem</i>	1848	<i>IncreaseCommercialSector</i>
<i>DecreaseItem</i>	1849	<i>DecreaseCommercialSector</i>
Markets		
<i>Item</i>	310	<i>Market</i>
<i>IncreaseItem</i>	1846	<i>IncreaseMarkets</i>
<i>DecreaseItem</i>	1847	<i>DecreaseMarkets</i>

Table 7.44 Transportation infrastructure SaF classes

SaF role	ID	OE element
Airports		
<i>Item</i>	617	<i>AirportInfrastructure</i>
<i>IncreaseItem</i>	635	<i>RebuildAirportInfrastructure</i>
<i>DecreaseItem</i>	655	<i>DamageAirportInfrastructure</i>
Bridges and tunnels		
<i>Item</i>	614	<i>BridgeAndTunnelInfrastructure</i>
<i>IncreaseItem</i>	627	<i>RebuildBridgeOrTunnelInfrastructure</i>

Table 7.44 (continued)

SaF role	ID	OE element
<i>DecreaseItem</i>	651	<i>DamageBridgeOrTunnelInfrastructure</i>
Railroads		
<i>Item</i>	613	<i>RailroadInfrastructure</i>
<i>IncreaseItem</i>	623	<i>RebuildRailroadInfrastructure</i>
<i>DecreaseItem</i>	649	<i>DamageRailroadInfrastructure</i>
Roads		
<i>Item</i>	612	<i>RoadInfrastructure</i>
<i>IncreaseItem</i>	619	<i>RebuildRoadInfrastructure</i>
<i>DecreaseItem</i>	647	<i>DamageRoadInfrastructure</i>
Seaports		
<i>Item</i>	616	<i>SeaportInfrastructure</i>
<i>IncreaseItem</i>	631	<i>RebuildSeaportInfrastructure</i>
<i>DecreaseItem</i>	653	<i>DamageSeaportInfrastructure</i>
Non-military vehicles		
<i>Item</i>	618	<i>VehicleNonMilitary</i>
<i>IncreaseItem</i>	639	<i>Rebuild_ReplaceVehicle</i>
<i>DecreaseItem</i>	657	<i>DamageVehicle</i>
Waterways		
<i>Item</i>	615	<i>WaterwaysInfrastructure</i>
<i>IncreaseItem</i>	643	<i>RebuildWaterwaysInfrastructure</i>
<i>DecreaseItem</i>	659	<i>DamageWaterwaysInfrastructure</i>

Table 7.45 Energy infrastructure SaF classes

SaF role	ID	OE element
Extractive energy production		
<i>Item</i>	546	<i>ExtractiveEnergyProductionInfrastructure</i>
<i>IncreaseItem</i>	556	<i>RebuildExtractiveEnergyProductionInfrastructure</i>
<i>DecreaseItem</i>	568	<i>DamageExtractiveEnergyProductionInfrastructure</i>
Extractive energy transportation		
<i>Item</i>	547	<i>ExtractiveEnergyTransportationInfrastructure</i>
<i>IncreaseItem</i>	560	<i>RebuildExtractiveEnergyTransportationInfrastructure</i>
<i>DecreaseItem</i>	570	<i>DamageExtractiveEnergyTransportationInfrastructure</i>
Electricity production		
<i>Item</i>	544	<i>ElectricityProductionPlant</i>
<i>IncreaseItem</i>	548	<i>RebuildElectricityProductionPlant</i>
<i>DecreaseItem</i>	564	<i>DamageElectricityProductionPlant</i>
Electricity distribution		
<i>Item</i>	545	<i>ElectricityDistributionInfrastructure</i>
<i>IncreaseItem</i>	552	<i>RebuildElectricityDistributionInfrastructure</i>
<i>DecreaseItem</i>	566	<i>DamageElectricityDistributionInfrastructure</i>

Table 7.46 Water infrastructure SaF classes

SaF role	ID	OE element
Dams		
<i>Item</i>	664	<i>DamInfrastructure</i>
<i>IncreaseItem</i>	673	<i>RebuildDamInfrastructure</i>
<i>DecreaseItem</i>	681	<i>DamageDamInfrastructure</i>
Water and sewage treatment plants		
<i>Item</i>	663	<i>WaterAndSewageTreatmentInfrastructure</i>
<i>IncreaseItem</i>	669	<i>RebuildWaterOrSewageTreatmentFacilities</i>
<i>DecreaseItem</i>	679	<i>DamageWaterOrSewageTreatmentFacilities</i>
Water distribution systems		
<i>Item</i>	662	<i>WaterDistributionInfrastructure</i>
<i>IncreaseItem</i>	665	<i>RebuildWaterDistributionInfrastructure</i>
<i>DecreaseItem</i>	677	<i>DamageWaterDistributionInfrastructure</i>

Table 7.47 Government infrastructure SaF classes

SaF role	ID	OE element
Government infrastructure		
<i>Item</i>	573	<i>GovtInfrastructure</i>
<i>IncreaseItem</i>	576	<i>RebuildGovtInfrastructure</i>
<i>DecreaseItem</i>	584	<i>DamageGovtInfrastructure</i>
Prison infrastructure		
<i>Item</i>	72	<i>PrisonStructure</i>
<i>IncreaseItem</i>	1814	<i>BuildPrisonInfrastructure</i>
<i>DecreaseItem</i>	1815	<i>DamagePrisonInfrastructure</i>
Military infrastructure		
<i>Item</i>	574	<i>MilitaryInfrastructure</i>
<i>IncreaseItem</i>	580	<i>RebuildMilitaryInfrastructure</i>
<i>DecreaseItem</i>	586	<i>DamageMilitaryInfrastructure</i>
Military vehicles		
<i>Item</i>	575	<i>MilitaryVehicle</i>
<i>IncreaseItem</i>	588	<i>Rebuild_ReplaceMilitaryVehicle</i>
<i>DecreaseItem</i>	592	<i>DamageMilitaryVehicle</i>

Table 7.48 Business infrastructure SaF classes

SaF role	ID	OE element
Agriculture infrastructure		
<i>Item</i>	498	<i>AgricultureStructure</i>
<i>Item</i>	499	<i>LivestockAndAgricultureEquipment</i>
<i>IncreaseItem</i>	507	<i>RebuildAgricultureInfrastructureLivestock</i>
<i>DecreaseItem</i>	511	<i>DamageAgricultureInfrastructureLivestock</i>
Financial infrastructure		
<i>Item</i>	1941	<i>FinancialInfrastructure</i>

(continued)

Table 7.48 (continued)

SaF role	ID	OE element
<i>IncreaseItem</i>	1991	<i>RebuildFinancialInfrastructure</i>
<i>DecreaseItem</i>	331	<i>DamageFinancialInfrastructure</i>
Manufacturing infrastructure		
<i>Item</i>	497	<i>ManufacturingStructure</i>
<i>IncreaseItem</i>	501	<i>RebuildManufacturingInfrastructure</i>
<i>DecreaseItem</i>	505	<i>DamageManufacturingInfrastructure</i>
Media infrastructure		
<i>Item</i>	519	<i>GeneralInformationAndMediaInfrastructure</i>
<i>IncreaseItem</i>	520	<i>RebuildInformationAndMediaInfrastructure</i>
<i>DecreaseItem</i>	524	<i>DamageInformationAndMediaInfrastructure</i>
Computer infrastructure		
<i>Item</i>	2057	<i>MIS</i>
<i>IncreaseItem</i>	1791	<i>AssistInMISOrItsUse</i>
<i>DecreaseItem</i>	2058	<i>DamageMIS</i>
Mining infrastructure		
<i>Item</i>	1903	<i>MiningInfrastructure</i>
<i>IncreaseItem</i>	1904	<i>RebuildMiningInfrastructure</i>
<i>DecreaseItem</i>	1905	<i>DamageMiningInfrastructure</i>
Shops and commercial infrastructure		
<i>Item</i>	496	<i>ShopAndCommercialStructure</i>
<i>IncreaseItem</i>	513	<i>RebuildShopsOrCommercialInfrastructure</i>
<i>DecreaseItem</i>	517	<i>DamageShopsOrCommercialInfrastructure</i>
Cultural infrastructure		
<i>Item</i>	1916	<i>CulturalInfrastructure</i>
<i>IncreaseItem</i>	1917	<i>RebuildCulturalInfrastructure</i>
<i>DecreaseItem</i>	1918	<i>DamageCulturalInfrastructure</i>

Table 7.49 Social infrastructure SaF classes

SaF role	ID	OE element
Civilian housing infrastructure		
<i>Item</i>	350	<i>CivilianHousing</i>
<i>IncreaseItem</i>	371	<i>RebuildCivilianHousing</i>
<i>DecreaseItem</i>	377	<i>DamageCivilianHousing</i>
Temporary shelter infrastructure		
<i>Item</i>	405	<i>IDP_RefugeeCampAndTemporaryShelter</i>
<i>IncreaseItem</i>	369	<i>ProvideTemporaryShelterHousingRefugeeCamps</i>
<i>DecreaseItem</i>	2034	<i>DamageRefugeeCampOrTemporaryShelter</i>
Education infrastructure		
<i>Item</i>	528	<i>GeneralEducationInfrastructure</i>
<i>IncreaseItem</i>	529	<i>RebuildSchoolOrEducationalInfrastructure</i>
<i>DecreaseItem</i>	533	<i>DamageSchoolOrEducationalInfrastructure</i>

(continued)

Table 7.49 (continued)

SaF role	ID	OE element
Healthcare infrastructure		
<i>Item</i>	535	<i>GeneralHealthcareInfrastructure</i>
<i>IncreaseItem</i>	536	<i>RepairHealthcareInfrastructure</i>
<i>DecreaseItem</i>	540	<i>DamageHealthcareInfrastructure</i>
Religious infrastructure		
<i>Item</i>	438	<i>ReligiousBuilding</i>
<i>IncreaseItem</i>	443	<i>RebuildReligiousFacility</i>
<i>DecreaseItem</i>	445	<i>DamageReligiousFacility</i>

Other Items

The Other Items subcategory of SaF classes includes four kinds of crime-related items, six kinds of supply-related items, three kinds of miscellaneous items, and three kinds of civil items. In simple conflicts there may be at most one instantiation of each SaF class; however, more complex situations may require multiple instantiations. The 16 SaF classes that are required are defined as follows:

- Table 7.50 represents four crime-related classes:
 - Corruption,
 - Drug crime,
 - General crime, and
 - Non-state Actor recruiting, funding, and support.
- Table 7.51 represents six supply-related classes:
 - Goods and equipment supply,
 - Education supplies,
 - Healthcare supplies,
 - Potable water supply,
 - Food supply, and
 - Natural resources supply.
- Table 7.52 represents three miscellaneous classes:
 - Waste,
 - Funds, and
 - C4I.
- Table 7.53 represents three civil item classes:
 - Sense of community,
 - Government policies, and
 - Civil disturbance.

Table 7.50 Crime-related SaF classes

SaF role	ID	OE element
Corruption		
<i>Item</i>	66	<i>CorruptionInCulture</i>
<i>Item</i>	67	<i>CorruptionInSocialServices</i>
<i>Item</i>	68	<i>CorruptionInLawEnforcement</i>
<i>Item</i>	69	<i>CorruptionInCentralAuthority</i>
<i>Item</i>	198	<i>CorruptionInMilitary</i>
<i>Item</i>	254	<i>CorruptionInBusiness</i>
<i>Item</i>	1957	<i>CorruptionInLocalAndMidLevelAuthority</i>
<i>IncreaseItem</i>	255	<i>EngageInCriminalOrCorruptAction</i>
<i>DecreaseItem</i>	76	<i>ConductPolicingOperation</i>
<i>DecreaseItem</i>	90	<i>MonitorOrReportOnCorruptionByGovtOfficials</i>
<i>DecreaseItem</i>	1787	<i>PromoteAntiCorruptionReforms</i>
Drug crime		
<i>Item</i>	60	<i>CrimeDrug</i>
<i>Item</i>	249	<i>DrugUse</i>
<i>Item</i>	250	<i>DrugCultivation</i>
<i>Item</i>	251	<i>DrugManufacture</i>
<i>Item</i>	252	<i>DrugTransshipment</i>
<i>IncreaseItem</i>	255	<i>EngageInCriminalOrCorruptAction</i>
<i>IncreaseItem</i>	1777	<i>ConductDrugTrade</i>
<i>DecreaseItem</i>	76	<i>ConductPolicingOperation</i>
<i>DecreaseItem</i>	243	<i>SupportReductionOfDrugCrops</i>
<i>DecreaseItem</i>	1776	<i>InterdictDrugs</i>
<i>DecreaseItem</i>	1778	<i>ReduceDrugDemand</i>
General crime		
<i>Item</i>	58	<i>CrimeCommon</i>
<i>Item</i>	61	<i>CrimeOrganized</i>
<i>Item</i>	62	<i>CrimeOverall</i>
<i>IncreaseItem</i>	98	<i>Extort_SuppressPopulation_Opposition</i>
<i>IncreaseItem</i>	100	<i>ConductExtrajudicialAction</i>
<i>IncreaseItem</i>	255	<i>EngageInCriminalOrCorruptAction</i>
<i>IncreaseItem</i>	1781	<i>ConductFinancialCrimeOrMoneyLaundering</i>
<i>IncreaseItem</i>	1782	<i>ConductIntellectualPropertyTheft</i>
<i>IncreaseItem</i>	1784	<i>EngageInOrganizedOrGangRelatedCrime</i>
<i>DecreaseItem</i>	76	<i>ConductPolicingOperation</i>
<i>DecreaseItem</i>	423	<i>ProvideAnti_ConductTraffickingInPersons</i>
<i>DecreaseItem</i>	1779	<i>ReduceFinancialCrimesOrMoneyLaundering</i>
<i>DecreaseItem</i>	1780	<i>ReduceIntellectualPropertyTheft</i>
<i>DecreaseItem</i>	1783	<i>ReduceOrganizedOrGangRelatedCrime</i>
Non-state actor recruiting, funding, and support		
<i>Item</i>	191	<i>NonNationStateActorFunding</i>
<i>Item</i>	192	<i>NonNationStateActorRecruiting</i>

(continued)

Table 7.50 (continued)

SaF role	ID	OE element
<i>Item</i>	193	<i>NonNationStateActorSupport</i>
<i>IncreaseItem</i>	2039	<i>RecruitFundOrGainSupportByNonNationStateActor</i>
<i>DecreaseItem</i>	76	<i>ConductPolicingOperation</i>
<i>DecreaseItem</i>	201	<i>IDOrInterdictFundingOfNonNationStateActor</i>
<i>DecreaseItem</i>	203	<i>IDInderdictOrInterruptRecruitmentByNonNationStateActor</i>
<i>DecreaseItem</i>	205	<i>IDFinancialInstitutionalOrLocalSupportForNonNationStateActor</i>

Table 7.51 Supply-related SaF classes

SaF role	ID	OE element
Goods and equipment supply		
<i>Item</i>	1923	<i>GoodsAndEquipment</i>
<i>IncreaseItem</i>	325	<i>ProduceGoodsOrEquipment</i>
<i>IncreaseItem</i>	329	<i>ParticipateDirectlyInEconomy</i>
<i>IncreaseItem</i>	699	<i>AcquireEquipmentOrMaterial</i>
<i>IncreaseItem</i>	1997	<i>ConductTradeInGoodsOrServices</i>
<i>DecreaseItem</i>	327	<i>ConsumeGoodsOrEquipment</i>
<i>DecreaseItem</i>	329	<i>ParticipateDirectlyInEconomy</i>
<i>DecreaseItem</i>	703	<i>DistributeEquipmentOrMaterial</i>
<i>DecreaseItem</i>	1997	<i>ConductTradeInGoodsOrServices</i>
Education supplies		
<i>Item</i>	1943	<i>EducationSupplies</i>
<i>IncreaseItem</i>	384	<i>ProvideEducationSupplies</i>
<i>DecreaseItem</i>	327	<i>ConsumeGoodsOrEquipment</i>
Healthcare supplies		
<i>Item</i>	1942	<i>HealthcareSupplies</i>
<i>IncreaseItem</i>	1990	<i>ProvideHealthcareSupplies</i>
<i>DecreaseItem</i>	327	<i>ConsumeGoodsOrEquipment</i>
Potable water supply		
<i>Item</i>	346	<i>PotableWaterSupply</i>
<i>IncreaseItem</i>	2035	<i>ProducePotableWater</i>
<i>DecreaseItem</i>	357	<i>DistributeWater</i>
Food supply		
<i>Item</i>	345	<i>FoodSupply</i>
<i>IncreaseItem</i>	229	<i>ConductAgricultureOperation</i>
<i>IncreaseItem</i>	237	<i>SupportAgricultureDirectly</i>
<i>IncreaseItem</i>	353	<i>ImportFood</i>
<i>DecreaseItem</i>	235	<i>ConsumeFood</i>
<i>DecreaseItem</i>	237	<i>SupportAgricultureDirectly</i>
<i>DecreaseItem</i>	355	<i>DistributeFood</i>
Natural resources supply		
<i>Item</i>	767	<i>NaturalResource</i>
<i>IncreaseItem</i>	323	<i>ManageNaturalResources</i>
<i>DecreaseItem</i>	2003	<i>ConsumeNaturalResources</i>

Table 7.52 Miscellaneous item SaF classes

SaF role	ID	OE element
Waste		
<i>Item</i>	347	<i>Pollution</i>
<i>Item</i>	348	<i>TrashDisposal</i>
<i>Item</i>	349	<i>WasteWaterTreatment</i>
<i>IncreaseItem</i>	363	<i>ProduceWaste</i>
<i>DecreaseItem</i>	359	<i>ProvideSanitationOrWasteWaterManagement</i>
<i>DecreaseItem</i>	361	<i>ReducePollution</i>
<i>DecreaseItem</i>	1986	<i>RemoveWaste</i>
Funds		
<i>Item</i>	1796	<i>BankAccountAndFunds</i>
<i>IncreaseItem</i>	2029	<i>ObtainOrDisperseFunds</i>
<i>DecreaseItem</i>	2029	<i>ObtainOrDisperseFunds</i>
C4I		
<i>Item</i>	1809	<i>InterventionC4I</i>
<i>Item</i>	1810	<i>HNMilitaryC4I</i>
<i>Item</i>	2063	<i>OtherC4I</i>
<i>IncreaseItem</i>	743	<i>EstablishSensorProcesses</i>
<i>IncreaseItem</i>	745	<i>EstablishCommunicationsProcesses</i>
<i>IncreaseItem</i>	747	<i>EstablishCommandAndControlProcesses</i>
<i>DecreaseItem</i>	1811	<i>DamageSensorProcesses</i>
<i>DecreaseItem</i>	1812	<i>DamageCommunicationsProcesses</i>
<i>DecreaseItem</i>	1813	<i>DamageCommandAndControlProcesses</i>

Table 7.53 Civil item SaF classes

SaF role	ID	OE element
Sense of community		
<i>Item</i>	1972	<i>PopularSenseOfCommunity</i>
<i>IncreaseItem</i>	447	<i>RebuildSenseOfCommunity</i>
<i>DecreaseItem</i>	1987	<i>DecreaseSenseOfCommunity</i>
Government policies		
<i>Item</i>	11	<i>RightsAndFreedoms</i>
<i>Item</i>	59	<i>CrimePolitical</i>
<i>Item</i>	73	<i>ProtectionOfHumanRights</i>
<i>Item</i>	74	<i>PoliticalPersecution</i>
<i>Item</i>	283	<i>GovtEconomicAndFinancialPolicy</i>
<i>Item</i>	351	<i>PropertyRightsAndAccess</i>
<i>Item</i>	426	<i>SocialIssueDecisionMaking</i>
<i>Item</i>	1946	<i>TaxationStructuresAndPolicy</i>
<i>Item</i>	1947	<i>OtherGovtPolicy</i>

(continued)

Table 7.53 (continued)

SaF role	ID	OE element
<i>IncreaseItem</i>	96	<i>ChangePropertyProcedure</i>
<i>IncreaseItem</i>	241	<i>ChangeAgriculturalPolicy</i>
<i>IncreaseItem</i>	284	<i>Privatize_NationalizeBusinesses</i>
<i>IncreaseItem</i>	286	<i>ChangeGovtEconomicOrFinancialPolicy</i>
<i>IncreaseItem</i>	290	<i>ChangeCommercialLaw</i>
<i>IncreaseItem</i>	292	<i>ChangeTaxOrTradePolicy</i>
<i>IncreaseItem</i>	1789	<i>ChangeInformationAndMediaPolicies</i>
<i>IncreaseItem</i>	1993	<i>ChangeTransportationPolicy</i>
<i>IncreaseItem</i>	1994	<i>ChangeEnergyPolicy</i>
<i>IncreaseItem</i>	1995	<i>ChangeNaturalResourcesPolicy</i>
<i>IncreaseItem</i>	1996	<i>ChangeLaborPolicy</i>
<i>IncreaseItem</i>	2004	<i>ChangeEducationPolicy</i>
<i>IncreaseItem</i>	2005	<i>ChangeHealthcarePolicy</i>
<i>IncreaseItem</i>	2006	<i>ChangeSocialOrCulturalPolicy</i>
<i>DecreaseItem</i>	96	<i>ChangePropertyProcedure</i>
<i>DecreaseItem</i>	241	<i>ChangeAgriculturalPolicy</i>
<i>DecreaseItem</i>	284	<i>Privatize_NationalizeBusinesses</i>
<i>DecreaseItem</i>	286	<i>ChangeGovtEconomicOrFinancialPolicy</i>
<i>DecreaseItem</i>	290	<i>ChangeCommercialLaw</i>
<i>DecreaseItem</i>	292	<i>ChangeTaxOrTradePolicy</i>
<i>DecreaseItem</i>	1789	<i>ChangeInformationAndMediaPolicies</i>
<i>DecreaseItem</i>	1993	<i>ChangeTransportationPolicy</i>
<i>DecreaseItem</i>	1994	<i>ChangeEnergyPolicy</i>
<i>DecreaseItem</i>	1995	<i>ChangeNaturalResourcesPolicy</i>
<i>DecreaseItem</i>	1996	<i>ChangeLaborPolicy</i>
<i>DecreaseItem</i>	2004	<i>ChangeEducationPolicy</i>
<i>DecreaseItem</i>	2005	<i>ChangeHealthcarePolicy</i>
<i>DecreaseItem</i>	2006	<i>ChangeSocialOrCulturalPolicy</i>
Civil disturbance		
<i>Item</i>	120	<i>Civil_Internal_Unrest</i>
<i>Item</i>	1975	<i>Violence</i>
<i>Item</i>	2054	<i>CivilDisturbance</i>
<i>IncreaseItem</i>	1992	<i>ConductLaborStrikes</i>
<i>IncreaseItem</i>	2055	<i>CreateCivilDisturbance</i>
<i>DecreaseItem</i>	2056	<i>QuellCivilDisturbance</i>

Stocks-and-Flows Ontology Recap

Several relations are used in this chapter and are explained as follows:

is-a: Each instance of A is an instance of B and each property of B is a property of A. Its inverse relation is *superClassOf*.

necessaryPartOf: A is a necessary part of B (composition). Its inverse relation is *hasNecessaryPart* (also shown as *includes*).

affects: A is an Action and affects Actor, Environment Element, or Metric B. Its inverse relation is *affectedBy*.

increases: A is an Action and increases Actor, Environment Element, or Metric B. Its inverse relation is *increasedBy*.

decreases: A is an Action and decreases Actor, Environment Element, or Metric B. Its inverse relation is *decreasedBy*.

performs: A is an Actor and performs Action B. Its inverse relation is *performedBy*.

relatesTo: A is an Actor or Environment Element and is related in some way to Actor or Environment Element B. Its inverse relation is *relatesTo*.

hasMember: A is an Actor and has Actor B as a member. Its inverse relation is *memberOf*.

hasOverlap: A is an Actor and there are members of A that are members of Actor B. Its inverse relation is *hasOverlap*.

playsRole: A is an Element and plays role B. Its inverse relation is *playedBy*.

These associations of the Stocks-and-Flows Ontology collectively include most, but not all of the Actors, Actions and Environment Elements, defined by the roles that the elements may play in interacting with each other. The associations are divided into organization-oriented, population-oriented, and environment-oriented SaF classes.

Chapter 8 discusses another set of associations, in this case, associations induced by similarities of meanings. Again, not all of the Actors, Actions and Environment Elements are included in the collective set of associations.

Chapter 8

Semantic Concept Ontology



The Semantic Concept Ontology is organized around similarities in meaning among the element classes and is a component of the situation-independent part of the Unconventional Conflict Ontology. These similarities are expressed by a set of semantic concepts to which the appropriate elements are linked. Figure 8.1 illustrates things that are linked by semantic concepts, in this case road and air infrastructure and vehicles. (The Semantic Concept Ontology may also be regarded as a type of thesaurus).



Fig. 8.1 Transportation: Road and air infrastructure & vehicles

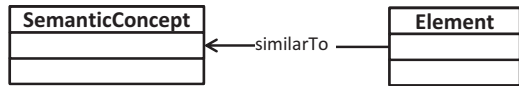
All of the element classes are part of at least one of the Actor, Action, and Environment ontologies, which were described in Chaps. 3, 4, and 5, respectively. All of the Metric classes are part of both Metric ontologies, described in Chap. 6. These ontologies describe some of the known relationships among the basic parts of the Unconventional Conflict Ontology. Many of the element classes are part of the Stocks-and-Flows Ontology described in Chap. 7. The Stocks-and-Flows Ontology added descriptions of additional known relationships among the Elements. The Semantic Concept Ontology completes the description of known relationships by adding connections among some of the element classes, based on similarities of meaning.

The Semantic Concept Ontology is incomplete. The semantic concepts that are contained in this Ontology were chosen to avoid those that connect extremely large sets of elements. For instance, “change” is a valid semantic concept; however, a very large percentage of Action classes would be included, along with many Environmental classes. The discriminatory power of a class generated by “change” would be low and have little practical use. Similarly, semantic concepts with only one or two element class connections are not included because they would add little value.

Ontology Organization

Those Actor, Environment and Action element classes that have similarities to the semantic concepts are linked by a *similarTo* relation to one or more semantic concepts, as shown in Fig. 8.2.

Fig. 8.2 Semantic concept



The Semantic Ontology differentiates the semantic concept classes and provides similarity linkages among the classes. Figure. 8.3 provides a diagram of the ontology. There are five concept categories and 25 semantic concepts. Each element may be connected to more than one semantic concept.

In the tables below that identify the element classes related to each semantic concept, the element ID and name are included, along with columns for Actor (“A”), Environment (“E”), and Action (“D” for DIME) element. For each Element in the table, a “T” (for “true”) is placed in the appropriate column or columns. The tables are sorted by element ID for tracking purposes. Unfortunately the ID numbers were created as the elements were added, meaning that some obvious pairings (increase versus decrease) do not appear sequentially.

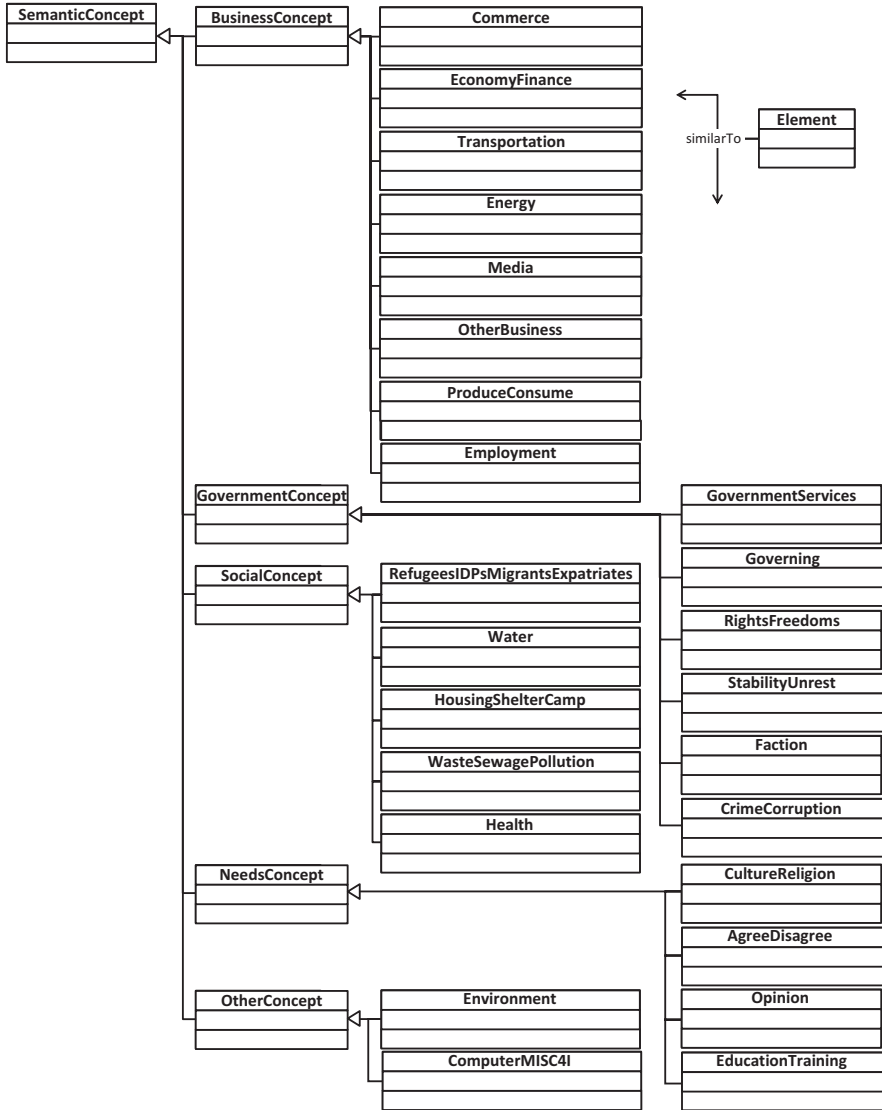


Fig. 8.3 Semantic concept Ontology

Business Concepts

The business concepts category includes eight important concepts that are relevant to business in its larger sense. The category includes the following 8 semantic terms:

- Commerce, in Table 8.1;
- Economy & Finance, in Table 8.2;

- Transportation, in Table 8.3;
- Energy, in Table 8.4;
- Media, in Table 8.5;
- Business (not transport, energy, media, or finance), in Table 8.6;
- Produce & Consume, in Table 8.7; and
- Employment, in Table 8.8.

Table 8.1 Business concept: commerce

ID	OE element	A	E	D
237	<i>SupportAgricultureDirectly</i>			T
253	<i>BlackAndGrayMarket</i>		T	
260	<i>ImportEnergy</i>			T
280	<i>CreateStockMarket</i>			T
317	<i>CriticalIndustries</i>		T	
329	<i>ParticipateDirectlyInEconomy</i>			T
353	<i>ImportFood</i>			T
1777	<i>ConductDrugTrade</i>			T
1846	<i>IncreaseMarkets</i>			T
1847	<i>DecreaseMarkets</i>			T
1848	<i>IncreaseCommercialSector</i>			T
1849	<i>DecreaseCommercialSector</i>			T
1976	<i>Trade</i>		T	
1997	<i>ConductTradeInGoodsOrServices</i>			T

Table 8.2 Business concept: economy & finance

ID	OE element	A	E	D
191	<i>NonNationStateActorFunding</i>		T	
201	<i>IDOrInterdictFundingOfNonNationStateActor</i>			T
237	<i>SupportAgricultureDirectly</i>			T
253	<i>BlackAndGrayMarket</i>		T	
265	<i>MonetaryHealth</i>		T	
266	<i>FinancialSystem</i>		T	
267	<i>FinancialServicesIndustryBusiness</i>	T		
268	<i>InsuranceSystem</i>		T	
269	<i>ForeignAndLocalInvestment</i>		T	
270	<i>CreateInsuranceSystem</i>			T
272	<i>CreateInterbanksPaymentSystem</i>			T
274	<i>CreateNewCurrency</i>			T
276	<i>Seek_InhibitInvestmentCapital</i>			T
278	<i>DevelopMicrofinance.System</i>			T
280	<i>CreateStockMarket</i>			T
283	<i>GovtEconomicAndFinancialPolicy</i>		T	
286	<i>ChangeGovtEconomicOrFinancialPolicy</i>			T
288	<i>AssistEconomicIntegrationOrCooperation</i>			T

(continued)

Table 8.2 (continued)

ID	OE element	A	E	D
292	<i>ChangeTaxOrTradePolicy</i>			T
297	<i>AvailabilityOfAcceptableJobs</i>		T	
298	<i>Employment</i>		T	
305	<i>ChangeSocialSafetyNet</i>			T
318	<i>EconomicStatistics</i>		T	
319	<i>GeneralEconomy</i>		T	
321	<i>EconomicFoundation</i>		T	
329	<i>ParticipateDirectlyInEconomy</i>			T
331	<i>DamageFinancialInfrastructure</i>			T
1779	<i>ReduceFinancialCrimesOrMoneyLaundering</i>			T
1781	<i>ConductFinancialCrimeOrMoneyLaundering</i>			T
1796	<i>BankAccountAndFunds</i>		T	
1842	<i>IncreaseFinancialServicesIndustryBusinesses</i>			T
1843	<i>DecreaseFinancialServicesIndustryBusinesses</i>			T
1941	<i>FinancialInfrastructure</i>		T	
2029	<i>ObtainOrDisperseFunds</i>			T
2039	<i>RecruitFundOrGainSupportByNonNationStateActor</i>			T

Table 8.3 Business concept: transportation

ID	OE element	A	E	D
315	<i>TransportationBusiness</i>	T		
611	<i>GeneralTransportationInfrastructure</i>		T	
612	<i>RoadInfrastructure</i>		T	
613	<i>RailroadInfrastructure</i>		T	
614	<i>BridgeAndTunnelInfrastructure</i>		T	
615	<i>WaterwaysInfrastructure</i>		T	
616	<i>SeaportInfrastructure</i>		T	
617	<i>AirportInfrastructure</i>		T	
618	<i>VehicleNonMilitary</i>	T	T	
619	<i>RebuildRoadInfrastructure</i>			T
623	<i>RebuildRailroadInfrastructure</i>			T
627	<i>RebuildBridgeOrTunnelInfrastructure</i>			T
631	<i>RebuildSeaportInfrastructure</i>			T
635	<i>RebuildAirportInfrastructure</i>			T
639	<i>Rebuild_ReplaceVehicle</i>			T
643	<i>RebuildWaterwaysInfrastructure</i>			T
647	<i>DamageRoadInfrastructure</i>			T
649	<i>DamageRailroadInfrastructure</i>			T
651	<i>DamageBridgeOrTunnelInfrastructure</i>			T
653	<i>DamageSeaportInfrastructure</i>			T
655	<i>DamageAirportInfrastructure</i>			T
657	<i>DamageVehicle</i>			T
659	<i>DamageWaterwaysInfrastructure</i>			T

Table 8.4 Business concept: energy

ID	OE element	A	E	D
258	<i>EnergySupplyAndDistribution</i>		T	
259	<i>EnergyBusiness</i>	T		
260	<i>ImportEnergy</i>			T
543	<i>GeneralEnergyInfrastructure</i>		T	
544	<i>ElectricityProductionPlant</i>		T	
545	<i>ElectricityDistributionInfrastructure</i>		T	
546	<i>ExtractiveEnergyProductionInfrastructure</i>		T	
547	<i>ExtractiveEnergyTransportationInfrastructure</i>		T	
548	<i>RebuildElectricityProductionPlant</i>			T
552	<i>RebuildElectricityDistributionInfrastructure</i>			T
556	<i>RebuildExtractiveEnergyProductionInfrastructure</i>			T
560	<i>RebuildExtractiveEnergyTransportationInfrastructure</i>			T
564	<i>DamageElectricityProductionPlant</i>			T
566	<i>DamageElectricityDistributionInfrastructure</i>			T
568	<i>DamageExtractiveEnergyProductionInfrastructure</i>			T
570	<i>DamageExtractiveEnergyTransportationInfrastructure</i>			T
664	<i>DamInfrastructure</i>		T	
673	<i>RebuildDamInfrastructure</i>			T
681	<i>DamageDamInfrastructure</i>			T
1840	<i>IncreaseEnergyBusinesses</i>			T
1841	<i>DecreaseEnergyBusinesses</i>			T
1994	<i>ChangeEnergyPolicy</i>			T
2065	<i>ProduceEnergy</i>			T

Table 8.5 Business concept: media

ID	OE element	A	E	D
312	<i>MediaBusiness</i>	T		
460	<i>InformationAndEntertainment</i>		T	
461	<i>PublicRecords_Transparency</i>		T	
463	<i>FreedomOfDomesticMedia</i>		T	
464	<i>KeyMediaIndividual</i>	T		
465	<i>FreedomOfInternationalMedia</i>		T	
466	<i>SponsorMediaTrainingOrProfessionalization</i>			T
476	<i>CollectInformation</i>			T
480	<i>ControlOrDisseminateInformation</i>			T
519	<i>GeneralInformationAndMediaInfrastructure</i>		T	
520	<i>RebuildInformationAndMediaInfrastructure</i>			T
524	<i>DamageInformationAndMediaInfrastructure</i>			T
745	<i>EstablishCommunicationsProcesses</i>			T
1789	<i>ChangeInformationAndMediaPolicies</i>			T
1812	<i>DamageCommunicationsProcesses</i>			T
1850	<i>IncreaseMediaBusinesses</i>			T

(continued)

Table 8.5 (continued)

ID	OE element	A	E	D
1851	<i>DecreaseMediaBusinesses</i>			T
1876	<i>ChangeKeyLeaderIdentities</i>			T
1893	<i>LocalOrInternationalMediaPerson</i>	T		
1894	<i>KeyInternationalMediaLeader</i>	T		
1895	<i>IncreaseInternationalOrLocalMediaPersonnel</i>			T
1896	<i>DecreaseInternationalOrLocalMediaPersonnel</i>			T

Table 8.6 Business concept: business-other businesses

ID	OE element	A	E	D
229	<i>ConductAgricultureOperation</i>			T
230	<i>AgricultureBusiness</i>	T		
231	<i>ArableLand</i>		T	
235	<i>ConsumeFood</i>			T
237	<i>SupportAgricultureDirectly</i>			T
241	<i>ChangeAgriculturalPolicy</i>			T
243	<i>SupportReductionOfDrugCrops</i>			T
250	<i>DrugCultivation</i>		T	
251	<i>DrugManufacture</i>		T	
268	<i>InsuranceSystem</i>		T	
313	<i>ManufacturingBusiness</i>	T		
314	<i>ServiceBusiness</i>	T		
316	<i>TourismIndustryBusiness</i>	T		
317	<i>CriticalIndustries</i>		T	
497	<i>ManufacturingStructure</i>		T	
498	<i>AgricultureStructure</i>		T	
499	<i>LivestockAndAgricultureEquipment</i>		T	
501	<i>RebuildManufacturingInfrastructure</i>			T
505	<i>DamageManufacturingInfrastructure</i>			T
507	<i>RebuildAgricultureInfrastructureLivestock</i>			T
511	<i>DamageAgricultureInfrastructureLivestock</i>			T
1852	<i>IncreaseManufacturingBusinesses</i>			T
1853	<i>DecreaseManufacturingBusinesses</i>			T
1854	<i>IncreaseServiceBusinesses</i>			T
1855	<i>DecreaseServiceBusinesses</i>			T
1858	<i>IncreaseTourismIndustryBusinesses</i>			T
1859	<i>DecreaseTourismIndustryBusinesses</i>			T
1876	<i>ChangeKeyLeaderIdentities</i>			T
1884	<i>ContractorPerson</i>	T		
1885	<i>IncreaseContractorPersonnel</i>			T
1886	<i>DecreaseContractorPersonnel</i>			T
1889	<i>KeyContractorLeader</i>	T		
1900	<i>MiningBusiness</i>	T		

(continued)

Table 8.6 (continued)

ID	OE element	A	E	D
1901	<i>IncreaseMiningBusinesses</i>			T
1902	<i>DecreaseMiningBusinesses</i>			T
1903	<i>MiningInfrastructure</i>		T	
1904	<i>RebuildMiningInfrastructure</i>			T
1905	<i>DamageMiningInfrastructure</i>			T
1906	<i>FishingBusiness</i>			
1907	<i>IncreaseFishingBusinesses</i>	T		T
1908	<i>DecreaseFishingBusinesses</i>			T
1909	<i>TimberBusiness</i>	T		
1910	<i>IncreaseTimberBusinesses</i>			T
1911	<i>DecreaseTimberBusinesses</i>			T
1912	<i>CulturalBusiness</i>	T		
1913	<i>IncreaseCulturalBusinesses</i>			T
1914	<i>DecreaseCulturalBusinesses</i>			T
1915	<i>AvailabilityOfCulturalActivity</i>		T	
1916	<i>CulturalInfrastructure</i>		T	
1917	<i>RebuildCulturalInfrastructure</i>			T
1918	<i>DamageCulturalInfrastructure</i>			T
1921	<i>IncreaseAgricultureBusinesses</i>			T
1922	<i>DecreaseAgricultureBusinesses</i>			T
1939	<i>ContractorBusiness</i>	T		
1998	<i>ConductCulturalEvent</i>			T
2001	<i>IncreaseContractorBusinesses</i>			T
2002	<i>DecreaseContractorBusinesses</i>			T
2028	<i>ConductBusinessManagement</i>			T
2063	<i>OtherC4I</i>		T	
2066	<i>OperateFishingBusiness</i>			T
2067	<i>ProvideServices</i>			T

Table 8.7 Business concept: produce & consume

ID	OE element	A	E	D
229	<i>ConductAgricultureOperation</i>			T
235	<i>ConsumeFood</i>			T
237	<i>SupportAgricultureDirectly</i>			T
243	<i>SupportReductionOfDrugCrops</i>			T
258	<i>EnergySupplyAndDistribution</i>		T	
325	<i>ProduceGoodsOrEquipment</i>			T
327	<i>ConsumeGoodsOrEquipment</i>			T
543	<i>GeneralEnergyInfrastructure</i>		T	
544	<i>ElectricityProductionPlant</i>		T	
546	<i>ExtractiveEnergyProductionInfrastructure</i>		T	

(continued)

Table 8.7 (continued)

ID	OE element	A	E	D
548	<i>RebuildElectricityProductionPlant</i>			T
556	<i>RebuildExtractiveEnergyProductionInfrastructure</i>			T
564	<i>DamageElectricityProductionPlant</i>			T
568	<i>DamageExtractiveEnergyProductionInfrastructure</i>			T
2003	<i>ConsumeNaturalResources</i>			T
2066	<i>OperateFishingBusiness</i>			T
2067	<i>ProvideServices</i>			T

Table 8.8 Business concept: employment

ID	OE element	A	E	D
17	<i>TrainFirstResponders</i>			T
80	<i>TrainLawEnforcementPersonnel</i>			T
151	<i>DemobilizeReduceReintegrateMilitaryOrParamilitaryUnits</i>			T
155	<i>TrainMilitaryForces</i>			T
161	<i>TrainIntelligenceServices</i>			T
192	<i>NonNationStateActorRecruiting</i>		T	
203	<i>IDInderdictOrInterruptRecruitmentByNonNationStateActor</i>			T
297	<i>AvailabilityOfAcceptableJobs</i>		T	
298	<i>Employment</i>		T	
299	<i>ProvideJobTrainingOrEmploymentForDischargedMilitaryPersonnel</i>			T
302	<i>CreatePublicWorksProgram</i>			T
380	<i>JobRelatedEducationalSystem</i>		T	
386	<i>TrainEducators</i>			T
389	<i>ProvideJobTraining</i>			T
1797	<i>Worker</i>	T		
1808	<i>ChangeWorkersJobStatus</i>			T
1816	<i>DecreaseFirstRespondersPersonnel</i>			T
1824	<i>IncreaseIntervenorDiplomaticPersonnel</i>			T
1825	<i>DecreaseIntervenorDiplomaticPersonnel</i>			T
1826	<i>IncreaseTheInterventionForcesPersonnel</i>			T
1827	<i>DecreaseTheInterventionForcesPersonnel</i>			T
1828	<i>DecreaseGovtMilitaryForcesPersonnel</i>			T
1829	<i>DecreaseIntelligenceServicesOrganizations</i>			T
1830	<i>IncreaseRegimeSponsoredNonMilitaryArmedForcesPersonnel</i>			T
1831	<i>DecreaseRegimeSponsoredNonMilitaryArmedForcesPersonnel</i>			T
1832	<i>IncreaseParamilitaryForcePersonnel</i>			T
1833	<i>DecreaseParamilitaryForcePersonnel</i>			T
1834	<i>IncreasePrivateSecurityForcesPersonnel</i>			T
1835	<i>DecreasePrivateSecurityForcesPersonnel</i>			T
1836	<i>IncreaseTerroristPersonnel</i>			T
1837	<i>DecreaseTerroristPersonnel</i>			T
1838	<i>IncreaseInsurgentPersonnel</i>			T

(continued)

Table 8.8 (continued)

ID	OE element	A	E	D
1839	<i>DecreaseInsurgentPersonnel</i>			T
1860	<i>IncreaseWorkers</i>			T
1861	<i>DecreaseWorkers</i>			T
1877	<i>LawEnforcementPerson</i>	T		
1878	<i>DecreaseLawEnforcementPersonnel</i>			T
1879	<i>IntelligenceServicePerson</i>	T		
1880	<i>DecreaseIntelligenceServicePersonnel</i>			T
1881	<i>GovtPerson</i>	T		
1882	<i>IncreaseGovtPersonnel</i>			T
1883	<i>DecreaseGovtPersonnel</i>			T
1884	<i>ContractorPerson</i>	T		
1885	<i>IncreaseContractorPersonnel</i>			T
1886	<i>DecreaseContractorPersonnel</i>			T
1890	<i>IntervenorSupportPerson</i>	T		
1891	<i>IncreaseIntervenorSupportPersonnel</i>			T
1892	<i>DecreaseIntervenorSupportPersonnel</i>			T
1893	<i>LocalOrInternationalMediaPerson</i>	T		
1895	<i>IncreaseInternationalOrLocalMediaPersonnel</i>			T
1896	<i>DecreaseInternationalOrLocalMediaPersonnel</i>			T
1897	<i>NGOWorker</i>	T		
1898	<i>IncreaseNGOWorkers</i>			T
1899	<i>DecreaseNGOWorkers</i>			T
1919	<i>Educator</i>	T		
1920	<i>DecreaseEducators</i>			T
1981	<i>IncreaseIntelligenceServicesPersonnel</i>			T
1984	<i>Increase number of educators</i>			T
2027	<i>Increase law enforcement personnel</i>			T

Government Concepts

The government concepts category includes six important concepts that are relevant to government in its larger sense. The category includes the following six semantic terms:

- Services, in Table 8.9;
- Governing, in Table 8.10;
- Rights & Freedoms, in Table 8.11;
- Stability & Unrest, in Table 8.12;
- Factions, in Table 8.13; and
- Crime & Corruption, in Table 8.14.

Table 8.9 Government concept: services

ID	OE element	A	E	D
5	<i>FirstResponderOrganization</i>	T		
8	<i>SocialServicesOrganization</i>	T		
17	<i>TrainFirstResponders</i>			T
67	<i>CorruptionInSocialServices</i>		T	
73	<i>ProtectionOfHumanRights</i>		T	
270	<i>CreateInsuranceSystem</i>			T
305	<i>ChangeSocialSafetyNet</i>			T
348	<i>TrashDisposal</i>		T	
349	<i>WasteWaterTreatment</i>		T	
359	<i>ProvideSanitationOrWasteWaterManagement</i>			T
375	<i>NegotiateWithBureaucraciesToGetRelief</i>			T
421	<i>ProvideSocialProtectionProgram</i>			T
1790	<i>AssistInCreatingSocialServices</i>			T
1925	<i>FirstResponderPerson</i>	T		
1935	<i>KeyFirstResponderLeader</i>	T		
1950	<i>SocialServicesSystem</i>		T	
1985	<i>RespondToCivilEmergencies</i>			T

Table 8.10 Government concept: governing

ID	OE element	A	E	D
4	<i>Governance</i>		T	
6	<i>ChangeInGovtLeadership</i>		T	
21	<i>TrainNewPoliticalLeaders</i>			T
23	<i>CreateGovt</i>			T
25	<i>ConductElections</i>			T
29	<i>ProduceConstitution</i>			T
31	<i>EstablishStaffOrFundTransitionGovt</i>			T
39	<i>KeyLeaderAdvocatingPeaceAndStability</i>	T		
40	<i>KeyLeaderAdvocatingConflictAndDissension</i>	T		
42	<i>KeyPoliticalIndividual</i>	T		
43	<i>PoliticalPopulation</i>	T		
45	<i>PoliticalFaction</i>	T		
46	<i>OppositionPartyUseOfForce</i>		T	
53	<i>MonitorPowersharingArrangements</i>			T
55	<i>TransferControlOfGovtFunctionsToHNOofficials</i>			T
59	<i>CrimePolitical</i>		T	
63	<i>LegalSystemTradition</i>		T	
70	<i>ConnectionBetweenLawEnforcementAndTheMilitary</i>		T	
74	<i>PoliticalPersecution</i>		T	

(continued)

Table 8.10 (continued)

ID	OE element	A	E	D
76	<i>ConductPolicingOperation</i>			T
78	<i>RebuildOrMonitorLawEnforcementOrganizations</i>			T
84	<i>ChangeThePenalSystem</i>			T
86	<i>ChangeTheLegalSystem</i>			T
94	<i>ConductWarCrimesInvestigation</i>			T
96	<i>ChangePropertyProcedure</i>			T
100	<i>ConductExtrajudicialAction</i>			T
108	<i>Government</i>		T	
138	<i>ConductBorderControlBoundarySecurityFreedomOfMovement</i>			T
151	<i>DemobilizeReduceReintegrateMilitaryOrParamilitaryUnits</i>			T
153	<i>CreateOrReformOrMonitorMilitary</i>			T
159	<i>CreateOrReformOrMonitorIntelligenceServices</i>			T
172	<i>SafeguardInstitutionOfGovernanceOrKeyOfficial</i>			T
207	<i>MitigatePoliticalOrSocialInstabilityOrIndividualUnrestAction</i>			T
237	<i>SupportAgricultureDirectly</i>			T
241	<i>ChangeAgriculturalPolicy</i>			T
260	<i>ImportEnergy</i>			T
268	<i>InsuranceSystem</i>		T	
270	<i>CreateInsuranceSystem</i>			T
272	<i>CreateInterbanksPaymentSystem</i>			T
274	<i>CreateNewCurrency</i>			T
278	<i>DevelopMicrofinanceSystem</i>			T
280	<i>CreateStockMarket</i>			T
283	<i>GovtEconomicAndFinancialPolicy</i>		T	
284	<i>Privatize_NationalizeBusinesses</i>			T
286	<i>ChangeGovtEconomicOrFinancialPolicy</i>			T
288	<i>AssistEconomicIntegrationOrCooperation</i>			T
290	<i>ChangeCommercialLaw</i>			T
292	<i>ChangeTaxOrTradePolicy</i>			T
305	<i>ChangeSocialSafetyNet</i>			T
323	<i>ManageNaturalResources</i>			T
351	<i>PropertyRightsAndAccess</i>		T	
382	<i>PromoteCivicEducation</i>			T
409	<i>FreedomOfMovement</i>		T	
410	<i>ForcedPopulationMovement</i>		T	
421	<i>ProvideSocialProtectionProgram</i>			T
440	<i>PerceptionByPeopleThatTheirInterestsAreRepresented</i>		T	
460	<i>InformationAndEntertainment</i>		T	
461	<i>PublicRecords_Transparency</i>		T	
463	<i>FreedomOfDomesticMedia</i>		T	

(continued)

Table 8.10 (continued)

ID	OE element	A	E	D
465	<i>FreedomOfInternationalMedia</i>		T	
1785	<i>ImproveLegislatureOrLegislativePractices</i>			T
1786	<i>ImproveExecutiveFunction</i>			T
1787	<i>PromoteAntiCorruptionReforms</i>			T
1788	<i>PromoteCivilControlOfSecuritySector</i>			T
1789	<i>ChangeInformationAndMediaPolicies</i>			T
1790	<i>AssistInCreatingSocialServices</i>			T
1799	<i>PoliticalPowersharing</i>		T	
1802	<i>ConductJudicialAction</i>			T
1803	<i>ConductLegislativeAction</i>			T
1804	<i>ConductExecutiveAction</i>			T
1887	<i>ExecutiveBranch</i>	T	T	
1888	<i>LegislativeBranch</i>	T	T	
1928	<i>KeyBureaucrat</i>	T		
1931	<i>KeyJudicialLeader</i>	T		
1932	<i>KeyLegislator</i>	T		
1933	<i>KeyGovtExecutive</i>	T		
1940	<i>GovtBureaucracyOrganization</i>	T		
1944	<i>TypeGovt</i>		T	
1945	<i>Constitution</i>		T	
1946	<i>TaxationStructuresAndPolicy</i>		T	
1947	<i>OtherGovtPolicy</i>		T	
1948	<i>GeneralGovtPolicy</i>		T	
1949	<i>PenalSystem</i>		T	
1950	<i>SocialServicesSystem</i>		T	
1956	<i>Bureaucracy</i>		T	
1985	<i>RespondToCivilEmergencies</i>			T
1993	<i>ChangeTransportationPolicy</i>			T
1994	<i>ChangeEnergyPolicy</i>			T
1995	<i>ChangeNaturalResourcesPolicy</i>			T
1996	<i>ChangeLaborPolicy</i>			T
2004	<i>ChangeEducationPolicy</i>			T
2005	<i>ChangeHealthcarePolicy</i>			T
2006	<i>ChangeSocialOrCulturalPolicy</i>			T
2024	<i>CivilDefensePlan</i>		T	
2025	<i>ExecuteCivilDefensePlan</i>			T

Table 8.11 Government concept: rights & freedoms

ID	OE element	A	E	D
11	<i>RightsAndFreedoms</i>		T	
59	<i>CrimePolitical</i>		T	
73	<i>ProtectionOfHumanRights</i>		T	
74	<i>PoliticalPersecution</i>		T	
92	<i>MonitorHumanRightsPractice</i>			T
94	<i>ConductWarCrimesInvestigation</i>			T
96	<i>ChangePropertyProcedure</i>			T
351	<i>PropertyRightsAndAccess</i>		T	
382	<i>PromoteCivicEducation</i>			T
409	<i>FreedomOfMovement</i>		T	
423	<i>ProvideAnti_ConductTraffickingInPersons</i>			T
460	<i>InformationAndEntertainment</i>		T	
461	<i>PublicRecords_Transparency</i>		T	
463	<i>FreedomOfDomesticMedia</i>		T	
465	<i>FreedomOfInternationalMedia</i>		T	
1780	<i>ReduceIntellectualPropertyTheft</i>			T
1782	<i>ConductIntellectualPropertyTheft</i>			T
1789	<i>ChangeInformationAndMediaPolicies</i>			T

Table 8.12 Government concept: stability & unrest

ID	OE element	A	E	D
35	<i>DestabilizeGovt</i>			T
109	<i>CivilStabilityAndDurablePeace</i>		T	
120	<i>Civil_Internal_Unrest</i>		T	
167	<i>ConductInterventionStabilityOperation</i>			T
184	<i>ProvideSecurityForStabilityActivities</i>			T
207	<i>MitigatePoliticalOrSocialInstabilityOrIndividualUnrestAction</i>			T
1975	<i>Violence</i>		T	
1992	<i>ConductLaborStrikes</i>			T
2054	<i>CivilDisturbance</i>		T	
2055	<i>CreateCivilDisturbance</i>			T
2056	<i>QuellCivilDisturbance</i>			T

Table 8.13 Government concept: factions

ID	OE element	A	E	D
40	<i>KeyLeaderAdvocatingConflictAndDissension</i>	T		
44	<i>ExternalForceOrganizationAdvocatingConflict</i>	T		
45	<i>PoliticalFaction</i>	T		
46	<i>OppositionPartyUseOfForce</i>		T	
47	<i>FactionalDispute</i>		T	
48	<i>ResolutionOfDifferencesByCompetingGroups</i>		T	

(continued)

Table 8.13 (continued)

ID	OE element	A	E	D
49	<i>MediateNegotiateOrPersuadeConflictingParties</i>			T
51	<i>MaintainComplianceWithPeaceAccords</i>			T
53	<i>MonitorPowersharingArrangements</i>			T
103	<i>SideInConflict</i>	T		
132	<i>EstablishDemilitarizedZoneSanctionArmsEmbargo</i>			T
136	<i>ImplementWeaponsControlRegime</i>			T
430	<i>SocialFaction</i>	T		
431	<i>ReligiousFaction</i>	T		
432	<i>Family</i>	T		
435	<i>KeySocialIndividual</i>	T		
436	<i>KeySpiritualIndividual</i>	T		
1798	<i>ComplianceWithPeaceAccords</i>		T	
1799	<i>PoliticalPowersharing</i>		T	
1821	<i>IncreaseExternalForceOrganizationsAdvocatingConflict</i>			T
1822	<i>DecreaseExternalForceOrganizationsAdvocatingConflict</i>			T
1823	<i>ChangePoliticalFactions</i>			T
2037	<i>ChangeSocialFactions</i>			T
2038	<i>ChangeReligiousFactions</i>			T

Table 8.14 Government concept: crime & corruption

ID	OE element	A	E	D
58	<i>CrimeCommon</i>		T	
59	<i>CrimePolitical</i>		T	
60	<i>CrimeDrug</i>		T	
61	<i>CrimeOrganized</i>		T	
62	<i>CrimeOverall</i>		T	
66	<i>CorruptionInCulture</i>		T	
67	<i>CorruptionInSocialServices</i>		T	
68	<i>CorruptionInLawEnforcement</i>		T	
69	<i>CorruptionInCentralAuthority</i>		T	
74	<i>PoliticalPersecution</i>		T	
90	<i>MonitorOrReportOnCorruptionByGovtOfficials</i>			T
94	<i>ConductWarCrimesInvestigation</i>			T
98	<i>Extort_SuppressPopulation_Opposition</i>			T
100	<i>ConductExtrajudicialAction</i>			T
197	<i>TerroristOrganization</i>	T		
198	<i>CorruptionInMilitary</i>		T	
199	<i>ConductTerrorismOrAntiOrCounterterrorismOp</i>			T
243	<i>SupportReductionOfDrugCrops</i>			T
246	<i>CriminalPopulation</i>	T		
247	<i>CriminalOrganization</i>	T		

(continued)

Table 8.14 (continued)

ID	OE element	A	E	D
248	<i>KeyCriminalLeader</i>	T		
249	<i>DrugUse</i>		T	
250	<i>DrugCultivation</i>		T	
251	<i>DrugManufacture</i>		T	
252	<i>DrugTransshipment</i>		T	
253	<i>BlackAndGrayMarket</i>		T	
254	<i>CorruptionInBusiness</i>		T	
255	<i>EngageInCriminalOrCorruptAction</i>			T
423	<i>ProvideAnti_ConductTraffickingInPersons</i>			T
1776	<i>InterdictDrugs</i>			T
1777	<i>ConductDrugTrade</i>			T
1779	<i>ReduceFinancialCrimesOrMoneyLaundering</i>			T
1780	<i>ReduceIntellectualPropertyTheft</i>			T
1781	<i>ConductFinancialCrimeOrMoneyLaundering</i>			T
1782	<i>ConductIntellectualPropertyTheft</i>			T
1783	<i>ReduceOrganizedOrGangRelatedCrime</i>			T
1784	<i>EngageInOrganizedOrGangRelatedCrime</i>			T
1787	<i>PromoteAntiCorruptionReforms</i>			T
1957	<i>CorruptionInLocalAndMidLevelAuthority</i>		T	
1982	<i>IncreaseCriminalPopulation</i>			T
1983	<i>DecreaseCriminalPopulation</i>			T
1999	<i>IncreaseCriminalOrganizations</i>			T
2000	<i>DecreaseCriminalOrganizations</i>			T

Needs Concepts

The needs concepts category includes five important concepts that are relevant to human needs. The category includes the following five semantic terms:

- Refugees, IDPs, Migrants, & Expatriates, in Table 8.15;
- Water, in Table 8.16;
- Housing, Shelter & Camp, in Table 8.17;
- Waste, Sewage & Pollution, in Table 8.18; and
- Health in Table 8.19.

Table 8.15 Needs concept: refugees, IDPs, migrants, & expatriates

ID	OE element	A	E	D
369	<i>ProvideTemporaryShelterHousingRefugeeCamps</i>			T
402	<i>InternallyDisplacedPopulation</i>	T		
403	<i>MigrantPopulation</i>	T		
404	<i>StressMigration</i>		T	
405	<i>IDP_RefugeeCampAndTemporaryShelter</i>		T	
406	<i>RefugeePopulation</i>	T		
407	<i>ExpatriatePopulation</i>	T		
408	<i>ReturnOfExpatriates</i>		T	
410	<i>ForcedPopulationMovement</i>		T	
412	<i>ChangeInPopulationComposition</i>		T	
413	<i>ResettlePeople</i>			T
419	<i>ProvideRefugeeCampSecurity</i>			T
1864	<i>IncreaseIDPs</i>			T
1865	<i>DecreaseIDPs</i>			T
1866	<i>IncreaseMigrants</i>			T
1867	<i>DecreaseMigrants</i>			T
1868	<i>IncreaseRefugees</i>			T
1869	<i>DecreaseRefugees</i>			T
1870	<i>IncreaseExpatriates</i>			T
1871	<i>DecreaseExpatriates</i>			T
1973	<i>SecurityInRefugeeCamp</i>		T	
2034	<i>DamageRefugeeCampOrTemporaryShelter</i>			T

Table 8.16 Needs concept: water

ID	OE element	A	E	D
346	<i>PotableWaterSupply</i>		T	
352	<i>OverallImmediateNeedsOfThePeople</i>		T	
357	<i>DistributeWater</i>			T
373	<i>PrepositionHumanitarianReliefStocks</i>			T
662	<i>WaterDistributionInfrastructure</i>		T	
663	<i>WaterAndSewageTreatmentInfrastructure</i>		T	
664	<i>DamInfrastructure</i>		T	
665	<i>RebuildWaterDistributionInfrastructure</i>			T
669	<i>RebuildWaterOrSewageTreatmentFacilities</i>			T
673	<i>RebuildDamInfrastructure</i>			T
677	<i>DamageWaterDistributionInfrastructure</i>			T
679	<i>DamageWaterOrSewageTreatmentFacilities</i>			T
681	<i>DamageDamInfrastructure</i>			T
1952	<i>WaterAndWasteSystem</i>		T	
2035	<i>ProducePotableWater</i>			T

Table 8.17 Needs concept: housing, shelter & camp

ID	OE element	A	E	D
350	<i>CivilianHousing</i>		T	
352	<i>OverallImmediateNeedsOfThePeople</i>		T	
369	<i>ProvideTemporaryShelterHousingRefugeeCamps</i>			T
371	<i>RebuildCivilianHousing</i>			T
373	<i>PrepositionHumanitarianReliefStocks</i>			T
377	<i>DamageCivilianHousing</i>			T
405	<i>IDP_RefugeeCampAndTemporaryShelter</i>		T	
413	<i>ResettlePeople</i>			T
419	<i>ProvideRefugeeCampSecurity</i>			T
1973	<i>SecurityInRefugeeCamp</i>		T	
2034	<i>DamageRefugeeCampOrTemporaryShelter</i>			T

Table 8.18 Needs concept: waste, sewage & pollution

ID	OE element	A	E	D
347	<i>Pollution</i>		T	
348	<i>TrashDisposal</i>		T	
349	<i>WasteWaterTreatment</i>		T	
359	<i>ProvideSanitationOrWasteWaterManagement</i>			T
361	<i>ReducePollution</i>			T
363	<i>ProduceWaste</i>			T
663	<i>WaterAndSewageTreatmentInfrastructure</i>		T	
669	<i>RebuildWaterOrSewageTreatmentFacilities</i>			T
679	<i>DamageWaterOrSewageTreatmentFacilities</i>			T
1952	<i>WaterAndWasteSystem</i>		T	
1986	<i>RemoveWaste</i>			T

Table 8.19 Needs concept: health

ID	OE element	A	E	D
121	<i>DeathAndInjuryOfCiviliansFromConflict</i>		T	
122	<i>DeathAndInjuryOfCombatantsFromConflict</i>		T	
392	<i>DeathAndIllnessFromDiseaseOtherHealthIssues</i>		T	
394	<i>SatisfactionOfHealthRequirements</i>		T	
395	<i>ExperienceHealthEmergency</i>	T	T	T
397	<i>ProvideMedicalTreatment</i>			T
399	<i>SupportHealthcare</i>			T
535	<i>GeneralHealthcareInfrastructure</i>		T	
536	<i>RepairHealthcareInfrastructure</i>			T
540	<i>DamageHealthcareInfrastructure</i>			T
1924	<i>HealthcarePerson</i>	T		
1934	<i>KeyHealthcareLeader</i>	T		

(continued)

Table 8.19 (continued)

ID	OE element	A	E	D
1937	<i>HealthcareOrganization</i>	T		
1942	<i>HealthcareSupplies</i>		T	
1978	<i>IncreaseHealthcarePersonnel</i>			T
1979	<i>DecreaseHealthcarePersonnel</i>			T
1988	<i>IncreaseHealthcareOrganizations</i>			T
1989	<i>DecreaseHealthcareOrganizations</i>			T
1990	<i>ProvideHealthcareSupplies</i>			T
2005	<i>ChangeHealthcarePolicy</i>			T

Social Concepts

The social concepts category includes four important concepts that are relevant to society in its larger sense. The category includes the following four semantic terms:

- Culture & Religion, in Table 8.20;
- Agreement & Disagreement, in Table 8.21;
- Opinion, in Table 8.22; and
- Education & Training, in Table 8.23.

Table 8.20 Social concept: culture & religion

ID	OE element	A	E	D
66	<i>CorruptionInCulture</i>		T	
207	<i>MitigatePoliticalOrSocialInstabilityOrIndividualUnrestAction</i>			T
426	<i>SocialIssueDecisionMaking</i>		T	
428	<i>CulturalPopulation</i>	T		
429	<i>ReligiousPopulation</i>	T		
430	<i>SocialFaction</i>	T		
431	<i>ReligiousFaction</i>	T		
432	<i>Family</i>	T		
433	<i>KeyIdea</i>		T	
434	<i>SocialNorm</i>		T	
435	<i>KeySocialIndividual</i>	T		
436	<i>KeySpiritualIndividual</i>	T		
437	<i>SatisfactionOfPeoplesSpiritualNeeds</i>		T	
438	<i>ReligiousBuilding</i>		T	
439	<i>ObservationOfCulturalAndSocialInterest</i>		T	
441	<i>PerceptionByPeopleOfChangesInTheirSocialStatus</i>		T	
447	<i>RebuildSenseOfCommunity</i>			T
1874	<i>ChangeCulturalPopulation</i>			T

(continued)

Table 8.20 (continued)

ID	OE element	A	E	D
1875	<i>ChangeReligiousPopulation</i>			T
1876	<i>ChangeKeyLeaderIdentities</i>			T
1972	<i>PopularSenseOfCommunity</i>		T	
1987	<i>DecreaseSenseOfCommunity</i>			T
2006	<i>ChangeSocialOrCulturalPolicy</i>			T
2037	<i>ChangeSocialFactions</i>			T
2038	<i>ChangeReligiousFactions</i>			T

Table 8.21 Social concept: agreement & disagreement

ID	OE element	A	E	D
33	<i>EmployDiplomaticAction</i>			T
39	<i>KeyLeaderAdvocatingPeaceAndStability</i>	T		
40	<i>KeyLeaderAdvocatingConflictAndDissension</i>	T		
47	<i>FactionalDispute</i>		T	
48	<i>ResolutionOfDifferencesByCompetingGroups</i>		T	
49	<i>MediateNegotiateOrPersuadeConflictingParties</i>			T
51	<i>MaintainComplianceWithPeaceAccords</i>			T
53	<i>MonitorPowersharingArrangements</i>			T
90	<i>MonitorOrReportOnCorruptionByGovtOfficials</i>			T
92	<i>MonitorHumanRightsPractice</i>			T
105	<i>KeyIntervenorDiplomaticPerson</i>	T		
109	<i>CivilStabilityAndDurablePeace</i>		T	
134	<i>EstablishObserverMissionOrInterposeForces</i>			T
141	<i>CooperationBetweenGovtMilitaryAndIntervenors</i>		T	
170	<i>EstablishConfidenceBuildingOrSecurityMeasure</i>			T
176	<i>ConductSecurityCoordination</i>			T
367	<i>CoordinateNGOActivities</i>			T
375	<i>NegotiateWithBureaucraciesToGetRelief</i>			T
459	<i>PositiveAndNegativeImpactOfIntervention</i>		T	
478	<i>EstablishLiaisonProgramsWithGovt</i>			T
482	<i>ConductBenignPublicInformationOperation</i>			T
484	<i>ConductNegativeInformationOperation</i>			T
1793	<i>DeLegitimizeTerroristIdeology</i>			T
1794	<i>DeLegitimizeInsurgents</i>			T
1795	<i>DeLegitimizeHNGovt</i>			T
1798	<i>ComplianceWithPeaceAccords</i>		T	
1799	<i>PoliticalPowersharing</i>		T	
1824	<i>IncreaseIntervenorDiplomaticPersonnel</i>			T
1825	<i>DecreaseIntervenorDiplomaticPersonnel</i>			T
1876	<i>ChangeKeyLeaderIdentities</i>			T
2033	<i>IntervenorDiplomaticPerson</i>	T		

Table 8.22 Social concept: opinion

ID	OE element	A	E	D
106	<i>DomesticLegitimacyOfGovt</i>		T	
107	<i>InternationalLegitimacyOfGovt</i>		T	
109	<i>CivilStabilityAndDurablePeace</i>		T	
170	<i>EstablishConfidenceBuildingOrSecurityMeasure</i>			T
193	<i>NonNationStateActorSupport</i>		T	
205	<i>IDFinancialInstitutionalOrLocalSupportForNonNationStateActor</i>			T
352	<i>OverallImmediateNeedsOfThePeople</i>		T	
394	<i>SatisfactionOfHealthRequirements</i>		T	
418	<i>PerceptionOfASafeAndSecureEnvironment</i>		T	
433	<i>KeyIdea</i>		T	
434	<i>SocialNorm</i>		T	
437	<i>SatisfactionOfPeoplesSpiritualNeeds</i>		T	
440	<i>PerceptionByPeopleThatTheirInterestsAreRepresented</i>		T	
441	<i>PerceptionByPeopleOfChangesInTheirSocialStatus</i>		T	
442	<i>ToleranceByPeopleOfTheStatusQuo</i>		T	
447	<i>RebuildSenseOfCommunity</i>			T
459	<i>PositiveAndNegativeImpactOfIntervention</i>		T	
469	<i>OpinionOfPopulation</i>		T	
470	<i>OpinionOfSignificantGroup</i>		T	
471	<i>OpinionOfSignificantLeader</i>		T	
472	<i>OpinionChangeOfPopulation</i>		T	
473	<i>OpinionChangeOfSignificantGroup</i>		T	
474	<i>OpinionChangeOfSignificantLeader</i>		T	
482	<i>ConductBenignPublicInformationOperation</i>			T
484	<i>ConductNegativeInformationOperation</i>			T
1793	<i>DeLegitimizeTerroristIdeology</i>			T
1794	<i>DeLegitimizeInsurgents</i>			T
1795	<i>DeLegitimizeHNGovt</i>			T
1972	<i>PopularSenseOfCommunity</i>		T	
1987	<i>DecreaseSenseOfCommunity</i>			T
2039	<i>RecruitFundOrGainSupportByNonNationStateActor</i>			T

Table 8.23 Social concept: education & training

ID	OE element	A	E	D
15	<i>EducateGovtPersonnel</i>			T
17	<i>TrainFirstResponders</i>			T
21	<i>TrainNewPoliticalLeaders</i>			T
80	<i>TrainLawEnforcementPersonnel</i>			T
155	<i>TrainMilitaryForces</i>			T
161	<i>TrainIntelligenceServices</i>			T
299	<i>ProvideJobTrainingOrEmploymentForDischargedMilitaryPersonnel</i>			T
380	<i>JobRelatedEducationalSystem</i>		T	

(continued)

Table 8.23 (continued)

ID	OE element	A	E	D
381	<i>KeyEducationIndividual</i>	T		
382	<i>PromoteCivicEducation</i>			T
384	<i>ProvideEducationSupplies</i>			T
386	<i>TrainEducators</i>			T
466	<i>SponsorMediaTrainingOrProfessionalization</i>			T
528	<i>GeneralEducationInfrastructure</i>		T	
529	<i>RebuildSchoolOrEducationalInfrastructure</i>			T
533	<i>DamageSchoolOrEducationalInfrastructure</i>			T
1919	<i>Educator</i>	T		
1920	<i>DecreaseEducators</i>			T
1938	<i>EducationOrganization</i>	T		
1943	<i>EducationSupplies</i>		T	
1977	<i>EducateStudents</i>			T
1984	<i>IncreaseEducators</i>			T
2004	<i>ChangeEducationPolicy</i>			T
2007	<i>IncreaseEducationOrganizations</i>			T
2008	<i>DecreaseEducationOrganizations</i>			T

Other Concepts

The Other Concepts category includes two important concepts that are not contained in the other categories. The category includes the following two semantic terms:

- Environment, in Table 8.24 and
- Computer, MIS & C4I in Table 8.25.

Table 8.24 Other concept: environment

ID	OE element	A	E	D
231	<i>ArableLand</i>		T	
322	<i>NaturalResourceMgmtEnvironment</i>		T	
323	<i>ManageNaturalResources</i>			T
615	<i>WaterwaysInfrastructure</i>		T	
664	<i>DamInfrastructure</i>		T	
751	<i>Day_Night_Season</i>		T	
752	<i>Obscurants_FogOrManmade</i>		T	T
754	<i>Temperature_HeatOrColdWave</i>		T	
755	<i>AirMovementOrStorm</i>	T	T	T
757	<i>Precipitation_Drought</i>		T	
763	<i>LandCharacterization</i>		T	
764	<i>NaturalFeature</i>		T	

(continued)

Table 8.24 (continued)

ID	OE element	A	E	D
765	<i>GeographicalSubdivision</i>	T	T	
766	<i>Seastate</i>		T	
767	<i>NaturalResource</i>		T	
768	<i>EarthMovement</i>	T	T	T
770	<i>FireOrWildfire</i>	T	T	T
772	<i>WaterMovement</i>	T	T	T
774	<i>ManmadeDisaster</i>	T	T	T
1995	<i>ChangeNaturalResourcesPolicy</i>			T
2003	<i>ConsumeNaturalResources</i>			T

Table 8.25 Other concept: computer, MIS & C4I

ID	OE element	A	E	D
747	<i>EstablishCommandAndControlProcesses</i>			T
1791	<i>AssistInMISOrItsUse</i>			T
1809	<i>InterventionC4I</i>		T	
1810	<i>HNMilitaryC4I</i>		T	
1812	<i>DamageCommunicationsProcesses</i>			T
1813	<i>DamageCommandAndControlProcesses</i>			T
2057	<i>MIS</i>		T	
2058	<i>DamageMIS</i>			T
2063	<i>OtherC4I</i>		T	

Semantic Concepts Ontology Recap

The only relations used in this chapter are the *is-a* and *similarTo* relations, explained as follows:

is-a: Each instance of A is an instance of B and each property of B is a property of A. Its inverse relation is *superClassOf*.

similarTo: A is similar to B. Its inverse relation is *similarTo*.

These associations of the Semantic Concepts Ontology collectively include most, but not all of the Actors, Actions and Environment Elements, defined by similarities of meaning.

This chapter concludes the discussion of the situation-independent ontology of the Unconventional Conflict Ontology. Chapter 9 discusses the situation-dependent ontology.

Chapter 9

Situation-Dependent Ontology



Technically, the situation-dependent ontology is intimately connected to the situation-independent ontology. However, we will limit the discussion of the situation-dependent ontology to those parts that are additions to the situation-independent ontology. These additions include knowledge structures and the instantiations related to a particular situation that populate the structures.

The situation-dependent structures represent knowledge about general unconventional conflict that can be partially defined as relations among the classes of the (situation-independent) ontology, but which can be completed only at the instance level. Four situation-dependent structures are defined: Goal-Task-Owner (GTO) Sets, Owner Rules, Actor Relations Structures, and Actor-Action-Results (AAR) Structures. GTO Sets represent the agendas of the owners (major parties to a conflict). Owner rules represent the restrictions the owners place upon their own actions (for example, military rules of engagement). Actor relations structures represent the relations between Actors (for example alliances and network inducing relations) and the relations between Actors and Environmental elements (for example, territorial ownership). AAR structures represent the connections between Actions in particular situations and the consequences that result.

As indicated in the name, the situation-dependent structures depend on a particular situation. Figure 9.1 shows the situation (labeled as a model) consisting of an aggregation of a number of GTO Sets, a number of Actor-Environment relations sets, and a number of Actor-Actor relations sets (the latter two being the two types of Actor relations structures). (See Table 1.1 in Chap. 1 for the meanings of the relation icons in the figures and the description preceding Table 7.1 in Chap. 7 for the meanings of the cardinality indicators on the connections.) The GTO Sets also have an aggregation of Action rule sets, which together constitute the owner rules for that GTO Set. In addition, the GTO Sets have aggregations of AAR Sets. Not shown is the supplementary information for the situation (model), such as name and date and the other parts of the model, which contains all of the instantiated ontology for a particular situation (which may be a portion of a larger situation, such as the part covering a particular range of dates or a particular geographical area).

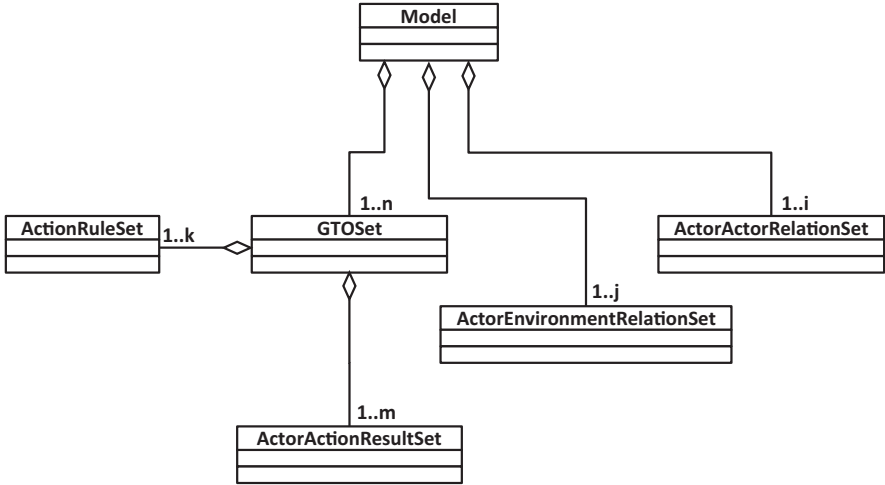


Fig. 9.1 The situation (model) definition

GTO Sets

The motivation for GTO Sets as the agendas for owners (Actors) was presented in Chap. 2, with a brief definition. Figure 9.2 illustrates a possible subgoal: occupy a mountain top. The corresponding subtask would indicate whether this would involve climbing the mountain, airlifting people and equipment, or some other sets of actions.



Fig. 9.2 Subgoal: occupy the top of the mountain

Because the ontology diagrams are complex and (by nature) abstract, we will start with an example that should help in understanding the diagrams.

Example GTO Task-Goal Pair

Table 9.1 shows one task from one GTO Set and Table 9.2 shows the corresponding goal. In Table 9.1, the owner (Coalition Forces) is not shown. The GTO task (“Establish Civil Security (combat ops)”) and its decomposition into GTO subtasks are a standard U.S. military task and its decomposition. Note that the seventh subtask basically says, “And all other things that fit this GTO Task.” Each subtask is decomposed into Action classes that are believed (by the owner) to be required and sufficient to accomplish the subtask. These are shown by their element ID (discussed in Chap. 4), rather than name, for brevity and are divided into two levels, those that directly lead to accomplishing the subtask and those that are indirect or implied requirements.

Table 9.1 Example GTO set (Part 1)

GTO Task	GTO subtasks	Element ID	Element ID
		Actions – Direct	Actions – Indirect
1.0 Establish Civil Security (combat ops)	1 Restore & maintain order	167, 184, 126, 182, 2054	33, 49, 51, 53, 132, 134, 136, 151, 1864, 1868
	2 Conduct operations to halt violence	126, 167, 184, 199, 1837, 1839, 2049, 2050	201, 203, 205, 209, 211, 213
	3 Establish border security	138	1822
	4 Provide public safety support	174, 211	165, 170, 172, 176, 415, 419
	5 Provide civil defense support	17, 155, 167, 2025	
	6 Perform HN police training and support	76, 80	78, 94
	7 Execute civil security common or general tasks	178, 180, 182, 184, 186, 1826, 1827	128, 130, 215, 217, 235, 327, 331, 363, 377, 445, 476, 478, 480, 482, 484, 505, 511, 517, 524, 533, 540, 564, 566, 568, 570, 584, 586, 592, 647, 649, 651, 653, 655, 657, 659, 677, 679, 681, 699, 701, 703, 705, 707, 709, 711, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 740, 743, 745, 747, 1811, 1812, 1813, 1815, 1905, 1918, 2021, 2022

The GTO subgoals that correspond to the subtasks are shown in the first column of Table 9.2. For example, subgoal 1 corresponds to subtask 1. The owner believes that completing subtask 1 will lead to the accomplishment of subgoal 1. The Metrics that

the owner believes relate to the subgoals are divided into two levels. The second column shows the Metrics that are useful indicators of whether the subgoal has been accomplished. The Metrics that most closely reflect that status are in the third column. All are represented by their Metric ID for brevity (discussed in Chap. 6). The last subgoal (column 1), which corresponds to the “all else” subtask, is set to equal the GTO goal, which is repeated in column 4 (“Safe, secure & stable environment established”) with its Metric in column 5. Column 6 displays the verbal description of the task and goal. In the general case, without a pre-defined decomposition, this verbal description is used to decompose the task and goal into subtasks, subgoals, Actions, and Metrics.

Table 9.2 Example GTO set (Part 2)

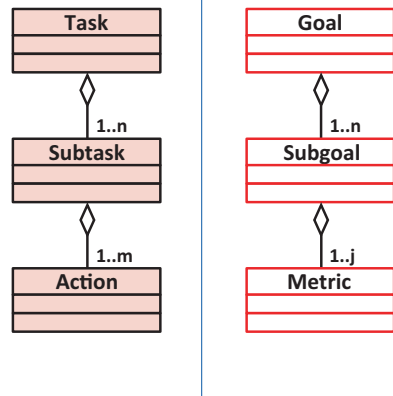
GTO Subgoals	Metric ID	Metric ID	GTO Goal	Metric ID	Description
	Indicators	Metrics		Metrics	
1 Civil unrest quelled		120	1.0 Safe, secure & stable environment established	418	Combat operations: restore and maintain order; establish border security; provide public safety and civil defense support; train and support police
2 Violence halted	121, 122, 123	1006			
3 Borders are secure		808			
4 Public safety established		5, 173			
5 Civil defense mechanisms in place		1056			
6 HN police trained and established		71			
7 Safe, secure & stable environment established	472, 473, 474	418			

The example in these two tables shows one of the Task-Goal pairs for one owner, the Subtask-Subgoal pairs for that Task-Goal pair, and the Actions and Metrics that are associated with the Subtask-Subgoal pairs. In the situation illustrated in Fig. 2.30 on page 80, there are 12 owners, each with its own GTO Set (agenda), each having three to seven Task-Goal pairs. Clearly, instantiating these agendas involves lots of work and requires an explicitly defined structure to hold the results. With this example in mind, the following diagrams should be more comprehensible.

GTO Set Ontology Diagrams

The words “task,” “goal,” “subtask,” and “subgoal” have specific meanings here. As shown in Fig. 9.3, a subtask is an aggregation of Actions (from the ontology) and a task is an aggregation of subtasks. Similarly, a subgoal is an aggregation of Metrics and a goal is an aggregation of subgoals. The cardinality indicators next to the

Fig. 9.3 Defining tasks and goals



aggregation connectors show that each aggregation may range from a single thing to multiple things (e.g., one or more subtasks for a task), with the cardinalities in the figure identical for Subtasks and Subgoals, but independently chosen for Actions and Metrics.

Note that these are defined as aggregations rather than compositions. The distinction is that the disaggregations are not unique or even necessarily complete. These definitions model actual human choices as opposed to some ideal choice. Thus, a given person might divide a task into two large and one small subtasks, while another person might divide it into four small tasks, but forget a fifth task.

The left side of Fig. 9.4 begins the definition of Task-Goal Pairs and Subtask-Subgoal Pairs: a Task-Goal Pair consists of exactly one task and one goal and a Subtask-Subgoal Pair consists of exactly one subtask and one subgoal. As indicated, the task part *affects* the goal part of each pair. This relation indicates that pair choice is intended to reflect a task/subtask that will accomplish the goal/subgoal; however, because this is a human choice, the best that can be assumed is that the task part will affect the goal part.

The right side of Fig. 9.4 shows how the two pairs are connected. Each Task-Goal Pair is an aggregation of from 1 to n Subtask-Subgoal Pairs in which the Task is an aggregation of the subtasks (with the same cardinality) and the Goal is an aggregation of the subgoals (with the same cardinality). The subtasks are aggregations of Actions (with independent cardinality) and the subgoals are aggregations of Metrics (with independent cardinality). At the Action-Metric (bottom) level, the various Actions affect various Metrics through their connections in the larger ontology; however, those Metrics may or may not be contained in the chosen Metrics (again reflecting human fallibility) and so there is no direct connection shown in the figure.

Figure 9.5 represents the structure of a *GTOSet*, with the internal connections of Fig. 9.4 implied. Each *GTOSet* has exactly one *Owner*, who will be represented by an *Actor* in the ontology upon instantiation. This owner’s agenda is represented by

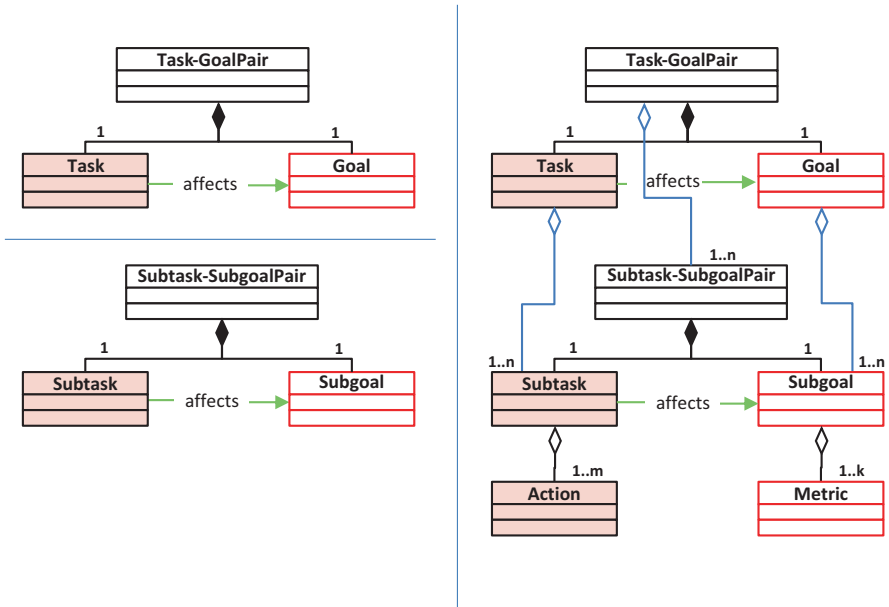


Fig. 9.4 Defining task-goal pairs

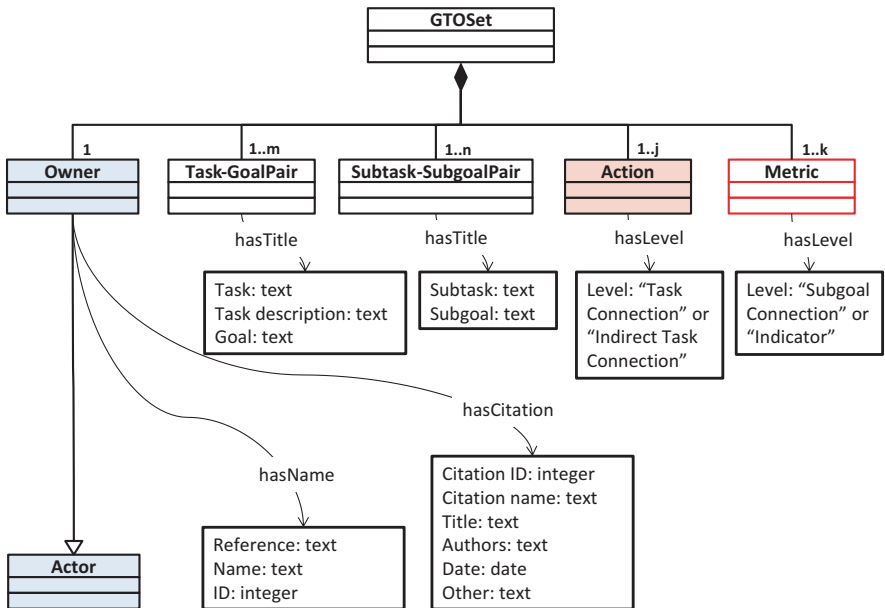


Fig. 9.5 GTO set structure

the m Task-Goal Pairs, the n Subtask-Subgoal Pairs, the j Actions, and the k Metrics that the owner believes will indicate accomplishment of the agenda. The figure also shows the additional information that is part of the *GTOSet* instantiation.

The actual GTO Set structure is actually slightly more complex than what is shown in these figures. There is a special subtask for each task that allows for the need for Actions that cut across the other tasks (reducing the need for duplication of Actions). Subtask 7, the “all else” subtask in Table 9.1, is an example of such a subtask. This special subtask is paired with a special subgoal that repeats the title of the goal to allow for Metrics that are closely aligned with the entire goal, as opposed to any one of the subgoals; see subgoal 7 in Table 9.2.

The final part of the GTO Set structure is the attachment of GTO Sets to a model, as was shown in Fig. 9.1

Owner’s Metric Model

Each Owner has a set of goals and subgoals in his agenda and a set of tasks and subtasks that he believes will lead to the realization of this agenda. Even though the owner’s beliefs do not ensure that accomplishing these tasks will, in fact, lead to accomplishing the goals, it is important to record in the ontology what each owner believes. These beliefs form the owner’s implicit metric model.

The first part of an owner’s metric model consists of the connections between the subtasks and subgoals. That is, the owner believes, for example, that “Establishing civil security (combat ops)” by means of the listed Actions will result in “Civil unrest is quelled,” measured by the listed Metric (subtask 1 in Table 9.1 and subgoal 1 in Table 9.2). The second part of the metric model consists of the connections between the subtasks and the tasks and between the tasks and the overall agenda or, alternatively expressed, between the subgoals and the goals and between the goals and the overall agenda. Viewed in this latter fashion, the set of Metrics on the goals side of the GTO Set (Table 9.2) form a model that describes the owner’s beliefs. As shown in Fig. 9.6, the owner believes that the value of Metric 418 can be inferred from the values of the

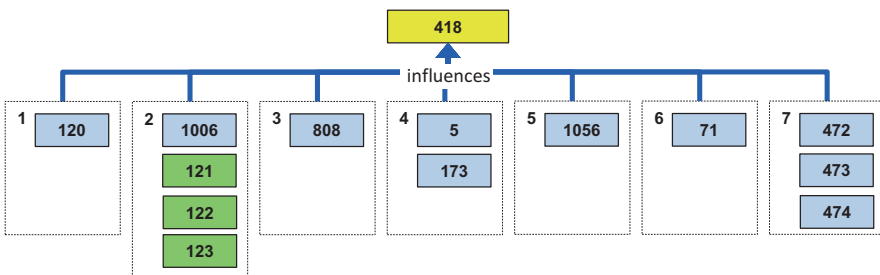


Fig. 9.6 Part of the metric model for a GTO set

Metrics below it. It should be noted that these connections are not being represented as justified by any theories; rather, they represent the beliefs of the owner. Each owner will have his own metric model and these metric models may disagree in the aggregate.

There are two types of metric models: owner’s metric models and theoretical metric models. Theoretical metric models will be discussed in the Theories Ontology Chap. 10.

Owner Rules

Owner rules are restriction on the permitted Actions. Within the military, these are called “rules of engagement” and are stated explicitly. However, all parties to a conflict have analogous rules, whether explicit or implicit. For example, terrorists might have an “anything goes” rule or might have rules that restrict operations to a particular area during a particular time-frame. Figure 9.7 shows an *ActionRuleSet* as an aggregation of rules. Each *ActionRuleSet* has a start date for that set of rules. (A new set of rules with a later start date automatically supersedes sets of rules with earlier start dates.) Each rule applies to an *ActionSubcategory* or set of subcategories, and thus to all of the Actions that are children of the subcategories.

Fig. 9.7 Action rule set definition

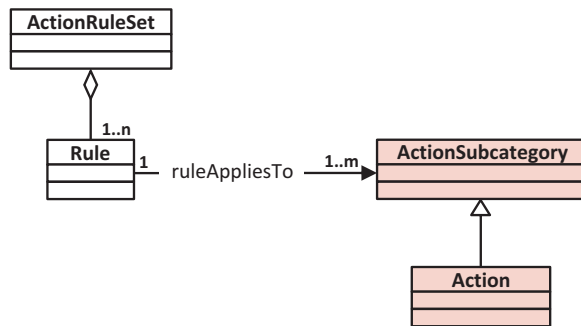


Figure 9.8 shows that the owner of a GTO Set attaches an aggregation of *ActionRuleSets* to the *GTOSet* to restrict the Actions. This attachment was abbreviated in Fig. 9.1.

Table 9.3 shows a sample of rules that could be assigned at various times and places by an owner. They are organized here by Action subcategory, although other organizational principles are possible. Note that the definitions of which Actors are friends, foes, neutral, or shades of these relationships are set in the Actor Relations Structures, as are such things as ownership of or control of geographic areas, both discussed in a later section. Such concepts may be included in the rule definitions as restrictions on the rule’s application.

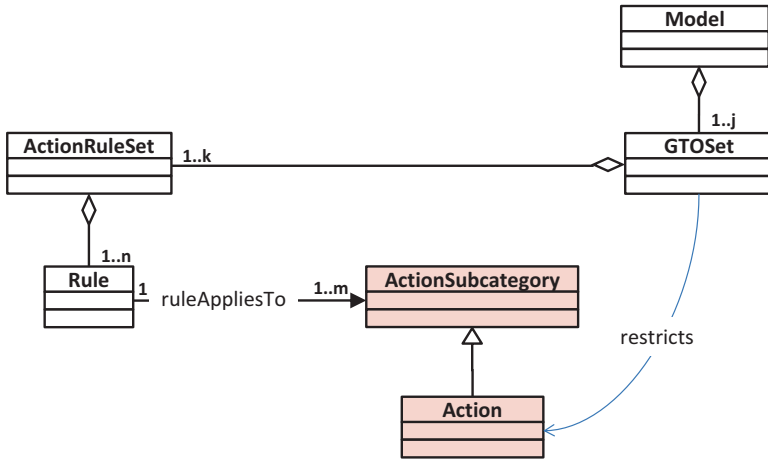


Fig. 9.8 Owner rules definition

Table 9.3 Sample rules

ActionSubcategory	Rule
Antiperson	Avoid casualties to civilians, friendly forces, no chemical, biological, or radiological weapons
Antiperson	Casualties are only restricted by resources and capabilities
Antiperson	Do not injure anyone
Antiperson	Engage in limited extrajudicial, criminal, and suppression activities
Antiperson	Use weapons only when attacked, avoid civilian casualties
Damage	Avoid damage to civilian infrastructure, friendly force infrastructure, Host Nation infrastructure
Damage	Damage is only restricted by resources and capabilities
Damage	Do not damage the environment
GeneralConflict	Avoid all conflict
GeneralConflict	Conduct conflict by any means available
GeneralConflict	Do not participate in terrorism or piracy

Actor Relations Structures

Actor relations have two types: an Actor’s relationship with an Environmental element (Actor to Thing) and an Actor’s relationship with another Actor (Actor to Actor). The marching unit in Fig. 9.9 implies a unit organization, with a coordination of different people carrying out different functions. Such a unit organization can be described by Actor-to-Actor relationships.



Fig. 9.9 Actor-Actor relations: unit organization

Actor-Environment Relations

Figure 9.10 shows how the Actor-to-Thing relation requires both class relations and instance relations for its definition. An *ActorEnvironmentRelationSet* is composed of an *Actor*, an *ActorEnvironmentRelation*, and an *EnvironmentElement*. In this case, Islamic State of Iraq and Syria (*ISIS*), which is an instance of the Actor class *TerroristOrganization*, *controls* (an instance of the *ActorEnvironmentRelation*

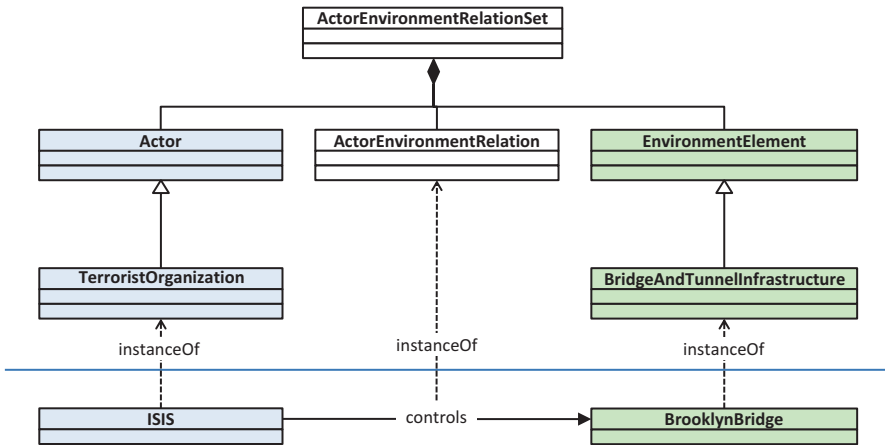


Fig. 9.10 Actor-to-thing relation

class) the *BrooklynBridge*, which is an instance of the *EnvironmentElement* class, *BridgeAndTunnelInfrastructure*.

Table 9.4 provides a list of some Actor-to-Environment-Element instance relations. In a theater-level situation, the most important Actor-to-Thing relations will probably be designations of which group-type Actor owns, controls or occupies which geographical areas or parts of the infrastructure.

Table 9.4 Sample actor to thing relations

<i>ActorEnvironmentRelation</i>	Relation Description
<i>consumes</i>	Actor consumes the Thing or portions of the Thing.
<i>createsOrProduces</i>	Actor creates or produces the Thing.
<i>uses</i>	Actor makes use of or derives benefit from the Thing.
<i>hasInterestIn</i>	Actor is concerned about the Thing.
<i>occupiesOrPossesses</i>	Actor physically occupies or possesses the Thing.
<i>owns</i>	Actor owns or has some property rights to the Thing.
<i>controls</i>	Actor controls access or use of the Thing.

Actor-Actor Relations

Actor-to-Actor relations are more complex than Actor-to-Thing relations. As illustrated in Fig. 9.11, an *ActorActorRelationSet* is composed of two Actors (in a particular order, *Actor1* and *Actor2*) and an *ActorActorRelation*. In this instance, *Frank directsOrControls Ralph*. Frank is an instance of the Actor class *KeyNonGovtArmedOfficial* and Ralph is an instance of the Actor class *NonGovtArmedOfficial* and *directsOrControls* is an instance of *ActorActorRelation*. As an aid to understanding the origin of the relation, the figure also shows that both Actor instances are members of *ISIS*, which is an instance of the Actor class *TerroristOrganization*. As with Actor-to-Thing relations, the actual relationship is at the instance level.

Table 9.5 lists some of the Actor-to-Actor relations that are possible. Many of these relations are taken from a website on vocabularies (Davis, 2010). Note that in these relations, the Actor1, Actor2 order is significant.

These Actor-to-Actor relations can be used in describing a network of Actors. In a theater-level situation, most of these relations will be between group-type Actors, indicating superior-subordinate relations in hierarchies and friend-foe-neutral relationships between groups. However, in special cases, relationships between individual Actors may be appropriate. Terrorist networks provide examples of special cases and include the possibility of indicating several different relationships within the network, such as kinship, friendship, control, and remote influence.

The connections for both types of sets of relations were shown in Fig. 9.1.

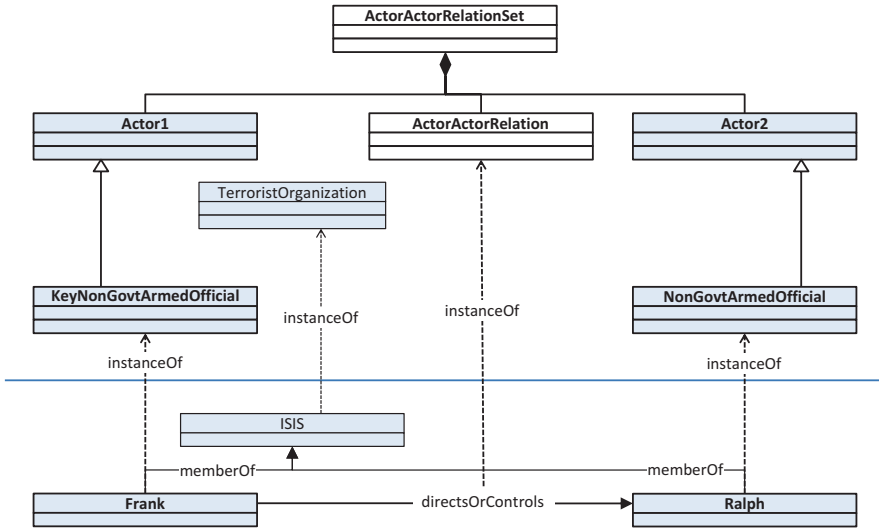


Fig. 9.11 Actor-to-Actor relation

Table 9.5 Sample actor to actor relations

<i>ActorActorRelation</i>	Relation Description
<i>wouldLikeToKnow</i>	Actor1 desires to know Actor2 more closely.
<i>knowsOf</i>	Actor2 has come to be known to Actor1 through his, her or its actions or position.
<i>knowsByReputation</i>	Actor2 is known by Actor1 primarily for a particular action, position or field of endeavor.
<i>knowsInPassing</i>	Actor1 has slight or superficial knowledge of Actor2.
<i>hasMet</i>	Actor2 has met Actor1 whether in passing or longer.
<i>acquaintanceOf</i>	Actor2 has more than slight or superficial knowledge of Actor1 but short of friendship.
<i>talksWith</i>	Actor 1 and Actor2 talk together.
<i>friendOf</i>	Actor2 shares mutual friendship with Actor1.
<i>closeFriendOf</i>	Actor2 shares a close mutual friendship with Actor1.
<i>lostContactWith</i>	Actor2 was once known by Actor1 but has subsequently become uncontactable.
<i>livesWith</i>	Actor2 shares a residence with Actor1.
<i>neighborOf</i>	Actor2 lives in the same locality as Actor1.
<i>ambivalentOf</i>	Actor1 has mixed feelings or emotions towards Actor2.
<i>isTheSuperiorOf</i>	Actor1 is the superior of Actor2 in some organization
<i>directsOrControls</i>	Actor1 directs or controls the actions of Actor2.

AAR Structures

Actor-Action-Result structures complete the connections between owners' agendas and their results. The AAR structures can be described with classes; however, they can only be completed with instances. The description requires several steps.

Figure 9.12 defines the *ActorActionSet*. This class sets up the vignette (small part of the situation). It centers on a single Action that will be originated by one or more Actors. The Action requires one or more resources (Environment elements) and will be aimed at one or more targets (Environment elements or Actors or both).

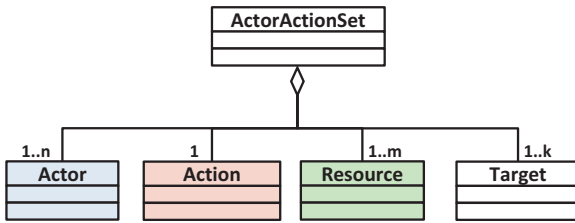


Fig. 9.12 The ActorActionSet

Figure 9.13 defines the *ResultSet*. This class contains the elements that will be changed as a result of the Action (including “no change” as a possible “change”). The originating Actors are also subject to change, as are the resources. The targets are obviously subject to change; however, other (non-targeted) Environment elements or Actors may also be affected and are included.

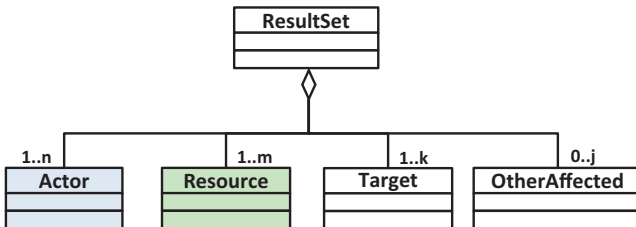


Fig. 9.13 The ResultSet

The left side of Fig. 9.14 illustrates the way that Actions affect Things. The Action affects an element and we observe the effect through a change in a state variable (metric) value. We may say that the Action affects the element or we may say it affects the Metric. The right side of the figure relates this definition to a *ResultSet* and elaborates on the definition. Each Action has a time and a location specified by its Metrics. In addition, the effect that the Action has on the *ResultSet* is explained by one or more *Theories*.

These concepts are abbreviated in the *ActorActionResultSet* structure shown in Fig. 9.15.

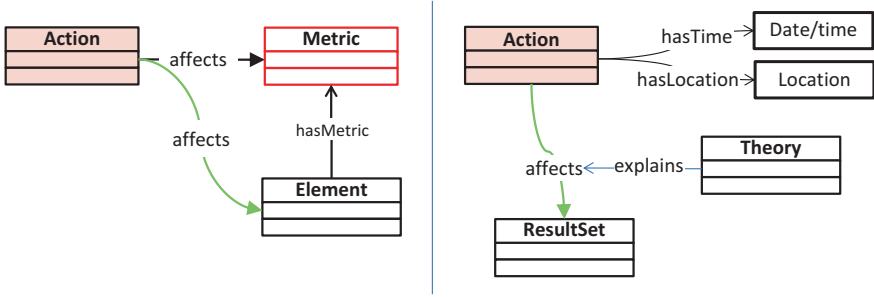


Fig. 9.14 How actions affect things

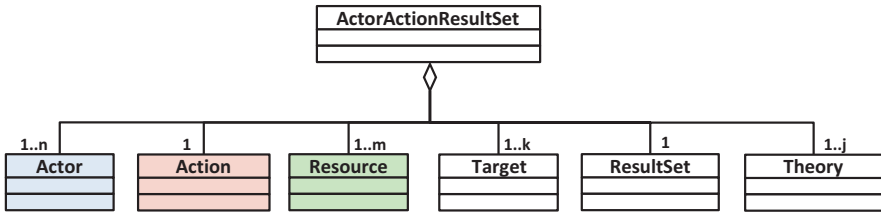


Fig. 9.15 The ActorActionResultSet

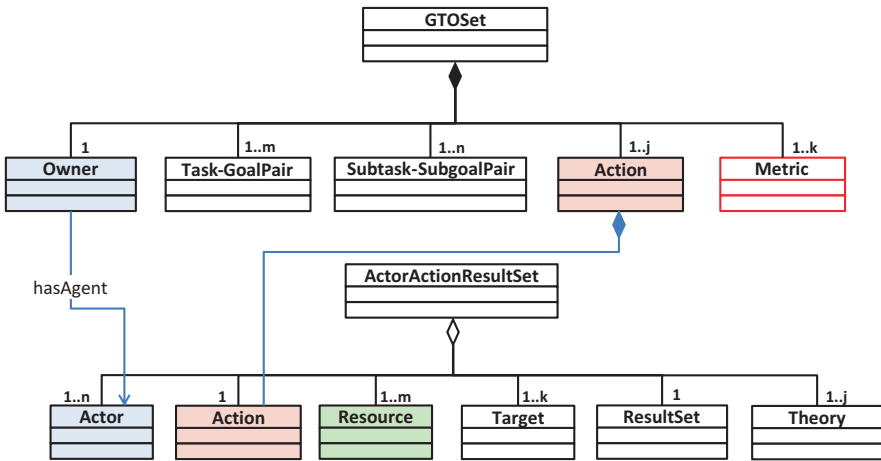


Fig. 9.16 Connecting AAR sets to GTO sets

Figure 9.16 shows the relationship between the AAR Sets and the GTO Sets. Each Action in a GTO Set is represented by an AAR Set each time it occurs. The Actors in the AAR Set are related to the owner of the GTO Set. (The same Action performed as part of a different owner's GTO Set would be carried out by Actors related to that owner.) This connection of the AAR Sets to the GTO Sets was abbreviated in Fig. 9.1.

Situation Dependence Recap

Several class relations are used in this chapter and are explained as follows:

is-a: Each instance of A is an instance of B and each property of B is a property of A. Its inverse relation is *superClassOf*.

necessaryPartOf: A is a necessary part of B (composition). Its inverse relation is *hasNecessaryPart* (also shown as *includes*).

optionalPartOf: A is an optional part of B (aggregation). Its inverse relation is *hasOptionalPart*.

influences: A is a Metric and influences Metric or Element B. Its inverse relation is *influencedBy*.

affects: A is an Action and affects Actor, Environment Element, or Metric B. Its inverse relation is *affectedBy*.

hasRule: A is an Action Subcategory and has a rule B. Its inverse relation is *ruleAppliesTo* (shown here).

restricts: A is a rule and constrains Action B. Its inverse is *restrictedBy*.

explains: A is a Theory and explains Action B. Its inverse is *explainedBy*.

instanceOf: A is an instance of Class B. Its inverse is *instantiatedBy*.

Several class relations are used in their instance versions. The class relations are explained as follows:

hasAgent: A is an Actor and has Actor B as an agent. Its inverse relation is *agentOf*.

hasTitle: A has title B. Its inverse relation is *titleOf*.

hasName: A has name B. Its inverse relation is *nameOf*.

hasLevel: A is an Action or a Metric and has level B where B is a GTO Set level. Its inverse relation is *levelOf*.

hasCitation: A has citation B. Its inverse relation is *citationOf*.

hasTime: A has time B. Its inverse relation is *timeOf*.

hasLocation: A has location B. Its inverse relation is *locationOf*.

memberOf: A is an Actor and a member of B (aggregation). Its inverse relation is *hasMember*.

In addition, two purely instance relations were used. These relations are explained as follows:

controls: Actor controls access or use of the Thing. Its inverse relation is *controlledBy*.

directsOrControls: Actor1 directs or controls the actions of Actor2. Its inverse relation is *directedOrControlledBy*.

The situation-independent ontology contains the structures, classes, and relations that can be defined without regard to a specific situation. This ontology expresses most of the generic knowledge we have about unconventional conflict.

The situation-dependent structures described in this chapter complete the expression of our generic knowledge; however, these structures require a connection to a particular situation for their full expression.

For example, the partial GTO Set shown in Table 9.1 and Table 9.2 appears to be situation-independent because it reflects a U.S. military owner and a standard U.S. military doctrine. However, this is only an apparent situation-independent state. General doctrine changes and can be situation-dependent. Further, the identities and agendas of other parties to an unconventional conflict must be regarded as situation-dependent. Similarly, Owner Rules, Actor Relations, and AAR structure instantiations will be strongly situation-dependent, despite the fact that the structures of the knowledge will be unchanged.

It should be clear that both the situation-independent ontology and the situation-dependent parts are required for describing and understanding unconventional conflict in general and any particular unconventional conflict.

This completes the description of the unconventional conflict ontology *per se*; however, the various references to theories indicate a need for an ontology of theories. Chapter 10 introduces the Theories Ontology and discusses its current status and the need for additional work to make it more nearly complete.

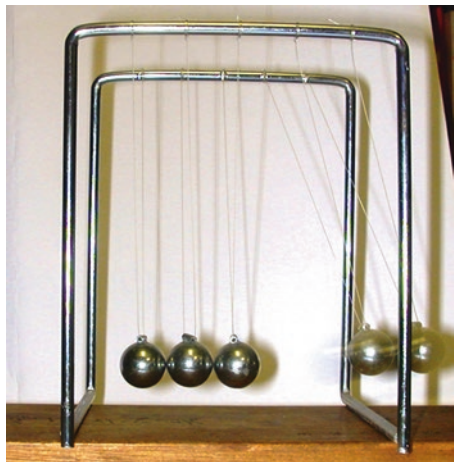
Chapter 10

Theories Ontology



The Theories Ontology is not strictly part of the Unconventional Conflict Ontology; it is a separate ontology. However, it is useful in the application of the situation-dependent part of the Unconventional Conflict Ontology both for justifying decisions in modeling unconventional conflict and for explaining the results of situations in a real-world conflict. There are five discipline categories, representing a total of 32 disciplines. The five discipline categories are the social sciences, “hard” sciences, applied sciences, formal theories, and a miscellaneous group that does not consist of disciplines but is applied as if they were. Figure 10.1 illustrates a hard science theory, conservation of momentum. This chapter describes the organization of the Theories Ontology and all of its theory classes. In addition, the last section of this chapter discusses the connections between the Theories Ontology and the Unconventional Conflict Ontology.

Fig. 10.1 Theory:
conservation of momentum



Ontology Organization

Figure 10.2 illustrates a theory class connected to its source discipline. It is also connected to a context and to a validity valuation for the theory in that context.

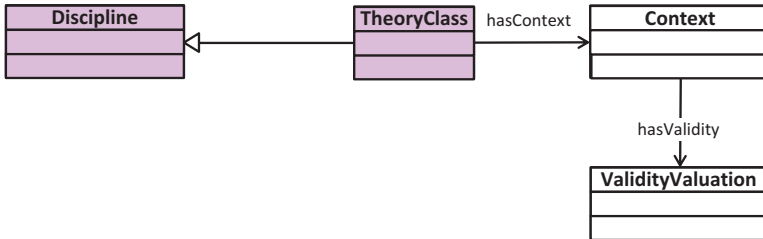


Fig. 10.2 Theory connections

The Theories Ontology differentiates the theory classes and provides similarity linkages among the classes. Figure 10.3 provides a diagram of the ontology showing the connections between the disciplines and the discipline categories. The individual theory classes are represented by a single class, situated to the right of the taxonomy, with two *is-a* connections that show that each theory class may have multiple parents.

The theories are preliminary. They need to be addressed by experts in the various fields as to which theories should be included, how the theories should be broken up or combined, and how the theories should be stated. The validity of the theories, given in the tables below, should be treated as place-holders. In each case a general context was assumed, but not stated. The experts will need to decide what contexts are germane to each theory and how the theory should be assessed within each context. The validity assessment codes are shown in Table 10.1. They represent text anchors for a Likert-type assessment of the validity of the theories.

Note that “disproved” theories are accorded some value, as sometimes “disproved” theories are only out of favor and could later be accorded higher values. Also, a “scientifically proved theory” may later undergo revisions; however, for these purposes we will regard both Newton’s and Einstein’s theories of gravitation as examples of Proved theories within appropriate domains of applicability.

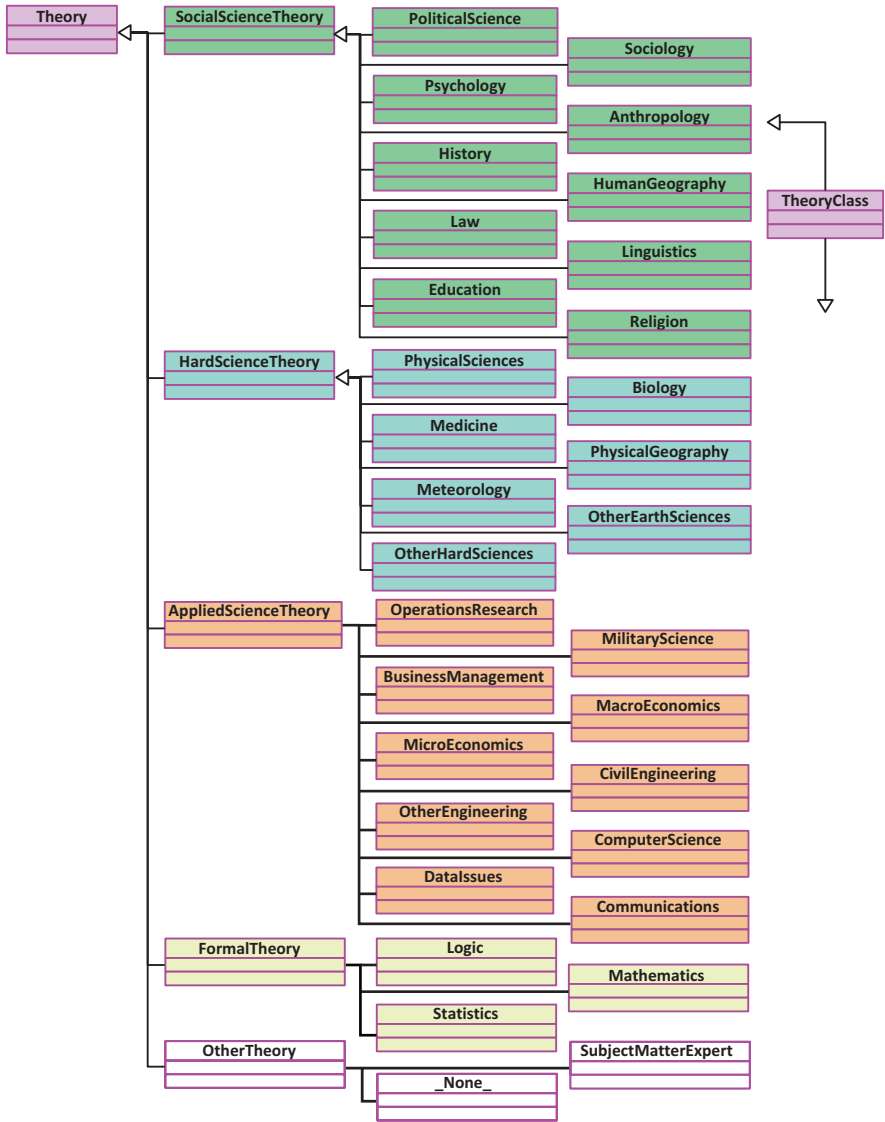


Fig. 10.3 Theories ontology

Table 10.1 Theory validity codes

Type	Description	Value
Nil	Uncodified	0.0
Nil+	Codified but amorphous	0.5
WAG	“Wild Assed Guess” (WAG) or “disproved” theory	1.0
WAG+	WAG plus some science	1.5
SWAG	“Scientific Wild Assed Guess” (SWAG)	2.0
SWAG+	SWAG with some review or peer-reviewed with some negatives	2.5
PeerRvw	Peer-reviewed theory or well-reviewed with some negatives	3.0
PeerRvw+	Well reviewed theory	3.5
Accepted	Generally accepted theory	4.0
Proved-	Close to proven theory	4.5
Proved	Scientifically proved theory	5.0

Social Science Theories

Currently, there are ten disciplines that are children of the social science discipline category. Each is represented by a table of theory names and validity assessments, as follows:

- Political science theories are shown in Table 10.2.
- Psychology theories are shown in Table 10.3.
- Sociology theories are shown in Table 10.4.
- Anthropology theories are shown in Table 10.5. Many of these are not “theories” in a predictive sense; however, they may be thought of as theories that describe how people organize their thinking about various subjects.
- History theories are shown in Table 10.6.
- Human geography theories are shown in Table 10.7.
- Law theories are shown in Table 10.8.
- Linguistic theories are shown in Table 10.9
- Education theories are shown in Table 10.10
- Religion theories are shown in Table 10.11

Table 10.2 Political science theory classes

Theory	Value
Aristocracy	4
Arms race	3
Authoritarian government	4
Autocracy	4
Combat, nationality	3
Contingency theory	2.5
Democracy, direct	4
Democracy, representative	4

(continued)

Table 10.2 (continued)

Theory	Value
Despotism	4
Deterrence, classical	3.5
Deterrence, dynamic	3.5
Deterrence, GameTheory	3.5
Dictatorship	4
Economic. Voting	3.5
Fascism	4
Governance, quest for viable peace (QVP)	3
Inherency theory	2.5
Legitimacy, charismatic	3
Legitimacy, congruence	2
Legitimacy, consent	3
Legitimacy, corruption	3
Legitimacy, crime	3
Legitimacy, elite	3
Legitimacy, endorsement	3
Legitimacy, ideological	3
Legitimacy, popularity	3
Legitimacy, rational	3
Median voter	3.5
Monarchy	4
Oligarchy	4
Politics of fertility and economic development (POFED)	3
Power transition	3.5
Regime change	3
Spatial bargaining	3.5
Subjective well-being	2.5
Theocracy	4
Totalitarian government	4
Unity messages	3
Wedge messages	3

Table 10.3 Psychology theory classes

Theory	Value
Actor observer bias	2.5
Affect control theory	3.5
Altruism	2.5
Archetypes	1
Attachment theory	3
Attitude functions	3
Attribution theory 1	2.5
Attribution theory 2	2.5

(continued)

Table 10.3 (continued)

Theory	Value
Attribution theory 3	2.5
Behavioral theory	3
Belief, desire, intention	2.5
Big five factor model	3.5
Bounded rationality	4
Bystander effect	2.5
Cattell sixteen factor personality	4
Cognitive development	3
Cognitive dissonance theory	2.5
Combat, initiative	3
Combat, leadership	3
Compliance	2.5
Conformity	3
Elaboration likelihood model (ELM)	3
Ethnomethodology	3
Eysenck 3 dimension personality model	3.5
Halo effect	2.5
Hierarchical temporal memory (HTM) theory	3
Heroism	1.5
Heuristic-systematic model (HSM)	3
Influence, authority	3.5
Influence, consistency	3.5
Influence, liking	3.5
Influence, political	3.5
Influence, reciprocation	3.5
Influence, scarcity	3.5
Influence, social proof	3.5
Inoculation theory	2.5
Intelligence, general	3.5
Intelligence, multiple	3
Intelligence, primary abilities	3
Intelligence, triarchic	3
Involvement elaboration likelihood model (ELM)	3
Language expectancy theory	3
Leader behavior	3
Leadership	3
Leadership, behavioral	1.5
Leadership, contingency	1.5
Leadership, great man	1.5
Leadership, participative	1.5
Leadership, relationship	1.5
Leadership, situational	1.5
Leadership, trait theory	1.5

(continued)

Table 10.3 (continued)

Theory	Value
Leadership, transactional	1.5
Learning style Jungian	1
Learning style Kolb	3
Learning style VARK	3
Left brain right brain	1
Love vs liking	1.5
Love, color wheel model	1.5
Love, compassion v passion	1.5
Love, triangular theory	1.5
Maslow needs theory	2
Memory	3.5
Minnesota multiphasic personality inventory (MMPI)	3
Mood states	2.5
Moral development	2.5
Myers–Briggs	2.5
Neurotic needs theory	1
Obedience	3
Parenting styles	2.5
Preferences on goals	2.5
Prototype concepts	4
Psychoanalytic personality	1
Psychogenic needs theory	3
Psychosexual development	1
Psychosocial development	3
Rational choice theory	3
Reactance theory	2.5
References	2.5
Self-affirmation theory	2.5
Self-awareness theory	2.5
Self-awareness, quantum state	2
Self-completion theory	2.5
Self-discrepancy theory	2.5
Self-evaluation maintenance theory	2.5
Self-monitoring theory	2.5
Self-perception theory	2.5
Self-presentation theory	2.5
Self-verification theory	2.5
Set of happiness	2.5
Social cognitive theory	3
Social comparison theory	2.5
Social emotion theory	3.5
Social exchange theory	2.5

(continued)

Table 10.3 (continued)

Theory	Value
Social facilitation	2.5
Social identity	3
Social impact theory	2.5
Social learning theory 1	3
Structural strain theory	2.5
Subjective well-being	2.5
Terror management theory	2.5
Theory of planned behavior	3
Theory of reasoned action	3
Trait theory – Allport	3
Triangular theory of love	2.5
Two factor theory of emotion	2.5

Table 10.4 Sociology theory classes

Theory	Value
Actor observer bias	2.5
Agenda setting theory	2.5
Altruism	2.5
Arousal theory	2.5
Bounded confidence	3.5
Bystander effect	2.5
Chaos theory	4
Civil violence model	2.5
Coalition theory	3
Combat, initiative	3
Combat, intelligence	3
Combat, leadership	3
Combat, morale	3
Combat, nationality	3
Communication penetration theory (CPT)	4
Computational organization theory	2.5
Compliance	2.5
Conflict theory	3.5
Conformity	3
Critical theory	0.5
Cultural dimensions	3.5
Feminist theory	0.5
Forced migration	2.5
Framing theory (FT)	2.5
Functionalist theory	3.5
Game theory	3.5
Halo effect	2.5
Heroism	1.5

(continued)

Table 10.4 (continued)

Theory	Value
Horizontal inequality	3
Impression management	3
Influence, political	3.5
Informational social influence	2.5
Insecurity	3
Integration theory	3
Labeling theory	1
Leadership, behavioral	1.5
Leadership, contingency	1.5
Leadership, great man	1.5
Leadership, participative	1.5
Leadership, relationship	1.5
Leadership, situational	1.5
Leadership, trait theory	1.5
Leadership, transactional	1.5
Manifest & latent functions	3
Media outlet theory	2.5
Micro-generation	2.5
Minimum resource theory	3
Normative social influence	2.5
Opinion description	3
Opinion leadership theory (OPT)	3
Priming theory (PT)	2.5
Public discourse	3
Rational choice theory	3
Relative deprivation	2
Role theory	3
Semantic differential	2.5
Source message channel receiver (SMCR)	3.5
Social constructionism	2.5
Social emotion	3.5
Social identity	3
Social impact theory	2.5
Social judgment theory (SJT)	2.5
Social network	3
Social network quantum theory	2
Social phenomenology	2.5
Sociobiology	3
Source lines of communication	2
Structural strain theory	2.5
Structuration theory	2.5
Symbolic interactionism	3
Tipping point	3.5
Vertical collectivism	3

Table 10.5 Anthropology theory classes

Theory	Value
Asymmetric info/NoTrust/terroristic violence	2
Circumscription theory	3
Cultural dimensions	3.5
Cultural group selection	2.5
Cultural success	3.5
Economic defendability	3.5
Fine art development	2.5
Fraternal interest groups	2
Honor_Arab	3
Modernization theory	3
Neoevolution	3
Origin of government	3
Patronage_Arab	3.5
Population density. Food	2
Postindustrial society	2.5
Protein hypothesis	2.5
Sacred values	1.5
Sigmoid utility theory	3
Socialization	3
Sociobiology	3
Trading raiding	2
Transcultural diffusion	4
Unilineal evolution	1
Vertical collectivism	3
Woman capture	3.5

Table 10.6 History theory classes

Theory	Value
Demographic structural theory	2
Leadership, great man	1.5
Public discourse	3

Table 10.7 Human geography theory classes

Theory	Value
Birth rate – age specific	4
Combat, nationality	3
Death rate – Thatcher	4

Table 10.8 Law theory classes

Theory	Value
Influence, political	3.5
<i>Jus sanguinis</i>	4
<i>Jus soli</i>	4
Labeling theory	1
Social learning theory 2	2.5
Structural strain theory	2.5

Table 10.9 Linguistic theory classes

Theory	Value
Discourse theory	4
Semantic differential	3
Semantic differential model input	2.5

Table 10.10 Education theory classes

Theory	Value
Behavior conditioning	3
Constructivism	3
Education system flow	2.5
Intelligence, multiple	3
Learning style Jungian	1
Learning style Kolb	3
Learning style VARK	3
Operant conditioning	3
Social cognitive learning theory	3
Social learning theory 1	3

Table 10.11 Religion theory classes

Theory	Value
Essentialist religion theories	2
Functional religion theories	2

Hard Science Theories

Currently, there are seven disciplines that are children of the hard science discipline category. Each is represented by a table of theory names and validity assessments, as follows:

- Physical sciences theories are shown in Table 10.12.
- Biological sciences theories are shown in Table 10.13.
- Medicine theories are shown in Table 10.14.
- Physical geography theories are shown in Table 10.15. These are not theories in the predictive sense; however, they are methods of representing physical geography.
- Meteorology theories are shown in Table 10.16.
- Other earth science theories are shown in Table 10.17.
- Other hard science theories are shown in Table 10.18.

Table 10.12 Physical sciences theory classes

Theory	Value
Circular error probable (CEP)	4
Combat, technology	3
Line of sight algorithm	4
Social network quantum theory	2
Trajectories	4
Vulnerability	4

Table 10.13 Biological sciences theory classes

Theory	Value
Evolution	4
Sociobiology	3

Table 10.14 Medicine theory classes

Theory	Value
Disability adjusted life years (DALY) model	2.5
Epidemic Hoppenstaedt	3.5
Epidemic susceptible-infectious-recovered (SIR) model	3
Epidemic susceptible-infectious-susceptible (SIS) model	2.5
Hierarchical temporal memory (HTM) theory	3

Table 10.15 Physical geography theory classes

Theory	Value
Arc-node network	2.5
Combat, geometry	3
Digital terrain elevation data (DTED)-0	3
Digital terrain elevation data (DTED)-1	3.5
Digital terrain elevation data (DTED)-2	4
Hex or square grid	3
Lat-long coordinates	4
Line of sight algorithm	4
No spatial coords	2
XY coordinates	3.5

Table 10.16 Meteorology theory classes

Theory	Value
Combat, weather	3
Meteorology	2.5

Table 10.17 Other earth science theory classes

Theory	Value
Earthquake prediction	2.5
Volcano prediction	1.5

Table 10.18 Other hard science theory classes

Theory	Value
Semantic differential	2.5

Applied Science Theories

Currently, there are ten disciplines that are children of the applied science discipline category. Each is represented by a table of theory names and validity assessments, as follows:

- Operations research theories are shown in Table 10.19
- Military science theories are shown in Table 10.20
- Business management theories are shown in Table 10.21
- Macroeconomics theories are shown in Table 10.22
- Microeconomics theories are shown in Table 10.23
- Civil engineering theories are shown in Table 10.24
- Other engineering theories are shown in Table 10.25
- Computer science theories are shown in Table 10.26
- Data issues theories are shown in Table 10.27
- Communications theories are shown in Table 10.28

Table 10.19 Operations research theory classes

Theory	Value
Analytic hierarchy process (AHP)	3
Bayes' theorem	4
Bayesian decision theory	4
Bounded rationality	4
Circular error probable (CEP)	4
Cluster analysis	4
Coalition theory	3
Computational organization theory	2.5
Cost effectiveness analysis	4
Data envelopment analysis (DEA)	4
Decision tree	4
Dempster–Shafer theory	4
Dijkstra's algorithm	5
Dynamic programming	4
Exponential smoothing	4
Game theory	3.5
Graph theory	3.5
Hidden Markov models	3.5
Influence diagram	4
Line of sight algorithm	4
Linear programming	5
Little's law	5
Markov chains	5
Multi-attribute utility theory (MAUT)	4
Multiple criteria decision making (MCDM)	3.5
Neural networks	3.5
Portfolio theory	3.5
Queueing theory	5
Recognitions-primed decision (RPD) making and image theory	3.5
Search theory	5
Time series analysis	4
Trajectories	4

Table 10.20 Military science theory classes

Theory	Value
Actor-centric COIN	3
Bonder Farrell theory	3.5
Circular error probable (CEP)	4
COIN accidental guerrilla	2.5
COIN CI math	2.5
COIN counter GDP	2.5
COIN dominating religion	2.5
COIN force to population ratio	2.5
COIN GDP level	2.5

(continued)

Table 10.20 (continued)

Theory	Value
Combat, force size	3
Combat, geometry	3
Combat, initiative	3
Combat, intelligence	3
Combat, leadership, attrition	3
Combat, leadership, winning	3
Combat, morale	3
Combat, nationality	3
Combat, posture	3
Combat, technology	3
Combat, weather	3
FM 3–24 coin	3.5
Hartley log-linear law	3
Insurgent strategy	3.5
Insurgent type	3
Lanchester linear law	2.5
Lanchester square law	2.5
Line of sight algorithm	4
Small wars manual	3.5
Trajectories	4
Vulnerability	4

Table 10.21 Business management theory classes

Theory	Value
Bureaucracy	2.5
Leadership, contingency	1.5
Leadership, relationship	1.5
Leadership, situational	1.5
Leadership, transactional	1.5
Parkinson’s law	2.5
Peter principle	2
Satisficing	3
Theory X	2
Theory Y	2

Table 10.22 Macroeconomics theory classes

Theory	Value
Aggregate demand curve	3
Beveridge curve	3
Business cycles	4
Capital flight	3
COIN counter GDP	2.5
COIN GDP level	2.5
Currency crisis	3
Debt-deflation spiral	3
Deficit-led hyperinflation	3

(continued)

Table 10.22 (continued)

Theory	Value
Disaster fallacy	1
Endogenous growth	3
Exchange rate effect	3
Fiscal policy	4
Fisher effect	3
Gross domestic product (GDP)	4
Income inequality Gini coefficient	3
Income inequality Lorenze curve	3
Interest rate effect	3
Keynesian economics	2.5
Laffer curve	3
Mercantilism, currency	3
Monetarism	3.5
Money quantity theory	3
Phillips curve	2.5
Production possibilities frontier (PPF)	4
Rule of 70	4
Solow growth model	3.5
Stagflation and imports	3
Trade balance using forex	3.5
Unemployment	4
Wealth effect	3

Table 10.23
Microeconomics theory classes

Theory	Value
Aggregate demand curve	3
Bounded rationality	4
Circular flow model	4
Coalition theory	3
Efficiency wage theory	3
Elasticity theory	4
Externalities	4
Game theory	3.5
Income inequality Gini coefficient	3
Income inequality Lorenze curve	3
Opportunity cost	4
Preference theory	3.5
Prospect theory	3
Rational choice theory	3
Risk propensity	3.5
Subjective well-being	2.5
Supply and demand	4
Supply demand model	4
Utility theory	4
Utility, subjective perception	3.5
Welfare analysis	3.5

Table 10.24 Civil engineering theory classes

Theory	Value
Build roads: Time, cost and jobs based on capacity, length, etc.	4
Build tunnel: Time, cost and jobs based on capacity, rock, etc.	4
Build bridge: Time, cost and jobs based on capacity, type, etc.	4
Build building: Time, cost and jobs based on size, type, etc.	4
Build dam: Time, cost and jobs based on size, type, etc.	4
Build sewage system: Time, cost and jobs based on capacity, type, etc.	4
Build water distribution system: Time, cost and jobs based on capacity, type, etc.	4
Build railroad: Time, cost and jobs based on capacity, type, etc.	4
Build waterway: Time, cost and jobs based on capacity, type, etc.	4
Build seaport: Time, cost and jobs based on capacity, type, etc.	4
Build airport: Time, cost and jobs based on capacity, type, etc.	4
Build prison: Time, cost and jobs based on capacity, type, etc.	4
Build refugee camp: Time, cost and jobs based on capacity, type, etc.	4
Build electric power plant: Time, cost and jobs based on capacity, type, etc.	4
Build electric power distribution system: Time, cost and jobs based on capacity, type, etc.	4
Build extractive energy plant: Time, cost and jobs based on capacity, type, etc.	4
Build mine: Time, cost and jobs based on capacity, type, etc.	4

Table 10.25 Other engineering theory classes

Theory	Value
Combat, technology	3
Control theory	4

Table 10.26 Computer science theory classes

Theory	Value
A*	4
Coherence theory of thought and action	3
Computational organization theory	2.5
Continuous simulation	4
Discrete event simulation	4
Greedy algorithm	3
Hierarchical temporal memory (HTM) theory	3
Identical variables	4
Mixed continuous and discrete event simulation	4
Programmer’s decision	1
Random number generator	3.5
Simulated annealing	4
Static model	3
Tabu search	4
Time stepped simulation	4

Table 10.27 Data issues theory classes

Theory	Value
Input data	4
Likert scales	3

Table 10.28 Communications theory classes

Theory	Value
Communication penetration theory (CPT)	4
Framing theory (FT)	2.5
Media outlet theory	2.5
Source lines of communication	2
Source message channel receiver (SMCR)	3.5
Symbolic interactionism	3

Formal Theories

Currently, there are three disciplines that are children of the formal theories discipline category. Each is represented by a table of theory names and validity assessments, as follows:

- Logic theories are shown in Table 10.29.
- Mathematics theories are shown in Table 10.30.
- Statistics theories are shown in Table 10.31

Table 10.29 Logic theory classes

Theory	Value
Predicate logic	5

Table 10.30 Mathematics theory classes

Theory	Value
Catastrophe theory	4.5
Chaos theory	4
Coalition theory	3
Communication theory	3.5
Computational organization theory	2.5
Game theory	3.5
Information theory	4
Opinion description	3

Table 10.31 Statistics theory classes

Theory	Value
Central limit theorem	5
Law of large numbers	5

Other Theories

Currently, there are 2 “disciplines” that are children of the other theories discipline category. Each is represented by a table of theory names and validity assessments, as follows:

- Subject matter expert theories are shown in Table 10.32. These are actually judgements of the validity values for various subject matter experts, individually and as types of subject matter experts.
- `_None_` theories are shown in Table 10.33. These are special case entries that cover situations where no justification is given for the connection between a situation and its results and for situations that are not modeled or considered.

Table 10.32 Subject matter expert theory classes

Theory	Value
Cobb, Loren	2.5
Deployable exercise support (DEXES) system	3
Hartley DIME/PMESII	2
Hayes & sands	2.5
Role player	1
Scenario designer	1.5

Table 10.33 `None_theory` classes

Theory	Value
No justification	0
Not modeled	0

Connecting the Theories Ontology

There are three points of connection between the Theories Ontology and the Unconventional Conflict Ontology, all dealing with the Metrics.

Direct Connection to Metrics

In the Context subsection of the Situation-Independent section of Chap. 2, theories are called for to explain changes in Metric values resulting from Actions (or to justify creating those changes in a computer model). This view was further developed in the AAR Structures subsection of the Situation-Dependent section of Chap. 2. This requirement for theory is especially evident where changes to opinions are involved. This view is illustrated with ontology diagrams in the AAR Structures section of Chap. 9.

Implicit Metric Models

The Owner's Metric Model subsection of the GTO Sets section of Chap. 9 introduced the concept of an implicit metric model. Each Owner's agenda is represented in a GTO Set and its instantiation represents an instantiation of the Owner's beliefs concerning how Actions relate to Metrics and how the Metrics relate to the Owner's goals. Figure 9.6, in Chap. 9, illustrates the concept by showing how the Metrics must be related if the Owner believes that the tasks and goals relate as shown in the instantiation. These connections represent the Owner's implicit theories. By defining the Owner as a subject matter expert, these implicit theories could be codified as Theories falling into the Other Theories category.

Theoretical Metric Models

A theoretical metric model is similar to an owner's metric model in structure; however, rather than describing the beliefs of one of the parties to the conflict, it uses the Metrics in the ontology and some explicit theoretical basis to describe the inferential connections among the Metrics for a generic unconventional conflict (or for some specific situation). If this theoretical basis could be validated, then the theoretical metric model would provide the "correct" answer. Absent any absolute validation, several theoretical metric models can be constructed.

The Metric classes and their instantiated objects contain the status of the situation (or outputs of a simulation). However, a close reading of the ontology will reveal that the Metrics are not connected to one another! This was done on purpose. Saying that the value of one Metric affects the value of another Metric is a model. Describing how one value affects the other is an elaboration of the model. This theory-based metric model is not properly part of a general ontology, but part of the model of a specific situation (even if it later becomes evident that the metric model is generalizable into a universal metric model) and requires VV&A.

Metrics can be aggregated (for example, through the PMESII hierarchy); however, this may not lead to the desired outcome. Element Metrics are (generally) at a low level and aggregation remains at that level. There are some specified aggregate Metrics that are at a somewhat higher level, but not quite what is desired.

The Measures of Merit (MoMs) hierarchy explains the levels of metrics:

- Dimensional Parameters (DP): Properties or characteristics inherent in physical entities, e.g., flow rate of a water purification unit under ideal conditions.
- Measures of Performance (MoP): Measures of direct results, e.g., flow rate of water purification unit in the field.
- Measures of Effectiveness (MOE): Measures of effects that depend on purpose, such the number of people supplied with sufficient potable water per day.
- Measures of Force Effectiveness (MoFE): MOEs that relate to an entire organization's activities, such as humanitarian relief.

- Measures of Political Effectiveness (MoPE): MOEs that relate to the effectiveness at the highest level, such as civil stability and durable peace.

Conceptually, the hierarchical levels of MoMs are connected, with the values of higher level MoMs being determined by the values of lower level MoMs. However, there are practical problems.

- The values of MoPs may (sometimes) be either deterministically or probabilistically calculable from a set of related DPs. For example, there may be a theory that connects the flow rate of a water purification unit in the field that is based on the flow rate under ideal conditions and the different conditions that obtain in the field. Alternatively, there may be a set of charts that give ranges of values that are based on testing. Probabilistic predictions can be derived from these charts.
- Inferring the values of MOEs from MoPs becomes more problematic, partly because the identification of the proper MoPs that should be used is often difficult and partly because the theoretical bases for making the connections are more difficult to determine and apply.
- Inferring MoFE values from MOEs and MoPE values from MoFE values is even more difficult. MoFEs and MoPEs depend on human factors to a very large extent, contributing to the difficulty of inferring values.

A simple example may clarify the general problem. Suppose one wants to infer the happiness of a population. An inference that smiles imply happiness might be a starting point. Smiles are observable and could be counted, yielding an estimate of happiness. Unfortunately, this is not sufficient because some people might be happy, but not smiling. Another measure might be added, such as asking people if they are happy. There are several problems that are immediately apparent (and others that might not be apparent):

- Some people may be caught smiling because they have just heard a funny joke, but are not generally happy.
- The people who are asked about their happiness may be those who are convenient to ask, perhaps just those in safe zones, skewing the results.
- The starting inference may be culturally biased. Do smiles indicate happiness in all cultures?

This example shows the need for theory-based inferences. However, some of the “theories” may not be codified in textbooks. This is the reason that the Subject Matter Expert subcategory of theories exists. Some inferences will be based on what an expert says is the case, not on some peer-reviewed theory.

The theoretical metric model differs from the metric models of the GTO Sets, shown in Fig. 9.6. Those metric models represent the beliefs of the GTO Set owners, not necessarily the true inferential relations among the Metrics. The theoretical metric model is meant to represent the true relations, based on theories.

Figure 10.4 shows a partial theoretical metric model, asserted in the ISSM (Hartley D. S., Operations Other Than War (OOTW) Flexible Asymmetric Simulation Technologies (FAST) Prototype Toolbox: ISSM v4.00 Analysts’ Guide, 2006b).

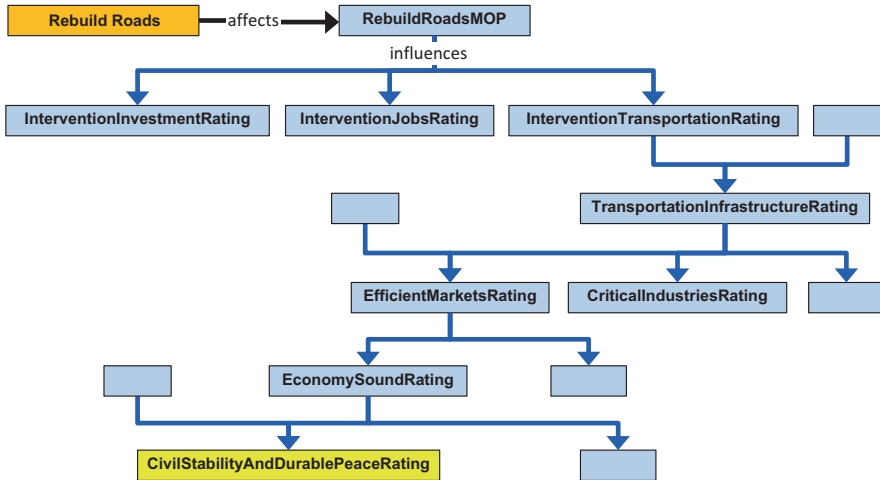


Fig. 10.4 Example of a partial theoretical metric model

- The Action, “Rebuild Roads” yields a measure of performance Metric, *RebuildRoadsMOP*.
- The value of this Metric affects three rating Metrics (after suitable time delays), *InterventionInvestmentRating*, *InterventionJobsRating*, and *InterventionTransportationRating*.
- The *InterventionTransportationRating* is also affected by other Metrics and its value affects the Metrics, *EfficientMarketsRating*, *CriticalIndustriesRating*, and other Metrics (boxes without labels).
- The *EfficientMarketsRating* is also affected by other Metrics and its value affects the value of *EconomySoundRating* and other Metrics.
- The value of *EconomySoundRating* affects *CivilStabilityAndDurablePeaceRating* and other Metrics.
- The final Metric, which measures the success of the model (from the U.S. point of view), *CivilStabilityAndDurablePeaceRating*, is also affected by other Metrics.

The import of this model is that you can infer the value of the highest level metrics, measures of political effectiveness (MoPEs), from the values of more accessible metrics in a real situation. And you can do the same thing in a computer model where the calculated values of the “accessible” metrics can be based on theories with relatively high validity. The MoPEs are the metrics that represent answers to the questions of those responsible for dealing with a situation (or that the model is designed to answer).

Creating a metric model requires subject matter experts in several fields. It is not technically difficult because the ontology provides all the elements that need to be connected. However, it is very important because this is where the assertion is made

that a certain state of the situation is better or worse than another state. Each connection requires a call to a specific theory or set of theories as justification. ***This is a key part of model design.*** That means that each Metric represents an attachment point of one or more theories, ***which are outside of the Unconventional Conflict Ontology.***

This point deserves emphasis. Unless the model output consists only of a collection of numbers, requiring human analysis to establish the meaning of the model's results, ***the metric model provides the most important output of the model.*** It provides the answer to “who won?” and similar questions.

Theories Recap

Only a few relations are used in this chapter and they are explained as follows:

is-a: Each instance of A is an instance of B and each property of B is a property of A. Its inverse relation is *superClassOf*.

influences: A is a Metric and influences Metric or Element B. Its inverse relation is *influencedBy*.

affects: A is an Action and affects Actor, Environment Element, or Metric B. Its inverse relation is *affectedBy*.

explains: A is a Theory and explains Action B. Its inverse is *explainedBy*.

hasContext: A is a Theory and has context B. Its inverse is *contextOf*.

hasValidity: A is a Theory context and has validity B. Its inverse is *validityOf*.

The Theories Ontology is a work in progress. It contains a structure and a set of classes. However, the contents require review, emendation and additions by experts in the various disciplines before it can be regarded as nearly complete.

Chapter 11 relates the domain of unconventional conflict to complexity and emergent properties through examples of other domains. It also relates the Unconventional Conflict Ontology to ontologies in these other domains.

Chapter 11

Complexity and Emergent Properties



Consider billiards: the billiard balls travel in nice straight lines, bouncing off the cushions with geometric precision, striking other balls and sending them in predictable directions, obeying Newton's laws, only restricted by energy loss through friction and imperfect cushions. Introducing spin increases the complexity of the game, as the reaction with the surface can result in curved paths. The game of pool introduces the "absorbing state" of Markov analysis: the pocket. The ball that enters the gravity field of the pocket may fall and be out of play. If the ball does not fall, its trajectory will be changed in a complex way. At the beginning of the game, the balls are racked in an array. The array is struck by the cue ball, sending all the balls around the table. Because the array is not perfectly formed and the cue ball placement and trajectory are not the same each time, the resulting trajectories are not repeatable: a simple geometric game actually involves complexity and chaos theory.

It's Complicated

Not all complicated things are complex; but complexity is complicated. In regard to complexity and complex systems, several characterizations are relevant:

- The first page of each Springer Complexity series book says, "Complex Systems are systems that comprise many interacting parts with the ability to generate a new quality of macroscopic collective behavior the manifestations of which are the spontaneous formation of distinctive temporal, spatial or functional structures" (Fellman, Bar-Yam, & Minai, 2015). The macroscopic collective behavior referred to is also called an "emergent property."
- Mesjasz says, "The most universal characteristics of complex systems are: large numbers of constituent elements and interactions, non-linearity of the characteristics depicting its behavior, various forms of hierarchical structure, non-decomposability, unpredictability, and self-organization" (Mesjasz, 2015).

- Wikipedia says, “A complex system is a system composed of many components which may interact with each other. In many cases it is useful to represent such a system as a network where the nodes represent the components and the links their interactions. Examples of complex systems are Earth's global climate, organisms, the human brain, social and economic organizations (like cities), an ecosystem, a living cell, and ultimately the entire universe.” And, “Complex systems are systems whose behavior is intrinsically difficult to model due to the dependencies, relationships, or interactions between their parts or between a given system and its environment. Systems that are "complex" have distinct properties that arise from these relationships, such as nonlinearity, emergence, spontaneous order, adaptation, and feedback loops, among others. Because such systems appear in a wide variety of fields, the commonalities among them have become the topic of their own independent area of research” (Wikipedia, 2017a).

In regard to emergence and emergent properties, two characterizations are sufficient:

- Wikipedia says about emergence, “In philosophy, systems theory, science, and art, emergence is a phenomenon whereby larger entities arise through interactions among smaller or simpler entities such that the larger entities exhibit properties the smaller/simpler entities do not exhibit” (Wikipedia, 2017b).
- In the same article, it describes emergent properties, “An emergent behavior or emergent property can appear when a number of simple entities (agents) operate in an environment, forming more complex behaviors as a collective. If emergence happens over disparate size scales, then the reason is usually a causal relation across different scales. In other words, there is often a form of top-down feedback in systems with emergent properties. The processes from which emergent properties result may occur in either the observed or observing system, and can commonly be identified by their patterns of accumulating change, most generally called 'growth'. Emergent behaviours can occur because of intricate causal relations across different scales and feedback, known as interconnectivity. The emergent property itself may be either very predictable or unpredictable and unprecedented, and represent a new level of the system's evolution. The complex behaviour or properties are not a property of any single such entity, nor can they easily be predicted or deduced from behaviour in the lower-level entities, and might in fact be irreducible to such behavior. The shape and behaviour of a flock of birds or school of fish are good examples of emergent properties” (Wikipedia, 2017b).

Complexity deals with complicated systems, so it should be no surprise that the topic is complicated. The Santa Fe Institute represents itself as the world headquarters for complexity science, which is probably an accurate representation. It hosts several courses about complexity, such as its “Introduction to Complexity,” which provide more detailed information about the subject (Santa Fe Institute, 2017).

Ontologies provide a technique to portray what is known, side-stepping complexity problems. Each of the sections below describes a complex system and the ontology that clarifies it.

Physics

Complexity abounds in the universe, defying man’s attempts to impose order. Scarcely had we decided that matter was divided into indivisible “atoms,” providing a firm foundation for understanding the world, than we discovered that these same atoms were in fact divisible! It now seems that the number of subatomic particles types is infinite – or at least ungovernably large (actually the number of particle types is probably less than 1000). However, as chaotic as the situation seems, physicists are working on an ontology (sometimes called the “bestiary” of subatomic particles). One version of this ontology is shown in Fig. 11.1.

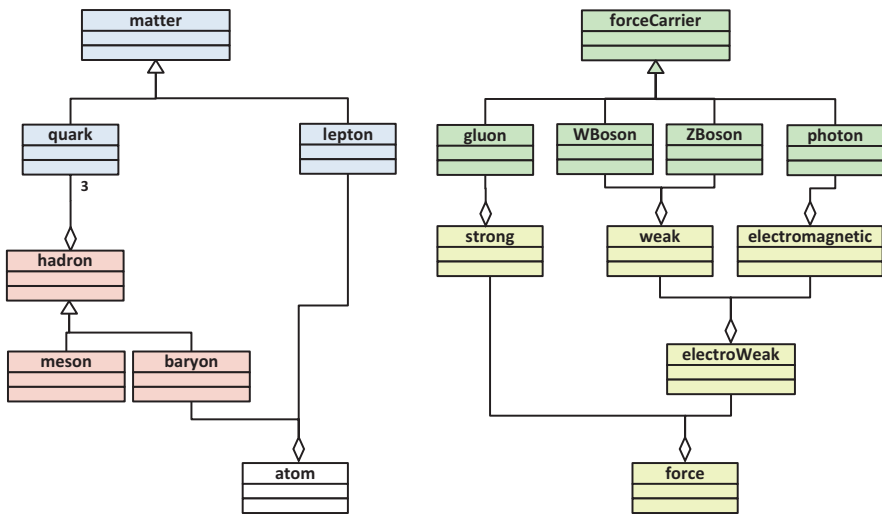


Fig. 11.1 Subatomic particle ontology

There are elementary particles: quarks (up, down, top, bottom, charm, and strange), leptons (electron, muon, tau, electron neutrino, muon neutrino, and tau neutrino), and elementary bosons that mediate the forces (photon for the electromagnetic force, gluon for the strong nuclear force, and Z and W boson for the weak force). The quarks are always bound together in triplets and form the hadrons, which come in two types, mesons and baryons. The baryons form the nuclei of atoms and together with the electron form atoms. The forces are the relations of the ontology, explained by such things as quantum chromodynamics, quantum electrodynamics, and the electroweak theory.

Now that the Higgs boson has been found, gravity and mass can be “explained” and added to the ontology. This ontology is reducing the chaos into a manageable order. It is not yet complete, but it is useful.

Emergent Properties and Chemistry

One surprising characteristic of complex systems is that some properties are scale-dependent. For example, at the atomic level, elements are distinguished by the number of protons in the nucleus (the atomic number). Figure 11.2 shows some basic properties of an element, in this case, the element is iron.

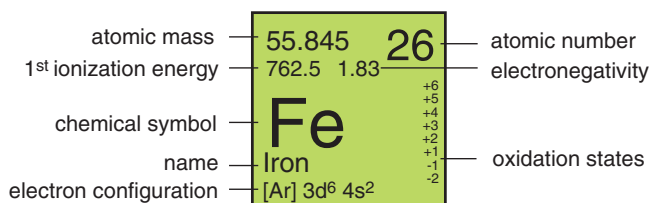


Fig. 11.2 Properties of elements

Its chemical symbol is “Fe,” which is most prominent in the display. It has 26 protons in the nucleus, the atomic number. Four isotopes have 28, 30, 31, and 32 neutrons in the nucleus, with the second being the most abundant. The protons and neutrons in the abundance-weighted mix of the isotopes contribute most of the atomic mass. A non-ionized iron atom will have 26 electrons.

Of particular interest is the electron configuration. For example, the electron configuration of iron is shown in Fig. 11.2 as the configuration of argon [Ar] plus “3d⁶ 4s².” Chemistry deals with atoms in large numbers and is dependent on an emergent property based on the electron configuration of atoms. Atoms with filled electron shells (noble gases, such as argon) behave differently from those with unfilled shells: they are (nearly) chemically inert. Atoms with one electron more than a filled shell are highly reactive, as are those with one less electron than a filled shell. Iron has eight more electrons than argon and ten fewer electrons than the next noble gas, krypton, and is thus in the middle.

The periodic table of elements (Fig. 11.3) is a particularly successful ontology. The noble gases are shown in the right-hand column in cyan (the lighter blue color). The halogens, with one less electron than a filled shell are shown one column to the left, colored magenta. The alkali metals are shown in the left-hand column, colored orange. The table itself is constructed as an increasing sequence of elements by atomic number, starting with hydrogen, atomic number “1.” Helium is a noble gas, so the list of elements is divided there. The next row, or period, begins under hydrogen. There are seven elements before the next noble gas, forcing a gap in the first period. The third period also has eight elements; however, the fourth period has 18 elements,

group 1
period 1

1 1.00794 H Hydrogen																	18 4.002602 He Helium														
2 3 6.941 Li Lithium	4 9.012182 Be Beryllium											8 18.998403 F Fluorine	9 19.998466 Ne Neon																		
3 11 22.989769 Na Sodium	12 24.304 Mg Magnesium											16 32.06 S Sulfur	17 35.453 Cl Chlorine	18 39.948 Ar Argon																	
4 19 39.0983 K Potassium	20 40.078 Ca Calcium	21 44.9559 Sc Scandium	22 47.867 Ti Titanium	23 50.9415 V Vanadium	24 54.93804 Cr Chromium	25 55.845 Mn Manganese	26 58.9332 Fe Iron	27 58.9332 Co Cobalt	28 58.9332 Ni Nickel	29 63.546 Cu Copper	30 65.38 Zn Zinc	31 69.723 Ga Gallium	32 72.64 Ge Germanium	33 74.9216 As Arsenic	34 78.96 Se Selenium	35 79.904 Br Bromine	36 83.798 Kr Krypton														
5 37 85.4678 Rb Rubidium	38 87.62 Sr Strontium	39 88.90585 Y Yttrium	40 91.224 Zr Zirconium	41 92.90638 Nb Niobium	42 95.96 Mo Molybdenum	43 98 Tc Technetium	44 101.07 Ru Ruthenium	45 102.9055 Rh Rhodium	46 106.42 Pd Palladium	47 107.8682 Ag Silver	48 112.411 Cd Cadmium	49 114.818 In Indium	50 118.710 Sn Tin	51 127.46 Sb Antimony	52 127.46 Te Tellurium	53 126.90447 I Iodine	54 131.293 Xe Xenon														
6 55 132.9054 Cs Cesium	56 137.27 Ba Barium	57 138.905 La Lanthanum	58 140.9076 Ce Cerium	59 144.242 Pr Praseodymium	60 147.07 Nd Neodymium	61 150.36 Pm Promethium	62 151.964 Sm Samarium	63 157.25 Eu Europium	64 162.5 Gd Gadolinium	65 162.5003 Tb Terbium	66 164.9303 Dy Dysprosium	67 168.9343 Ho Holmium	68 173 Er Erbium	69 175 Tm Thulium	70 176.93 Yb Ytterbium	71 177.054 Lu Lutetium	72 178.49 Hf Hafnium	73 180.9479 Ta Tantalum	74 183.84 W Tungsten	75 186.207 Re Rhenium	76 186.207 Os Osmium	77 192.22 Ir Iridium	78 192.22 Pt Platinum	79 196.96657 Au Gold	80 200.59 Hg Mercury	81 204.3833 Tl Thallium	82 208.9804 Pb Lead	83 208.9804 Bi Bismuth	84 208.9804 Po Polonium	85 208.9804 At Astatine	86 208.9804 Rn Radon
7 87 223.019 Fr Francium	88 226.0254 Ra Radium	89 227 Ac Actinium	90 231.03688 Th Thorium	91 231.03688 Pa Protactinium	92 238.02891 U Uranium	93 237 Np Neptunium	94 241 Pu Plutonium	95 243 Am Americium	96 247 Cm Curium	97 251 Bk Berkelium	98 252 Cf Californium	99 257 Es Einsteinium	100 259 Fm Fermium	101 262 Md Mendelevium	102 265 No Nobelium	103 269 Lr Lawrencium	104 277 Rf Rutherfordium	105 286 Db Dubnium	106 286 Sg Seaborgium	107 286 Bh Bohrium	108 286 Hs Hassium	109 286 Mt Meitnerium	110 286 Ds Darmstadtium	111 286 Rg Roentgenium	112 286 Cn Copernicium	113 286 Nh Nihonium	114 286 Fl Flerovium	115 286 Uup Ununpentium	116 286 Uuh Ununhexium	117 286 Uus Ununseptium	118 286 Uuo Ununoctium

■ alkali metals
■ alkaline metals
■ other metals
■ transition metals
■ lanthanoids
■ actinoids
■ metalloids
■ nonmetals
■ halogens
■ noble gases
■ unknown elements

Fig. 11.3 Periodic table of elements

forcing a gap in the second and third periods and enlarging the gap in the first period. The gap is placed so that elements with similar chemistries (the emergent property) are found in the same or adjacent columns. The fourth and fifth periods have the same number of elements; however, the sixth and seventh periods have an additional 14 elements. Rather than introducing a new gap, these additional elements are usually shown as a separate piece, sometimes with indications (other than the element numbers) as to where they should be inserted.

In the figure, elements with similar chemical properties are color-coded. The remarkable clustering of the colors indicates the reason that the periodic table is such a successful ontology.

Organic Chemistry and Biology

The development of chemistry from emergent properties of physics is replicated in the development of organic chemistry from the emergent properties of carbon chemistry. Carbon molecules exhibit an amazing array of classes, categories and especially shapes. These shapes are the emergent property that makes organic chemistry different from inorganic chemistry. Organic molecules fold into specific shapes, leading to chemical reactions that depend not only on the chemistry of the reactants but also on the particular sites on the molecules that are exposed.

Life as we know it is carbon-based. The ribonucleic acid (RNA) and deoxyribonucleic acid (DNA) molecules are long organic chains that encode information by sequences of nucleotides. They contain the instructions for forming the proteins needed by living organisms and for reproducing the organisms. Their structures are made possible by the properties of carbon chemistry.

Living organisms show other evidences of emergent properties. First, the emergence of living creatures from non-living matter is an emergent property. Another example relates to genetic activity: Hox genes in arthropods control the development of the body structures. Each segment of the larval form contains the same set of Hox genes. During maturation, the Hox genes at the front segment are turned on in a way that creates the antenna structures, the Hox genes in the middle segments are turned on to create the legs, and the Hox genes in the last segments are turned on to create the abdomen. The DNA is not just a simple template, but responds to environmental cues to produce the organs that are needed in the proper places.

As is the case in the preceding examples, ontologies have proved useful in understanding living organisms. The biologic taxonomy has been revised several times since Linnaeus published the first version in 1735 (Wikipedia 2017d) and remains unsettled; however, for our purposes, the version in Fig. 11.4 is adequate. Note that several levels leading down to *Homo sapiens* have been omitted together with most of the parts that don't lead to *Homo sapiens*.

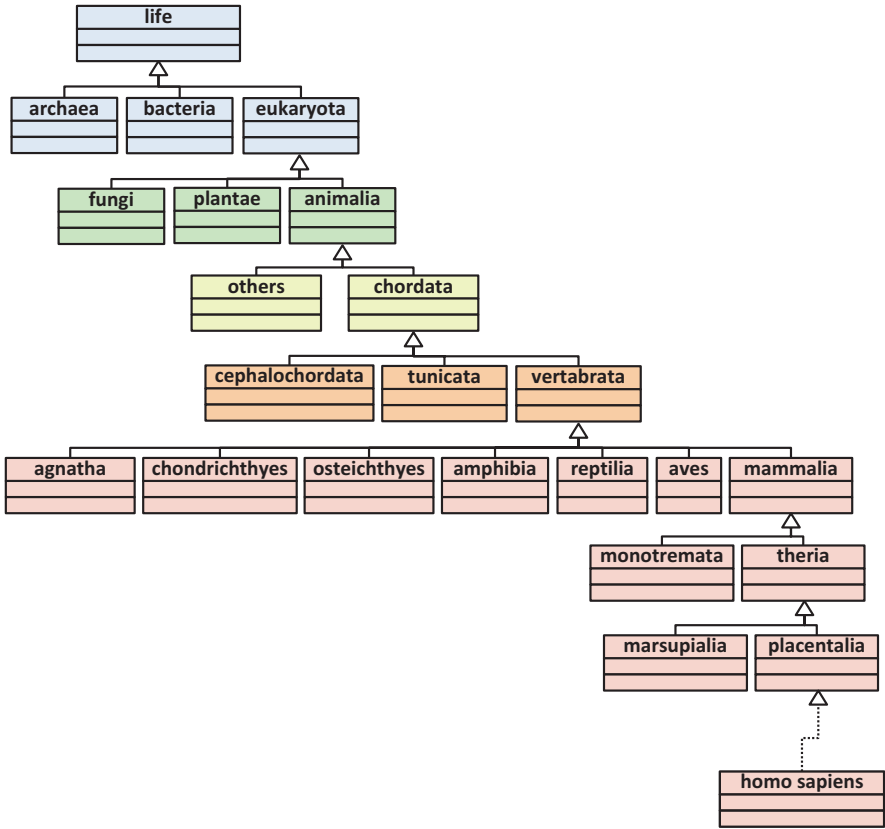


Fig. 11.4 A biologic taxonomy

Human Beings and Psychology

Human cognition is an observable reality, despite any firm theoretical basis. We are convinced that the enlarged nervous system organ we call the brain has something to do with cognition, self-awareness, etc. We know a lot about the details of some of the functions that contribute to these things and suspect that the increased complexity of the human brain over the brains of other animals is part of the cause. Thus we suspect that our mentality is an emergent property. The study of cognition is pursued in both psychology and artificial intelligence.

Human Beings and Sociology

Human beings have invented several types of societies. Social insects (such as termites and honey bees), pack animals (such as lions and wolves), and herd animals (such as wildebeests and cows) also have social organizations. Social organizations are clearly an emergent property of animals that live in groups. Several disciplines either investigate or describe social organizations or parts of them. These include anthropology, sociology, legal theory, and religious theory.

Conflict and Emergent Properties

Conflict is a part of living. Perhaps the simplest type of conflict is the conflict for resources by unicellular organisms. This conflict is replicated by all living organisms. The conflict types are increased to competition for mates in sexually reproducing organisms and predator-prey conflicts when carnivorous organisms are introduced into the mix. Human beings have merely added additional reasons (or excuses) for conflict.

From the examples in this chapter, it seems that it is the nature of complex systems to produce emergent properties at the next larger scale. Further, ontologies have been found to be useful in understanding the nature of complex systems. Table 11.1 places the Unconventional Conflict Ontology into this framework as the ontology that addresses human beings and social systems.

Table 11.1 Complex systems and ontologies

Objects	Behaviors	Ontology	Scientific Domain(s)
Subatomic particles, atoms	Gravity, electro-magnetic force, strong nuclear force, weak nuclear force	Bestiary of sub-atomic particles	Physics
Molecules	Ionic bond, covalent bond, dipolar bond, metallic bond	Periodic table of elements	Chemistry
Living systems	Movement, growth and development, response to stimuli, reproduction, use of energy, etc. organs, etc.	Biologic taxonomy	Biology
Human beings	Behaviors as living systems, cognitive behaviors, etc.	Unconventional conflict ontology	Physiology, psychology, artificial intelligence
Social systems	Behaviors as groups, including conflict		Anthropology, sociology, religion, law, etc.

The Unconventional Conflict Ontology is only a beginning in understanding the complexity of conflict. Its successors may eventually achieve the utility of the other three ontologies in the table.

Chapter 12 contains conclusions about the Unconventional Conflict Ontology presented here, some comments regarding its use and implementation, and concluding thoughts about the subject of unconventional conflict and the ontology.

Chapter 12

Conclusion



This book is not the final word on what we can know about unconventional conflict and its complexities. However, it is a distillation of what is currently known and what has been done with regard to creating an ontology of unconventional conflict at the theater level. It captures many, if not all, of the emergent properties that result in unconventional conflict. There is much that remains to be learned, particularly regarding the social theories that drive the estimates of outcomes of unconventional conflict activities. This chapter includes a review of the ontology's contents and how they fit together, a discussion of the uses of the ontology, and concluding thoughts.

What We Can Know

The Unconventional Conflict Ontology defines the things we comprehend about an unconventional conflict, including the relationships among the pieces. As shown in the upper part of Fig. 12.1, it starts with the things that don't require a particular situation – the situation-independent parts.

Situation-Independent Parts

The operational environment is divided into three parts, each with its own ontology:

- The active elements of the domain, the elements that do things, are called Actor classes. These classes include individual humans, groups of humans, and non-human elements that act. The Actor ontology performs the function of identifying the differences and commonalities among the Actor classes.

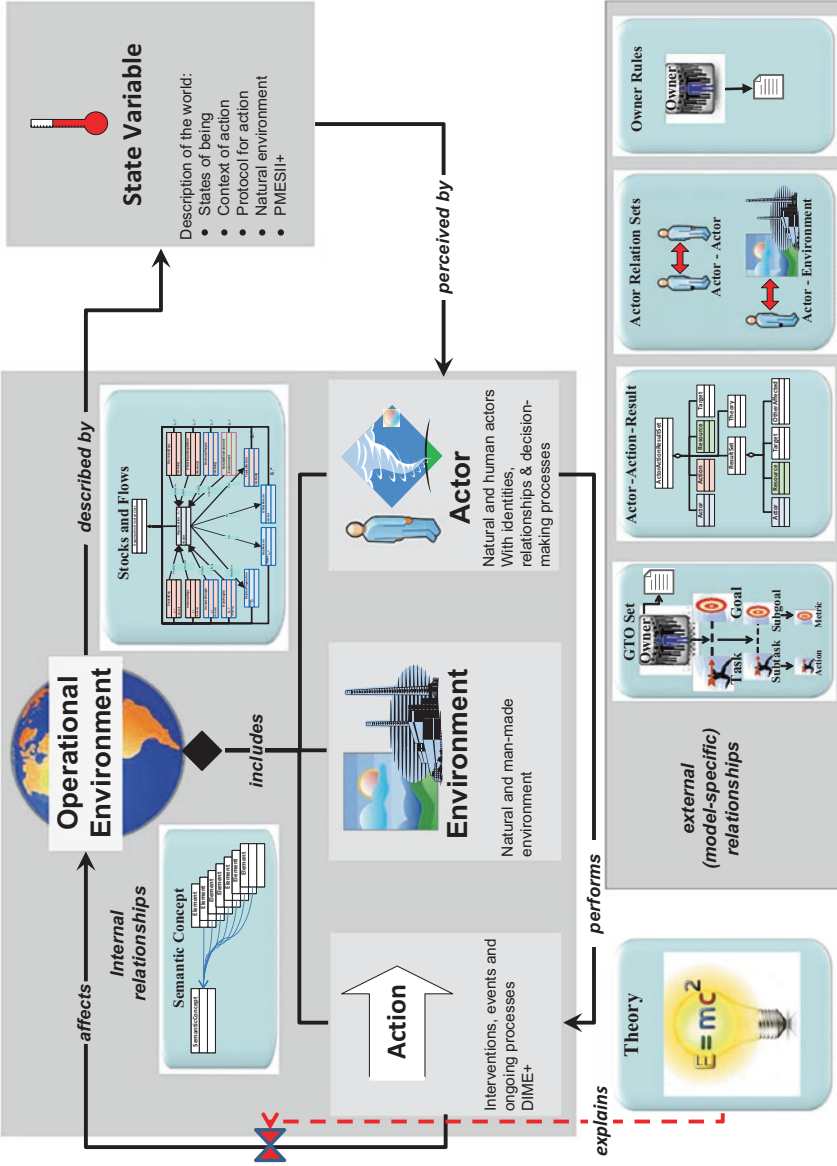


Fig. 12.1 Final context diagram

- Actors *perform* Actions, as shown in the figure. Actions are the interventions, events, and ongoing processes. Actions directly cause changes. As with the Actor ontology, the Action ontology performs the function of identifying the differences and commonalities among the Action classes.
- Actions cause changes to or *affect* the entire Operational Environment, which consists of Actors, Actions, and the passive Environment. The Environment consists of natural environment elements, man-made environment elements, and conceptual elements. As with the Actor and Action ontologies, the Environment ontology identifies the differences and commonalities among the Environment classes.

The elements in the Operational Environment are of interest because they represent entities that exist in the physical world; however, their state of being at any given time is also of interest. Each element is *described by* one or more state variables or Metrics. (Generally, each Metric will be a vector, with values expressing various significant aspects of the element.) There are two Metric ontologies. The PMESII ontology identifies the differences and commonalities among the Metrics using the PMESII paradigm, which divides the world into activity domains. The Type ontology identifies the differences and commonalities among the Metrics by the type of information contained in the Metric. These Metrics are *perceived by* the Actors, influencing their Actions, completing the cycle in Fig. 12.1.

In addition to the relations within each of the element ontologies and the metric ontologies, there are other relations among the elements:

- The Stocks-and-Flows ontology defines connections among the elements, such as Actions that increase or decrease the capacity of a particular class. Depending on the type of the class (Environment, population, or organization), additional relationships are identified that link other Action classes, Actor classes, and Environment classes to the particular class.
- The semantic concept ontology describes connections among the elements that associate commonalities of meaning. A set of semantic concepts is defined, to which the elements are connected based on semantic similarity.

The situation-independent parts of the ontology are consistent for all situations in the sense that if a given element is part of a situation, the relations that are specified in the situation-independent ontologies hold in the particular situation.

Situation-Dependent Parts

The situation-dependent parts of the ontology consist of two components, a situation-independent structure and a situation-dependent set of relations among the classes that describe a part of the situation.

- GTO Sets describe the agendas – the goals and tasks that are thought to be required for accomplishing the goals of each of the important parties (owners) in

a particular situation. The structure of the GTO Sets can be defined independently of the situation; however, the particular owners, the Action classes that represent their tasks, and the Metric classes that represent their goals all depend on the situation. The owners' beliefs that the Action classes will actually accomplish the goals constitute their particular metric models.

- The AAR Sets describe the connections between particular Actions in a particular situation with the results that occur. Again, the structure of the AAR Sets can be defined independently of the situation; but the classes that are related depend on the situation.
- The two types of Actor relations, Actor-to-Actor and Actor-to-Thing, have simple structures, independent of the situation. However, the actual relations among the classes depend on the situation. The Actor-to-Actor relations generally will specify networks of Actors and the friend/neutral/enemy relations between parties to the conflict, while the Actor-to-Thing relations will specify ownership and control of the environment.
- The final situation-dependent part is the owner rule sets. These are also simple situation-independent structures that specify the restrictions that owners place upon themselves in the choice of Actions that they may take. The actual relations are situation-dependent.

These four situation-dependent parts are shown in the box at the lower right corner of Fig. 12.1, outside the cycle.

Theory

The theory icon is also outside of the cycle in Fig. 12.1, but is also outside the situation-dependent box. There are three ways in which the Theories ontology interacts with the Unconventional Conflict Ontology.

- Why have things changed in the way they have changed? This reflects the change in a Metric value from one observation to the next.
- What is the meaning of the observed situation? This reflects the need to connect the set of Metric values to some larger understanding of the state of the situation (a metric model). In detail, this is the inference that one Metric's value is based on the values of other Metrics.
- What will happen if I do some particular thing? This reflects the calculation of the "result" in an AAR based on the situation and an Action.

These theory connections are all represented in the figure by the dashed-arrow connection (the *explains* arrow) of the theory icon to a valve in the *affects* arrow. That is, while it is known that each Action affects other things, the particular effect is based on something, which we call a theory. This theory may be a detailed understanding of causal effects or it could be a probabilistic statement that a set of effects is possible, each with a probability of occurrence. In any case, the theory *explains* the effect.

Relations

The context diagram in Fig. 12.1 does not focus on the relations of the ontology, although a few of them are used in the figure. In the preceding chapters the relations that are used have been described within the chapter; however, it may be useful to gather them together for a better view of the relations of the Unconventional Conflict Ontology.

The relations that involve the classes of the ontology are gathered in Table 12.1. Each relation has a directional meaning. That is, “Class A is related to Class B” generally is a different relation from “Class B is related to Class A.” The first column in the table names the relation in one direction and the third column names it for the other direction. The middle column explains the meaning of the relation in the first column. The meaning of the relation in the third column should be decipherable by analogy. Certain of the relations are specializations of other relations. These are identified by an initial “*” symbol and are specialized from the immediately preceding relation without the asterisk. Those with an initial “**” are specializations of the preceding relation with a single asterisk.

Table 12.1 Recap of class relations

A → B	Explanation of Relation	B → A
<i>is-a</i>	Each instance of A is an instance of B and each property of B is a property of A.	<i>superClassOf</i>
<i>part-of</i>	A is a part of B.	<i>hasPart</i>
<i>*necessaryPartOf</i>	A is a necessary part of B (composition).	<i>*hasNecessaryPart</i>
<i>*optionalPartOf</i>	A is an optional part of B (aggregation).	<i>*hasOptionalPart</i>
<i>hasProperty</i>	A has property B.	<i>propertyOf</i>
<i>*hasMetric</i>	A has metric B.	<i>*metricOf</i>
<i>*hasTitle</i>	A has title B.	<i>*titleOf</i>
<i>*hasLevel</i>	A is an Action or a Metric and has level B where B is a GTO Set level.	<i>*levelOf</i>
<i>*hasName</i>	A has name B.	<i>*nameOf</i>
<i>*hasCitation</i>	A has citation B.	<i>*citationOf</i>
<i>*hasTime</i>	A has time B.	<i>*timeOf</i>
<i>*hasLocation</i>	A has location B.	<i>*locationOf</i>
<i>*hasContext</i>	A is a Theory and has context B.	<i>*contextOf</i>
<i>*hasValidity</i>	A is a Theory context and has validity B.	<i>*validityOf</i>
<i>*hasRule</i>	A is an Action Subcategory and has a rule B.	<i>*ruleAppliesTo</i>
<i>perceives</i>	A is an Actor and perceives Metric B.	<i>perceivedBy</i>
<i>performs</i>	A is an Actor and performs Action B.	<i>performedBy</i>
<i>similarTo</i>	A is similar to B.	<i>similarTo</i>
<i>hasSource</i>	A is an Element or a Metric and has Source B.	<i>sourceOf</i>
<i>hasAgent</i>	A is an Actor and has Actor B as an agent.	<i>agentOf</i>

(continued)

Table 12.1 (continued)

$A \rightarrow B$	Explanation of Relation	$B \rightarrow A$
<i>hasMember</i>	A is an Actor and has Actor B as a member.	<i>memberOf</i>
<i>hasOverlap</i>	A is an Actor and has members that are also members of Actor B.	<i>hasOverlap</i>
<i>affects</i>	A is an Action and affects Actor, Environment Element, or Metric B.	<i>affectedBy</i>
<i>*increases</i>	A is an Action and increases Actor, Environment Element, or Metric B.	<i>*increasedBy</i>
<i>*decreases</i>	A is an Action and decreases Actor, Environment Element, or Metric B.	<i>*decreasedBy</i>
<i>explainsOrConstrains</i>	A is a thing and explains or constrains Action B.	<i>explainedOrConstrainedBy</i>
<i>*restricts</i>	A is a rule and constrains Action B.	<i>*restrictedBy</i>
<i>*explains</i>	A is a Theory and explains Action B.	<i>*explainedBy</i>
<i>influences</i>	A is a Metric and influences Metric or Element B.	<i>influencedBy</i>
<i>relatesTo</i>	A is an Actor or Environment Element and is related in some way to Actor or Environment Element B.	<i>relatesTo</i>
<i>playsRole</i>	A is an Element and plays role B.	<i>playedBy</i>
<i>instanceOf</i>	A is an instance of Class B.	<i>instantiatedBy</i>

Most of the relations that have been discussed have involved classes; however, that does not mean that there aren't relations between instances. In fact, many formal ontologies define the class relations in terms of the instance relations. The general formula for such a definition is that if all the instances of class A have the given relation with an instance of class B, then A has that relation at the class level with B. Thus (with the exception of the last relation, which involves an instance), each of the relations in Table 12.1 have a corresponding instance-level relation. Table 12.2 recaps the sampling of additional instance relations discussed in Chap. 9.

Table 12.2 Recap of instance relations

Relation	Relation description
Actor \rightarrow Environment Element	
<i>consumes</i>	Actor consumes the Thing or portions of the Thing.
<i>createsOrProduces</i>	Actor creates or produces the Thing.
<i>uses</i>	Actor makes use of or derives benefit from the Thing.
<i>hasInterestIn</i>	Actor is concerned about the Thing.
<i>occupiesOrPossesses</i>	Actor physically occupies or possesses the Thing.
<i>owns</i>	Actor owns or has some property rights to the Thing.
<i>controls</i>	Actor controls access or use of the Thing.

(continued)

Relation	Relation description
Actor1 → Actor2	
<i>wouldLikeToKnow</i>	Actor1 desires to know Actor2 more closely.
<i>knowsOf</i>	Actor2 has come to be known to Actor1 through his, her or its actions or position.
<i>knowsByReputation</i>	Actor2 is known by Actor1 primarily for a particular action, position or field of endeavor.
<i>knowsInPassing</i>	Actor1 has slight or superficial knowledge of Actor2.
<i>hasMet</i>	Actor2 has met Actor1 whether in passing or longer.
<i>acquaintanceOf</i>	Actor2 has more than slight or superficial knowledge of Actor1 but short of friendship.
<i>talksWith</i>	Actor 1 and Actor2 talk together.
<i>friendOf</i>	Actor2 shares mutual friendship with Actor1.
<i>closeFriendOf</i>	Actor2 shares a close mutual friendship with Actor1.
<i>lostContactWith</i>	Actor2 was once known by Actor1 but has subsequently become uncontactable.
<i>livesWith</i>	Actor2 shares a residence with Actor1.
<i>neighborOf</i>	Actor2 lives in the same locality as Actor1.
<i>ambivalentOf</i>	Actor1 has mixed feelings or emotions towards Actor2.
<i>isTheSuperiorOf</i>	Actor1 is the superior of Actor2 in some organization.
<i>directsOrControls</i>	Actor1 directs or controls the actions of Actor2.

Using the Ontology

An ontology of unconventional conflict supports the understanding of unconventional conflict in general. Unconventional conflict is a complex system and is the result of the emergent properties of the underlying human complex systems. As with other complex systems (described in Chap. 11), ontologies provide the organizational structure that aids in understanding how the pieces fit together.

An ontology of unconventional conflict also provides a tool for understanding and investigating a particular unconventional conflict. Such an ontology does these things by providing a structure that exposes the things that are known about unconventional conflict and the relationships among these things. And it exposes significant things that are not known.

Constructing the original IW Ontology (which led to the Unconventional Conflict Ontology) was not a "science project," with its creation as the sole goal. It was constructed to be used for DIME/PMESII models. Two of the uses that were envisioned have already been implemented: improving existing models and performing VV&A on models. A third use actually preceded the original IW Ontology: a rudimentary ontology was used to construct a model that was used to track an actual unconventional conflict and to track simulated unconventional conflicts.

While these three uses satisfied important needs, these needs were important because the models they addressed were meant to help understand unconventional conflict. These and other uses are discussed here.

Tracking and Understanding the Situation

The ISSM was developed as a metric model of OOTWs, based on the work reported in *Doing Windows* (Hayes & Sands, 1997). Figure 12.2 shows an ISSM tracking chart (Hartley, 2006a). The chart tracks the values of several ISSM variables over time (horizontal axis), based on inputs taken from reporting of the situation. The vertical axis represents a scale from “horrible” at the bottom to “wonderful” at the top. The first variable in the legend, “Civil stability and durable peace exists,” is the final output variable of the model (magenta line in the chart). The other seven variables are the penultimate variables that influence the final variable.

The particular scenario being tracked in this case was Operation Iraqi Freedom (OIF) from its start on March 20, 2003 to November 9, 2004. The text boxes are added to indicate significant events on the time-line. The inferences from this chart are that the situation was improving as of the end date, with some sectors doing better than others. The lowest sector, “Civil (internal) unrest is not present,” might have been regarded as a warning. In fact, later events in this sector led to a reversal of the gains shown in this chart.

The Unconventional Conflict Ontology provides the opportunity to create a more complete method for tracking the course of an unconventional conflict, a method that is based on a more complete understanding of unconventional conflict.

Consider the impact of a hurricane on a small country. The hurricane winds, storm surge and flooding, and spawned tornados damage the infrastructure. The damage leads to reductions in the business economy, including jobs. Damage clear-

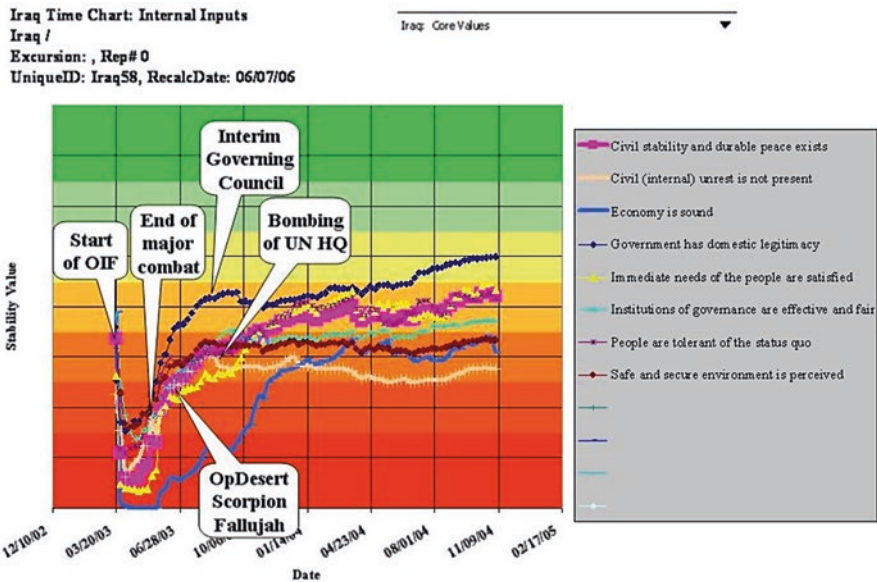


Fig. 12.2 The ISSM tracking model

ance takes weeks, competing with the normal economy. During this time there is increased criminal activity (e.g., looting) and increased civil unrest. Support by police and national armed forces are required. The financial costs of the clean-up cause economic dislocation, but fund some temporary jobs. The long-term recovery includes gradual improvement to the economy and jobs. All of this is reflected in the changes in values of the state variables. However, some kind of metric model will be required to provide a clear picture of the damage and progress in recovering from it.

While a metric model can provide a single number that represents the state of the situation, perhaps on a scale from “horrible” to “wonderful,” a little more detail is usually needed. Figure 12.3 is taken from a discussion of validating systems of models; however, it is also useful in showing what can be done to help understand the state of a situation. The upper left diagram is labeled “System Validation Metrics” and represents the validity state for the entire system. Here, think of it as representing the value of some important metric for the entire situation. This particular diagram has 9 axes (currently showing the PMESII components, plus DIME)

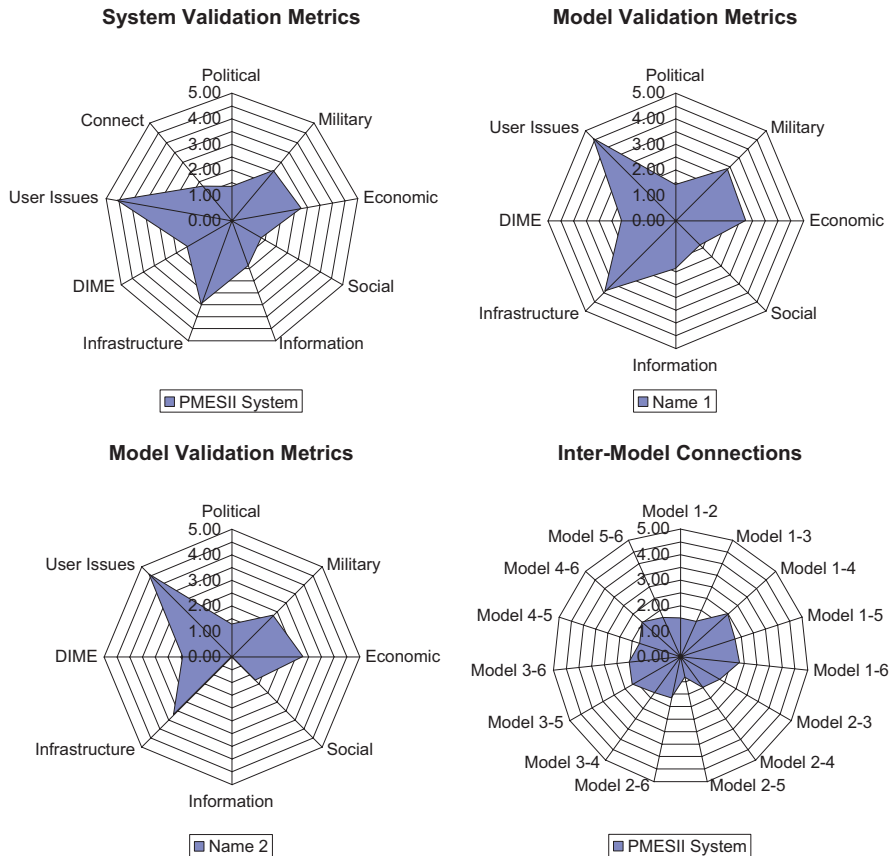


Fig. 12.3 Spider diagrams

as a single component, and two “User Issues” components). The value of the metric within each of the desired components is shown by its distance from the center. When the values on each axis are connected and the polygon is colored, the relative strengths on each axis become obvious. In our use for understanding a situation, the axes might be provinces within the country. The other diagrams in the figure could then represent further breakdowns for each province. Alternatively, the main chart could represent some composite metric and the subcharts could represent the component values.

The point is that there are multiple ways of tracking and understanding the relevant information about a situation.

Improving or Building Models

TRAC used the list of Metrics in the IW Metrics Ontology (Hartley & Lacy, 2011) to plan for improvements to the IW Tactical War Game (TWG). TRAC personnel reviewed each Metric (and its definition) to determine whether the concept it represented was already included in the model. Those Metrics that were not already included were binned into three categories: those that should be included in the next year’s model improvements, those that should be included in future improvements, and those that were not germane to the model’s intended uses. The TRAC users passed these results to the IW TWG modelers. Other model users can employ the Ontology in the same manner for any existing model in the unconventional conflict domain.

The ontology can be used in building a model of unconventional conflict (Hartley, 2017). The unconventional conflict ontology supports holistic modeling. Holistic modeling means that we can both see the entire picture of what needs to be modeled and make informed decisions about what to model and what to omit. The unconventional conflict ontology also separates the things we understand best from the things we understand least. That is, it separates the easy (relatively speaking) things from the hard things and allows us to put more effort into deciding how to address the hard parts. These “hard parts” include adjudication (the choice of theories and their implementation), the GTO Sets (metric models), the tactical decision rules, and the modeling of intelligence operations (ground truth versus perception). This separation also means that we can perform verification, validation and accreditation more efficiently and can describe the competence of the model more accurately.

Supporting VV&A of Models

VV&A is an integral part of modeling. Frequently it is thought of as an expensive add-on to the modeling process; however, any good modeler is checking and testing his or her model during the design and implementation process and endeavors to have the results accepted when the work is finished. This is the core of VV&A.

The underpinnings of the ontological VV&A approach ensure that the problem of testing for coverage is relatively simple. The things that should be covered are exposed to see if they are explicitly modeled (or not modeled). This makes it relatively simple to verify the implementation of the conceptual model and perform validation on the more mundane aspects of the model. The explicit exposure of the use of theories makes the estimation of the validity of the more difficult aspects of the model easier.

Hartley Consulting has also used the ontology to improve its VV&A tool (Hartley, 2008), which was used to perform verification and validation (V&V) of the HSCB Testbed (Hartley, 2009) and the Deployable Exercise Support system (DEXES) (Hartley, 2012).

Understanding General and Particular Situations

It may seem obvious that understanding the situation in an unconventional conflict is important. However, an example of the type of understanding possible should help bring this importance into perspective.

As this book was being written there were three situations of global importance (North Korea, Iran, and ISIS) each involving a common, seemingly intractable element: the person or persons in charge of one of the parties were variously described as mentally unstable, unpredictable, depraved, and irrational. The inference that might be drawn was that understanding the situations was either essentially impossible or practically inconsequential. However, the use of the GTO Set creation methodology leads to a different conclusion. In each case, an agenda, consisting of a set of tasks and goals, subtasks and subgoals, and Actions and Metrics, can be created for the difficult party. The GTO Set owner might have the aforementioned personal or corporate characteristics; however, no matter how the agendas are determined, they each have shown a logical approach to determining what to do. The possession of this GTO Set analysis (however imperfect) provides two things: it provides an analysis of what actions may need to be countered and it separates the problem into a more tractable “action” component and a less tractable “intent” component. Just as the weather needs to be analyzed and tracked and is not easily contested, the “intent” component may need to be analyzed and tracked and may not present any easy countering solutions. However, this is preferable to assuming that the entire problem is intractable.

Implementing the Ontologies

Constructing an ontology is a fascinating process. It requires knowledge of the fundamentals of ontologies and the choices available for their implementation. It also requires the willingness to delve into the details of the domain to be described. For domains of the size of unconventional conflict, this means taking pains to check the minutiae of descriptions of thousands of entries from multiple sources.

It also requires the ability to create a vision of the overall picture. For this project, this started when Lee Lacy created the first version of the Context Diagram (Fig. 12.15 in Chap. 2). This set the context for the entire ontology. Similar visions were required along the way in discovering symmetries and repeated structures in the domain.

As with any software process, organization is critical. However, an iterative or cyclical process is also critical, especially for larger ontologies. This means that you should be willing to rip out chunks of completed work in order to recast them with a different structure when a better understanding of the domain of knowledge leads to a revision of your thinking.

Implementation History

The ontology that is described here is the result of two projects for the U.S. Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC) and several independent research and development projects by Hartley Consulting. As described in Chap. 2, the development of the ontology was one of incremental development, rather than a unified top-down effort. This had the disadvantage of gaps in the development process; however, it provided the advantage of time to reflect on what had been accomplished and to plan for and implement changes.

For example, version 1.0 of the ontology, called the IW Metrics Ontology (Hartley & Lacy, 2011) used the concept of Lines of Effort (LOEs) to capture the agendas of major players. The LOEs for U.S. forces were taken from the *Army Field Manual on Tactics in Counterinsurgency* (HQ Department of the Army, 2009). However, in version 2.0, called the IW Ontology 2 (Hartley & Lacy, 2013a, 2013b), we introduced the GTO Sets to broaden the concept.

Version 2.0 listed properties as separate items; however, in version 3.0, called the Unconventional Conflict Ontology, we have merged properties into the Metrics, creating a Metric-Type ontology to differentiate the Metrics along the lines of the previous properties concept. Additionally, the Semantic Thesaurus of Version 2.0, which linked the Concepts to the Metrics, has been recast as the Semantic Concepts Ontology, which links the Concepts to the Elements.

Further, the preparation of this book afforded the opportunity to review the details of the ontology and discover and correct wording and connection errors, as well as to discover a few missing Elements and Metrics.

The Current Version

Versions 1.0 and 2.0 were implemented in OWL Lite, with a Microsoft Access™ database holding the basic materials. The Unconventional Conflict Ontology and the associated Theories Ontology are implemented in a Microsoft Access™ database. Figure 12.4 illustrates the structure of the tables in the database.

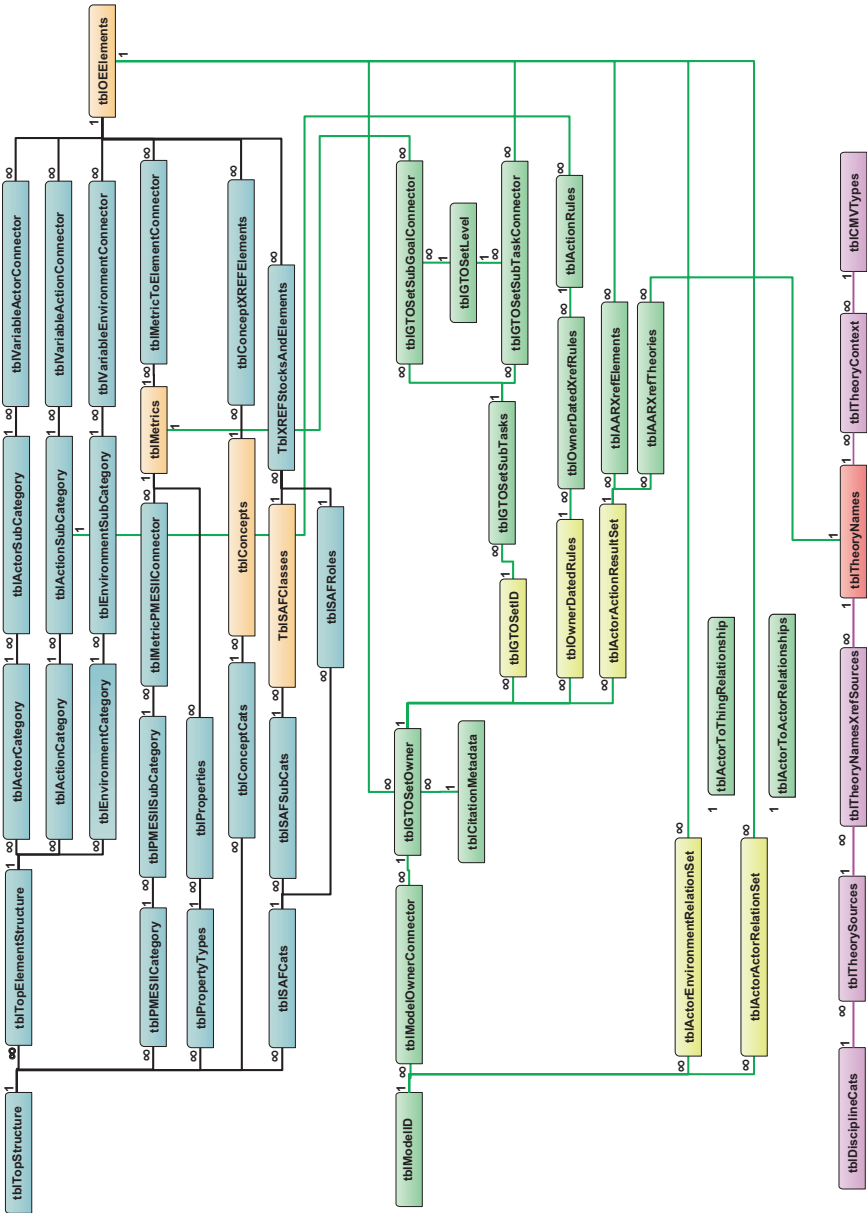


Fig. 12.4 Database structure

The names of the tables are shown in the boxes; however, they are not important for this discussion. The figure includes the standard cardinality markings for the connections between tables (1 and ∞); however, these are also not important for this discussion. The groupings, colors and connections illustrate the important points.

The situation-independent parts of the Unconventional Conflict Ontology occupy the top portion of the figure and consist of blue and orange boxes. The three element ontologies comprise the first three rows and connect to the orange **element** box in the top right corner. The next two rows (one full row and one half row) represent the two Metric ontologies, with the orange **metrics** box shown, connecting through a blue box, to the element box. The next row represents the concepts ontology, with the orange **concepts** box also connecting to the elements box. The last row (with a complex blue box connection) represents the Stocks-and-Flows (SaF) ontology, with the orange **SaFClasses** box also connected to the elements box through a blue box.

The situation-dependent parts of the Unconventional Conflict Ontology occupy the middle portion of the figure and consist of the green and yellow boxes. The complicated first rows represent the **GTO Sets** (yellow box), the **Owner Rules** (yellow box), and the **ActorActionResults Sets** (yellow box). These are connected (green lines) to ActionSubCategory box, the Metrics box, the element box, and the theories box. The next row represents the ActorEnvironmentRelation structure, with the **ActorEnvironmentRelations Set** (yellow box) and the list of possible relations (green box). It is connected to the element box. The last row of this portion of the figure represents the ActorActorRelation structure, with the **ActorActorRelations Set** (yellow box) and list of possible relations (green box). It is also connected to the element box.

The Theories Ontology is shown in the last row of the figure and consists of magenta and red boxes. The **TheoryNames** box is the red box and is connected (green line) to the ActorActionResults box.

The figure does not include the numerous queries that produce useful lists of related items in the database. However, these queries are based on the connections shown in the figure and can easily be imagined.

Future Enhancements

The ontology might be brought into alignment with some common ontology format, such as the Basic Formal Ontology (Arp, Smith, & Spear, 2015). This would support interoperability with other similarly aligned ontologies. An alternative is to adopt some of the standards of one or more of these formal ontologies to improve the definitions of the terms and refine the child-parent relationships.

The ontology might be expanded to include warfare or some part of warfare. This might seem to be overly ambitious; however, years of experience in modeling warfare and the writings of experts, for example, *A Concise Theory of Combat* (DuBois, Hughes, & Low, 1997), have convinced me that such an expansion would be

possible. It would involve a considerable amount of work; however, the structure of the domain appears to be very similar to what has already been developed to describe unconventional conflict.

The database also includes a rudimentary structure for modifying and using the ontology. A possible next step is to enhance this structure to support a robust set of uses for the ontology. For example, building the capacity to create scenarios with the full set of instantiations would be a relatively straightforward project.

Concluding Thoughts

Unconventional conflict is a complex, messy thing. It normally involves multiple Actors, with their own conflicting agendas and differing concepts of legitimate actions. This complexity means that understanding unconventional conflict is very difficult. For example, answering the simple question “who won?” is not simple for unconventional conflict. Because unconventional conflict is the norm now, understanding it is a necessity, despite the difficulties.

The unconventional conflict ontology supports understanding the entire situation. It also supports understanding how the parts of the situation fit into the entire situation. Perhaps most important, it defines what we do not know or at least do not know well – the thing we have called the Theories Ontology – and how Actions create effects.

The core message of this book is that understanding unconventional conflict, despite its complexity and the emergent properties of the complex human systems that lead to it, is now easier than it had been because of the development of an ontology that describes the unconventional conflict domain.

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