

# Logical Model of Guilt as a Part of a Structure of Crime

Jakub Nowakowski<sup>1</sup>, Czesław Jedrzejek<sup>1</sup>

<sup>1</sup>Institute of Control and Information Engineering, Poznań University of  
Technology, Poznań, Poland  
czeslaw.jedrzejek@put.poznan.pl  
jakub.s.nowakowski@gmail.com

**Abstract.** We model guilt as a part of crime using an ontology which is an extension of the LKIF ontology, and to put its elements into context of particular criminal jurisdictions common law and the laws of EU countries codes. Differences between existing multipartite guilt frameworks are analysed. We list entities defining these models. An ontological comparative analysis of guilt frameworks in various jurisdictions reveals 7 types of frameworks. Rules of defeasible reasoning are necessary to decide blameworthiness using justification or excuse arguments as we show on an example.

**Keywords:** defeasible rules · defeater · guilt · LKIF · structure of crime · mens rea · excuse · justification

## 1 Introduction

A structure or concept of crime is one of the central issues of criminal law research [1], [5], [37], [43]. A narrower issue is the development of rules, according to which it is decided that a certain person deserves punishment for a certain conduct. These rules are quite different in different jurisdictions and are a subject of study in comparative law [1]. In this paper we represent a top-down approach to legal system development using provisions of criminal codes. By juxtaposing all EU criminal laws we are able to find common legal entities that are crucial for any AI and Law undertaking that strives to model written law. We extend LKIF from a different perspective than that originally designed. We do not focus on the most popular notions among legal practitioners [8]. We focus on the provisions from the general parts of criminal codes, because it is imperative that they are being taken under consideration when inferring about any particular offence.

There are two aspects of a concept of legal guilt. The first one is related to conditions that allow deciding whether an offender is guilty [48], [5] (blameworthy [43]), therefore a binary guilt is a suitable name in this respect. The second legal meaning of guilt is in the context of the infliction of a punishment. Here guilt is evaluated according to mitigating and aggravating circumstances of the crime. We focus on the first aspect. Furthermore we do not analyse aspects connected to other parts of the structure of crime such as actus reus and notions describing it, such as omissions or causality. However, sometimes we describe guilt in the context of another part of crime –

justification [6]. We found a useful application for both these notions in the defeasible logic and argumentation theory. Their role in the structure of crime is very similar to the nature and purpose of rebutting and undercutting defeaters.

In this work we deal only with the legal part entering discretionary decisions to charge defendants. With regard to petty crimes, notwithstanding readily demonstrable legal guilt, administrative reasons, and equitable reasons might be as well important in prosecutors' decisions [7].

There are many approaches to guilt and the notions that describe it as moral, linguistic, normative entity, mental state, obligation or basis for punishment [37], [43], [1], [48], [35]. The aim of this paper is to model guilt as a part of crime and to put its elements into the context of a particular EU member state criminal jurisdiction. We expected particular jurisdictions to fall in bipartite, tripartite and quadripartite standard framework categories. The first framework consists of two notions: mens rea and actus reus. The quadripartite one adds two more notions to the bipartite framework: social harm of an act and an addressee of the criminal norm or that someone is excluded from liability. The tripartite framework introduces different categorization of notions. It puts all the mentioned notions into one category of the description of a crime. The other two elements of the tripartite approach are justification and excuse. All of these frameworks are Fletcher's basic variants as described in [37] and are also mentioned by other authors in [5] and [43].

We extend the work of Fletcher [37]. Fletcher did not distinguished many aspects of the structure of crime, therefore, the standard framework categories are not able to cover complexity of national jurisdiction guilt frameworks. After closer scrutiny, we distinguish 7 variants of the basic frameworks. These correspond to models represented in Figs. 2-4 and 6-9. Figs. 1 and 5 come from Fletcher.

A multitude of views on importance and a structure of legal concepts makes it difficult to develop ontology based formalization. Such an attempt is done by us, using LKIF as a basis, however, LKIF lacks justification and excuse concepts [8].

In section 1 we describe the most frequently appearing models of crime to determine the placement of guilt. In section 2 we describe legal theories of guilt to underline the distinction between proposition (psychological) and propositional attitude (normative) entities in the LKIF ontology. In section 3 we provide definitions of the most frequently appearing guilt-related terms. Section 4 provides formalization of our model of guilt and in the following section the reader can find couple of examples of defeasible rules implementing parts justifying and excusing from criminal liability.

## **2 Structures of crime**

Component elements of binary guilt differ depending on a legal system. George Fletcher, after considering the most influential domestic criminal and penal systems, has divided them into three models [37].

The context of the crime is crucial to properly define guilt. In the bipartite and the quadripartite frameworks the notion of guilt is connected with intent and negligence [37]. But as it turns out in section 3 these notions often appear in the tripartite struc-

ture. In the tripartite structure of the offence guilt is frequently an assignment of blame to the perpetrator for violating a criminal norm and that there is no excuse for the behaviour [37], [5], [43], [48]. Here, guilt is a negative set-type notion described by excuses like duress, an excessive self-defence or a mistake of law.

## 2.1 Bipartite framework

The framework is historically the first and consists of two elements determining guilt, hence the name, meaning *actus reus* (the external element of the crime) and *mens rea* (the internal element, guilty mind). Both parts must take place at the same time in order for crime to be committed.

In Fig. 1 we demonstrate that the bipartite model for Belgium, United Kingdom and Ireland fits the Fletcher's basic variant. Legal definitions of crime and provisions describing every part of crime for Denmark, France, Malta, Netherlands and Spain are covered by the extended bipartite model to which exclusion<sup>1</sup> is added (Fig. 2). Elements of guilt are marked by the purple colour.

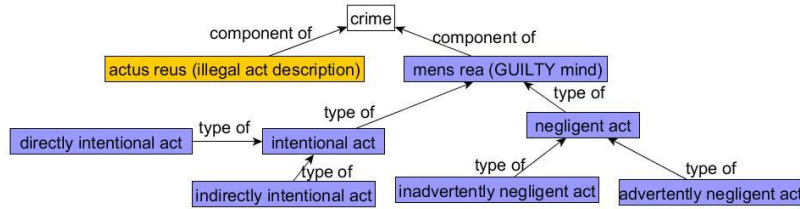


Fig. 1. Ontological model of crime for Belgium, United Kingdom and Ireland.

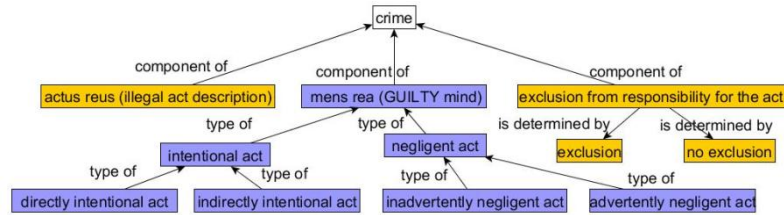


Fig. 2. Ontological model of crime for Denmark, France, Malta, Netherlands and Spain.

## 2.2 Quadripartite framework

The second approach to modelling crimes is the quadripartite system. Fletcher defines it as a variation of the first model, because still justification and excuse are not core components of crime. The four elements of the crime framework are: (1) the subject of the offence - addressee of the criminal norm, (2) the object of the offence - social harm (3), the subjective side of the offence - *mens rea*, (4) the objective side of the offence - *actus reus*.

<sup>1</sup> Exclusion is a situation when an addressee of the norm is excluded from the jurisdiction of the criminal law (e.g. psychological illness), therefore it constitutes a separate entity in the model of a crime.

The first new element (the subject of the offence) concerns total exclusions from criminal liability, for example minors. The second new element (the object of the offence) was introduced to put socially important values under state protection. This rationale leads to a conclusion that when a certain conduct, even if in conflict with a criminal norm, does not reach a certain level of social dangerousness, should not be considered a crime.

We did not find a quadripartite model in its pure form, but for Bulgaria, Hungary and Lithuania we extend the model according to legal provisions. In Bulgaria, there exists a very interesting situation, because guilt is defined both through intention and negligence and excuses<sup>2</sup>. Because of the prevailing importance of the social harm underlined in the Bulgarian Criminal Code we classified the structure of a crime as a quadripartite framework.

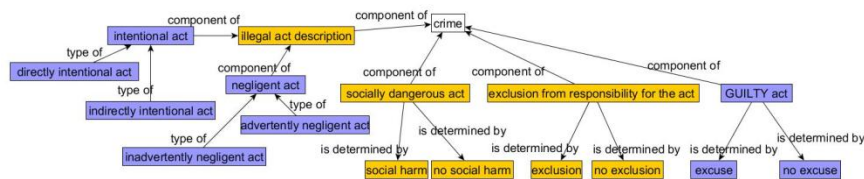


Fig. 3. Ontological model of crime for Bulgaria<sup>3</sup>.

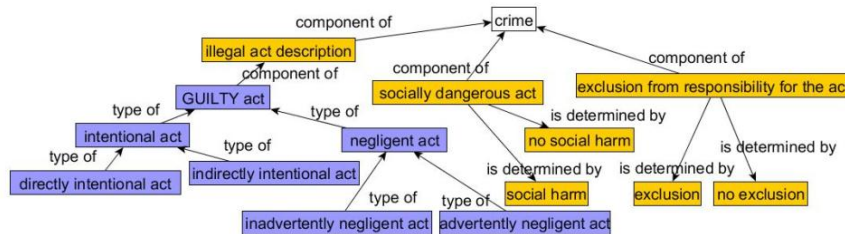


Fig. 4. Ontological model of crime for Hungary and Lithuania.

## 2.3 Tripartite framework

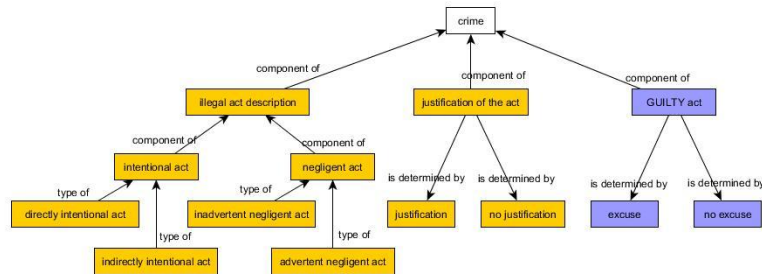
The founding idea of the tripartite system is the distinction between description of the offence, wrongdoing (absence of justification) and guilt for the wrongdoing (absence of excuse). The definition of the offence consists of actus reus and mens rea. By moving the psychological factor of intention to the description, this approach can deal with negligent behaviour. The requirement of a violation of a duty of care and the

<sup>2</sup> Article 11(1) An act dangerous to society shall be considered culpably committed where it is intentional or committed through negligence.

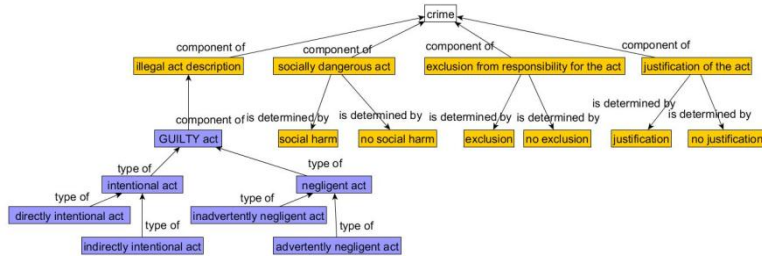
<sup>3</sup> The definition of the crime from Bulgarian code that indicates the structure of crime is the following:  
Article 9(1) Crime shall be an act dangerous to society (action or inaction), which has been culpably committed and which has been declared punishable by law.  
(2) Criminal shall not be an act which, although formally containing the elements of crime provided by law, because of its insignificance is not dangerous to society or its danger to society is obviously insignificant.

foreseeability of the result is now a part of the new approach to guilt - the Normative Theory of Guilt. Negligence is tried by a reasonable man standard and is only a basis for liability if it is expressed in the description of a particular offence [37], [5].

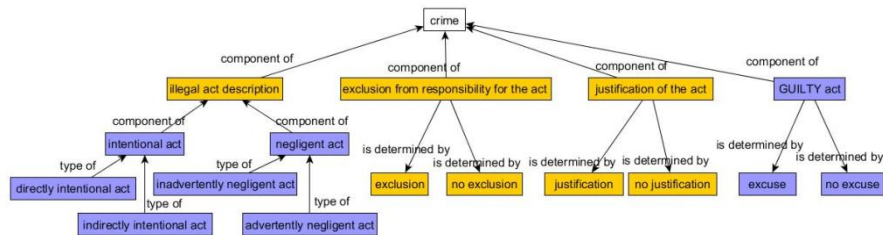
The tripartite framework was originally introduced in Germany and in its basic form can also be found in Austria, Estonia and Portugal. Applying some alterations it is also a working model for the rest of the EU nations.



**Fig. 5.** Ontological model of crime for Austria, Germany, Estonia and Portugal.



**Fig. 6.** Ontological model of crime for Greece and Romania<sup>4</sup>.



**Fig. 7.** Ontological model of crime for Italy, Slovenia and Sweden<sup>5</sup>.

<sup>4</sup> Here are two provisions defining criminal act in Romanian code:

Art.17 - (1) An offence is an act provided in the criminal law, manifesting a social peril and committed in guilt.

Art.21 - (1) An act provided in the criminal law committed in the circumstances of one of the justifying clauses provided in the law shall not be an offence.

<sup>5</sup> In this case, just like for Bulgaria, guilt is both defined as intention and negligence and excuses [42], [31], [17].

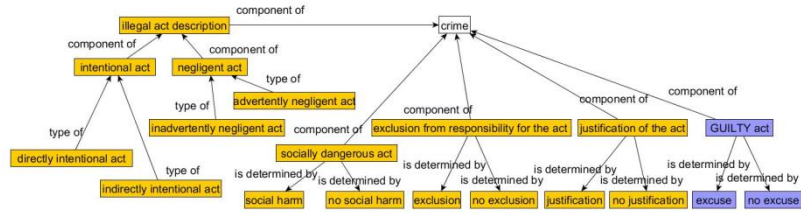


Fig. 8. Ontological model of crime for Croatia, Czech Republic and Poland.

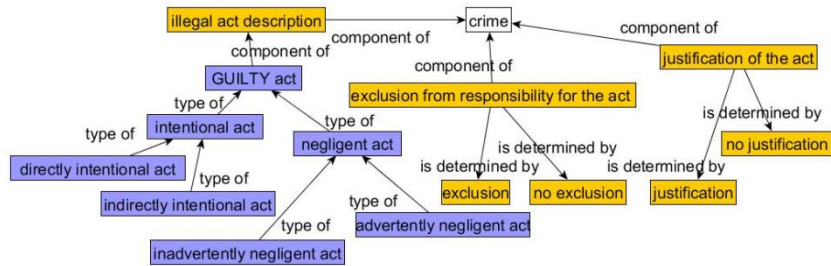


Fig. 9. Ontological model of crime for Cyprus, Finland, Latvia, Luxembourg and Slovakia.

### 3 Theories of guilt

Having established where guilt can be found in the structure of crime, the attention can be focused on the theories of guilt. For the purpose of ontology development, the most important ones are the Psychological and Normative theories. In LKIF there is a distinction between Proposition and Propositional\_Attitude [8]. Intention is a subclass of Propositional\_Attitude, and there is even a comment stating that Intent is related to mens rea in the criminal law. The normative approach is not classified as clearly in LKIF ontology, but according to the ontology systematization [8] the normative elements fall under the Evaluative\_Proposition class, a subclass of Proposition.

#### 3.1 The Psychological Theory of Guilt

According to this theory only mental, internal states draw borders of blameworthiness for an illegal action. The notion of guilt is reduced to intention, knowledge and consciousness. Reckless or negligent behaviour is outside the model, therefore, crime does not take place or the perpetrator cannot be found liable [37], [43], [48].

In the Fletcher's theory guilt is a positive concept: there has to be feeling in actor's mind. Moving to next tenet, guilt becomes a negative concept - if there are no excuses the actor is being found accountable [37].

### 3.2 The Normative Theory of Guilt

Because of the mentioned shortcomings of descriptive guilt, German scholars found that it is necessary to blame the offender for not complying with the law. The basis of finding someone blameworthy moved from feelings to a judgement of whether the risk taken was reasonable from an abstract point of view [5]. An offender is punished for not paying closer attention to the circumstances of own actions, for recklessness and negligence [37].

## 4 Elements of Guilt

All elements of guilt are enclosed by two notions, that is, either by mens rea/the subjective side of the offence (bipartite and quadripartite legal systems), excuse (tripartite legal systems) or both of them at the same time.

In England and Wales there are two basic types of intent: direct (purpose) and oblique (indirect/knowledge). The first one describes a situation of purposeful, desired act aimed at achieving a particular consequence. The latter, describes a mental state of a perpetrator who acts without the direct intent but foresees a possibility that the conduct may be a crime [33].

Another element, but now from the normative perspective is recklessness, which is defined as behaviour causing a socially unjustifiable risk. The notion comes in two flavours: the subjective recklessness (takes place when offender saw the possibility of causing a criminal effect but ignored it [34], and the objective recklessness involves the test of the reasonable man who would have foreseen the risk [9], [41]. In Tab. 1 recklessness is always the subjective recklessness. Offender acts negligently when unintentionally breaking an objective (from law abiding-citizen's point of view) standard of behaviour [33].

In Germany and Poland guilt is defined by the lack of excuses. One of them is the situation of excessive self-defence, where a defendant exceeds the limits of self-defence out of confusion, fear or terror [5]. Another excuse – duress – takes place when someone faces an imminent danger that cannot be otherwise averted than by committing a crime [5], [43]. Subsequent three negative elements of guilt constitute a group of mistakes. The mistakes of justifying and excusing fact are described as a situation when there exists a justified belief on the side of the culprit that there are some circumstances excluding respectively, unlawfulness and guilt of the act. The mistake of law holds when a perpetrator is not aware that the act infringes a criminal norm and that the mistake was unavoidable [5] or justified [43]. Insanity is described as a mental state of not being able to understand meaning of one's behaviour [5], [43].

These are the most frequently appearing elements of guilt. Different legal systems provide with different definitions of the same notions. In Tab. 1 all significant elements of guilt gathered from EU criminal systems are presented. We used Google Translate to translate all the codes that were not in English. There were not many difficulties with understanding the provisions.

**Table 1.** Elements of guilt as collected from the EU member countries codes

Name of the element	Country	Expressions used, provisions or source (GT if translated by Google Translate)
direct intent	BE, BG, HR, CY, CZ, DK, FI, FR, GR, HU, IT, UK, IRL, LV, LT, LU, MT, NL, RO, SK, SI, ES, SE	‘committed the offense voluntarily’ (GT), art. 11 (GT), art. 44, ‘intentionally’ (GT), par. 15 (GT), ‘intentionally’ (GT), chapter 3 section 6, ‘intentionally’, ‘intentionally’ (GT), section 13, art. 43 (GT), [13], [40], section 9, art. 15, ‘intentionally’ (GT), ‘intentionally’, ‘intentional’ (GT), art. 20 (GT), section 15, art. 25, ‘intentionally’, ‘intentionally’
indirect intent	BE, BG, HR, CY, CZ, DK, FI, FR, GR, HU, IT, UK, IRL, LV, LT, LU, MT, NL, RO, SK, SI, ES	‘committed the offense knowingly’ (GT), art. 11 (GT), art. 44, ‘knowingly’ (GT), par. 15 (GT), ‘knowingly’ (GT), chapter 3 section 6, ‘knowingly’, ‘knowingly’ (GT), section 13, art. 43 (GT), [13], [40], section 9, ‘general intent’, art. 15, ‘knowingly’ (GT), ‘knowingly’, ‘knowingly’ (GT), art. 20 (GT), section 15, art. 25, ‘knowingly’
advertent negligence	BG, HR, CY, CZ, DK, FI, FR, GR, HU, IT, UK, IRL, LV, LT, LU, MT, NL, RO, SK, SI, ES	art. 11 (GT), art. 45, ‘reckless’ (GT), par. 16 (GT), ‘reckless’ (GT), chapter 3 section 7, ‘recklessly’, ‘recklessly’ (GT), section 14, art. 43 (GT), [13], [40], section 10, art. 16, ‘recklessly’ (GT), ‘recklessly’, ‘recklessness’ (GT), art. 20 (GT), section 16, art. 26, ‘recklessly’
inadvertent negligence	BE, BG, HR, CY, CZ, DK, FI, FR, GR, HU, IT, UK, IRL, LV, LT, LU, MT, NL, RO, SK, SI, ES, SE	‘committed by negligence’ (GT), art. 11 (GT), art. 45, ‘negligent’ (GT), par. 16 (GT), ‘negligence’ (GT), chapter 3 section 7, ‘negligence’, ‘negligence’ (GT), section 14, art. 43 (GT), [13], [40], section 10, art. 16, ‘negligence’ (GT), ‘negligence’, ‘negligence’ (GT), art. 20 (GT), section 16, art. 26, ‘negligence’, ‘negligence’
error of fact	HT, CZ, PT, SI	‘shall not be culpable’, par. 18 (GT), ‘excludes intent’, ‘shall not be held liable (guilty)’
error of law	AT, HR, CZ, DE, PL, PT, SI, SE	‘not culpable’ (GT), ‘shall not be culpable’, par. 19 (GT), [5], [22], excludes intent, ‘shall not be held liable (guilty)’, ‘excusable’
error of justifying fact	AT, EE, PL, PT	‘not culpable’ (GT), ‘deemed to have acted without guilt’, [22], ‘excludes intent’
minor	BG, EE, PL	‘considered culpable of their acts’ (GT), ‘not capable of guilt’, [22]
mental illness	AT, EE, SI	‘not culpable’ (GT), ‘not capable of guilt’, ‘shall not be held responsible (guilty)’
mental disability	AT, HR, EE	‘not culpable’ (GT), ‘not be culpable’, ‘not capable of guilt’
insanity	DE, IT, PL	[5], ‘(fault) not attributable’ (GT), [22]
a profound disturbance of consciousness	AT, EE, IT	‘not culpable’ (GT), ‘not capable of guilt’, ‘(fault) do not answer’ (GT)
necessity/emergency	AT, PL, PT, SI	‘excused’ (GT), [22], ‘acts without guilt’, ‘shall not be found guilty’
coercion/threat/duress	DE, PL	[5], [22]
superior’s orders	BG, PL, PT	‘considered not culpable’ (GT), [22], ‘acts without guilt’



## 5 Formalization

For reasons stated in the introduction to [44] we consider the criminal law as a system that follows the rules of defeasible reasoning. The process of establishing guilt is in its nature argumentation-theoretic [38].

As a matter of fact, all the rules that can be provided by the prosecution on the basis of this theory are defeasible rules - the effect of rules describing mens rea in bipartite system that someone is blameworthy can be rejected by justification or excuse. The defence rules on the other hand are in their very nature defeaters and are often final aim of particular argumentation scheme. More precisely, a strict defeater in the argumentation theory in [44]. If at some level of argumentation a conclusion is that x is guilty of some offence, a justificatory rule works as an undercutter stating that the committed offence is not a proper ground for x being guilty, because (for self-defence reasons) there is, in fact, no offence. It is the reason why rules do not have a not sign before the head, because the head does not take place in the inference chain. If there is a justification for the act, therefore there is no crime and there is no need to check if the actor is guilty of the crime. An excusatory rule is a rebbuter because it negates the conclusion that x is guilty [45], [2]. In LKIF there are rules corresponding to the described defeaters, meaning (valid <rule>) and (excluded <rule> <atom>) [4]. Valid rule works in the same way as the undercutter and excluded rule gives a similar effect to the rebbuting defeater.

The mentioned elements of guilt are rules of defeasible reasoning. They depend on the legal definitions or landmark cases, although, the basic entities which they are composed of are often the same. Below are some definitions of duress from different criminal systems with their place in the structure of crime mentioned. The form of the rule corresponds to the formalism presented in LegalRuleML [2]. They are constitutive rules without modal operators.

To make the rules more expressive, we connected them with the LKIF Core Ontology. As stated in [8] norms can be expressed as LKIF rules and such a connection is possible with some tractability limitations. Every term in the rule can be either an entity (class or object property) from the LKIF Core Ontology, or a framework, a more complex knowledge structures as defined in [8]. Structures of crimes can be described as mereological frameworks. Defeasible rules are constructed using elements of guilt. Frameworks in basic entities are situational frameworks. Part of the implementation of the topics described in this article (structures of crimes, elements of guilt and basic entities) can be found under: [https://github.com/jkbno/LKIF\\_GUILT\\_ONTOLOGY](https://github.com/jkbno/LKIF_GUILT_ONTOLOGY).

Below there are some examples of rules concerning duress, which under some jurisdictions are justifications and under other are excuses. The structures of crime from section 1 are connected with the elements of guilt by additional rules that play a role of a metainterpreter. If the ontology for a particular country is triggered, then certain elements of guilt are becoming active in the reasoning process. The problem with this solution is that additional rules are needed to connect parts of the ontology of the model of crime with the specific country. Having everything under one ontology causes the Pellet reasoner [47] to throw logical inconsistencies. The examples below

some entities and relations have the same meaning (although using different lexicalizations) and therefore belong to the same class.

Force, Coercion, Constraint are equivalent. The same is for equivalent relations: Resist, -IsAbleToWithstand, ActsUnder, ActsUnderInfluence, respectively.

However, the crucial difference is in the meaning: no infringement, no criminal offence (which are equivalent) and act not criminally liable/act not punishable. In this latter case there is no offence (under the tripartite model) and hence guilt cannot be established.

Article 23 Any act committed under coercion, which the perpetrator was not able to withstand, shall not constitute a criminal offence (Slovenian Criminal Code duress as justification) [31].

con: Person(x), Coercion(y), ActsUnder(x, y), -IsAbleToWithstand(x, y), Offence(v), Commits(x, v) ~> Guilty(x)

Article 122-2 A person is not criminally liable who acted under the influence of a force or constraint which he could not resist (French Code Penal duress as excuse) [12].

con1: Person(x), Force(y), ActsUnderInfluence(x, y), -Resist(x, y), Offence(v), Commits(x, v) ~> - Guilty(x)

con2: Person(x), Constraint(y), ActsUnderInfluence(x, y), -Resist(x, y), Offence(v), Commits(x, v) ~> - Guilty(x)

## 6 Entities for building the Elements of Guilt

As mentioned above basic entities for building the elements of guilt can either be frameworks or direct entities of the LKIF Core Ontology. All the entities for the elements of mens rea are provided in the Expression Module of the LKIF Core Ontology [8]. Some of the entities for the tripartite approach to guilt were added by us to the LKIF Core Ontology.

The process of distinguishing the necessary entities starts with crossing out all the duplicate terms from the rules. Next step is to check whether some terms are equivalent to other terms, for example acts\_under\_influence<sup>6</sup> is equivalent to acts\_under and therefore can be crossed out.

For example in rules for duress, the following entities can be described:

**Table 2.** More detailed concepts and relations for the elements of excuse

able_to_withstand	immediately_before
acts_under	Offence
Coercion	Ordinary_Powers_Of_Human_Resistance
commits	overbears
Constraint	Physical_Violence
evade	resist
imposed_on	Serious_Personal_Violence

<sup>6</sup> notation is as described in [8].

## 7 Conclusions

The presented model is an attempt to find and formalize elements of crimes that can be found in many legal systems. It can be used for further development of other parts of crime like actus reus or justification. The ontology of our model is an extension of the LKIF ontology. In the future, we would use LegalRuleML [2], which will provide all the necessary functionalities and features to specify jurisdictions, and temporal attributes. That would reify elements of guilt which without the context of a particular legal system lose their place in the structure of offence.

We demonstrated the ontology use by exploiting its elements in rules defining particular pieces of laws: concerning duress, which under some jurisdictions are justifications and under other jurisdictions are excuses, showing that rules of defeasible reasoning are necessary to decide of blameworthiness. After subsequent investigation of other parts of national criminal codes other appearing notions will be worth incorporating in the ontology.

This work is the step towards automatic guilt determination using the description of crime. The ontology needs to be more detailed (e.g. for excuse relevant more specific concepts need to be added) up to level of terms that will be lexicalized, enabling reasoning.

This work was supported by the Polish PUT 04/45/DSPB/0105 grant.

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