

An Ontological Approach to Territorial Disputes

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Abstract – Disputes over territory are a major contributing factor to the disruption of international relations. We believe that a cumulative, integrated, and continuously updated resource providing information about such disputes in an easily accessible form would be of benefit to intelligence analysts, military strategists, political scientists, and also to historians and others concerned with international disputes. We propose an ontology-based strategy for creating such a resource. The resource will contain information about territorial disputes, arguments for and against claims pertaining to sovereignty, proffered evidence for such claims, political and military motives (overt or hidden), and associated conflicts. Our approach is designed to address several issues surrounding the representation of geopolitical conflict, including the tracking and individuation of disputes and the validation of disseminated information.

Keywords—*applied ontology; territory; international conflict; BFO 2.0*

I. INTRODUCTION

In what follows, our focus is on the ontological representation of territorial disputes and the different sorts of entities associated therewith. The ontology is intended to be used for the consistent annotation of data and information about territorial claims, arguments for and against such claims, political and military motives (overt or hidden), and the different types of conflicts associated with territorial disputes, from occasional skirmishes and limited engagements to terrorist campaigns and outright war.

We begin with a survey of some of the problems faced in representing territorial disputes in data and information systems. Second, we sketch how Basic Formal Ontology (BFO) 2.0 can be used as a framework for a realist understanding of different ways in which individual and group agents participate in territorial and other conflicts (<http://www.ifomis.uni-saarland.de/bfo/>). Third, we provide a framework for the handling of data about territorial claims; such claims can cause problems for a realist ontology, since they are often marked by the use of empty or disputed reference, for example when opposing parties in a territorial conflict produce maps of putative political entities in a given territory which cannot simultaneously be veridical. Finally, we propose a way to capture the relationships between motives and arguments underlying territorial claims, and we conclude with a case study of a territorial dispute between Japan and Russia.

II. THE TROUBLE WITH TERRITORIAL DISPUTES

The problems facing the successful ontological representation of territorial disputes include:

(1) The need to identify the dispute at issue (which may evolve with time and may be described in conflicting ways by the disputing parties, as when Israelis use ‘Israel’ and Palestinians use ‘the Zionist entity’ to refer to the same territory).

(2) The need to identify the entities involved in a dispute, including:

- The disputing parties (governments, underground militias, liberation movements); leaders and representatives of the disputing parties (politicians, terrorist leaders, tribal leaders, religious leaders...).
- External or third parties (multinational agencies such as the UN, NGOs, aid agencies; mercenaries, religious bodies, press and broadcasting agencies, salient minorities (for example, Russians in East Ukraine).
- Actions (negotiations, propaganda, military actions, acts of terrorism, terrorist campaigns).
- Territories and territorial borders.
- Information artifacts involved in territorial disputes such as diplomatic notes, treaties, claims, maps.
- Objectives and motives of the parties involved (both overt and concealed).

III. IDENTIFYING AND TRACKING DISPUTES

The first step toward the representation of a territorial dispute is the ability to identify the dispute itself. This can be problematic, since how we should individuate any given dispute may be unclear. For example, is the on-going dispute over oil resources in the Arctic a *single* dispute or an interconnected web of disputes, involving multiple different countries? (See Supplementary Material Figure 4)

A second task for an ontology of territorial disputes is the need to take account of conflicting descriptions of both the dispute and the surrounding matters of (actual and purported) fact. For instance, the People’s Republic of China claims the island of Taiwan as one of its provinces; the inhabitants of Taiwan, on the other hand, maintain that, not only the island, but also the whole of mainland China, fall under the jurisdiction of a distinct sovereign nation, *viz.*, the Republic of

China, which was (they allege) wrongly forced off the mainland in 1949. Such incompatibilities cause problems for theories – like the theory defended by John Searle – which see political entities such as nations as social objects maintained in existence by the beliefs of the parties involved. An approach like Searle’s, it seems, can provide an account of the ontology of geopolitical entities that is satisfied only in a world in which territorial disputes do not exist [1].

Because territorial disputes do indeed exist, as also do the associated conflicting claims, an ontology of territorial disputes must find some way to do justice to the fact that given claims may have no referent in the real world. To capture, for example, what is involved when disputants talk about “the Chinese territory of Taiwan” or “the Taiwanese territory of China,” or when a neutral observer talks about the disputed territory of Taiwan combined with (the rest of) China, we need to find a way to link claims to the corresponding geographical regions without also prejudicing our representation in favor of one or other party.

Something similar holds when claims issued in the course of a dispute come in the form of accounts of a nation’s historical presence in a territory which are offered as evidence to legitimize a claim of present sovereignty over that region (for example, accounts of the Jewish presence in the territory of present-day Israel since the time of the First Temple). Again, our ontology would need to be able to represent the content of such reports without necessarily endorsing their claim to truth, and the same would hold of geographic or oceanographic reports documenting measurements of the boundaries of given territories in ways that may affect claims of sovereignty. For example, Russia has claimed approximately half of the Arctic Ocean (1.2 million square kilometers) on the basis of measurements of its continental shelf (the natural prolongation of its landmass, as defined by the United Nations Convention of the Law of the Sea (UNCLOS) – see [2]). The international community has greeted these measurements with considerable skepticism. Nonetheless, it is essential that analysts be able to search for data about the region Russia *does* claim. How, then, do we make sense of the content of our words without thereby imparting to our words a referent in the world? In what follows, we propose a solution to this problem, whose goal is to render an ontology capable of handling both true and false claims made within a territorial dispute.

IV. ENTITIES IN A TERRITORIAL DISPUTE

One of the questions an ontology is designed to answer is: What kind of entity is *X*? Consider for example the *role* of being an arbitrator of a dispute. In BFO terms, this is a specifically dependent entity – it could not exist apart from the person who bears the role. Or consider the information about some arbitrator contained in some document; to what kind of entity are we referring when we refer to *this information*? From the BFO point of view, an information artifact of this sort is a generically dependent entity, which means that whereas it requires some bearer – for instance, some hard drive – in order to exist, it does not require any specific bearer, because it can be copied from one hard drive to another; forwarded over e-mail, or printed out in the form of a paper document (<http://code.google.com/p/information-artifact-ontology/>).

In addition, an information artifact is a kind of entity that is capable of being *about* other entities. Territorial claims, maps, treaties—all exist as information artifacts in this sense. They are, like persons and roles, territories and territorial boundaries, what BFO calls *continuant* entities, which means that they continue to exist through time, even while undergoing changes of various sorts, for example in the form of amendments, codicils, and ratifications.

Territorial *disputes*, in contrast, are *occurrent* entities, which means that they are entities that occur in time and unfold themselves in successive temporal parts. Territorial disputes will differ along a number of dimensions, including their duration, the parties involved, and the degree to which they involve different levels of violent conflict.

They will also differ according to the territories to which they relate, the boundaries of these territories, the populations of human beings occupying these territories, and so on. An ontology to support reasoning with territorial dispute data will thus require a resource such as the I2WD Geospatial Ontology (<http://milportal.org>), incorporating also references to the different kinds of fiat geopolitical entities described in [3].

In the case of claims that nations stake upon disputed territory, the information artifacts involved may be descriptive or directive. For instance, during the Six Day War in 1967 Israeli forces seized East Jerusalem and asserted that this region is (and always had been) part of the geopolitical region of Israel. Thus, Israel’s claim on East Jerusalem is formulated as a piece of descriptive information. However, this claim was associated with directive information specifying how persons should conduct themselves with respect to that territory, declaring inhabitants of East Jerusalem subject to Israeli law and restricting access to the region by non-Israelis.

Territorial claims are often bolstered by arguments aimed at establishing their truth. For instance, to justify the seizure of Palestinian territories, Geula Cohen of the Israeli Parliament argued in 1999, “The Jews did not come back to Israel to be safe but to build a nation on the lands given to us by the Bible.” [4] In this statement, Cohen gives an argument in support of Israel’s territorial claim on the basis of divine right. Here, we can distinguish Israel’s territorial claim, Cohen’s argument in favor of this claim, and the religious beliefs underpinning this argument, all of which are salient to representing the territorial dispute as a whole. Or consider also the 1994 argument of Stephen N. Schwebel, in favor of the legality of the Israeli settlements on the basis of the principle of a sovereignty vacuum [5] (See Supplementary Material Figure 5). Another important feature of territorial disputes are the motives of the disputing parties. Salient motives include:

- total autonomy, independence, or secession (for example of Quebec from Canada, of Scotland from the United Kingdom, of Catalonia from Spain);
- local autonomy (of Kashmir, South Tyrol, Sicily) within one or another existing sovereign nation;
- economic advantage via the exploitation of natural resources (for example petroleum and natural gas in the areas surrounding Hans Island and Paracel Islands, and in the Aegean Sea);

- restoration of territory held to have been lost (of Gibraltar to Spain, of Ceuta to Morocco, of Belize to Guatemala);
- expansion of territory (of Canada, Russia, the United States, Denmark, and Norway into the Arctic Circle);
- strategic gain (of Tuzla Island and the Strait of Kerch for Russia).

This collection of data relating to motives is complicated by the fact that overt motives may differ significantly from hidden ones. We contend in what follows that an ontology of territorial disputes should have the resources to represent motives of both types, though we recognize that obvious problems arise in regard to the latter since it is possible for the motive that is driving a territorial claim to be perfectly concealed. This however is not different in principle from what is involved when gaps in scientific knowledge are revealed by new discoveries.

V. DISPUTES, CONFLICTS, AND RELATIONAL QUALITIES

Persons, organizations, and governments engage in a wide array of disputes over plans, goals, predictions, decisions, policies, laws, beliefs, property, and territory. Additionally, they engage in a similarly wide array of conflicts. But what kind of things *are* disputes and conflicts, and how do they relate to entities of other sorts?

As a provisional characterization, both disputes and conflicts – whether or not they are territorial in nature – are *relational processes* in BFO terms; thus they are processes dependent upon and involving as participants at least two agents. In the case of a *dispute*, the participants have views that clash, and the dispute unfolds in a series of sub-processes in which each disputant offers claims and arguments in the hope of convincing others of the correctness of their views. A *conflict*, on the other hand, is a relational process that is made up of inherently hostile (violent) interactions among participants. Not every dispute engenders conflict: a disagreement over the precise demarcation of a border, for example, may be resolved through negotiation. And not every conflict involves a dispute, as when one person strikes another in some random attack.

When two agents – which may be either single persons or more or less formally organized groups of persons – are involved in a dispute, then there exists also a *relational quality*, which in BFO terms is a specifically dependent continuant that inheres in multiple bearers and which connects them together. We can refer to this relational quality as a *state of dispute*. A state of dispute comes into existence at a certain time (for example as the result of an act by one of the parties of staking or contesting a territorial claim); but it exists thereafter in its own right until, perhaps through some further act, it goes out of existence. A state of dispute is essentially relational; thus it not reducible to non-relational qualities inhering separately in the involved parties (compare in this respect relational qualities such as claims and obligations).

Once the state of dispute comes into existence and it preserves its identity for as long as it exists even while undergoing a variety of different sorts of changes (for example

in intensity of associated conflict). Even while we do not believe that it is possible to articulate an exact account of the identity conditions for disputes over time, we nonetheless believe that it is in many cases unproblematic to identify a given state of dispute as one and the same from one time to the next. Just as an obligation comes into being upon the making of a promise – for example as documented in a written contract – and only ceases to exist upon either the fulfillment of the promise or the waiving of the obligation by the one to whom the promise was made, so a dispute comes into being upon the act of instigation and only ceases to exist upon either (1) a resolution amenable to the parties involved, (2) the ceasing to exist of one or more of these parties, (3) the involvement of further parties for example in imposing a resolution by force, or in creating conditions which deprive the original dispute of its basis.

Consider, now, the special case of territorial disputes, a typical case of which involves two or more governments in dispute over sovereignty in regard to some specific territory. In our view, the state of dispute is an entity existing through time as an entity in its own right inhering in the participant agents. The state of dispute begins to exist because of actions on the part of one of the parties involved (for instance, Nation A moves armed forces into a territory claimed by Nation B; Nation A releases a map that depicts a region that is claimed by B as falling within the geopolitical boundaries of A). Dispute processes may then ensue, for example on the diplomatic level, but the state of dispute exists even during periods of time when no such processes are occurring.

In some cases, such dispute processes lead to outright conflict, and there then arises a new relational quality called a state of conflict, with subtypes including a state of war, between them. Both states of dispute and states of conflict are relational qualities that inhere in two or more agents.

VI. DATA ABOUT TERRITORIAL CLAIMS

A. Kinds of Data

We turn now to the handling of data about territorial claims. Most of these data are readily treated with the resources of the I2WD ontology framework, including the Information Artifact Ontology, Geospatial Ontology, Time Ontology, Event Ontology, and Agent Ontology, with BFO as foundation. This suite of ontologies can be used as a tool for tagging different types of data salient to territorial disputes, including:

(1) *Map-based data*: representations of geospatial regions in proclamations and agreements between nations, for example as *claimed*, *disputed*, *demilitarized*, and so on).

(2) *Causes of a dispute*: assertions relating to the history of a region (especially its political history), statements of motives for claims (concerning natural resources, strategic position, purported loyalties of a population, and so on), incidents prompting the emergence of the dispute.

(3) *Arguments*: the arguments offered on each side for the legitimacy of a territorial claim can come in a variety of forms, including appeals to international courts, historical documents, results of referenda, and geographic and oceanographic reports; they can be presented as official

announcements, through political speeches, diplomatic notes, and so on.

(4) *Treaties*: Treaties are relational qualities in the sense outlined above. The treaty document serves multiple functions. First, it documents the deliberative process which led to an understanding on the part of the parties involved that the dispute should be brought to an end. Second, it documents the terms of this understanding, which amount to a set of bi-directional obligations to act henceforth in accordance with these terms. Third (at least in the ideal case), by being ratified by the representatives of the involved parties it serves to bring the dispute to an end. And fourth, by containing signatures of these representatives it documents their acknowledgement of these terms and their acceptance of the concomitant obligations. Legal appeals to treaties can thus make reference to both the treaty itself (the relational quality) and to the signed document (an information artifact). Moreover, as we shall see in more detail below, already existing treaties may be utilized as evidence in favor of new territorial claims.

B. False and Disputed Information

Any territorial dispute will involve conflicting information about the status of some territory, the location of the relevant borders, the soundness of the arguments supporting territorial claims, the (descriptive or rhetorical) character of given press releases, the validity of existing treaties and rights of other nations or groups, the interpretation of salient judgments of international law, the history of the disputed region, and so forth. Sometimes the salient information can be classified either as true or false *simpliciter* – for example, in the case of geographical coordinates of given landmarks. In most cases, however, we shall need to refer to claims as true or false in the eyes of one or other of the disputed parties, or as being such that their truth or falsehood is uncertain (with various modalities). We now suggest a way of tagging information along these lines, distinguishing three categories of information that fall short of being true *simpliciter*:

- a. Information that has a truth-value that is to a degree uncertain.
- b. Information that is not false, but has some related defect, for instance, in being misleading.
- c. Information that falsely asserts that a relation or a particular exists when it does not.

Categories a. and b., which cover many territorial claims, can easily be handled within our framework. For instance, it is (currently) uncertain whether Hans Island belongs (or should belong) to Canada or to Denmark, whether Bethlehem belongs (or should belong) to Israel or to Palestine, and whether the Paracel Islands belong (or should belong) to China, to Taiwan, or to Vietnam. Confidence in such claims begins as a cognitive process of assessment that has as input, the claim, and, as output some degree of confidence (*uncertain, very uncertain*, and so on) that will be used to tag the information in our knowledgebase. Information in category b. that is not false, but in the vicinity thereof – because it is metaphorical, bullshit, rhetorically embroidered, evokes codes only understood by its intended audience, and so on – can be handled by tagging the claim as output of one or other kind of performative act (*of*

misleading, provoking, inciting, and so on). In this way, we can draw attention to the fact that the information is being communicated with a special purpose or in a special context that modifies the literal meaning of the words being used.

However, category c. cannot be dealt with so easily. In many cases, analysts do know with a high degree of certainty that a claim is false. For example, in III we noted that Russia has claimed 1.2 million square kilometers of the Arctic Ocean on the basis of a false report of oceanographic measurements of its continental shelf. Our ontology must be able to represent what that report is about, in this case, the 1.2 million square miles that (Russia claims) comprise their continental shelf. The problem is that, on the supposition that the Russian claim is false, there is no such entity as the Russian continental shelf of 1.2 million square kilometers.

A common strategy for representing false statements involves employing reified RDF triples, where an individual RDF statement may be annotated with the quality “false.” This strategy allows knowledge about an RDF triple to be expressed in two steps: the first consists in representing the triple by an instance of a statement that has subject, predicate, and object indicated separately in three different triples. The second step involves creating assertions about that instance as if it is a statement – in our case, an assertion of falsehood. This strategy allows for making statements about statements, but it has largely been found to be inefficient by many users, who find that it dramatically increases the run-time of queries – often making them impossible (though this may change in the future with the introduction of new strategies [6]).

We are exploring an alternative two-step approach that begins by appealing to the family of *lacks* relations introduced in [7] in the context of a treatment of negative assertions concerning medical documents. For example, the proposed relation *lacks_part* would hold between a particular *p* and a universal *U* whenever *p* has no instance of *U* as part (such assertions will be made where there is an assumption that *p* *should have* or *is expected to have* a part of this sort, as for example in: *John is missing his left arm*. Since the particular (John) and the universal (*left arm*) both exist, the assertion of a *lacks_part* relation between them is perfectly in order from a realist point of view. When applied to territorial disputes, this strategy would allow us to posit the fact that corresponds to a false claim: e.g. that the Russian continental shelf *lacks* an extension covering 1.2 million square miles. We can then tag the false claims as being both *false* and also *about* the corresponding lacks relation. This allows us to interpret the class of false information content entities as bearing an *is about* relation to an existing portion of reality. This allows us to deal with false beliefs held for example by specific governmental organizations while remaining in conformity with the principles of ontological realism.

VII. ARGUMENTS, MOTIVES, OBJECTIVES

Another significant component of territorial claims are the *arguments* made by disputing parties in defense of their claims. Any adequate representation of territorial disputes needs to capture the arguments for or against the truth of given claims, together with the other information content entities delineated

above. To this end, we likewise treat arguments as information content entities borne by documents of a range of different sorts. Like claims, arguments are generically dependent continuants that can exist in many bearers, for example in multiple hard drives, in printed form in newspapers, in fliers posted on walls, and so forth.

We should think of arguments as wholes that are comprised of informational parts. For example, the argument supporting the thesis that Russia exercises sovereignty over half the Arctic Ocean involves both the *conclusion* that Russia exercises sovereignty over a particular region and other claims (the *premises* of the argument) offered to support that conclusion, here: that international law stipulates the criteria for a nation's continental shelf, that the measurements of Russia's continental shelf include half the Arctic Ocean, and that whatever falls within a nation's continental shelf belongs to that nation. The argument in favor of Russia's sovereignty over half the Arctic is the logically ordered collection of these information artifacts. Dividing an argument into its parts allows our ontology to keep track of the ways arguments are amended over time. In the first place, we can tag the claim that Russia exercises sovereignty over the Arctic as the conclusion of an argument. We can then situate that claim within an aggregate of other relevant claims. If different reasons are given at a different time, then we can treat those supporting reasons as comprising a separate argument on behalf of the same conclusion. Finally, if some argument is bolstered or diminished by new evidence (e.g., if an independent party issues the results of new and more precise measurements of Russia's continental shelf) then we can represent that emendation.

Next, we consider the various kinds of arguments that could be offered in support of different kinds of claims. Kinds of argument are differentiated by what kinds of considerations they appeal to, for example evidence from geography, from geology, from history, and so on. Brian Sumner [8] identifies nine such kinds of considerations nations might appeal to in defense of a given territorial claim:

(1) *Treaty Law*: Treaties between nations form the basis of a strong legal appeal for the legitimacy of a claim of sovereignty over given territory. However, these treaties are also disputable, most importantly by third parties, who were not included in the making of the treaty, but who have other considerations in favor of a claim over the territory in question. Further, treaties may turn out to expire or suffer revocation at a later date, e.g., if colonizers of some land made a treaty concerning that land's territorial borders.

(2) *Geography*: Geographic and environmental features naturally suggest territorial boundaries. In Sumner's words, "Mountain ranges, rivers, oceans, and other bodies of water and physical formations have perennially separated political entities." Our ontology readily accommodates the use of geographic features as evidence for a territorial claim, insofar as it differentiates between the geographic features themselves (mountains, oceans, etc.) and the geopolitical boundaries that are claimed to coincide with these geographic features. (Recall that these claims may be tagged as false or disputed.)

(3) *Economy*: An economic argument in favor of some territorial claim makes appeal to economic necessity. In such cases, a nation claims that the territory in question is necessary for its sustenance or development. Such claims may include appeal to the necessity of sea-routes, aerial routes, trading establishments, natural resources, raw materials, agricultural potential, or foreign investment for a nation's flourishing. (Such arguments may also make reference to a nation's proximity to certain economically valuable resources, but strictly these considerations are adjudicated by UNCLOS, and do not flow from the existence of economically valuable considerations taken in and of themselves.) Assessment of an argument from economic necessity requires assessment of its individual components. Our ontology therefore captures information pertaining to, for example, deposits of natural resources, trade and transport routes, their economic value to the territory in question, as separately evaluable entities.

(4) *Culture*: An argument from culture appeals to "common language, religion, kinship, or other cultural characteristic that defines the group of people living in a particular territory." Quebec's attempted secessions from Canada have involved arguments of this sort, factors relating common cultural background being offered as evidence for the drawing of new territorial borders insofar as these factors would contribute to the unification of a region's population. In some territories, religion plays a strong unifying role. Again, our ontology captures such arguments by treating cultural factors such as ethnicity, religion, and language as separate entities.

(5) *Effective Control*: Arguments from effective control appeal to facts about a nation's *de facto* uncontested administration of a given territory. Historical appeals to such administration are used to support arguments for adverse possession of a region. Analogous arguments are applied, too, over longer time scales, for example in support of native populations' claims to sovereignty over regions of territory over which they once held sway and which have subsequently colonized by outsiders.

(6) *History*: Many territorial claims make reference to purported historical facts about the region under dispute. For instance, China claims that their fishermen have made use of the bulk of the South China Sea for centuries, and that this fact is strong evidence in favor of a claim over the vast majority of the Sea. (This also shows the overlap between historical and economic considerations, insofar as China's claim rests upon the longstanding economic importance of the region to China.)

(7) *Uti Possidetis* (meaning "as you possess") is a principle upon which newly independent nations inherit the boundaries determined by colonial powers. Nowadays, this principle is only rarely invoked. More to the point, it is usually taken to be relatively weak evidence for a claim, and considerations (1)-(6) generally take precedence over *uti possidetis*.

(8) *Elitism*: Arguments under this heading comprise involve appeal to the fact that one participant in a territorial dispute is in one or other respect in a superior position with respect to another participant. This includes appeals to divine right, the superiority of one's civilization, or racial superiority. Such claims, too, have become increasingly rare, and arguments from elitism are nowadays considered to be

relatively weak. However, that is not to say that such arguments are not made. Recall Cohen’s claim, quoted earlier, that the Jewish people returned to Israel “to build a nation on the lands given to us by the Bible.”

(9) *Ideology*: Finally, arguments from ideology make reference to ideological factors for the legitimacy of some territorial claim. Sumner cites anti-colonialism and the movement for social justice as sources of ideological arguments for territorial claims.

This classification becomes especially useful when we analyze arguments employed in territorial disputes from the perspective of the known or suspected *motives* of the governments involved. For instance, there is reason to believe that the Arctic region is the site of untapped natural resources. Russia’s stated arguments in favor of its sovereignty over half this region may make no mention of these resources, and yet an analyst can reasonably suppose that the intention to exploit those resources is one of Russia’s motives for claiming sovereignty. Thus, we first propose distinguishing between stated arguments and known or suspected motives, and then

viewing arguments in light of these motives. Motives comprise the objectives the government has in winning the territorial dispute, whereas arguments are devices to facilitate progress toward gaining these objectives. That is to say, arguments are only one part of a government’s plan to realize its objective, which is authority or sovereignty over a given disputed territory.

This objective will in every case be embedded within a nation’s efforts to realize broader economic, political, ideological, and military goals. A country might have a plan whose objective is to grow its economy, and this plan might include subplans for some sort of political or military action to achieve sovereignty over some region and exploit its resources. ([9] provides a detailed discussion of some Norwegian, Russian, and Finnish strategies pertaining to territorial claims in the Arctic along these lines.) The components of these subplans will in turn involve, at still lower levels, plans concerning how to achieve this task, whether by vigorously defending some claim at the United Nations or intimidating the military craft of other nations in a given area.

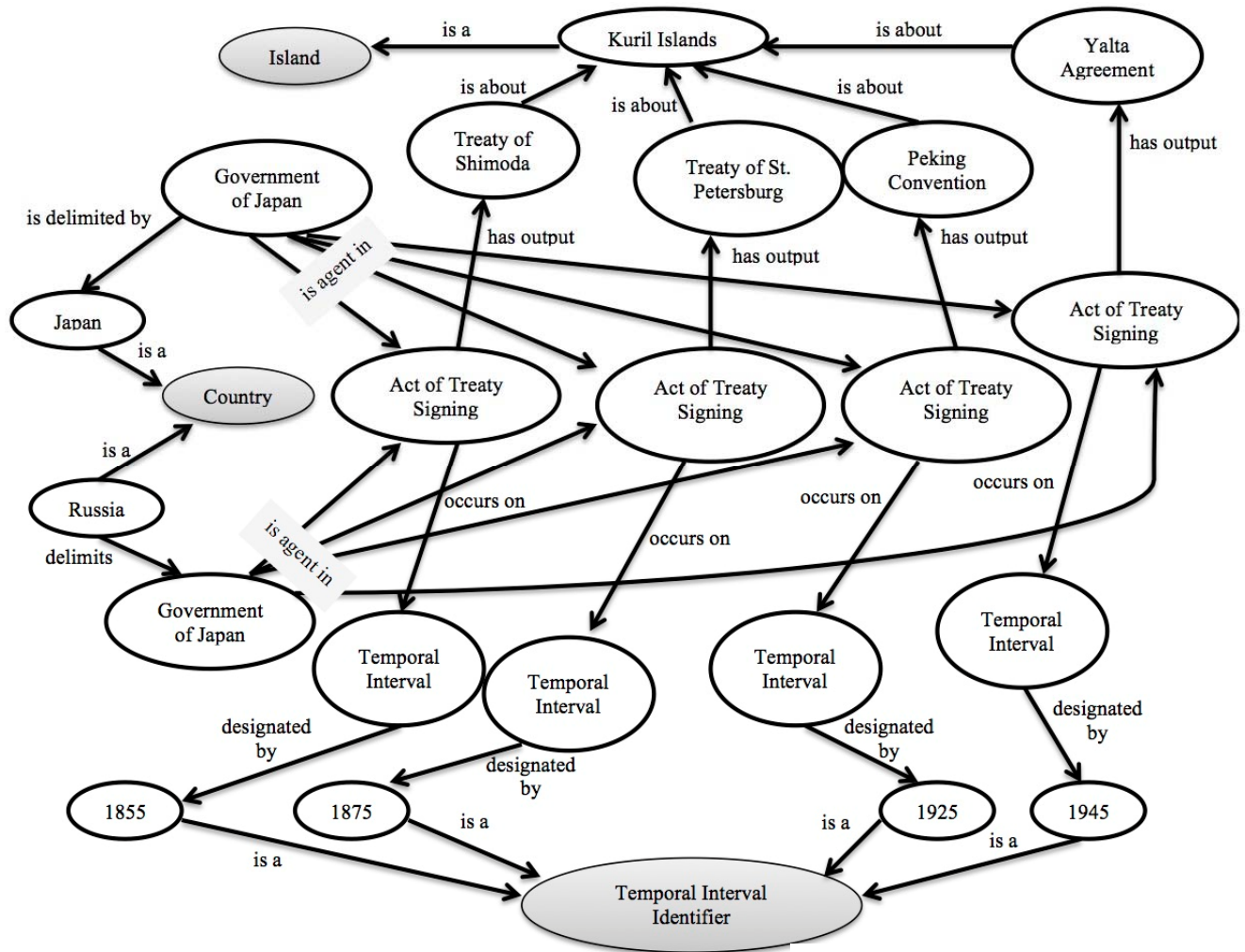
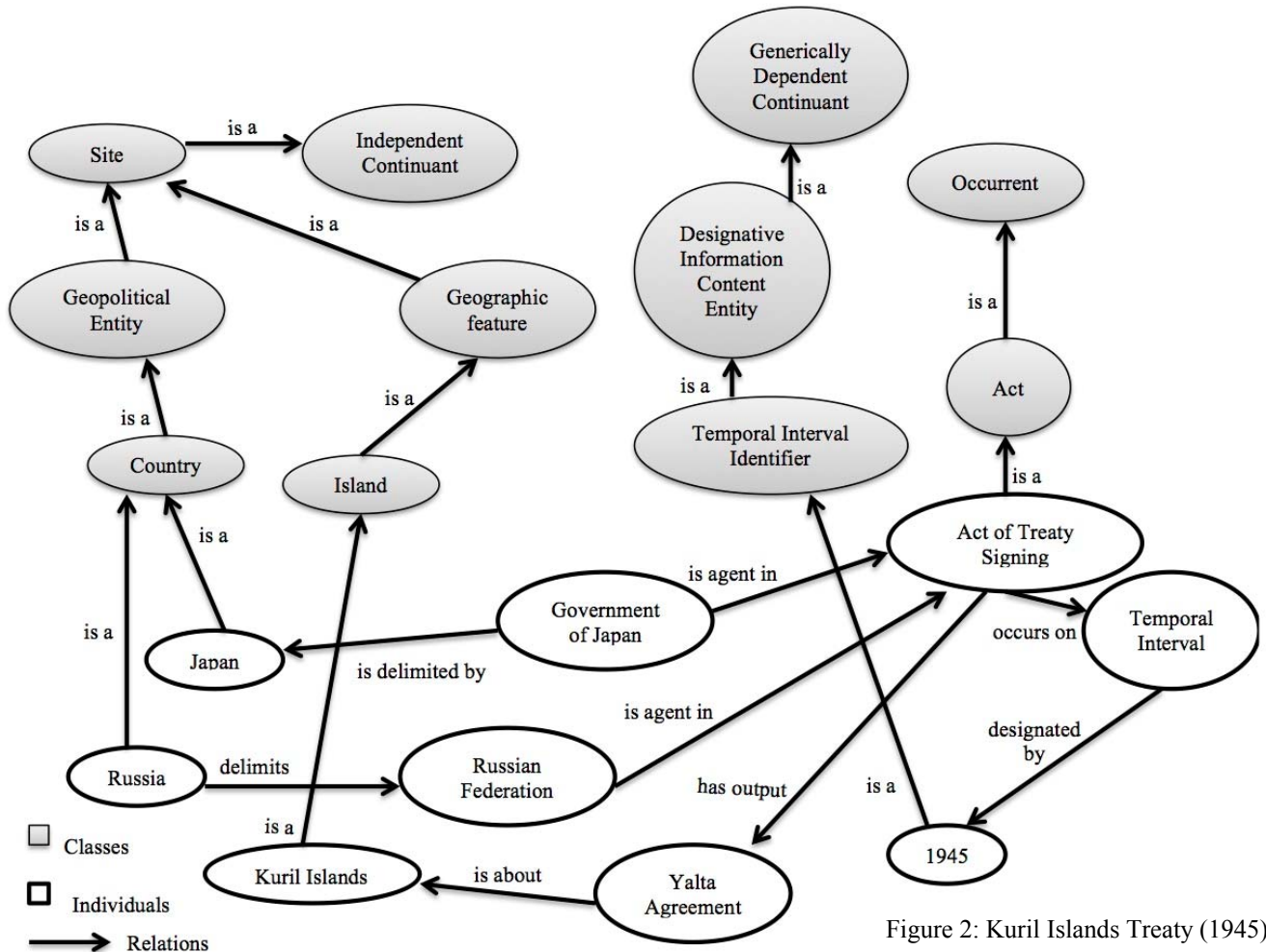


Figure 1: Kuril Island Treaty Timeline

VIII. APPLICATIONS: THE CASE OF THE KURIL DISPUTE

We will now apply our ontological approach to data about a specific dispute, namely that between Russia and Japan over the Kuril Islands, which has been on-going for over a century (Bobic, 2012, see Figure 1). In 1855, Russia and Japan signed the Treaty of Shimoda, which divided the northern and southern islands between them. One island, named Sakhalin, contained Russian, Japanese, and Ainu inhabitants, and so was omitted from the Treaty. Hostilities increased among the inhabitants of Sakhalin, and in 1875 Russia and Japan signed the Treaty of St. Petersburg, which gave sovereignty of Sakhalin to Russia and sovereignty of all the remaining Kuril Islands to Japan. As Bobic notes, the interest in the Kuril Islands is largely strategic. The islands have held strategic significance especially for Soviet Russia, which sought to station submarines in the area. Their economic value, however, is meager, as there are few petroleum or mineral deposits. There is some possibility of oil and gas reserves, but the amount is unknown. Finally, the islands have symbolic significance, insofar as they have been the site of important violent struggles between Russia and Japan. As Bobic reports, “the symbolic value of the islands matters the most to the local Russian residents, who believe that this was the land won with the blood of Russian soldiers.” [10] Early in the twentieth

century, the dispute escalated into full conflict between Russia and Japan, which was eventually resolved through ratification of a peace treaty through the mediation of the United States. After the October Revolution of 1917, Russian forces again clashed violently with Japanese in the region, but this eventually led to another agreement, the Peking Convention of 1925. Following the conclusion of World War II, Stalin expressed his desire to seize the Kuril and Sakhalin Islands from Japan, and did so with Roosevelt’s blessing in the Yalta Agreement of 1945 (see Figure 2). Japanese-Russian relations were “normalized” in 1955, but the dispute over the islands remained. Late in the 1970s, the Soviet Union stationed troops on some of the islands, and a few years later Japan sent Prime Minister Suzuki to visit the southern islands in the archipelago, and designated a “Northern Territories Day,” which only served to escalate tensions. At last, starting in 1990, Yeltsin in Russia moved toward a proper resolution of the dispute, and met with Japanese officials in 1993. Eventually, this led to an agreement of mutual use of fisheries in the region and of visa-free travel for Japanese to the area. Most recently Putin, however, has stalled further talks on resolution of the dispute. (See Figure 3 in the Supplementary Data provided at <http://ontology.buffalo.edu/14/territorial-disputes/>.)



Provided at <http://ontology.buffalo.edu/14/territorial-disputes/>:

Figure 1: Kuril Island Treaty Timeline
 Figure 2: Kuril Islands Treaty (1945)
 Figure 3: Russian Troops FDICE
 Figure 4: Arctic Dispute
 Figure 5: Schwebel Argument
 Figure 6: North Korea FDICE

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Our ontological approach is capable of representing this complex situation, spanning over a century of tension, conflict, treaties, and shifting borders. We do this by first considering the timeline formed by a sequence of acts of treaty signing. Each such act has the output of a signed treaty, and it also occurs at a specific temporal interval, which can be timestamped. Thus, there is an act of treaty signing with output the Treaty of St. Petersburg. This act has two participants – the governments of Japan and Russia – and occurs at a temporal interval that is designated '1875'. Such temporal intervals are proper parts of the temporal interval occupied by the territorial dispute taken as a whole. Two discrete increases in conflict, resulting in armed conflict, occur on their own temporal intervals, designated by dates, and each overlaps with parts of the temporal interval of the dispute. (See Figure 2 figures in accompanying material.)

In addition, the symbolic importance of the islands rests on an instance of the disposition type we have labeled *nationalism*, and this symbolic importance serves as an *ideological motive* for the dispute. The *objectives* of the governments, on the other hand, turned on *strategic naval advantage*. Both motives and objectives are distinct from the explicit arguments put forward by participants in the dispute at different times through the century. Acts with arguments as outputs can be represented in their turn as occurring on specific temporal intervals that are designated by particular dates.

IX. CONCLUSION

We have surveyed the ways in which our ontological approach can capture the features of a territorial dispute within the framework of the Basic Formal Ontology by appealing to the I2WD ontology suite. In particular, the ontology we propose offers the ability to capture the peculiar character of disputes and associated conflicts, it has a strategy to deal with both false and disputed information, and with the various kinds of arguments, motives, and objectives at work within them. In addition to terms representing entities such as claims, arguments, territories, and roles, the ontology must specify also the relationships among the diverse elements involved, for example, the relationship between the content of a piece of propaganda and an objective, or between an argument and a claim, relations such as *aboutness*, *support*, *ratified by*, and so on. Some of these relations are illustrated in the Figures.

ACKNOWLEDGEMENTS

We wish to thank John Beverley for incisive comments on an early draft of this paper, and Ron Rudnicki and Yonatan Schreiber for fruitful discussion of these issues.