

Ontology Modelling in the Legal Domain -Realism Without Revisionism? ¹

Wim Vandenberghe, Burkhard Schafer and John Kingston
Joseph Bell Centre
Edinburgh University, School of Law
Old College, Edinburgh EH8 9YL
www.cfslr.ed.ac.uk

Abstract

This paper discusses problems and issues in research on detection and prevention of financial fraud undertaken as part of the European Commission funded FF POIROT (Financial Fraud: Prevention Oriented Information Resources Using Ontology Technology) project. The goal of the project is to build a detailed ontology of European Law, of preventive practices and of knowledge of the processes of financial fraud within the European Union. It aims at compiling for several languages (Dutch, Italian, French and English) a computationally tractable and sharable knowledge repository (a formally described combination of concepts and their meaningful relationships) for the financial fraud domain. The paper explores in particular just how “heavy” an ontology needs to be to meet the needs of the various stakeholders in the criminal justice system, one of the as yet unresolved problems in the multi-partner, multi-jurisdiction and multi-profession project.

1 FF Poirot

It is estimated that the EU loses several billion euros per year due to financial fraud. Therefore it should not come as a surprise that prevention and early detection of fraudulent activity is an increasingly important goal for the EU and its Member States.² The impetus for building a financial fraud ontology results from the need to supplement the efforts of EU Member States to combat financial fraud, and especially to improve the cross-border co-operation between investigating and prosecuting agencies. FF POIROT is focusing on two areas of fraud: VAT (sales tax) fraud, which is the example used in this paper, and unauthorised online investment solicitation.

The detection of EU VAT fraud presents difficulties not encountered in areas such as, for example, the credit card industry. Whereas credit card fraud comes to light fairly early on, in EU VAT fraud it takes months, sometimes years, before individual transactions can definitively and legally be identified as fraudulent. Two examples of VAT fraud are “carousel fraud” and “missing trader intra-community fraud”. In carousel fraud, goods are apparently exported, thus making them exempt from VAT, but the export does not actually take place; the transaction may then be reversed in the “receiving country”, thus doubling the fraud while leaving stock levels in both countries unaffected. Missing trader intra-community fraud (MTIC fraud) is carried out (in general terms) by setting up fake or minimum-sized companies, which trade across borders in such a way that one becomes liable to repay VAT to the government, while the other has already claimed a VAT refund – and these companies then disappear without trace. In practice, several layers of buffer companies may be used.

¹ This work was supported under the IST project FF POIROT (Financial Fraud Prevention Oriented Information Resources using Ontology Technology), which is sponsored by the European Union's Information and Systems Technology Directorate (5th framework) under grant number IST-2001-38248

² See Communication from the Commission, Protecting the Communities' Financial Interests. Fight Against Fraud. Action Plan for 2001-2003, COM(2001) 254 final. A recent effort by the UK government is the initiative by HM Customs & Excise, titled “Protecting Indirect Tax Revenues”, designed to save £2 bn a year.

Complying with VAT regulations requires knowledge of a vast web of regulations, and is therefore a heavily knowledge-based task. *Detecting* VAT fraud appears to require less knowledge; once all the information is available, a numerical comparison between transaction sizes or identification codes on invoices, or a failure to match one invoice with another, will reveal the fraud. The European Community has developed a cross-border database (known as VIES, the VAT Information Exchange System).³ The problem is in making the information available in a timely fashion. The current operation of VIES does not allow sufficiently early availability of such information.

However, the task of fraud *prevention* – using profiles of typical fraudsters or typical fraudulent transactions to direct inspectors towards possible frauds at an early stage – appears to be an area much richer in knowledge. Profiles will consist of a mixture of single facts that raise “red flags”, conjunctions of facts that raise “red flags” if found together, and sequences of data over time (behaviour patterns). A better understanding of fraud-related risk factors could lead to better targeting of control visits and a significant increase in fraud prevention. It may be that this area is considered more suitable for an ontology-supported demonstrator than the task of fraud detection.

In what follows, we introduce a few of the requirements our analysis has discovered so far. They are chosen here because they indicate needs for variously detailed axiomatic descriptions of the concepts in question, and illustrate the range of theoretical choices and commitments that have to be made. At present, these requirements and the ensuing theoretical commitments are seen in isolation, as specific technological problems to be solved by technicians. This paper then is a first attempt to see them interrelated through more basic, theoretical or philosophical choices, amongst which the decisions between reference vs. application ontology, description vs. revision ontology and “upward constructive” (functionalist) and “downwards constructive” (formalist) theories of law figure prominently. To anticipate somewhat: The multi-jurisdictional setting of the project means that we are confronted with several mutually incompatible conceptualisations of the VAT domain. This indicates the need for a “heavy”, axiomatic characterisation to minimise the potential for misunderstandings between users from different jurisdictions. This then raises the question of the ontological status of legal concepts. In one approach, legal concepts are ontologically dependant on the social reality they regulate. This is a functionalist approach to law, and there are well developed comparative law theories (Zweigert, Koetz)⁴ and jurisprudential theories (Searle) that support this view. Decisions made on the modelling of evidence then have a direct impact on the modelling of legal regulations.

However, the realistic assumptions underpinning this view are a two-edged sword. On the one hand, they give a good explanation why legal comparison is possible: two concepts from different jurisdictions are the same if they regulate (are dependent upon) the same bits of social reality. On the other hand, this approach almost inevitably (and comparative law research in this tradition bears witness to this) results in a revisionist ontology. In a medical expert system, to get the right result as opposed to the result accepted by the medical fraternity seems a desirable goal. In a legal expert system however, this might well contradict a user requirement. To get the “right” answer is of little help if courts remain unconvinced – and indeed it is questionable what the “right” answer could mean if social institutions with the appropriate authority disagree with this result. As an alternative, there are equally well-

³ Certain parts of this common computer network can be accessed by businesses across Europe to check the validity of their customers’ VAT identification number on the Internet since 14 June 2002. See http://europa.eu.int/comm/taxation_customs/vies/en/vieshome.htm

⁴ Zweigert, Koetz: *Einfuehrung in the Rechtsvergleichung*. Muenchen 1986

developed “downwards constructive” jurisprudential (Teubner)⁵ and comparative legal (Samuel)⁶ theories. In these approaches, legal systems and concepts create their own (social and physical) reality. Decisions made about the correct representation of law then have a direct bearing on the correct modelling of evidence and other non-legal entities. However, this approach raises the question if two concepts of different jurisdictions can ever mean the same, and what “sameness” could possibly mean. According to some writers in this approach, cross-legal correspondence of terms is merely conventional, not based on any “real” and objective correspondence, and is ultimately policy driven. As a result, a lightweight application ontology might after all be necessary to represent the ad hoc, merely conventional and highly context sensitive correspondences between legal vocabularies of different jurisdictions in a thesaurus. The legal philosophy of Reinach might provide a compromise solution between these two that combines upward and downward construction. Legal concepts exist independently and irreducibly from the physical world that they regulate, and it is indeed a function of the law to “cut out” pieces (“Sachverhalte”) of this reality according to criteria intrinsic to the law. However, ultimately non-legal objects form parts of these Sachverhalte, which act as a bridge between law and social reality. As we will see, this approach has its own problems especially regarding the question of description vs. revision.

2 Selected User Requirements And Resulting Demands On The Ontology

The ideal system for supporting VAT compliance would be a knowledge based system that asks the user a few questions (in a choice of languages) and then supplies all the necessary information and forms for VAT compliance. This is very similar to a system that is already marketed by VAT Applications BV, a member of the FF POIROT consortium. If such a system were to be supported by an ontology, the requirements on the ontology would be:

1. To represent legislation and legal rules from multiple countries;
2. To support reasoning about compliance with these legal rules;
3. To associate natural language terms in various languages with key concepts, so that (for example) key rules from one country can be viewed in the language of another country;
4. To represent interpretation of legislation and legal rules useful to the user.⁷

As stated above, the most important asset in fighting cross border VAT in the EU would be an effective system of mutual assistance and information exchange in order to ensure the proper functioning of the VAT system. A possible use case would be the automatic and preferably spontaneous exchange of information to help in the detection of fraud in intra-Community trade. The ontology should support this system, providing a solid basis for the monitoring and enforcement of non-compliance of VAT laws. For this use case, the primary role of the system would be to enable two-way co-operation within and across agencies and within and across borders. This should include:

5. data integration within the same agency;
6. data integration between different (national) agencies;
7. data integration between two or more EU Member State agencies;

⁵ Günther Teubner: *Law as autopoietic System*. London: Blackwell 1992

⁶ Geoffrey Samuel: Comparative Law and Jurisprudence. *International Comparative Law Quarterly* 47

⁷ For example, HM C&E have refused to zero-rate supplies from companies which were complying with UK VAT law (notice 703). See, Case Study “How HM Customs & Excise misinterprets EC & UK VAT law to the detriment of British business trading in Europe”, <http://www.bavat.co.uk/cases/ec.htm>

8. knowledge about legal methods of fraud investigation (which will differ between countries);
9. knowledge of typical indicators of fraud. Note that knowledge of methods of fraud is not essential, only of the indicators that point to the use of those methods;
10. The system must deal with multiple data sources (VIES, ICT listing, etc), each having different functions and user interfaces;
11. The system should know about law related to fraud investigation as well as fraud identification. For example, Customs & Excise in the UK have power of criminal investigation, but only the police have the power to investigate in Belgium.
12. The system should automate repetitive tasks such as checking to ensure VAT numbers are valid.

VAT fraud prevention requires rather more wide-ranging knowledge than VAT fraud detection, since it is searching for indicators of possible future fraud rather than indicators of existing fraud. Its knowledge may therefore include past histories of individuals, psychological profiles, typical company organizations for fraud, and typical commodities traded in certain types of fraud.

13. The system should be capable of analysing indicators of possible fraud;
14. The system should be capable of link analysis, which relates known fraudsters to other individuals using record linkage and social network methods. In the VAT fraud domain, VAT investigators have found that fraudsters seldom work in isolation from each other. In particular, VAT carousels are often the work of the same fraudsters over and over again;
15. The system should (ideally) be capable of graphical/illustrative presentations of key issues to assist users in understanding them, in navigating through them, and in presenting them to a jury.

Since the goal of such a system would be to direct VAT inspectors to more likely cases of fraud, there is also a need to represent national and supranational laws relating to VAT fraud and national laws relating to investigation of VAT fraud.

Listed below are the top-level requirements of the ontology to address the demo showcases on this project (VC indicates a compliance-related requirement, VD is related to fraud detection, and VP to fraud prevention). It is not yet clear whether all these requirements can be met with current technology, within the timescales of this project. However, in order to support these requirements, the ontology must be able to describe concepts in the domains listed below.

- VC1: The law of various countries regarding offering VAT, and supranational laws governing cross-border VAT transactions in the EU;
- VC2: Knowledge of products, goods and transactions that is relevant to the various laws;
- VD2: The law regarding investigation of VAT fraud in various countries
- VD3: Different databases and their communication formats
- VD4: The law of various countries regarding offering VAT, and supranational laws governing cross-border VAT transactions in the EU;
- VD5: An understanding of corporate structure (for tracking down missing trader frauds)
- VP1: Knowledge of specific methods of fraud and related indicators

VP2: Knowledge of indicators of fraud relating to products and transactions
VP3: An understanding of companies and corporate structure, including:

- a) Management structure (partnership, etc);
- b) Managers (the director might be someone with a criminal record);
- c) Corporate structure (Does it have subsidiaries in other EU countries? Did head of Company A found other companies in neighbouring countries?)
- d) Does the company actually exist (or is it PO Box address only; answering machine, etc)?
- e) Who are its trading partners? Where are they located?

VP4: Knowledge of indicators of fraud relating to individuals and their history

VP5: Links between individuals and others via past or present relationships, or via types of evidence

VP5.1 Relationships

VP5.2 Certain types of evidence

VP5.3 Evidence databases

VP6: The law of various countries regarding offering VAT, and supranational laws governing cross-border VAT transactions in the EU.

VP7: The law regarding investigation of VAT fraud in various countries

Many of these top level requirements must be broken down into more specific requirements. For example, requirement VP1 (Knowledge of specific methods of fraud and related indicators) requires that the ontology must be able to represent the intention of actors. The legal definitions of fraud require the presence of an element of intentionality on the part of the individual. It's quite possible to perform a crime unintentionally – for non-compliance, this is normally due to ignorance of the correct procedures, while for fraud, it may occur if a legal trader is used as an unwitting link in a VAT carousel fraud. This leads to the following more detailed requirements:

Ontology requirement 1.2: The ontology must be capable of representing **plans** (modus operandi).

- The ontology must be able to represent actions. This should include identifying the actor(s); the resources created, modified, consumed or employed; and the resultant changes to the state of the world. Thus key elements to be represented by the ontology might include the fraudsters; their actions; the assets at risk; other assets required; and the indicators that a fraud has taken place.
- The ontology must be able to represent sequences of actions. Sequences of events reveal how related events unfold over a time period. The timing is important; for example, when did the suspected fraudster establish the involved companies? When did he 'sell' goods? When were these goods transported? When did he send invoices to the authority? From a legal viewpoint, there are three time intervals that are important: before, during and after the action (be it a fraud or the publishing of a non-compliant website) was committed. Because the focus of this project is on cross-border financial fraud, the location of the fraud and its aspects has to be determined. This is important mainly for the *assertion of jurisdiction* by the relevant investigative and prosecuting authorities. Questions to be asked are: Where is the company incorporated? Where are the victims (tax authority, private investor) situated? The ontology must be able to represent that some actions are 'before' or 'after' others. It's not yet clear whether precise time intervals between actions need to be represented.

- The ontology must be able to represent where the fraud happened (where harm is done), fraudsters are located, etc. Initially, the level of detail need be only the name of the nation(s) in which the individual resides/company is registered

Another example is the representation of laws regarding VAT, which is required for all three possible scenarios (see requirements VC1, VD4 and VP6). This requires that:

Ontology requirement 1.3: The ontology must be able to represent **legal rules**:

- The ontology must be able to represent legal and administrative rules in different countries across the EU;
- The ontology must be able to represent definitions of fraud, sanctions for fraud etc. in different countries across the EU;
- The ontology must be able to support matching of plans against multiple legal rules from a single jurisdiction.

This last requirement is important, for there are few laws that consider common fraud plans as crimes directly; once such laws are made, the fraudsters simply change their plans. For example, VAT carousels do not have their own statutory penalization; but they can be prosecuted as an amalgam of criminal offences, such as specific fiscal offences and forgery. Some of the other specific requirements that arise are listed below.

Ontology requirement 2.1: The ontology must be able to represent practical ('on the field') knowledge about authorities involved in investigation of fraud, derived from legal rules. For example: Who are the relevant investigating, prosecuting authorities? What is the structure of the investigating department?

Ontology requirement 3.1: The ontology must be able to represent products as concepts with multiple properties. The properties may be symbolic or numeric, single or multi-valued, may contain links to other concepts or properties, and may be derivable from other properties. Commercial transactions require a sale, a vendor and a purchaser. A sale is an agreement between two legal entities for the supply of a product or of a service for a price.

Ontology requirement 4.1: **The ontology must be capable of representing a Sale, an action that transfers ownership of a Product from a Vendor to a Purchaser (who must be a Legal Entity), and transfers a Sale Price from the Purchaser to the Vendor. A knowledge of the structure of companies is also needed.**

Ontology requirement 7.2: the ontology must be able to represent links between companies, both parent/subsidiary links and trading links.

4 Some Theoretical Reflections

We have indicated the wide variety of concepts that need to be represented in order to represent the workings of financial fraud. It can be seen that some requirements make high demands on ontologies: to give two examples⁸, natural language "terms" cannot merely be seen as annotations to "concepts", but need to be looked at as concepts themselves (in order to satisfy the requirements to be able to detect fraud markers in the material provided by the companies like annual reports etc); and also, the system must allow universals to be related to particulars (e.g. "the Belgian VAT law" is a particular but a person violating it must be

⁸ with acknowledgements to Werner Ceusters of L and C Computing BV, from whom these examples are quoted

represented as a universal). The choice of a general ontology on which the FF POIROT will be based should therefore be made very carefully.

It is the cross-border, multi-language and multi-profession environment that makes ontology-based solutions attractive. For an investigation conducted in the UK, the question whether the director of the German supplier of a British company has relevant previous convictions can be an important indicator of fraudulent activities. The relevant information will be held in a German database, labelled in German and using a largely contingent format of recording. An ontology-based approach should enable the investigator to give the system a query in his language (“does the director of this company have previous convictions?”) and get a reliable answer in English that is affirmative if the “Vorstand” of the “Gesellschaft” has a “Vorstrafe”. The processes involved on successful fraud detection and prosecution therefore involves

- To explain the meaning of a term to somebody outside the community - for instance to explain to a UK lawyer that “Vorstrafe” covers (most of) “previous conviction”
- To negotiate meaning between agents belonging to different communities (professional and national). This task is in our context partly fulfilled by the EU directives that have exactly this function. However, the system needs to represent how different (and possibly mutually inconsistent?) national laws “implement” one and the same directive
- (ideally) to establish consensus - to accept e.g. that a German “Haftbefehl” is similar enough to a UK “criminal charge” for the UK authorities to act on the German court order to seize assets held in the UK as evidence.

These three functions, explanation, negotiation and consensus are listed in [Borgo *et al*]⁹ as indicators that an explicit representation of ontological commitments is necessary to exclude terminological and conceptual ambiguities. A rich axiomatisation can deliver that. In this specific example for instance, it is possible to represent axiomatically the mereological structure of companies in German and UK law¹⁰. The two concepts (or wholes) are by no means identical, the German company having a necessary part (the “Aufsichtsrat”) that is missing in UK law. The UK lawyer would however see that for each of the parts in a UK company, there is a corresponding part on the German company and that in particular “Vorstand” corresponds to “Director” not only regarding his legal function, but also in respect of his place in the complex structure that makes a company.

Another of the ontology requirements introduced above makes this approach highly desirable. The graphic representation of specific networks as evidence was introduced above as one of the desiderata of the system. In this instance, it facilitates the communication of the investigative expert, for instance a forensic accountant, with the prosecutor and possibly a court or jury. However, Gestalt-psychology teaches us the intuitive compellingness of such a graphical arrangements which makes it almost inevitable to see groups in graph layouts - even if they are not substantial enough to establish say a “conspiracy to defraud” for legal purposes.¹¹ The historical link between Gestalt psychology and mereology developed by Gurwitsch could allow us to capitalise on the axiomatic features of the links in the graph to minimise misunderstanding. For instance, it might be desirable to represent only those links

⁹ Borgo, Gangemi, Guarino, Maselo, Oltramari: Wonderweb deliverable D15

¹⁰ Burkhard Schafer: Inheritance principles and the community of heirs. In N Guarino (ed.) Formal Ontology in Information systems. IOS Press Amsterdam 1998

¹¹ Sparrow, Malcolm K. (1991b). "The application of network analysis to criminal intelligence: An assessment of the prospects." *Social Networks* 13:251-274 Jensen, David (1997). "Prospective Assessment of AI Technologies for Fraud Detection: A Case Study." *AI Approaches to Fraud Detection and Risk Management*, Collected Papers from the 1997 Workshop. Technical Report WS-97-07. Menlo Park, CA: AAAI Press html

whose formal features guarantee that the ensuing whole is a “pregnant” whole. While shared ontological commitment facilitates understanding, we encounter here a serious difference between similar projects in the natural sciences or medicine, and the legal domain. In the sciences, the underlying philosophical realism assumes convincingly that there is the possibility to agree on the relevant classification. The one shared reality sees to this. In law, the parliaments of the individual member states can create divergent realities. While German and UK law will agree that an extended prison sentence handed out by a court is a “previous conviction” and “Vorstrafe” respectively, it cannot be taken for granted that UK law recognises the equivalent of a German legal term such as “Strafbefehl”¹². If such a “Strafbefehl” is recorded against the name of the company director, should the system return an affirmative or a negative answer to our initial query? In an application ontology, this decision is taken pragmatically based on the interests of a small group of users with clearly defined goals and extracted from the texts they produce. For the investigator, the question is if his suspect had previous problems with the law, not the precise legal classification of this problem, and the classification of the domain will represent this. For the prosecutor, a much more restricted reading is necessary that tells him that the “Strafbefehl” did not automatically disqualify a person from becoming a director, the way an equivalent conviction would have. The problem is moved to the lexicon. This however means that the ontology loses “portability” and with that one of the main advantages of an ontology based approach. While irrelevant for forming an initial suspicion, the legal difference becomes highly relevant when the decision is taken to ask the German authorities officially for help in securing the relevant evidence, and might be crucial once legal proceedings are started. The alternative is to re-introduce realism and to treat the issue not as one of translation but of theory formation in comparative law.

[Breuker *et al*] have developed for similar applications an approach that explicitly incorporates philosophical commitments and comparative legal methodology.¹³ In their “functional ontology”, they develop a hierarchical model of reality in which legal concepts are made up of the elements of social or physical reality that they regulate. This functional approach to legal concepts has great intuitive appeal and has formed the basis of mainstream comparative analysis since the days of Zweigert and Kötz and more recently in economic analysis and comparative law. In philosophical terms, Searle’s constructivism seems to come very close to this approach. In this model, agreement between different legal conceptualisations is always possible in principle by recourse to the shared reality that the norms regulate. However, this theoretical commitment means that the criticism levelled against these schools also applies to the resulting formal system. In comparative law, it has been long recognised that the reductionism inherent in a functionalist approach can result in serious misrepresentations of foreign law. In philosophy, Smith has shown how Searle’s approach either faces insurmountable problems accounting for crucial legal features or collapses into an unconvincing treatment of legal concepts as mere “façons de parler”.¹⁴

While we agree with Smith’s analysis of Searle, we think that some of the examples he uses point to even more serious difficulties that ultimately affect all realist approaches to legal ontology modelling. Of particular relevance to our setting is his treatment of a border conflict between China and Russia: both jurisdictions, on the basis of their law, might claim a specific piece of land. Searle has to treat these claims as valid even if they are not only

¹² similar to a fixed fine, literary “punishment order”

¹³ Breuker, Elha, Petkov, Winkels: *Ontologies for Legal Information Serving and knowledge management*. In: Bench Capon (ed.) *Legal Knowledge and Information Systems* IOS Amsterdam 2002

¹⁴ Barry Smith and John Searle, “The Construction of Social Reality: An Exchange”, *American Journal of Economics and Sociology*, 60 (2001).

mutually exclusive, but also solvable if higher-ranking law (e.g. international law) is employed. In our context, the presence of EU directives will sometimes solve similar disputes - but not always. To complicate matters further, different jurisdictions might disagree on exactly when EU law is competent. In legal doctrine, this is the issue of “competence competence”, and an as yet unresolved, and on legal-conceptual grounds possible irresolvable, question.¹⁵ Furthermore, and again in stark contrast to realist assumptions, it might be possible that different national jurisdictions implement the same directive in a way that is only “upward consistent”, that is, each national conceptualisation is consistent with the EU blueprint, but they remain mutually inconsistent. To “solve” contested legal issues through formal features of an ontology seems undesirable. Even though one could hope that such an analysis contributes to the quality of the discussion in that field, to impose them on a user who has to live with the relevant authorities seems overly ambitious. The requirement to represent jurisdictions as physical spaces as mentioned above therefore clarifies an important issue, but care must be taken that decisions on the correct modelling of space does not pre-empt the underlying legal question.

Another interesting group of examples in our context that is also discussed by Smith results from the requirement to represent temporal notions. Smith uses the examples of a legal claim whose documentary evidence had been lost together with any memory of the claim before it is “resurrected” by an heir centuries later. Another example he offers is the treatment of property in the former RDG (“East Germany”) after reunification. For him, and against Searle, this shows that legal objects can exist even if they are not recognised by anybody. From a legal doctrinal point however, only his first example is unproblematic. It is however at least possible on legal grounds to analyse the second case differently, as introducing objects that exists intermittently in time, popping in and out of existence –The status of such intermittent objects is highly contested in philosophy, although in law, and also in our application, they are not that infrequent. Consequently, a realist ontology which rejects them (on good philosophical grounds) would have to revise the ontology assumed by the legal system.

Any realist ontology will on numerous occasions face similar problems. Legal concepts do not evolve in isolation. They are influenced by (often misunderstood) philosophical doctrines of the time when they were first recognised, and law in many ways resembles a scrap heap of discarded philosophies. Fraud is in many respects particularly fruitful (or difficult), because it typically involves an attempt to deceive someone about certain attributes of an object which might or might not even exist, giving fertile grounds for legal systems to come to their specific answers on how to treat properties of non-existing objects, or to distinguish between attributes and essences. Certain distinctions in UK law on deception as to the identity or attributes of a fraudster (e.g. the difference between claiming to be Bill Gates, or to be just a very rich person) can’t be found in German law. To be sound from the perspective of comparative law, our ontology must not pre-empt this question in favour of one or the other.

As a radical alternative, we find “downward” constructivist theories in both comparative law and legal theory. They still allow for a “heavy”, axiomatic approach to legal ontology, and many formalist theories of law are actually much better suited for such an approach than some of the more pragmatic functionalist solutions. They do however turn the hierarchical conception of ontology upside down. The foundational ontology here is an axiomatic description of the more basic concepts of the respective legal system; the rest of

¹⁵ Neil MacCormick: Beyond the Sovereign State. *Modern Law Review* 1993 p1-18, Bankowski, Schafer Mistaken identities. In: Hoecke (ed) *European Private law in context*. Hart Oxford 2000

the universe of discourse is derived from these legal conceptual commitments. Law creates its own reality(ies). An example in point is the legal treatment of electricity. At some point in time, legal systems had to decide whether electricity is an object (and hence can be stolen) or a process (and hence something that can be fraudulently obtained). Different legal systems differ in their answer to this issue. Downward constructivist approaches take this difference seriously, and instead of deciding in the foundation ontology the status of electricity have multiple representations of it, one for each legal system.

A consequence of this approach is an inflationary, multiplicative approach to ontology, again borrowing from [Borgo *et al*]. Regardless of the question whether one adopts this radical stance or not, a multiplicative ontology seems one way to solve most of the issues discussed here, and in particular the question of jurisdiction. In those cases where the law does not provide a clear-cut solution, to assume that different and mutually contradictory legal entities can nonetheless have a co-localised existence seems a solution, which comes very close to the self-understanding of the law. As fraud under German law, a specific scenario might be punishable; as clever trading under UK law, it might not.

The problem with a downward constructivist approach is that it can't explain how legal systems reach non-arbitrary agreement over meaning of terms, which in a context dominated by EU legislation is the norm and not the exception. Their problems go even further than that. One of the requirements from above is the need to represent intention in criminal law. This intention again involves some understanding of the law. Individual fraudsters might have understandings of the law which are very different from the "official" reading, and if it is possible (as required by law) to say that nonetheless, their understanding is "sufficiently similar" to the correct one to constitute legal intent, such an assertion seems to rely on the same mechanisms this school considers impossible for cross-jurisdictional analysis.

A possible compromise solution is a multiplicative reading of Adolf Reinach's legal ontology.¹⁶ It showed as early as 1921 how we can think of a realist model of comparative law with jurisdiction-independent legal concepts, of which the national laws are but instantiations. The vocabulary to describe these supra-jurisdictional concepts cannot any longer be extracted from legal texts, but could be constructed *a priori* and axiomatically described. The corresponding axiomatic descriptions of national law are then partial models of these more general concepts, a relation that in turn can be axiomatically characterised. Law largely retains its autonomy in this approach, and the (legal!) notion of "Sachverhalt" becomes the crucial glue between legal concept and social reality.

However, this approach raises other philosophical and practical problems. In line with Reinach's philosophy, but in stark contrast in particular to the UK understanding of law, this would mean that national courts could get their conceptual definitions "objectively" wrong. While in a medical expert system, the correct answer is what the patient wants or needs even if it differs from the view of a specific human expert, in a legal context predicting the court might be more important than being "objectively" right. Since access to court decisions is a user requirement for our application, this issue would still need resolving. Unlike the functionalist approaches discussed above, "wrong" here only means internal conceptual contradictions or incompleteness. This indicates the inherent problem of this approach. As noted above, philosophy and law often co-evolve. Unlike in the cases mentioned above, here philosophy borrows from law. The problem remains the proximity between one specific legal tradition, here German law, and the resulting philosophy. Or put differently, a Reinachian

¹⁶ On the Cognition of States of Affairs", in K. Mulligan, ed., *Speech Act and Sachverhalt: Reinach and the Foundations of Realist Phenomenology*, Dordrecht/Boston/Lancaster: Nijhoff, 1987, 189–225

ontology does not impose so much a philosophical perspective on the law, but German legal concepts on the rest. To give a quick illustration, for Reinach it is *a priori* self-evident that the legal notion of contract and delict are instantiations of the more abstract concept of obligation. This is indeed an organisational principle of the German (or more generally continental legal) Civil Code. The consequence of this is that contract law cases that clarify the notion of obligation impact with necessity on the understanding of the law of delict.¹⁷ The ontology as a result produces potentially revisionist arguments, but at least in the case of German law, these revisions would be *legally* sound. Common law does not share this understanding, and here legal concepts can be essentially underdetermined if a court does not explicitly rule on them. The open issue remains if a multiplicative reading of Reinach can avoid cases of “bad” revision. This in turn depends on the question how the ontologically problematic “incomplete” concepts of the common law can be represented, that is concepts that should apply to a given *sachverhalt* (by the standards of UK law), but in the absence of a formal court decision are as yet lacking appropriate authorisation. Legal concepts in common law countries, understood internally, display certain features that we also find in objects of a very different kind, the fictional objects of literature and film. “Sherlock Holmes” has certain properties that are explicitly introduced by the Conan Doyle stories. He is male, he is English, he smokes a pipe. However, while his author, as a human being, also has the property of having a specific blood group (even if nobody ever knows which one), it does not make sense to ask of his creation, Sherlock, which blood group he has until such time as this information is explicitly introduced in one of the stories. Fictional characters are incomplete at any given time, but gain more and more features as the story progresses. The only constraint is that new attributes must be consistent with attributes already introduced. To treat (in a common law context) legal objects as fictional objects would account for instance of Dworkin’s intuition of law as a chain novel. An ontology that can model both actual and fictional objects, along the lines e.g. of Edward Zalta’s axiomatic metaphysics, could encompass both common law and civil law ideas about the status of legal concepts, but would result in a potentially undesirable inflation of the ontology. An alternative approach could be based on an analogy between legal objects and other “intended future” objects. When I order for instance a customised car, only certain of its properties are determined when I conclude the contract, some through explicit agreement, others by certain coherence requirements resulting from these specifications. To treat it because of this as a fictional object would be inappropriate. This sort of “intended future objects” might be a better candidate for a successful analogy than the fictional characters of literature.¹⁸

5 Conclusion

We have shown that describing a real application of law requires a detailed ontological description not only of laws themselves, but also of various related concepts. We have specifically discussed the laws themselves, and have shown that representing laws from multiple jurisdictions is possible, at least within the context of legal harmonisation within Europe, by generating a generic description of legal principles which are then instantiated into the legal codes of individual jurisdictions. However, we have also shown that such an ontology will always have to balance two conflicting demands, something that we expect to

¹⁷ B. Schäfer: Reinach, pragmatic universals and the methodology of comparative law. in: K. Dorn (ed.) *Pragmatics in Contemporary Philosophy*. Beiträge der Ludwig Wittgenstein Gesellschaft, Wien: LWS 1997.p.850-856

¹⁸ based on a very helpful observation by Barry Smith

be typical for domains with social objects. The “heavier” an ontology, and the more pronounced its realist bias, the more revisionist it is going to be. Since the legal systems of different countries often embody for historical reasons ontological assumptions taken from “bad” philosophies, it might not be possible to give an account of certain of their legal features that remain true the self-understanding of these legal systems. The benefits of heavy ontologies have to be balanced against the danger to impose the perspective of one’s own legal system on a foreign law that might have radically different structural features. Since the process of legal harmonisation within the EU can itself be seen as an exercise in revisionist ontology modelling (i.e. the attempt to chose the “right” conceptual framework for a harmonised law) POIROT should be able to capitalise on the potential of heavy, axiomatic approaches to ontology modelling, but already extending it to US-EU tax fraud might require a radically different approach.