

Deliverable 2.4

Ontology framework + user guide

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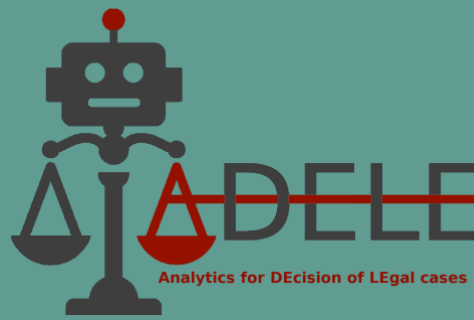
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1 Document History

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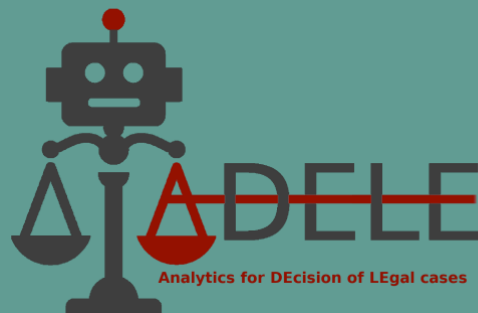
2 Contributors

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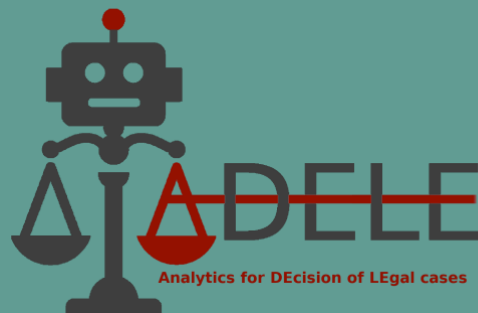


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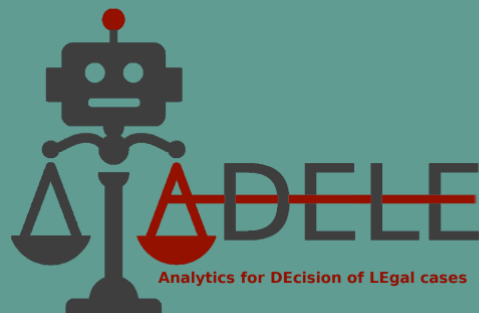
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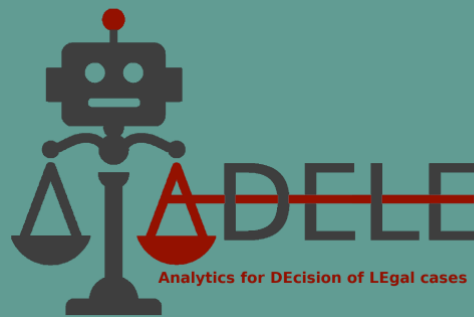
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6 List of Acronyms

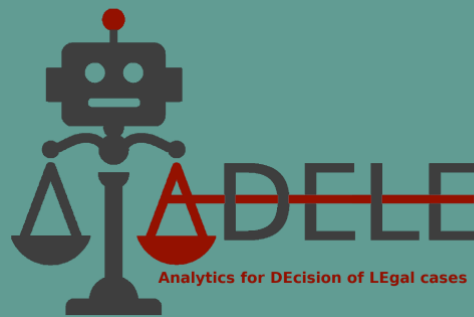
AI	Artificial Intelligence
APIS	Apis Europa, beneficiary in ADELE project
CJEU	Court of Justice of the European Union
EU	European Union
EUI	European University Institute, beneficiary in ADELE project
LIBRe	LIBRe Foundation, beneficiary in ADELE project
ML	Machine Learning
NLP	Natural Language Processing
OntoVat	Ontology on Value Added Tax
PaTrOnto	Ontology on Trademark and patents
TM&P	Trademark and patents
UNIBO	University of Bologna, coordinator of ADELE project
VAT	Value Added Tax
WP	Work package



7 Summary

This deliverable contains the user guides of the multi-language and multi-domain ontologies developed within Task 2.4 (*Lightweight Ontology Framework*) and delivers as linked folder the related ontologies' *.rdf* files. In addition, the deliverable includes a brief report of the work done in Task 2.3 (*Network analysis*), namely the extraction of citation, the creation of the citation graph and an analysis thereof.

[Section 8](#) provides a background on legal ontology and their use in AI applications. After that, [Section 9](#) and [10](#) contain the user guides respectively of the VAT Ontology (OntoVat) and the Trademark and Patent Ontology (PaTrOnto). Then, [Section 11](#) reports the work carried out for network analysis, in particular for the tasks of extracting citation, graph generation and citation analysis. Finally, [Section 12](#) explains how the ontology framework and the case law included in the dataset have been integrated.



8 Background

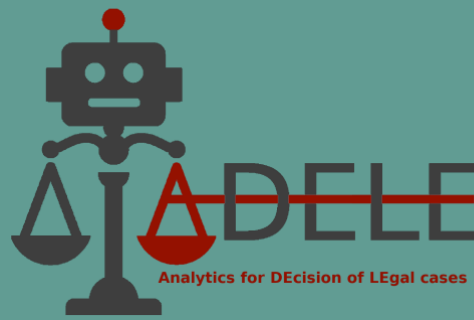
Ontologies are formal representations of knowledge, which provide a structured and organized way of describing concepts, and their relationships. They aim at modelling concepts at different layers of abstraction, where lower layers are closer to domain-specific concepts, while higher layers are closer to more general concepts. Ontologies are primarily used in artificial intelligence (AI), semantic web, natural language processing (NLP), and knowledge management systems. One can define ontologies as

We talk about top ontologies when the layer of abstraction of the concepts is very high. For example, some top ontologies such as DOLCE (Borgo and Masolo, 2009) are designed to capture very high-level concepts (e.g., mental processes, social constructs, and so on), while other top ontologies are designed to describe high-level concepts in specific domains, like in the case of LKIF (Hoekstra et al., 2007), which is a legal top-ontology. These top-ontologies are useful because they can provide lower-level ontologies (like the ones presented in this document) with a stronger conceptual consistency.

The components of an ontology include classes (or concepts), properties (or relationships), and instances (or individuals). Classes represent the concepts or categories within the domain. For example, in a legal domain, classes could include "Person", "Organization", "Contract", "Case", and so on. Properties define the relationships between classes and their attributes. For example, in a legal domain, one could relationship such as "isSignedBy" to describe the relationship between the concept "Contract" and the concept "Person". Establishing classes and properties is a design choice which is strictly connected to the scope and purposes of a given ontology. Finally, instances are the specific, concrete examples of the classes and properties. For example, an instance for the class "Person" could be a specific person (e.g., "Mario Rossi"), an instance for the class "Contract" could be a specific contract (e.g., "the lease contract n. 42").

In the field of AI, ontologies are useful tools of symbolic AI, because they produce machine-readable knowledge representation, which relies on modular and reusable pieces of information, shareable among different systems, applications, and users. Due to the complexity and diversity of legal concepts, relationships, and terminologies, *legal* ontologies can therefore play a crucial role in many regards, and in the context of both symbolic and sub-symbolic AI.

For example, ontologies can be used in knowledge representation (a field of symbolic AI) to provide a structured and standardized way of representing legal concepts, relationships, and terminologies, which helps in conveying clear and precise description of legal knowledge, reducing ambiguity and inconsistencies in the understanding and interpretation of legal information. This facilitates



processes of interoperability between legal information systems and the process of data integration (Loutsaris et al., 2020). In fact, legal ontologies can facilitate the sharing and integration of legal information among different systems, applications, and organizations by providing a common vocabulary and structure for legal data.

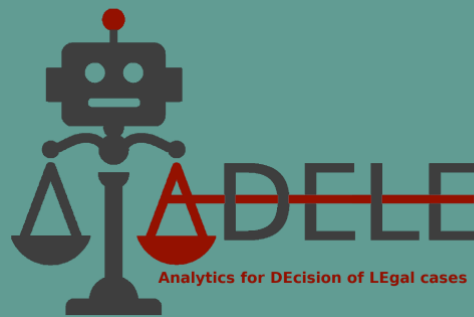
Ontologies can also be used for information retrieval, since they can enhance search and retrieval of legal documents, case files, and other relevant information by providing a semantic understanding of the content. This allows for more effective and accurate search results. Ontologies, in fact, associate different pieces of information to each specific concept (properties, semantic definitions, and much more), making ontologies more powerful than simple keywords in retrieving/searching information.

By representing legal knowledge in a structured and organized manner, ontologies can facilitate automated reasoning and decision support in legal systems (Ashley 2009; Palmirani et al., 2018). This has many potential applicative outcomes, such as evaluating evidence, generating legal arguments, facilitating the identification of precedents, predicting outcomes. Legal ontologies can also be used for compliance (Palmirani et al., 2018). For example, legal requirements and obligations from laws, regulations, and policies can be encoded into ontological and structured representation, which allows for better monitoring, reporting, and enforcement of compliance measures.

By providing a semantic understanding of legal concepts and terminologies, ontologies can also enable Natural Language Processing (NLP) systems to process and interpret legal language more accurately and efficiently. By providing a comprehensive and organized framework of legal knowledge, ontologies can also support the development of educational resources, case studies, and research projects. Therefore, they can have multiple important useful applications in both education and research (Hoekstra et al., 2007).

In summary, ontologies can serve as a powerful tool for the legal domain and the for the integration between AI and Law in a range of applicative contexts. Moreover, as the legal domain continues to evolve and adopt new technologies, ontologies can play an increasingly important role in addressing the challenges and opportunities associated with legal information management and with the combination between symbolic and sub-symbolic methods of Artificial Intelligence.

In the ADELE pilot tool, we represented the ontology visually as an interactive graph, to allow user the exploration of the ontological concepts as well as their relations. For any information on this functionality, we refer to Section 9.1 of Deliverable 4.3 (Final Version of the Pilot Tool).



9 VAT Ontology (OntoVat)

8.1. Introduction

An ontology about VAT (Value-Added Tax) is a challenging task, due to the heterogenous nature of the VAT domain. However, an ontology related to this domain can be crucial to integrate this domain of knowledge with computational tools and intelligent artificial systems.

It is probably because the intricate heterogenous nature of this domain that only few works addressed the possibility to build an ontology about VAT.

In this regard, the only works that we found is the work by Kerremans et al. [2003], in which the authors describe a potential way to deal with the problem of multilingualism in the context of a VAT ontology. Apart from this work, no ontology about VAT has been release so far.

This is part of the reason why we wanted to explore this difficult scenario, in cooperation with legal experts, lawyers and computer scientists. The ontology presented here, which we called OntoVAT, is the first version of an ontology built to model some of the main concept which judges take into account when producing judgements about VAT.

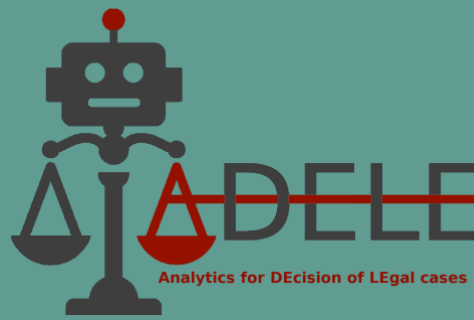
The OntoVat *rdf*. file can be downloaded at the following link: https://www.dropbox.com/sh/2yom7tje9qaew0z/AACvEVdmVkBLoPUSiOIT6V_ia?dl=0.

8.2. Description of the ontology

OntoVAT is a multilingual OWL ontology enriched with a SKOS lexicalisation and implemented in English, Italian and Bulgarian. This SKOS lexicalisation provides a way to mitigate the issue of semantic non-uniformity in multilingualism pointed out in previous research (Kerremans et al., 2003).

The ontology is currently composed of 129 concepts (i.e., OWL classes) and 36 properties (relationships between classes). More precisely:

Element	Quantity
Number of classes	122
Number of properties	28
Number of datatype properties	8
Number of transitive properties	0
Number of disjoint class pairs	578



Number of subclass relations	101
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Table 9-1. OntoVAT's statistics

Thanks to the SKOS lexicalization, each ontological class is enriched by some specific properties which are incorporated in the SKOS data model, namely:

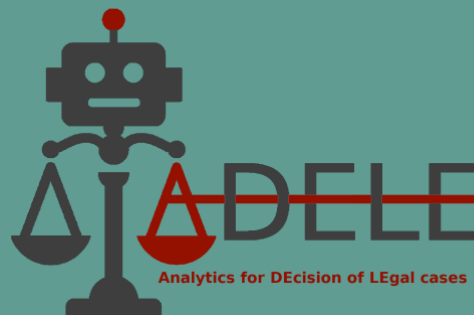
- skos:definition
- skos:scopeNote
- skos:altLabel
- skos:hiddenLabel
- skos:example

The addition of these properties to each ontological concept (which is repeated in English, Italian and Bulgarian) facilitates the integration of crucial information within the ontology, making OntoVAT particularly expressive and powerful. In particular, skos:definition contains the definition of each single OWL class (i.e., the definition of each single concept). In skos:scopeNote, we added relevant specifications about the skos:definition field (whenever was necessary to further specify the interpretative angle of the chosen definition). Furthermore, scopeNotes also contain all relevant normative references (if any) describing the concept. We also added any relevant synonyms in the three different languages as skos:altLabel properties. In skos:example, we added any example of the concept (this can be considered like defining subclasses of the concept). Finally, the property skos:hiddenLabel is used to store terms in natural language which might signal the presence of the concept in the text (this can be useful for any application layers built on top of OntoVAT).

To grant a coherent and harmonic conceptual framework, we built OntoVAT using concepts taken from the European VAT Directive, therefore all concepts are already designed to be appropriate for both Italy and Bulgaria. Moreover, Italy and Bulgaria implemented the VAT Directive into national legislation, so they must grant the uniform application of European law.

In most cases, the semantic meaning of concepts is therefore harmonic between Italy and Bulgaria. So, for each OWL class, a skos:definition is just provided in English and translated into Italian and Bulgarian with no adjustments.

However, in few cases, definitions of concepts (i.e., their semantic meaning) vary at national level. In these situations, priority was given to national definitions, therefore the skos:definition in Bulgarian/Italian will not be just a translation from English, instead it will be a different definition (coherent with the national legislation).



Moreover, whenever further specifications are needed, we employed `skos:scopeNote` (in Bulgarian/Italian/English) to further explain the scope of the concepts' meaning (at Bulgarian, Italian and European level).

Lastly, since national legislations may have alternative terms for referring to the Directive's concepts, we handled alternative terms as synonyms (`skos:altLabel`) in Italian/Bulgarian.

In sum, we handle multilingualism by specialising `skos:definitions`, `skos:scopeNotes` and `skos:altLabels` whenever needed, without affecting the coherence of the ontological concepts or their relations.

Regarding the definition of each concept, we proceeded by giving priority to the definition coming from the domain-specific legislative sources, whenever the concept exists in that domain. If the concept is not mentioned neither in the national nor in the European legislative sources, we searched for a definition in the case law of the Court of Justice of the European Union (CJEU). If the concept is not defined neither in the legislation nor in the case law of the CJEU, as it frequently happens for "factual concepts", it is defined following a simple description based on legal encyclopaedias or dictionaries.

8.3. Ontological commitments and scope

1) Classes and properties

We now report the current list of classes and properties in OntoVAT, considering just the English language, and reporting just the main properties: `definitions`, `prefLabels` and `altLabels` (for classes), and `range` and `domains` (for properties).

2) Classes

Class name: `Supplier` (`prefLabel`: `Supplier`)

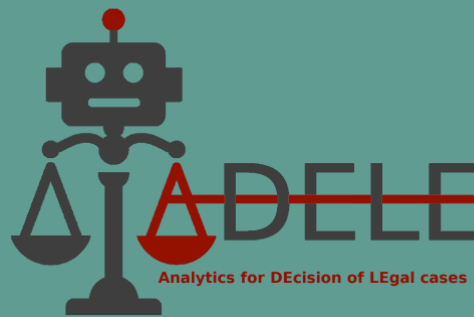
definitions: A person (natural or legal) that provides a supply of goods or services.

Class name: `SupplierActivity` (`prefLabel`: `Supplier Activity`)

definitions: Activity which is carried out by the supplier.

Class name: `PurposeOfTheTransactionObject` (`prefLabel`: `Purpose Of The Transaction Object`)

definitions: The purpose to which the transaction object is destined.



Class name: CustomsSituationCessation (prefLabel: Customs Situation Cessation)

definitions: Cessation of a legally relevant situation in the customs duties field.

Class name: TaxableIntra-CommunityAcquisitionOfGoods (prefLabel: Taxable Intra-Community Acquisition Of Goods)

definitions: One of the transactions which are subject to VAT consisting in the acquisition of the right to dispose as owner of movable tangible property dispatched or transported to the person acquiring the goods, by or on behalf of the vendor or the person acquiring the goods, in a Member State other than that in which dispatch or transport of the goods began.

Class name: TaxableImportationOfGoods (prefLabel: Taxable Importation of Goods)

definitions: One of the transactions which are subject to VAT consisting in the entry into the Community of goods which are not in free circulation within the meaning of Article 24 of the Treaty establishing the European Community.

Class name: TaxableSupplyOfServices (prefLabel: Taxable Supply of Services)

definitions: One of the transactions which are subject to VAT defined as any transaction which does not constitute a supply of goods.

Class name: TaxableSupplyOfGoods (prefLabel: Taxable Supply of Goods)

definitions: One of the transactions which are subject to VAT consisting in the transfer of the right to dispose of tangible property as owner.

Class name: ExemptIntra-CommunityAcquisitionOfGoods (prefLabel: Exempt Intra-Community Acquisition of Goods)

definitions: Intra-Community Acquisition which is not subject to VAT , defined as the supply of goods dispatched or transported to a destination outside their respective territory but within the Community, by or on behalf of the vendor or the person acquiring the goods, for another taxable person, or for a non-taxable legal person acting as such in a Member State other than that in which dispatch or transport of the goods began.

Class name: ExemptImportationOfGoods (prefLabel: Exempt Importation of Goods)

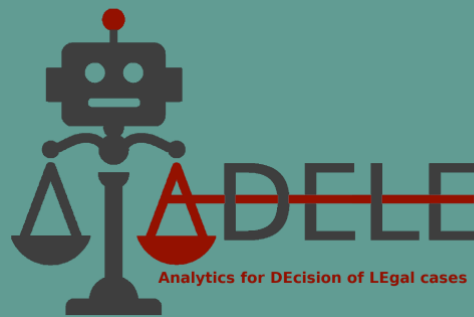
definitions: Importation which is not subject to VAT.

Class name: ExemptSupplyOfGoods (prefLabel: Exempt Supply of Goods)

definitions: Supply of goods which is not subject to VAT.

Class name: ExemptSupplyOfServices (prefLabel: Exempt Supply of Services)

definitions: Supply of services which is not subject to VAT.



Class name: TransactionPlace (prefLabel: Transaction Place)

definitions: Physically limited eographical space.

Class name: Person (prefLabel: Person)

definitions: Entity recognized by law as having rights and duties, which includes both natural persons (i.e. individuals) and legal persons (i.e. corporations, partnerships, and other entities recognized as having legal personality).

Class name: ThirdTerritory (prefLabel: Third Territory)

definitions: The territories referred to in Article 6 of the VAT Directive.

Class name: ImmovableGood (prefLabel: Immovable Good)

definitions: Such things, as land or buildings, which are thought to be stationary in space.

Class name: MovableGood (prefLabel: Movable Good)

definitions: Such things which can either move themselves or be moved in space.

Class name: ExemptTransaction (prefLabel: Exempt Transaction)

definitions: Transactions which are not subject to VAT and, hence, on which suppliers do not have to charge VAT to their customers.

Class name: Transaction (prefLabel: Transaction)

definitions: The agreement between a buyer and a seller to exchange goods and services in return for consideration.

Class name: MemberStateTerritory (prefLabel: Member State Territory)

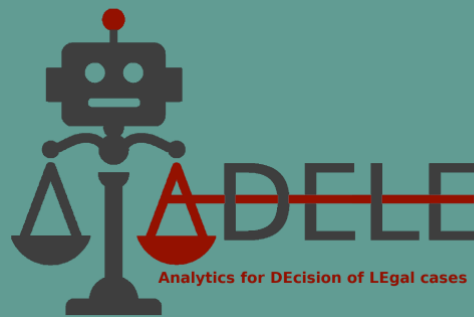
definitions: The territory of each Member State of the European Union to which the Treaty establishing the European Community is applicable, in accordance with Article 299 of that Treaty, with the exception of any territory referred to in Article 6 of Directive 2006/112/CE.

Class name: EuropeanUnionTerritory (prefLabel: European Union Territory)

definitions: The territory of each Member State of the Community to which the Treaty establishing the European Community is applicable, in accordance with Article 299 of that Treaty, with the exception of any territory referred to in Article 6 of this Directive.

Class name: ThirdCountryTerritory (prefLabel: Third Country Territory)

definitions: Any State or territory to which the Treaties of the European Union is not applicable.



Class name: TaxableTransaction (prefLabel: Taxable transaction)

definitions: Transaction which is subject to VAT, i.e. supplies of goods, supplies of services, importations, and intra-community acquisitions.

Class name: Exemption (prefLabel: Exemption)

definitions: Supplies to which VAT is not charged.

Class name: TransactionTerritoriality (prefLabel: Transaction Territoriality)

definitions: Set of rules to allocate taxing rights between States.

Class name: SupplyRecipient (prefLabel: Supply Recipient)

definitions: A person (natural or legal) that buys a supply of goods or services.

Class name: TransactionObject (prefLabel: Transaction Object)

definitions: The good or service being exchanged in the transaction.

Class name: TransactionValue (prefLabel: Transaction Value)

definitions: Value paid by the transferee or the person receiving the service to the supplier in exchange for the supply.

Class name: TaxableAmount (prefLabel: Taxable amount)

definitions: The taxable amount is the value of the transaction to which the tax rate is applied to understand the tax due. For supplies of goods and services it is everything which constitutes consideration obtained or to be obtained by the supplier, in return for the supply, from the customer or a third party, including subsidies directly linked to the price of the supply.

Class name: TaxRate (prefLabel: Tax Rate)

definitions: Percentage which is applied to the taxable amount to establish the chargeable amount.

Class name: TransactionIntermediary (prefLabel: Transaction Intermediary)

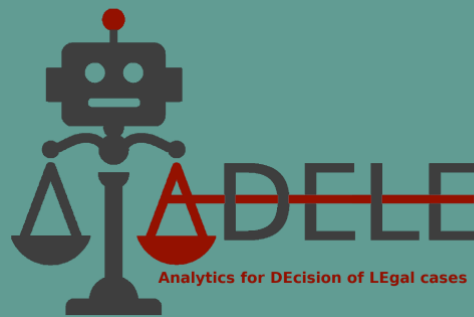
definitions: A person who acts on the name and behalf of the supplier in the transaction.

Class name: Airspace (prefLabel: Airspace)

definitions: Portion of terrestrial atmosphere, generally divided into national airspaces and international airspace.

Class name: Non-TaxablePerson (prefLabel: Non-Taxable Person)

definitions: Person who is not a taxable person for VAT purposes.



Class name: Power (prefLabel: Power)

definitions: The work of a force, or a system of forces, referred to the unit of time.

Class name: UsageOfTheMeansOfTransport (prefLabel: Usage of the means of Transport)

definitions: Measurement of the usage of a means of transport (e.g., in years, in kilometers).

Class name: NationalAirspace (prefLabel: National Airspace)

definitions: The portion of the atmosphere controlled by a country above its territory, including territorial waters.

Class name: Service (prefLabel: Service)

definitions: Professional service performed by a person in a public or private body, an enterprise and the like.

Class name: Good (prefLabel: Good)

definitions: Any tangible property, including electricity, gas, heat, refrigeration and the like, as well as: (a) certain interests in immovable property; (b) rights in rem giving the holder thereof a right of use over immovable property; (c) shares or interests equivalent to shares giving the holder thereof de jure or de facto rights of ownership or possession over immovable property or part thereof.

Class name: TaxablePerson (prefLabel: Taxable Person)

definitions: Any person who, independently, carries out in any place any economic activity, whatever the purpose or results of that activity.

Class name: EnergyProduct (prefLabel: Energy Product)

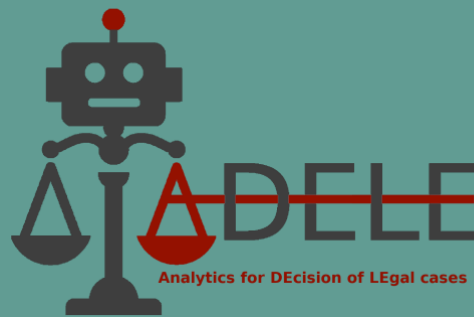
definitions: Products for motor fuel and heating fuel uses, such as natural gas, crude oil, refined petroleum products, other hydrocarbon products, natural gas liquids and products produced from the fractionation of natural gas liquids.

Class name: Weight (prefLabel: Weight)

definitions: A body's relative mass or the quantity of matter contained by it, giving rise to a downward force; the heaviness of a person or thing.

Class name: PrivateTeacher (prefLabel: Private Teacher)

definitions: Those who dedicate themselves to teaching and practise the profession of teaching in a non-public context.



Class name: DentalTechnician (prefLabel: Dental Technician)

definitions: A technician qualified to make dental prostheses.

Class name: Dentist (prefLabel: Dentist)

definitions: Person who has a degree in dentistry and making this job.

Class name: IndependentGroupOfPersons (prefLabel: Independent Group of Persons)

definitions: Groups of people which are not depending from others.

Class name: MedicalProfessional (prefLabel: Medical Professional)

definitions: Person who exercise their activity in the medical context, and thus is concerned with the study, treatment and prevention of people's illnesses.

Class name: InsuranceAgent (prefLabel: Insurance Agent)

definitions: Professional whose task is to mediate between insurance companies and their customers or stakeholders, and whose aim is generally to find insurance solutions on the market that meet the needs of those who rely on their service.

Class name: PhilosophicalInstitution (prefLabel: Philosophical Institution)

definitions: Body established for the pursuit of purposes related to the field of philosophy.

Class name: ParamedicalProfessional (prefLabel: Paramedical Professional)

definitions: A person who works, with appropriate professionalism, in the health sector, with tasks that assist the work of the doctor.

Class name: InsuranceBroker (prefLabel: Insurance Broker)

definitions: Those who professionally carries out an intermediary activity that puts his clients in contact with insurance companies, to which he is not bound by any commitment.

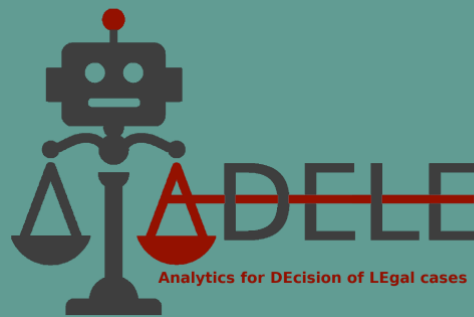
Class name: ReligiousInstitution (prefLabel: Religious Institution)

definitions: Body established for the pursuit of purposes related to the religious sector.

Class name: Hospital (prefLabel: Hospital)

definitions: A building, or complex of buildings, intended for the health care of the public, and therefore adequately equipped for the admission, maintenance and treatment, both clinical and surgical, of the sick and injured people.

Class name: MedicalCenter (prefLabel: Medical Center)



definitions: A place intended for the health care of the public, and therefore adequately equipped for the admission, maintenance and treatment of the sick and injured people, including clinics and doctors' offices.

Class name: CulturalBody (prefLabel: Cultural Body)

definitions: Body established for the pursuit of purposes related to the cultural sector.

Class name: Organisation (prefLabel: Organisation)

definitions: A group of people who work together to achieve a common goal or purpose.

Class name: PublicBody (prefLabel: Public Body)

definitions: Anybody, whether corporate or not, established for the specific purpose of meeting needs in the general interest, not having an industrial or commercial character, which has legal personality and is financed, for the most part, by the State, regional or local authorities, or other bodies governed by public law; or is subject to management supervision by those bodies; or has an administrative, managerial or supervisory board, more than half of whose members are appointed by the State, regional or local authorities, or by other bodies governed by public law.

Class name: InternationalBody (prefLabel: International Body)

definitions: Bodies created by states through international agreements and endowed with a permanent institutional apparatus for the purpose of realising common goals through the performance of unitary activities.

Class name: Non-profitOrganisation (prefLabel: Non-Profit Organisation)

definitions: Organisations carrying out activities of general interest and social utility without making a profit, or without the gains being shared among the members.

Class name: PublicRadioBody (prefLabel: Public Radio Body)

definitions: Any public body created for the specific purpose of providing radio services.

Class name: PublicTelevisionBody (prefLabel: Public Television Body)

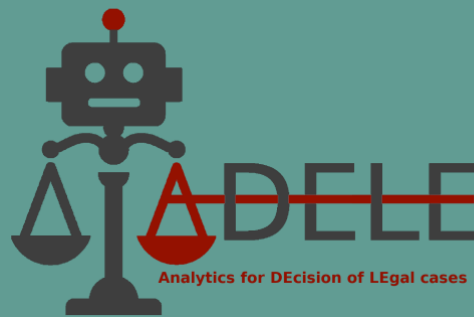
definitions: Any public body created for the specific purpose of providing television services.

Class name: EducationalDomain (prefLabel: Educational Domain)

definitions: Activities that have the objective of knowledge transmission and training.

Class name: Domain (prefLabel: Domain)

definitions: Any sphere of activity to which subjects and objects can be involved or destined.



Class name: SocialWell-BeingDomain (prefLabel: Social well-being domain)

definitions: Domain related to the sharing, developing, and sustaining of meaningful relationships with others and social stability.

Class name: VATChargeableEvent (prefLabel: VAT Chargeable Event)

definitions: The legal fact at the occurrence of which the legal conditions necessary for VAT to become chargeable are fulfilled.

Class name: HighSea (prefLabel: High Sea)

definitions: The open part of a sea or ocean especially outside territorial waters.

Class name: TerritorialWaters (prefLabel: Territorial Waters)

definitions: That area of the sea immediately adjacent to the shores of a state and subject to the territorial jurisdiction of that state.

Class name: InternationalAirspace (prefLabel: International Airspace)

definitions: Area over the contiguous zone, the exclusive economic zone or the continental areas, the high seas and all spaces not subject to the sovereignty of any State for which there is freedom of overflight for both civil and military aircraft, with the sole limitation of respecting the equal freedom of others.

Class name: MaritimeSpace (prefLabel: Maritime Space)

definitions: The world's oceans and seas, including both the portions that are under the jurisdiction of coastal states and the portions which are not (i.e., international waters).

Class name: LegalEvent (prefLabel: Legal Event)

definitions: The legal event that takes place as a consequence of the individual's conduct.

Class name: Building (prefLabel: Building)

definitions: Any structure fixed to or in the ground.

Class name: BuildingLand (prefLabel: Building Land)

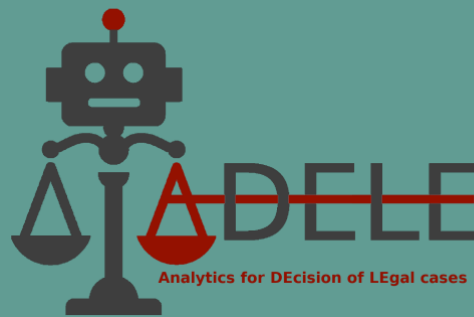
definitions: Any unimproved or improved land defined as such by the Member States.

Class name: Measurement (prefLabel: Measurement)

definitions: Any type of measurement having its own unit.

Class name: HumanOrgan (prefLabel: Human Organ)

definitions: Part of the body with a specific function.



Class name: MeansOfTransport (prefLabel: Means of Transport)

definitions: Where they are intended for the transport of persons or goods: (i) motorised land vehicles the capacity of which exceeds 48 cubic centimetres or the power of which exceeds 7,2 kilowatts; (ii) vessels exceeding 7,5 metres in length, with the exception of vessels used for navigation on the high seas and carrying passengers for reward, and of vessels used for the purposes of commercial, industrial or fishing activities, or for rescue or assistance at sea, or for inshore fishing; (iii) aircraft the take-off weight of which exceeds 1 550 kilograms, with the exception of aircraft used by airlines operating for reward chiefly on international routes.

Class name: AlcoholicBeverage (prefLabel: Alcoholic Beverage)

definitions: Any drink containing ethyl alcohol.

Class name: Antique (prefLabel: Antique)

definitions: Object that is over 100 years old and has value due to its age, rarity, historical significance, craftsmanship, or aesthetic qualities. This can include furniture, jewelry, artwork, pottery, and other types of items that are considered to be of cultural or historical importance.

Class name: PostageStamp (prefLabel: Postage Stamp)

definitions: Paper-value card with the reproduction of a graphic subject on one side, the indication of the issuing state, the nominal value, and gummed on the reverse, which, applied to letters, postcards and parcels (when the use of special franking machines is not authorised), serves for postal franking.

Class name: InvoiceIssuance (prefLabel: Invoice Issuance)

definitions: Obligation falling on taxable persons in respect of supplies of goods or services made in their territories.

Class name: Alcohol (prefLabel: Alcohol)

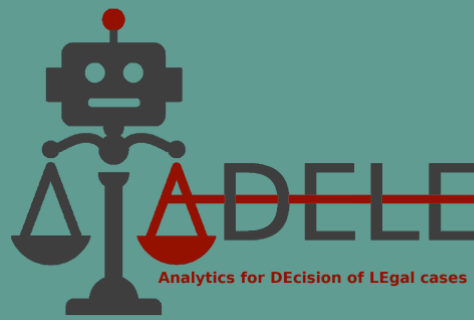
definitions: Ethyl alcohol to be used as a base for the manufacture of liqueurs or as a component of various alcoholic beverages.

Class name: CollectorsItem (prefLabel: Collectors' Item)

definitions: Object that is valued and sought after by collectors due to its rarity, historical significance, or other unique qualities.

Class name: ManufacturedTobacco (prefLabel: Manufactured Tobacco)

definitions: Tobacco, whether or not cut or otherwise shredded, spun or pressed into tablets, which can be smoked without further industrial processing (Directive 92/79/EEC).



Class name: HumanBlood (prefLabel: Human Blood)

definitions: Organic, opaque, viscous, red liquid which, because of cardiac activity, circulates in the cardiovascular system (heart, arteries, capillaries, veins), distributing itself in all the body and performing fundamental metabolic functions.

Class name: DentalProsthesis (prefLabel: Dental Prosthesis)

definitions: Artificial device intended to replace a tooth or part of a tooth with the intention of supplementing its function.

Class name: Vessel (prefLabel: Vessel)

definitions: Small, generally row-powered, less often sail- or motor-powered floats, used for communication between ships or between ships and land.

Class name: Aircraft (prefLabel: Aircraft)

definitions: A means of transport designed to depart from and return to solid surfaces, capable of moving and heading through the air by its own propulsion device.

Class name: MotorisedLandVehicle (prefLabel: Motorised Land Vehicle)

definitions: Any means of land transport, not on rails, powered by its own engine, i.e. not only motor vehicles on the road, but also tracked vehicles, with normal or special bodywork, i.e. vehicles for use in war, for agricultural work, road work, ecc.

Class name: UniversityEducation (prefLabel: University education)

definitions: Activities that have the objective of knowledge transmission and training in universities.

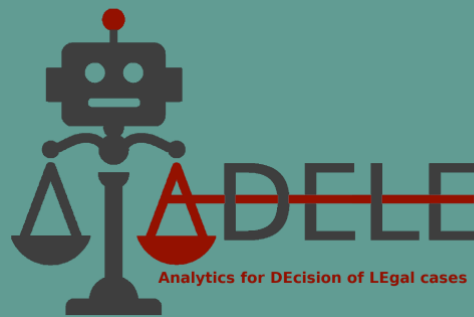
Class name: Pre-tertiaryEducation (prefLabel: Pre-tertiary education)

definitions: Activities that have the objective of knowledge transmission and training in primary and secondary schools.

Class name: AccomodationService (prefLabel: Accomodation Service)

definitions: Provision of accommodation in the hotel sector or in sectors with a similar function, including the provision of accommodation in holiday camps or on sites developed for use as camping sites.

Class name: LeasingOfImmovableProperty (prefLabel: Leasing of Immovable Property)



definitions: An arrangement whereby the lessor assigns to the lessee, in return for rent and for an agreed period, the right to occupy its property and to exclude any other person from it (CJEU decision, C-17/18, para. 36).

Class name: LettingOfPermanentEquipment (prefLabel: Letting of Permanent Equipment)

definitions: Letting of equipment that cannot be removed.

Class name: LettingOfParkingPlace (prefLabel: Letting of Parking Place)

definitions: Letting of an area corresponding to a place where a car vehicle be left.

Class name: LettingOfSafe (prefLabel: Letting of Safe)

definitions: Letting of an object corresponding with a metal cabinet (generally of high-strength steel, often multilayer, with intermediate filling of refractory materials or metals that cannot be attacked with oxyacetylene flame), intended for the safekeeping of valuables, precious objects or important documents.

Class name: PublicPostalService (prefLabel: Public Postal Service)

definitions: Services supplied by operators which meet the essential needs of the population and therefore, in practice, undertake to provide all or part of the universal postal service (services involving the clearance, sorting, transport and delivery of postal items) in a Member State, as defined in Article 3 of Directive 97/67 (CJEU decision, C-357/07, para. 36, C-114/14, para. 28).

Class name: SocialSecurityWork (prefLabel: Social Security Work)

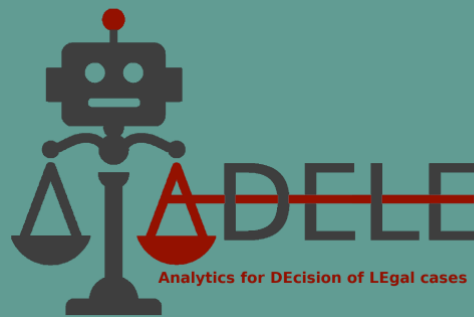
definitions: Set of institutions and activities, administered and carried out directly by the state (compulsory social security) or by authorised bodies (complementary or supplementary social security), which aim to provide citizens with the possibility of coping with particular situations of need (accident, illness, invalidity, involuntary unemployment, etc.), or the necessary means of subsistence at the end of working life (retirement and old age pensions) (CJEU decision, C-141/00, paragraph 44).

Class name: ProtectionOfChildren (prefLabel: Protection of Children)

definitions: Activities aimed at protecting children, such as support against the dangers of war and the use of children in conflicts, assistance for mental health, psychosocial and family reunification of lone children, whether displaced, refugees or migrants.

Class name: WelfareService (prefLabel: Welfare Service)

definitions: Welfare service includes the set of tasks of the public administration consisting of the provision of services, normally free of charge, aimed at eliminating economic and social



inequalities within society, including activities related to enabling an individual to survive in dignity in times of need (CJEU decision, C-335/14, Les Jardins de Jouvence).

Class name: Gambling (prefLabel: Gambling)

definitions: Transaction characterised by the allocation of a chance of profit to bettors against the assumption of the risk of having to pay out the associated winnings (CJEU decision, C-89/05, United Utilities, para. 29 - 30).

Class name: InvestmentFundsManagement (prefLabel: Investment Funds Management)

definitions: art. 135 (G) Directive 2006/112/EC: "the management of special investment funds as defined by Member States".

Class name: TransportationOfInjuredPeople (prefLabel: Transportation of Injured People)

definitions: The action and operation of transporting one who have been injured.

Class name: MedicalService (prefLabel: Medical Service)

definitions: All services that are provided in the course of the exercise of the medical profession to protect human health and involve care of a patient, including diagnosis and examination for the purpose of ascertaining whether a person is suffering from a medical condition with a view to treating it if that is possible (decision CJEU C-307/01, para. 57).

Class name: CreditManagementService (prefLabel: Credit Management Service)

definitions: Activity of an intermediary who does not occupy the position of a party to a contract relating to a financial product and whose activity amounts to something other than the provision of contractual services typically undertaken by the parties to such contracts. The purpose of such an activity is to do all that is necessary in order for two parties to enter into a contract, without the negotiator having any interest of his own in the content of the contract (CJEU decision, C-453/05, para. 23).

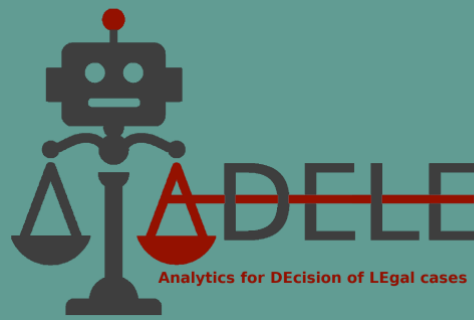
Class name: CulturalService (prefLabel: Cultural Service)

definitions: Services related to teaching, elaboration and diffusion of arts, sciences and technology.

Class name: InsuranceService (prefLabel: Insurance Service)

definitions: A service in which the insurer undertakes, in return for prior payment of a premium, to provide the insured, in the event of materialisation of the risk covered, with the service agreed when the contract was concluded (CJEU decision, C-40/15, para. 22).

Class name: TransportationOfSickPeople (prefLabel: Transportation of Sick People)



definitions: The action and operation of transporting one who is affected by disease.

Class name: PublicTelevisionService (prefLabel: Public Television Service)

definitions: Television broadcasting service, produced by the state (through a public body or organisation) or by a concessionaire company, which guarantees impartiality and completeness of information.

Class name: PublicRadioService (prefLabel: Public Radio Service)

definitions: Radio broadcasting service, produced by the state (through a public body or organisation) or by a concessionary company, which guarantees impartiality and completeness of information.

Class name: SocialWell-BeingService (prefLabel: Social Well-Being Service)

definitions: Services aimed at granting better social conditions to people.

Class name: EducationOfYoungsters (prefLabel: Education of Youngsters)

definitions: Transfer of knowledge and skills between a teacher and students (CJEU decision, C-434/05, para. 18, C-449/17, para. 21), not limited solely to education which leads to examinations for the purpose of obtaining qualifications or which provides training for the purpose of carrying out a professional or trade activity, but including other activities which are taught in schools in order to develop pupils' or students' knowledge and skills, provided that those activities are not purely recreational (CJEU decision C-473/08, para. 29, C-449/17, para. 22 and 23) OR Integrated system for the transfer of knowledge and skills covering a wide and diversified set of subjects, and to the furthering and development of that knowledge and those skills by the pupils and students in the course of their progress and their specialisation in the various constituent stages of that system (CJEU decision, C-449/17, para. 26).

Class name: PhysicalEducation (prefLabel: Physical Education)

definitions: A branch of education that deals with improving through sport activity the psychophysical development and individual and social health.

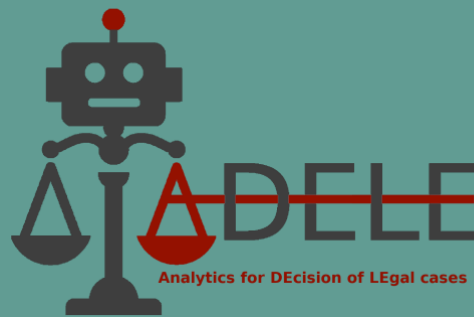
Class name: SportService (prefLabel: Sport Service)

definitions: Supply of services connected with practices in which there is not negligible physical element (CJEU decision, C-90/16).

Class name: RightToDeduction (prefLabel: Right to deduction)

definitions: A right which arises at the time the deductible tax becomes chargeable.

Class name: AgriculturalLevyChargeableEvent (prefLabel: Agricultural Levy Chargeable Event)



definitions: Any tax or charge, not being a customs duty, provided for under the common agricultural policy or under any special arrangements which, pursuant to Article 235 of the EEC Treaty, are applicable to goods resulting from the processing of agricultural products.

Class name: CustomsChargeableEvent (prefLabel: Customs Chargeable Event)

definitions: Event upon the application of which the legal conditions for customs duties to become chargeable are met.

Class name: ImportationFulfilment (prefLabel: Importation Fulfilment)

definitions: The fulfilment of all legal conditions for an importation to be considered legally accomplished.

Class name: SupplyFulfilment (prefLabel: Supply Fulfilment)

definitions: The occurrence of all legal conditions for a supply of goods to be considered legally accomplished.

Class name: ReceiptOfPayment (prefLabel: Receipt of Payment)

definitions: Document certifying the partial or total settlement of an invoice and showing the dates and amounts.

Class name: Capacity (prefLabel: Capacity)

definitions: Ability of a medium to hold up to a certain limit of people/weight/liquids.

Class name: Length (prefLabel: Length)

definitions: The measure of objects that develop predominantly in one dimension, i.e. the distance between the two extremes.

Class name: WorkOfArt (prefLabel: Work Of Art)

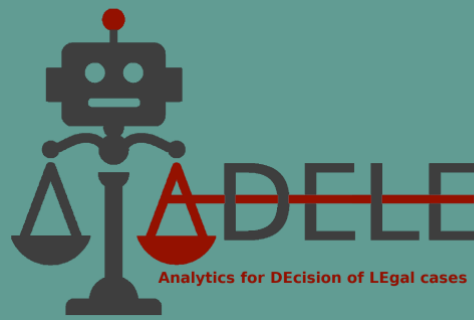
definitions: A creative product or expression that is considered to have aesthetic or cultural value.

Class name: TypeOfUse (prefLabel: Type of Use)

definitions: The use that it is possible to make of a means of transport.

Class name: HumanMilk (prefLabel: Human Milk)

definitions: An opaque white liquid, of complex chemical composition and intended to feed the children of human beings for whom it represents a complete and indispensable food in the first period of life.



3) Properties

Property: hasPurpose (prefLabel: has purpose)

Domain: TransactionObject

Range: PurposeOfTheTransactionObject

Property: hasPlace (prefLabel: has place)

Domain: TransactionTerritoriality

Range: TransactionPlace

Property: hasExemption (prefLabel: has exemption)

Domain: ExemptTransaction

Range: Exemption

Property: appliedTo (prefLabel: applied to)

Domain: TaxRate

Range: TaxableAmount

Property: isCalculatedFrom (prefLabel: is calculated from)

Domain: TaxableAmount

Range: TransactionValue

Property: hasBuyer (prefLabel: has buyer)

Domain: Transaction

Range: SupplyRecipient

Property: hasTerritoriality (prefLabel: has territoriality)

Domain: Transaction

Range: TransactionTerritoriality

Property: hasSupplier (prefLabel: has supplier)

Domain: Transaction

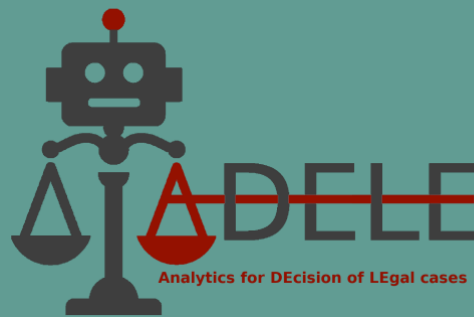
Range: Supplier

Property: hasObject (prefLabel: has object)

Domain: Transaction

Range: TransactionObject

Property: hasValue (prefLabel: has value)



Domain: Transaction

Range: TransactionValue

Property: actsOnBehalfOf (prefLabel: acts on behalf of)

Domain: TransactionIntermediary

Range: Supplier

Property: isSuppliedBy (prefLabel: is supplied by)

Domain: TransactionObject

Range: Supplier

Property: isBoughtBy (prefLabel: is bought by)

Domain: TransactionObject

Range: SupplyRecipient

Property: hasUsage (prefLabel: has usage)

Domain: MeansOfTransport

Range: UsageOfTheMeansOfTransport

Property: hasRightToDeduction (prefLabel: has right to deduction)

Domain: TaxablePerson

Range: RightToDeduction

Property: hasActivityDomain (prefLabel: has activity domain)

Domain: SupplierActivity

Range: Domain

Property: hasMeasurement (prefLabel: has measurement)

Domain: Good

Range: Measurement

Property: hasPurposeDomain (prefLabel: has purpose domain)

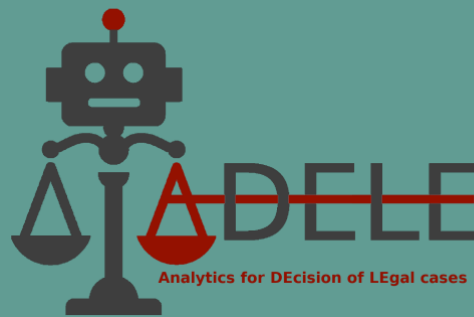
Domain: PurposeOfTheTransactionObject

Range: Domain

Property: precludes (prefLabel: precludes)

Domain: Exemption

Range: RightToDeduction



Property: arisesAt (prefLabel: arises at)

Domain: RightToDeduction

Range: VATChargeableEvent

Property: hasActivity (prefLabel: has activity)

Domain: Supplier

Range: SupplierActivity

Property: hasMainAerealRouteIn (prefLabel: has main aerial route in)

Domain: Aircraft

Range: Airspace

Property: hasMainMaritimeRouteIn (prefLabel: has main maritime route in)

Domain: Vessel

Range: MaritimeSpace

Property: hasLength (prefLabel: has length)

Domain: Vessel

Range: Length

Property: hasCapacity (prefLabel: has capacity)

Domain: MotorisedLandVehicle

Range: Capacity

Property: hasPower (prefLabel: has power)

Domain: MotorisedLandVehicle

Range: Power

Property: hasWeigth (prefLabel: has weigth)

Domain: Aircraft

Range: Weight

Property: hasTypeOfUse (prefLabel: has type of use)

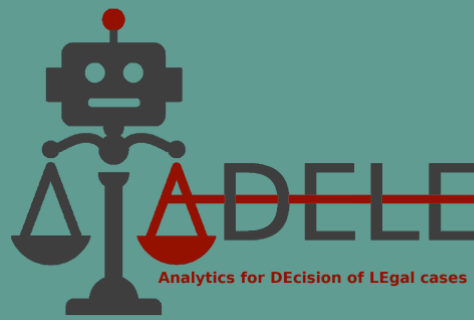
Domain: MeansOfTransport

Range: TypeOfUse

Datatype property: hasUsageTime (prefLabel: has usage time)

Domain: MeansOfTransport

Range: PlainLiteral



Datatype property: isSecondHandGood (prefLabel: is secondhand good)

Domain: Good

Range: boolean

Datatype property: isCommercialActivity (prefLabel: is commercial activity)

Domain: SupplierActivity

Range: boolean

Datatype property: isCommercialPurpose (prefLabel: is commercial purpose)

Domain: PurposeOfTheTransactionObject

Range: boolean

Datatype property: isSubjectToExciseDuty (prefLabel: is subject to excise duty)

Domain: Good

Range: boolean

Datatype property: hasEntryIntoService (prefLabel: has entry into service)

Domain: MeansOfTransport

Range: date

Datatype property: hasUnit (prefLabel: has unit)

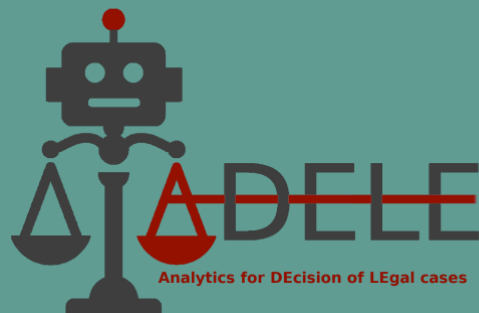
Domain: Measurement

Range: PlainLiteral

Datatype property: hasMeasurementValue (prefLabel: has measurement value)

Domain: Measurement

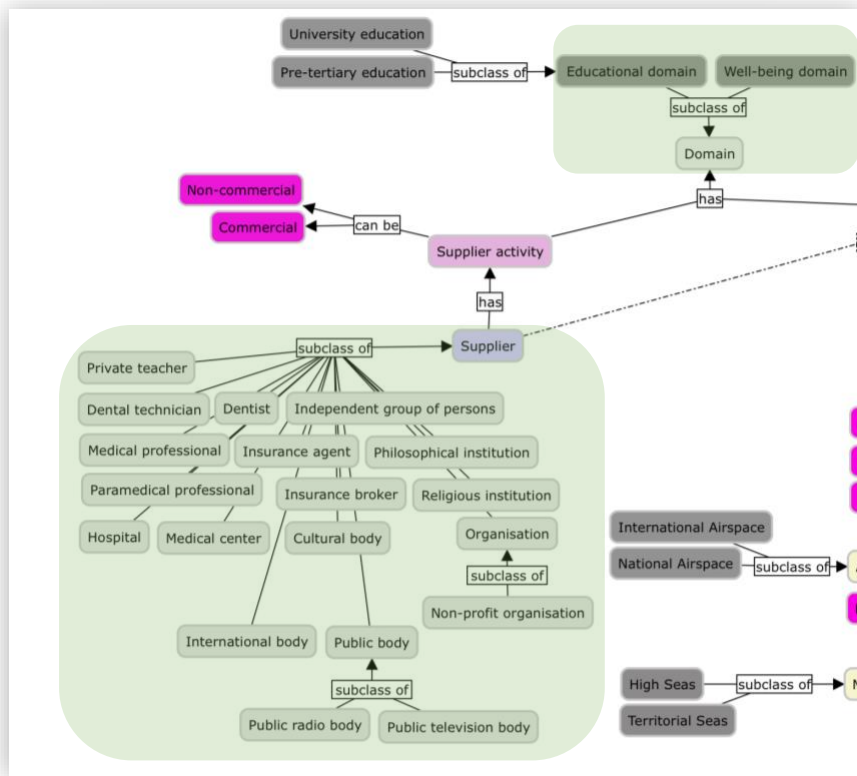
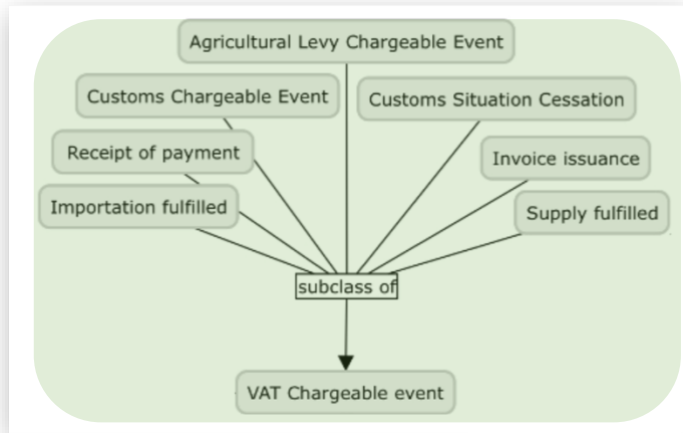
Range: PlainLiteral



To grant ontological robustness across the conceptual framework, most classes in OntoVAT are designed to be disjoint. The only class we decided not to disjoint are *VATChargeableEvent*, *Domain*, *Supplier*.

We did not disjoint the subclasses of *VATChargeableEvent* to allow an instance of VAT chargeable event to belong to multiple types of chargeable event. Regarding the *Domain* concept, we preferred to allow an instance of domain to belong to multiple classes as supplier's activity might sometimes

involve an overlap of multiple domains. For the same reason, we also wanted to allow potential overlaps in the subclasses of the concept *Supplier*.



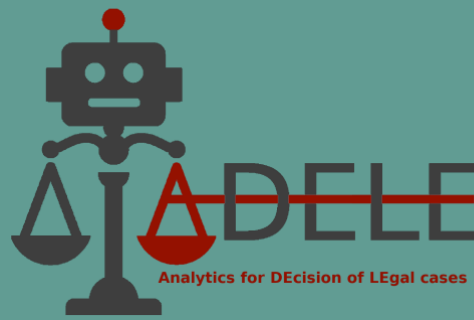
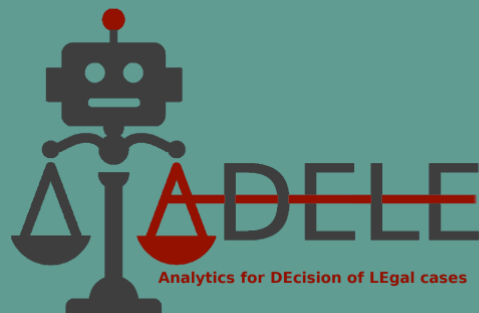


Figure 9-2. The portions of OntoVAT which allow internal overlaps (i.e. where individuals can belong to multiple classes) are the subclasses of VATChargeableEvent (image in top), Domain and Supplier (both depicted in the image at the bottom)

5) Commitment and provisional alignment with upper ontologies

To make OntoVAT more robust and interoperable, we are exploring alignments to other well-known legal upper ontologies, in particular LKIF (Legal Knowledge Interchange Format). We also align to the Descriptive Ontology for Linguistic and Cognitive Engineering (DOLCE) and to the DOLCE+DnS Ultralite (DUL) ontology (Borgo and Masolo, 2009). We list the alignment of our classes:

OntoVAT class	Aligned with class	In	Comment
Airspace	place:Place	LKIF	
Domain	expression:Qualification	LKIF	
Exemption	norm:Norm	LKIF	An exemption is the result of complex interactions between norms.
LegalEvent	top:Spatio_Temporal_Occurrence	LKIF	
MaritimeSpace	place:Place	LKIF	
Measurement	dul:UnitOfMeasure	DUL	
PurposeOfThe-TransactionObject	expression:Qualification	LKIF	
Person	legal-action:LegalPerson	LKIF	
RightToDeduction	norm:Right	LKIF	
Supplier	legal-role:Legal Role	LKIF	
SupplierActivity	expression:Qualification	LKIF	
SupplyRecipient	legal-role:Legal Role	LKIF	
TaxableAmount	dul:Amount	DUL	
TaxRate	dul:Amount	DUL	
Transaction	action:Trade	LKIF	action:Trade seems more appropriate than action:Transaction
TransactionIntermediary	legal-role:Legal Role	LKIF	



TransactionObject	dolce:Substantial	DOLCE	Good aligns to “dolce:Agentive physical Object” Service aligns to “dolce:SocialObject”
TransactionPlace	place:Place	LKIF	
TransactionTerritoriality	norm:Norm	LKIF	The concept of territoriality in the VAT domain cannot be reduced to the idea of a geographical place. Instead it is the result of complex interactions of norms.
TransactionValue	dul:Amount	DUL	
TypeOfUse	expression:Qualification	LKIF	

Table 9-2. Classes' alignment with the upper ontologies

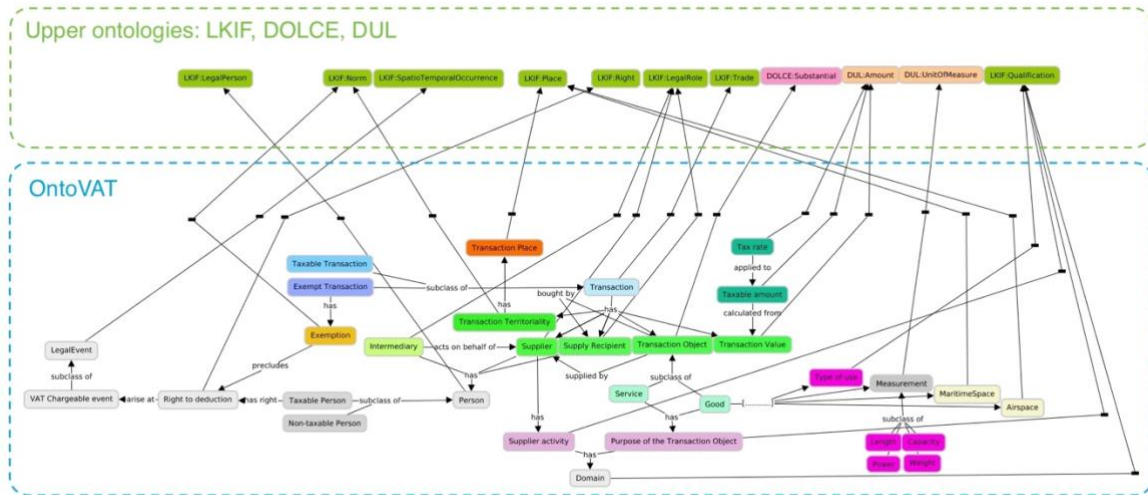
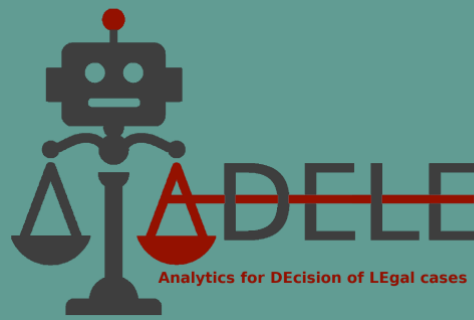


Figure 9-3. OntoVAT alignments with upper ontologies



10 Trademarks and Patents Ontology (PaTrOnto)

10.1 Introduction

The idea of creating an ontology for modelling patents and trademarks law together is related to the fact that these two areas share several similar juridical concepts. Moreover, only few attempts have been made to create such kinds of ontology in the past.

In recent years there have been studies attempting to build ontologies related to trademarks and patents, focusing on specific analytically angles such as infringement (Trappey et al., 2022; Li et al., 2020; Li et al., 2022; Jiang et al., 2017).

Some works on developing patent ontologies focused on the specific technological characteristics of patents (Lee et al., 2019; Zhai et al., 2022).

Unlike the previous few works on patent ontologies, our ontology, which we will call “PaTrOnto”, has the broader scope of integrating patent and trademarks into the same conceptual framework, focusing in particular on the key conceptual features which judges consider when producing judgements related to patents and trademarks.

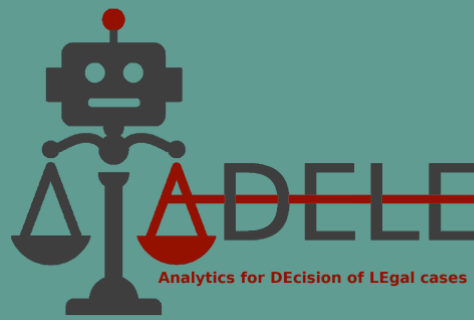
The PaTrOnto *rdf*. file can be downloaded at the following link: <https://www.dropbox.com/sh/2yom7tje9qaew0z/AACvEVdmVkBLoPUSiOIT6V?ia?dl=0>.

10.2 Description of the ontology

PaTrOnto is a multilingual OWL ontology enriched with a SKOS lexicalisation and implemented in English, Italian and Bulgarian. This SKOS lexicalisation provides a way to mitigate the issue of semantic non-uniformity in multilingualism pointed out in previous research (Kerremans et al., 2003).

The ontology is currently composed of 191 concepts (i.e., OWL classes) and 107 properties (relationships between classes). More precisely:

Element	Quantity
Number of classes	191
Number of properties	101
Number of datatype properties	6



Number of transitive properties	0
Number of disjoint class pairs	904
Number of subclass relations	157

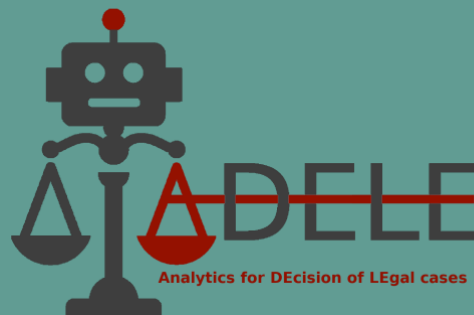
Table 10-3. PaTrOnto's statistics

Thanks to the SKOS lexicalization, each ontological class is enriched by some specific properties which are incorporated in the SKOS data model, namely:

- skos:definition
- skos:scopeNote
- skos:altLabel
- skos:hiddenLabel
- skos:example

The addition of these properties to each ontological concept (which is repeated in English, Italian and Bulgarian) facilitates the integration of crucial information within the ontology, making PaTrOnto particularly expressive and powerful. In particular, skos:definition contains the definition of each single OWL class (i.e., the definition of each single concept). In skos:scopeNote, we added relevant specifications about the skos:definition field (whenever was necessary to further specify the interpretative angle of the chosen definition). Furthermore, scopeNotes also contain all relevant normative references (if any) describing the concept. We also added any relevant synonyms in the three different languages as skos:altLabel properties. In skos:example, we added any example of the concept (this can be considered similar to defining subclasses of the concept). Finally, the property skos:hiddenLabel is used to store terms in natural language which might signal the presence of the concept in the text (this can be useful for any application layers built on top of PaTrOnto).

To grant a coherent and harmonic conceptual framework, we built PaTrOnto in coordination with Italian and Bulgarian experts in the domain of patents and trademarks. In most cases, the semantic meaning of concepts is already harmonic between Italy and Bulgaria. So, for each OWL class, a skos:definition is just provided in English and translated into Italian and Bulgarian with no adjustments.



However, in few cases, definitions of concepts (i.e., their semantic meaning) vary at national level. In these situations, priority was given to national definitions, therefore the `skos:definition` in Bulgarian/Italian will not be just a translation from English, instead it will be a different definition (coherent with the national legislation).

Moreover, whenever further specifications are needed, we employed `skos:scopeNote` (in Bulgarian/Italian/English) to further explain the scope of the concepts' meaning (at Bulgarian, Italian and European level).

Lastly, since national legislations may have alternative terms for referring to the same concepts, we handled alternative terms as synonyms (`skos:altLabel`) in Italian/Bulgarian.

In sum, we handle multilingualism by specialising `skos:definitions`, `skos:scopeNotes` and `skos:altLabels` whenever needed, without affecting the coherence of the ontological concepts or their relations.

Regarding the definition of each concept, we proceeded by giving priority to the definition coming from the domain-specific legislative sources, whenever the concept exists in that domain. If the concept is not mentioned neither in the national nor in the European legislative sources, we searched for a definition in the case law of the Court of Justice of the European Union (CJEU). If the concept is not defined neither in the legislation nor in the case law of the CJEU, as it frequently happens for "factual concepts", it is defined following a simple description based on legal encyclopaedias or dictionaries.

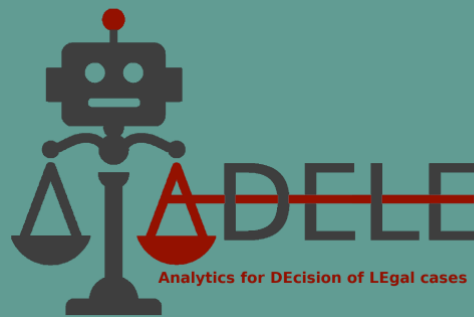
10.3 Ontological commitments and scope

1) Classes and properties

We now report the current list of classes and properties in PaTrOnto, considering just the English language, and reporting just the main properties: `definitions`, `prefLabels` and `altLabels` (for classes), and `range` and `domains` (for properties).

2) Classes

Class name: IntellectualProperty (prefLabel: Intellectual Property)
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definitions: Legislation protecting intangible creations of the human intellect

Class name: IndustrialProperty (prefLabel: Industrial Property)

definitions: Legislation protecting trade marks and other distinctive signs, geographical indications, designations of origin, designs and models, inventions, utility models, topographies of semiconductor products, trade secrets and new plant varieties

Class name: Patent (prefLabel: Patent)

definitions: Legal title by virtue of which the owner is granted an exclusive right to exploit the patented solution

Class name: IndustrialPropertyRight (prefLabel: Industrial Property Right)

definitions: Right belonging to the holder of the industrial property title

Class name: Trademark (prefLabel: Trademark)

definitions: Registration of a distinctive sign as a trademark

Class name: IntellectualPropertyRight (prefLabel: Intellectual Property Right)

definitions: Right belonging to the holder of the intellectual property title

Class name: Invention (prefLabel: Invention)

definitions: Novel and original solution to a technical problem

Class name: PatentedSolution (prefLabel: Patented Solution)

definitions: Solution (invention or utility model) for which a patent has been granted

Class name: Sign (prefLabel: Sign)

definitions: Distinctive sign eligible for registration as a trademark

Class name: PatentOwner (prefLabel: Patent Owner)

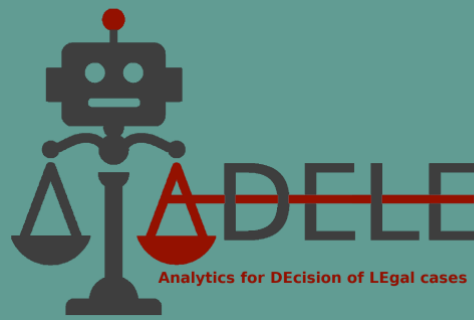
definitions: The subject, natural or legal person, having the exclusive right to dispose of and economically exploit the patent

Class name: OwnerOfIndustrialPropertyRight (prefLabel: Owner Of Industrial Property Right)

definitions: Owner of the industrial property right

Class name: TrademarkOwner (prefLabel: Trademark Owner)

definitions: The subject, natural or legal person, having the exclusive right to use the sign registered as a trademark



Class name: PatentValidity (prefLabel: Patent Validity)

definitions: Existence of all requirements for valid patentability of the patented solution

Class name: ValidityOfIndustrialPropertyRight (prefLabel: Validity Of Industrial Property Right)

definitions: Validity of the industrial property title

Class name: TrademarkValidity (prefLabel: Trademark Validity)

definitions: Existence of all requirements for valid registration of the sign registered as a trademark

Class name: PatentTerritoriality (prefLabel: Patent Territoriality)

definitions: Countries where the patent is effective

Class name: TerritorialityOfIndustrialPropertyRight (prefLabel: Territoriality Of Industrial Property Right)

definitions: Countries where the industrial property title is effective

Class name: TrademarkTerritoriality (prefLabel: Trademark Territoriality)

definitions: Countries where the trademark is effective

Class name: RegisteredSignRequirement (prefLabel: Registered Sign Requirement)

definitions: Requirements a sign must have to be validly registered as a trademark

Class name: ExclusivePatrimonialRightToPatentedSolution (prefLabel: Exclusive Patrimonial Right To Patented Solution)

definitions: Exclusive right of the patent owner to implement the invention, to dispose of it and to exploit it in the territory of the State

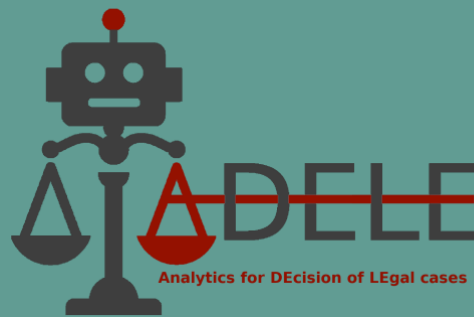
Class name: ExclusivePatrimonialRigthToIndustrialProperty (prefLabel: Exclusive Patrimonial Righth To Industrial Property)

definitions: Exclusive patrimonial right on industrial property title

Class name: ExclusiveRigthToRegisteredSign (prefLabel: Exclusive Rigth To Registered Sign)

definitions: Right of a trademark owner to exclusive use of the trademark for the goods or services for which it is registered

Class name: PrincipleOfExhaustion (prefLabel: Principle Of Exhaustion)



definitions: Principle according to which once a good has been put on the market in the territory of the European Union, the holder of one or more industrial property rights on that specific good loses its exclusive property rights, provided that the putting of the good on the market is done directly by the right holder or with its consent

Class name: TrademarkTransfer (prefLabel: Trademark Transfer)

definitions: Transfer of a trademark by its owner to a third party

Class name: TransferOfIndustrialPropertyRight (prefLabel: Transfer Of Industrial Property Right)

definitions: Transfer of an industrial property right by its owner to a third party

Class name: TrademarkLicence (prefLabel: Trademark Licence)

definitions: Agreement by which the owner of a trademark (licensor) grants its use, in whole or in part, to a third party (licensee), and to which the general rules relating to contracts (e.g. interpretation, termination for non-performance, etc.) therefore apply

Class name: LicenceOfIndustrialPropertyRight (prefLabel: Licence Of Industrial Property Right)

definitions: Granting to a third party of the right to exploit an industrial property right by its owner

Class name: PatentLicence (prefLabel: Patent Licence)

definitions: A contract by which the owner of a patent (licensor) grants the use of the patented solution, in whole or in part, to a third party (licensee), and to which the general rules relating to contracts (e.g. interpretation, termination for non-performance, etc.) therefore apply

Class name: LicenceOfIntellectualPropertyRight (prefLabel: Licence of Intellectual Property Right)

definitions: Granting to a third party of the right to exploit an intellectual property right by its owner

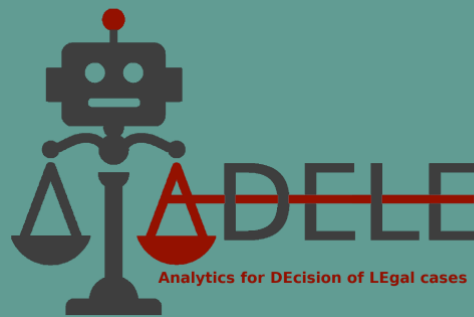
Class name: TrademarkClass (prefLabel: Trademark Class)

definitions: Class of goods or services contained in the Nice Classification in relation to which a trademark can be registered

Class name: TrademakWithdrawal (prefLabel: Trademak Withdrawal)

definitions: Deed whereby the owner of a trademark renounces it

Class name: WithdrawalOfIndustrialPropertyRight (prefLabel: Withdrawal Of Industrial Property Right)



definitions: Deed whereby the owner of an intellectual property right renounces it

Class name: LapseCauseOfIndustrialPropertyRight (prefLabel: Lapse Cause Of Industrial Property Right)

definitions: Cause of lapse of industrial property right

Class name: PatentTransfer (prefLabel: Patent Transfer)

definitions: Transfer of a patent by its owner to a third party

Class name: Inventor (prefLabel: Inventor)

definitions: Natural person who makes the invention and is entitled to file the patent application

Class name: Co-inventor (prefLabel: Co-inventor)

definitions: Natural person realising the invention together with one or more other co-inventors

Class name: RegisteredSignDescriptiveUseByThirdParty (prefLabel: Registered Sign Descriptive Use By Third Party)

definitions: Use by a third party of signs or indications that are not distinctive or that relate to the kind, quality, quantity, destination, value, geographical origin, the time of manufacture of its good or provision of its service or to other characteristics of the good or service

Class name: AllowedThirdPartyUseOfRegisteredSign (prefLabel: Allowed Third Party Use Of Registered Sign)

definitions: Cases in which the use of the registered trademark by unauthorised third parties is permitted by law

Class name: RegisteredSign (prefLabel: Registered Sign)

definitions: Sign registered as a trademark

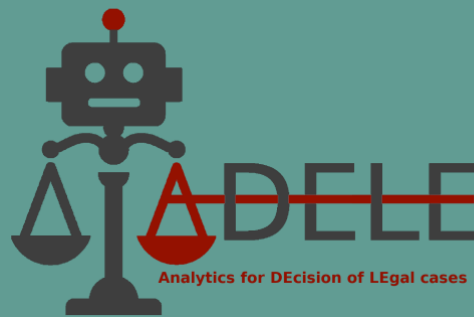
Class name: PatentWithdrawal (prefLabel: Patent Withdrawal)

definitions: Deed whereby the owner of a patent renounces it

Class name: PatentApplication (prefLabel: Patent Application)

definitions: Application submitted by the applicant to the competent patent granting authority

Class name: ApplicationOfIndustrialPropertyRight (prefLabel: Application Of Industrial Property Right)



definitions: Application of industrial property right

Class name: TrademarkApplication (prefLabel: Trademark Application)

definitions: Application submitted by the applicant to the competent trademark registration authority

Class name: PatentAuthority (prefLabel: Patent Authority)

definitions: Patent granting authority

Class name: AuthorityOfIndustrialPropertyRight (prefLabel: Authority Of Industrial Property Right)

definitions: Authority competent to grant industrial property titles

Class name: TrademarkAuthority (prefLabel: Trademark Authority)

definitions: Trademark registration authority

Class name: NationalPatentAuthority (prefLabel: National Patent Authority)

definitions: National patent granting authority

Class name: InternationalPatentAuthority (prefLabel: International Patent Authority)

definitions: International patent granting authority

Class name: EuropeanPatentAuthority (prefLabel: European Patent Authority)

definitions: European patent granting authority

Class name: NationalTrademarkAuthority (prefLabel: National Trademark Authority)

definitions: National trademark registration authority

Class name: InternationalTrademarkAuthority (prefLabel: International Trademark Authority)

definitions: International trademark registration authority

Class name: EuropeanTrademarkAuthority (prefLabel: European Trademark Authority)

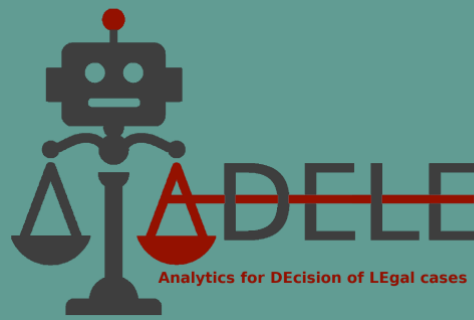
definitions: European trademark registration authority

Class name: IndustrialPropertyUse (prefLabel: Industrial Property Use)

definitions: Use of intellectual property

Class name: RegisteredSignUse (prefLabel: Registered Sign Use)

definitions: Use of the sign registered as a trademark



Class name: PriorityDate (prefLabel: Priority Date)

definitions: Date on which a patent or trademark application is first filed

Class name: PatentNumber (prefLabel: Patent Number)

definitions: Number identifying each granted patent, assigned by the granting authority

Class name: RegistrationNumberOfIndustrialPropertyRight (prefLabel: Registration Number Of Industrial Property Right)

definitions: Registration number of the industrial property title

Class name: PatentApplicationFilingDate (prefLabel: Patent Application Filing Date)

definitions: Date the patent application was filed with the competent patent granting authority

Class name: ApplicationFilingDateOfIndustrialPropertyRight (prefLabel: Application Filing Date Of Industrial Property Right)

definitions: Date of filing of the application for obtaining the industrial property title

Class name: TrademarkApplicationFilingDate (prefLabel: Trademark Application Filing Date)

definitions: Date the trademark application was filed with the competent trademark registration authority

Class name: TrademarkNumber (prefLabel: Trademark Number)

definitions: Number identifying each registered trademark, assigned by the registration authority

Class name: UnregisteredSign (prefLabel: Unregistered Sign)

definitions: Sign not registered as a trademark

Class name: DeFactoTrademark (prefLabel: De Facto Trademark)

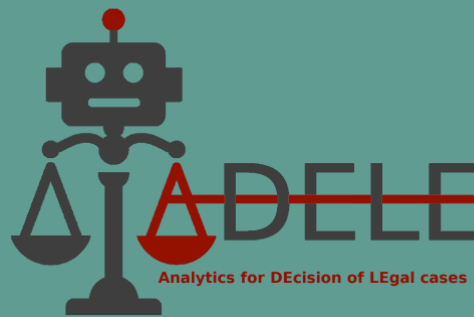
definitions: Trademark that has not been registered but is used to distinguish goods or services

Class name: StoreSign (prefLabel: Store Sign)

definitions: The distinctive sign adopted for the identification of a certain premises or establishment where a business activity is carried out

Class name: BusinessName (prefLabel: Business Name)

definitions: Name adopted by the entrepreneur or the company to distinguish itself in the exercise of the enterprise



Class name: InternetDomainName (prefLabel: Internet Domain Name)

definitions: The alphabetical address of a website

Class name: InfringementOfIndustrialPropertyRight (prefLabel: Infringement Of Industrial Property Right)

definitions: Infringement of an industrial property right by a third party

Class name: LiteralInfringement (prefLabel: Literal Infringement)

definitions: Patent infringement which occurs when the patented solution is implemented identically by the infringer

Class name: PatentInfringement (prefLabel: Patent Infringement)

definitions: Use of a patented solution by an unauthorised third party, and outside the cases permitted by law

Class name: InfringementByEquivalents (prefLabel: Infringement By Equivalents)

definitions: Patent infringement which occurs when a third party implements a solution equivalent, but not identical, to that protected by a patent

Class name: PatentedSolutionRequirement (prefLabel: Patented Solution Requirement)

definitions: Requirements that an invention or utility model must have in order to be validly patented

Class name: IndustrialPropertyRequirement (prefLabel: Industrial Property Requirement)

definitions: Validity requirement of the industrial property title

Class name: NonDeceptivenessOfTheSign (prefLabel: Non Deceptiveness Of The Sign)

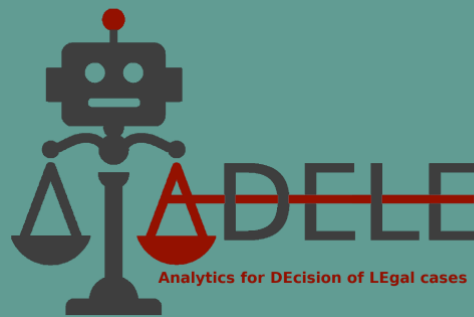
definitions: The sign is not liable to mislead the public as to the geographical origin, nature or quality of the goods or services, or the type of trademark

Class name: UtilityModel (prefLabel: Utility Model)

definitions: New form of an industrial product that improves its effectiveness, application or use

Class name: MethodInvention (prefLabel: Method Invention)

definitions: Invention covering a method for the production of goods or the rendering of a service



Class name: ProductInvention (prefLabel: Product Invention)

definitions: Invention covering a material product

Class name: LicenceDurationOfIndustrialPropertyRight (prefLabel: Licence Duration Of Industrial Property Right)

definitions: Duration of the industrial property right licence agreement

Class name: UnauthorisedThirdPartyUseOfPatentedSolution (prefLabel: Unauthorised Third Party Use Of Patented Solution)

definitions: Use of a patented solution by a third party not authorised by the owner and not permitted by law

Class name: PatentLimitation (prefLabel: Patent Limitation)

definitions: Limitation of the scope of protection of the patent by the Office or the Court, due to partial invalidity of the patent

Class name: PatentedSolutionUseByThirdParty (prefLabel: Patented Solution Use By Third Party)

definitions: Use of a patented solution by a third party other than the patent owner

Class name: TrademarkLicenceDuration (prefLabel: Trademark Licence Duration)

definitions: Time period within which the patent licence agreement produces its legal effects

Class name: PatentLicenceDuration (prefLabel: Patent Licence Duration)

definitions: Time period within which the trademark licence agreement produces its legal effects

Class name: PatentLapseCause (prefLabel: Patent Lapse Cause)

definitions: Fact causing termination of patent protection effects

Class name: TrademarkLapseCause (prefLabel: Trademark Lapse Cause)

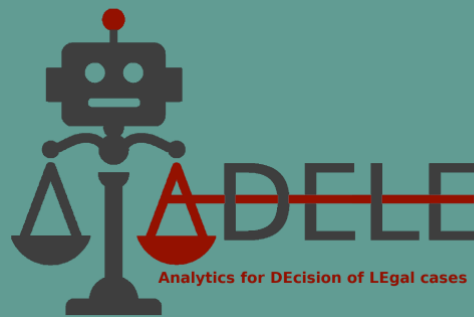
definitions: Fact causing termination of trademark protection effects

Class name: PatentPart (prefLabel: Patent Part)

definitions: Part of the patent text

Class name: DescriptionPart (prefLabel: Description Part)

definitions: Part of the patent text describing the purpose of the invention, i.e. the technical problem to be solved



Class name: SummaryPart (prefLabel: Summary Part)

definitions: Part of the patent text briefly describing the patented solution

Class name: ClaimsPart (prefLabel: Claims Part)

definitions: Part of the patent text containing the claims, i.e. the scope of protection of the patent

Class name: DrawingsPart (prefLabel: Drawings Part)

definitions: Part of the patent text containing the technical drawings representing the details of the invention and illustrating the features indicated in the description

Class name: DependentClaimsPart (prefLabel: Dependent Claims Part)

definitions: Claims that contain all the features of the independent claims to which they relate and indicate additional features or variants for which protection is sought

Class name: IndependentClaimsPart (prefLabel: Independent Claims Part)

definitions: Claims that reproduce the essential features of the patented solution

Class name: PatentedSolutionLawfulness (prefLabel: Patented Solution Lawfulness)

definitions: The patented solution is not contrary to public order or morality

Class name: PatentedSolutionNovelty (prefLabel: Patented Solution Novelty)

definitions: Non-inclusion of a patented solution in the prior art

Class name: InventiveStep (prefLabel: Inventive Step)

definitions: A solution implies inventive step when it is not obvious from the prior art, to a skilled person

Class name: IndustrialApplicability (prefLabel: Industrial Applicability)

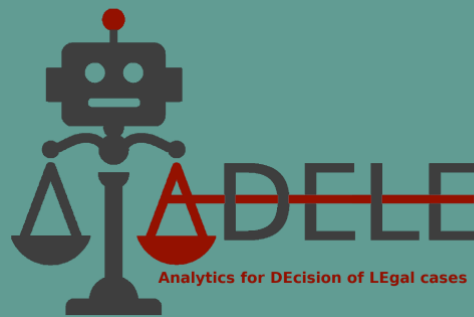
definitions: The suitability for the patented solution to be manufactured or used in any kind of industry

Class name: SufficientDisclosure (prefLabel: Sufficient Disclosure)

definitions: Disclosure of the patented solution sufficiently clear and complete for any skilled person to implement it

Class name: Problem-SolutionApproach (prefLabel: Problem-Solution Approach)

definitions: Method used to assess whether a patented solution is inventive, composed of three main stages: (i) determining the "closest prior art", (ii) establishing the "objective technical



problem" to be solved, and (iii) considering whether or not the claimed invention, starting from the closest prior art and the objective technical problem, would have been obvious to the skilled person

Class name: PriorArt (prefLabel: Prior Art)

definitions: Anything that has been made accessible to the public in the territory of the State or abroad before the filing date of the patent application, by written or oral description, use or any other means

Class name: ClosestPriorArt (prefLabel: Closest Prior Art)

definitions: The prior art which in one single reference discloses the combination of features which constitutes the most promising starting point for a development leading to the invention

Class name: ObjectiveTechnicalProblem (prefLabel: Objective Technical Problem)

definitions: Objective technical problem that the patented solution aims to solve

Class name: TechnicalField (prefLabel: Technical Field)

definitions: Technical sector to which the patented solution relates

Class name: PublicDisclosure (prefLabel: Public Disclosure)

definitions: Publication or communication of the invention to third parties prior to filing the application

Class name: SkilledPerson (prefLabel: Skilled Person)

definitions: A skilled practitioner in the relevant field of technology who is possessed of average knowledge and ability

Class name: SignLawfulness (prefLabel: Sign Lawfulness)

definitions: Non-violation of the law, public order or morality by a sign

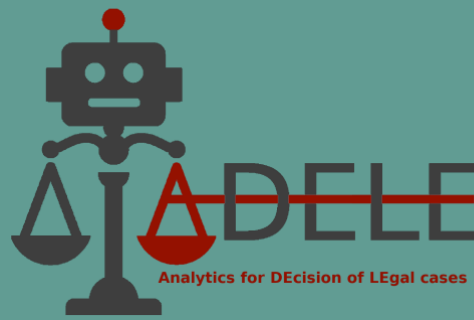
Class name: SignNovelty (prefLabel: Sign Novelty)

definitions: Novelty and non-likelihood of confusion of a sign with respect to signs previously registered or known as de facto trademarks

Class name: SignDistinctiveness (prefLabel: Sign Distinctiveness)

definitions: Characteristic of a sign permitting identification of the good or service for which registration is sought as originating from the trademark owner

Class name: ProductClass (prefLabel: Product Class)



definitions: Class of goods contained in the Nice Classification in relation to which a trademark can be registered

Class name: ServiceClass (prefLabel: Service Class)

definitions: Class of services contained in the Nice Classification in relation to which a trademark can be registered

Class name: Right (prefLabel: Right)

definitions: Right or claim, protected by law, of a certain active or omissive behaviour by third parties

Class name: SecondaryMeaning (prefLabel: Secondary Meaning)

definitions: Phenomenon occurring when a sign, originally devoid of distinctive character, acquires over time, as a result of its use, a second meaning to the consumers and is thus able to identify the origin of goods and services from a particular subject

Class name: GenericDenomination (prefLabel: Generic Denomination)

definitions: The common name of a given good or service

Class name: DescriptiveIndication (prefLabel: Descriptive Indication)

definitions: Signs describing certain goods or services, in particular with reference to their type, quality, quantity, destination, value, geographical origin, time of manufacture of the goods or provision of the service or other characteristics

Class name: GeographicalIndication (prefLabel: Geographical Indication)

definitions: A sign without distinctive character indicating the geographical origin of a certain product or service

Class name: CommonlyUsedDenomination (prefLabel: Commonly Used Denomination)

definitions: Sign that has become common in everyday language or in the constant usages of commerce

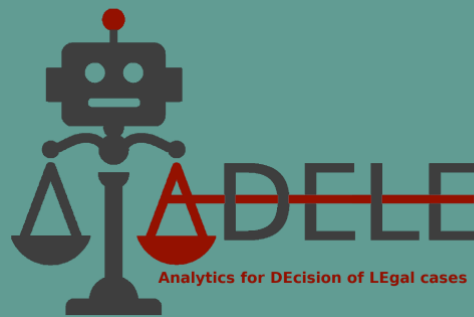
Class name: NonDistinctiveSign (prefLabel: Non Distinctive Sign)

definitions: Sign without distinctive character

Class name: PatentExpiration (prefLabel: Patent Expiration)

definitions: Expiry of the patent term

Class name: TrademarkExpiration (prefLabel: Trademark Expiration)



definitions: Expiry of the term of the trademark registration, which was not followed by a renewal of the registration

Class name: InfringementByLikelihoodOfConfusion (prefLabel: Infringement By Likelihood Of Confusion)

definitions: Infringement occurring when a third party uses in his economic activity, without the consent of the trademark owner, a sign identical or similar to the registered trademark, for identical or similar goods or services, if because of the identity or similarity of the signs and the identity or similarity of the goods or services there is a likelihood of confusion by the public, which may also consist of a likelihood of association between the two signs

Class name: TrademarkInfringement (prefLabel: Trademark Infringement)

definitions: Unlawful use of a registered trademark or similar sign by an unauthorised third party

Class name: SignVulgarisation (prefLabel: Sign Vulgarisation)

definitions: Phenomenon whereby the sign subject to trademark registration loses its distinctive character, due to the activity or inactivity of its owner

Class name: ExpirationOfIndustrialPropertyRight (prefLabel: Expiration Of Industrial Property Right)

definitions: Expiry of the term of an industrial property right

Class name: NonPaymentOfPatentRenewal (prefLabel: Non Payment Of Patent Renewal)

definitions: Failure to pay the annual fee due for the maintenance of the patent within six months of the expiry date

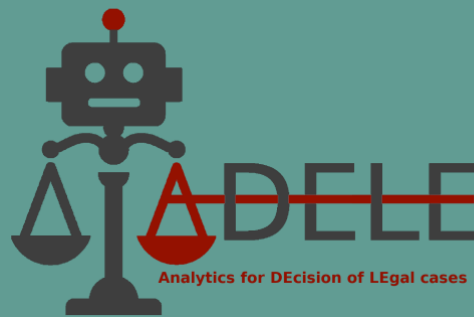
Class name: DurationOfIndustrialPropertyRight (prefLabel: Duration Of Industrial Property Right)

definitions: Duration of industrial property right

Class name: TrademarkDuration (prefLabel: Trademark Duration)

definitions: Time period within which trademark registration produces its legal effects: trademark registration is valid 10 years from the filing of the application and may be renewed every 10 years indefinitely

Class name: PatentDuration (prefLabel: Patent Duration)



definitions: Period of time within which the patent produces its legal effects: the duration of the invention patent is 20 years from the filing date, while the duration of the utility model patent is 10 years from the filing date

Class name: MoralRightToPatentedSolution (prefLabel: Moral Right To Patented Solution)

definitions: The right to be recognised as the author of the invention

Class name: RegisteredSignUseByOwner (prefLabel: Registered Sign Use By Owner)

definitions: Use of a sign registered as a trademark by its owner

Class name: RegisteredSignUseByThirdParty (prefLabel: Registered Sign Use By Third Party)

definitions: Use of a sign registered as a trademark by a person other than its owner

Class name: UnauthorisedThirdPartyUseOfRegisteredSign (prefLabel: Unauthorised Third Party Use Of Registered Sign)

definitions: Use of a sign registered as a trademark by a third party not authorised by the trademark owner and not permitted by law

Class name: AuthorisedThirdPartyUseOfRegisteredSign (prefLabel: Authorised Third Party Use Of Registered Sign)

definitions: Use of the sign registered as a trademark made by third parties authorised by the owner

Class name: VoluntaryPatentLicence (prefLabel: Voluntary Patent Licence)

definitions: Licence that the patent owner can freely decide whether to grant

Class name: TrademarkPartialInvalidity (prefLabel: Trademark Partial Invalidity)

definitions: Trademark invalidity occurring when the grounds for invalidity affect only part of the goods or services for which the trademark is registered

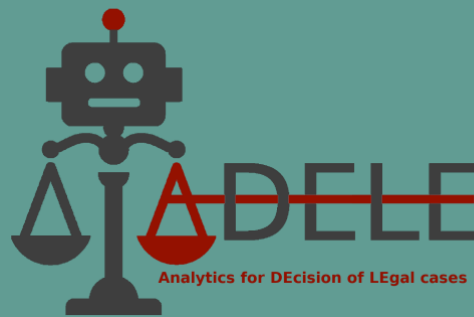
Class name: CompulsoryPatentLicence (prefLabel: Compulsory Patent Licence)

definitions: Licence that the patent owner is required by law to grant in certain cases

Class name: PatentPartialInvalidity (prefLabel: Patent Partial Invalidity)

definitions: Invalidity of the patent occurring when the grounds for invalidity only partially affect the patent

Class name: PatentTotalInvalidity (prefLabel: Patent Total Invalidity)



definitions: Invalidity of the patent occurring when the grounds for invalidity affect the patent in its entirety

Class name: TripleIdentityTest (prefLabel: Triple Identity Test)

definitions: Method for assessing infringement by equivalents, which consists of verifying the following profiles: whether the allegedly infringing product performs the same function, in the same way and with the same result as the allegedly infringed patent

Class name: PatentInvalidity (prefLabel: Patent Invalidity)

definitions: Lack of validity requirements for patenting an invention or utility model

Class name: TrademarkInvalidity (prefLabel: Trademark Invalidity)

definitions: Lack of validity requirements to register a sign as a trademark

Class name: DeceptiveUseOfRegisteredSignByOwner (prefLabel: Deceptive Use Of Registered Sign By Owner)

definitions: Use of the trademark by the owner, or with his consent, in consequence of which the trademark has become suitable to mislead the public as to the nature, quality or source of the goods or services for which it is used

Class name: PatentedSolutionUse (prefLabel: Patented Solution Use)

definitions: Use of the patented solution

Class name: PatentedSolutionUseByOwner (prefLabel: Patented Solution Use By Owner)

definitions: Use of a patented solution by the patent owner

Class name: AllowedThirdPartyUseOfPatentedSolution (prefLabel: Allowed Third Party Use Of Patented Solution)

definitions: Cases in which the use of the patented solution by unauthorised third parties is permitted by law

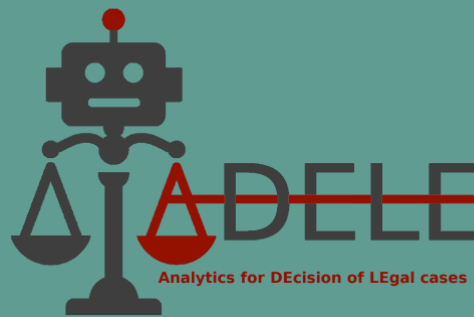
Class name: ScopeOfPatentProtection (prefLabel: Scope Of Patent Protection)

definitions: The scope of protection of the patent

Class name: AuthorisedThirdPartyUseOfPatentedSolution (prefLabel: Authorised Third Party Use Of Patented Solution)

definitions: Use of a patented solution by a third party authorised by the patent owner

Class name: ScientificUseByThirdParty (prefLabel: Scientific Use By Third Party)



definitions: Use of the invention by third parties for experimental purposes

Class name: UseByDeFactoTrademarkHolder (prefLabel: Use By De Facto Trademark Holder)

definitions: Use of the registered sign by the de facto trademark holder allowed by prior use

Class name: TrademarkTotalInvalidity (prefLabel: Trademark Total Invalidity)

definitions: Trademark invalidity occurring when the grounds for invalidity affect all the goods or services for which the trademark is registered

Class name: EffectivenessOfIndustrialPropertyRight (prefLabel: Effectiveness Of Industrial Property Right)

definitions: Effectiveness of an industrial property right

Class name: PatentEffectiveness (prefLabel: Patent Effectiveness)

definitions: Capacity of the patent to produce legal effects

Class name: DependentInvention (prefLabel: Dependent Invention)

definitions: Patentable invention whose implementation implies implementation of inventions protected by prior patents

Class name: TransferOfIntellectualPropertyRight (prefLabel: Transfer Of Intellectual Property Right)

definitions: Transfer of an intellectual property right by its owner to a third party

Class name: PatentText (prefLabel: Patent Text)

definitions: Text of the patent

Class name: ThirdPartyUseOfOwnPersonalAddressEquivalentToRegisteredSign (prefLabel: Third Party Use Of Own Personal Address Equivalent To Registered Sign)

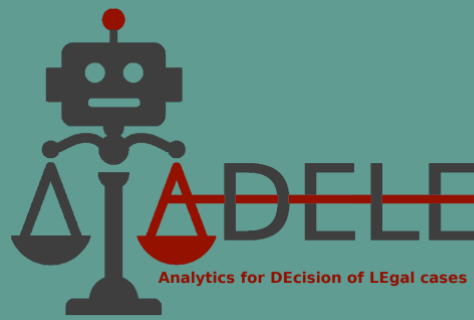
definitions: Use by a third party of its own address identical to a registered trademark

Class name: TrademarkEffectiveness (prefLabel: Trademark Effectiveness)

definitions: Capacity of trademark registration to produce legal effects

Class name: ThirdPartyUseOfOwnPersonalNameEquivalentToRegisteredSign (prefLabel: Third Party Use Of Own Personal Name Equivalent To Registered Sign)

definitions: Use by a third party of its own name identical to a registered trademark



Class name: ThirdPartyReferentialUseOfRegisteredSign (prefLabel: Third Party Referential Use Of Registered Sign)

definitions: Use by a third party of a registered trademark to identify or refer to goods or services of the trademark owner

Class name: ThirdPartyUseForObtainingDrugMarketingAuthorization (prefLabel: Third Party Use For Obtaining Drug Marketing Authorization)

definitions: Use of an invention by a third party not authorised by the owner for the purpose of studies and experiments aimed at obtaining a Marketing Authorisation (MA) for a drug and the consequent practical requirements

Class name: ThirdPartyUseAllowedBasedOnPreuse (prefLabel: Third Party Use Allowed Based On Preuse)

definitions: Use of an invention by a subject during the 12 months preceding the filing date of the patent application, or the priority date, by the patent owner, which allows that subject to continue using the invention within the limits of prior use

Class name: PriorUse (prefLabel: Prior Use)

definitions: Use of a sign by a subject before others register it as a trademark

Class name: Reputation (prefLabel: Reputation)

definitions: The level of familiarity acquired by consumers with a given brand

Class name: RegistrationDateOfIndustrialPropertyRight (prefLabel: Registration Date Of Industrial Property Right)

definitions: Date of registration of the industrial property title

Class name: TrademarkRegistrationDate (prefLabel: Trademark Registration Date)

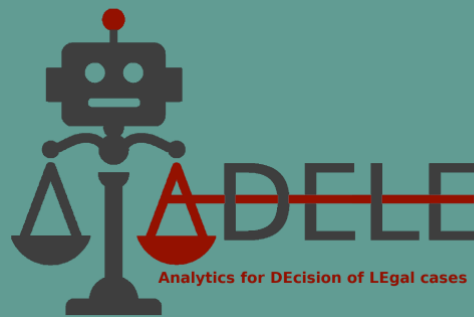
definitions: Date on which the trademark was registered by the competent authority

Class name: PatentGrantingDate (prefLabel: Patent Granting Date)

definitions: Date on which the patent was granted by the competent authority

Class name: WellKnownTrademarkInfringement (prefLabel: Well Known Trademark Infringement)

definitions: Infringement occurring when a third party uses in his economic activity, without the consent of the trademark owner, a sign identical or similar to the registered trademark for goods or services, even if they are not similar, where the registered trademark has a reputation



in the state and where use of that sign without due cause takes unfair advantage of, or is detrimental to, the distinctive character or the repute of the trademark

Class name: InfringementByIdentity (prefLabel: Infringement By Identity)

definitions: Infringement occurring when a third party uses in his economic activity, without the consent of the trademark owner, a sign identical to the registered trademark for goods or services identical to those for which the trademark is registered

Class name: CertificationTrademark (prefLabel: Certification Trademark)

definitions: A trademark which is described as such when the mark is applied for and is capable of distinguishing goods or services which are certified by the proprietor of the mark in respect of material, mode of manufacture of goods or performance of services, quality, accuracy or other characteristics, with the exception of geographical origin, from goods and services which are not so certified

Class name: CollectiveTrademark (prefLabel: Collective Trademark)

definitions: A trademark which is described as such when the mark is applied for and is capable of distinguishing the goods or services of the members of the association which is the proprietor of the mark from those of other undertakings

Class name: NonViolationOfThirdPartyRights (prefLabel: Non Violation Of Third Party Rights)

definitions: Non-infringement by the registered trade ark of another's name, portrait, copyright, industrial property right or other exclusive right

Class name: RegistrationInGoodFaith (prefLabel: Registration In Good Faith)

definitions: Registration of a trademark without the intention of infringing another's right

Class name: ExcessiveUnutilization (prefLabel: Excessive Unutilization)

definitions: Non-genuine use of the trademark for a period of five years, leading to its lapse

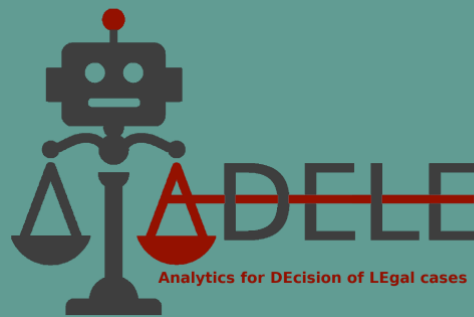
Class name: InvalidityOfIndustrialPropertyRight (prefLabel: Invalidity Of Industrial Property Right)

definitions: Invalidity of industrial property title

Class name: AbsoluteInvalidity (prefLabel: Absolute Invalidity)

definitions: Invalidity of a trademark that can be claimed by anyone having an interest in raising such claim

Class name: RelativeInvalidity (prefLabel: Relative Invalidity)



definitions: Invalidity of a trademark that can only be claimed by certain subjects

Class name: TrademarkValidation (prefLabel: Trademark Validation)

definitions: A phenomenon whereby the owner of an earlier trademark who has acquiesced, during a period of five successive years, in the use of an identical or similar registered later trademark, being aware of it, may not, on the basis of his earlier trademark, apply for a declaration of invalidity of the later trademark or oppose its use in relation to the goods or services for which it has been used

Class name: InternationalTrademark (prefLabel: International Trademark)

definitions: Trademark that gives the possibility, through a single filing, to obtain protection in the different countries designated among those adhering to the Madrid Agreement and/or Protocol

Class name: NationalTrademark (prefLabel: National Trademark)

definitions: Trademark registered by the IPTO with effect on Italian territory

Class name: EuropeanTrademark (prefLabel: European Trademark)

definitions: Trademark registered by the EUIPO with effect throughout the EU as a whole

Class name: Non-CommercialUseOfPatentedSolutionByThirdParty (prefLabel: Non-Commercial Use Of Patented Solution By Third Party)

definitions: Use of the patented solution by unauthorised third parties in private and for non-commercial purposes

Class name: ThirdPartyUseOfGalenicFormulations (prefLabel: Third Party Use Of Galenic Formulations)

definitions: Extemporaneous, unit-based preparation of medicines in pharmacies on prescription

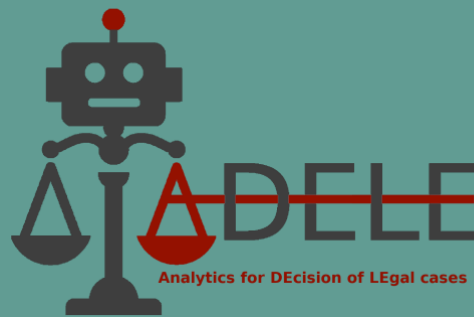
Class name: PatentTextTranslation (prefLabel: Patent Text Translation)

definitions: Translation of the text of the European patent, the filing of which is necessary for the patent to take effect in a given country

Class name: Agreement (prefLabel: Agreement)

definitions: Contract between two or more parties to constitute, regulate or extinguish a legal economic relationship between them

Class name: FigurativeSign (prefLabel: Figurative Sign)



definitions: Sign consisting of graphic elements

Class name: DenominativeSign (prefLabel: Denominative Sign)

definitions: Sign consisting of words without graphic elements

Class name: WeakSign (prefLabel: Weak Sign)

definitions: Sign with poor distinctiveness

Class name: StrongSign (prefLabel: Strong Sign)

definitions: Sign with high distinctiveness

Class name: CompositeSign (prefLabel: Composite Sign)

definitions: Sign composed of several elements, both figurative and denominative, each with distinctive character

Class name: EuropeanPatent (prefLabel: European Patent)

definitions: Patent granted by the European Patent Office (EPO), the effect of which may be extended to the member states of the European Patent Convention (EPC) by filing a translation of the patent in the designated state

Class name: InternationalPatent (prefLabel: International Patent)

definitions: Patent that gives the possibility, through a single filing, to obtain protection in the different designated countries among those adhering to the Patent Cooperation Treaty (PCT)

Class name: NationalPatent (prefLabel: National Patent)

definitions: Patent granted by the IPTO with effect on Italian territory

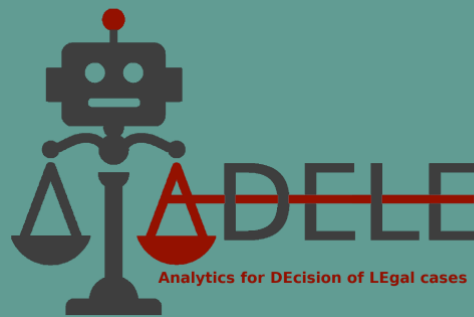
Class name: UnitaryPatent (prefLabel: Unitary Patent)

definitions: Patent granted by the European Patent Office (EPO) which has automatic effect in all designated member states

Class name: EmployeeInvention (prefLabel: Employee Invention)

definitions: Invention made by an employee, whereby the right to file the patent application belongs to the employer under certain conditions

3) Properties



Property: limitesExclusiveRightToIndustrialProperty (prefLabel: limites exclusive right to industrial property)

Domain: PrincipleOfExhaustion

Range: ExclusivePatrimonialRigthToIndustrialProperty

Property: stipulatesPatentTransfer (prefLabel: stipulates patent transfer)

Domain: PatentOwner

Range: PatentTransfer

Property: withdrawsIndustrialPropertyRightThrough (prefLabel: withdraws industrial property right through)

Domain: OwnerOfIndustrialPropertyRight

Range: WithdrawalOfIndustrialPropertyRight

Property: withdrawsTrademakThrough (prefLabel: withdraws trademark through)

Domain: TrademarkOwner

Range: TrademakWithdrawal

Property: stipulatesTrademarkTransfer (prefLabel: stipulates trademark transfer)

Domain: TrademarkOwner

Range: TrademarkTransfer

Property: hasPatentTerritoriality (prefLabel: has patent territoriality)

Domain: Patent

Range: PatentTerritoriality

Property: hasTrademarkValidity (prefLabel: has trademark validity)

Domain: Trademark

Range: TrademarkValidity

Property: hasPatentValidity (prefLabel: has patent validity)

Domain: Patent

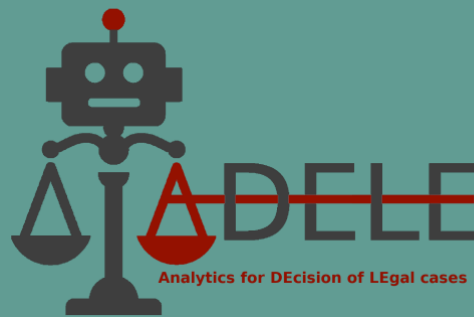
Range: PatentValidity

Property: hasTrademarkClass (prefLabel: has trademark class)

Domain: Trademark

Range: TrademarkClass

Property: hasPatentedSolutionUse (prefLabel: has patented solution use)



Domain: PatentedSolution

Range: PatentedSolutionUse

Property: authorisesPatentThirdPartyUse (prefLabel: authorises patent third party use)

Domain: PatentLicence

Range: AuthorisedThirdPartyUseOfPatentedSolution

Property: hasTrademarkOwner (prefLabel: has trademark owner)

Domain: Trademark

Range: TrademarkOwner

Property: vulgarizesSign (prefLabel: vulgarizes sign)

Domain: SignVulgarisation

Range: RegisteredSign

Property: grantsLicenceOfIndustrialPropertyRight (prefLabel: grants licence of industrial property right)

Domain: OwnerOfIndustrialPropertyRight

Range: LicenceOfIndustrialPropertyRight

Property: hasTrademarkTerritoriality (prefLabel: has trademark territoriality)

Domain: Trademark

Range: TrademarkTerritoriality

Property: protectsRegisteredSign (prefLabel: protects registered sign)

Domain: Trademark

Range: RegisteredSign

Property: protectsPatentedSolution (prefLabel: protects patented solution)

Domain: Patent

Range: PatentedSolution

Property: hasPatentOwner (prefLabel: has patent owner)

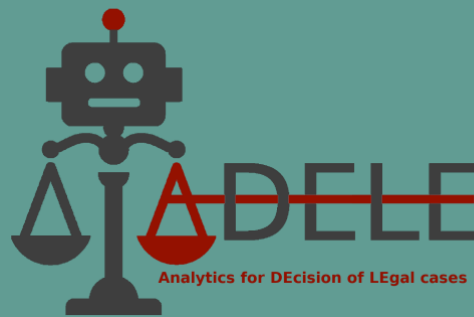
Domain: Patent

Range: PatentOwner

Property: withdrawsPatentThrough (prefLabel: withdraws patent through)

Domain: PatentOwner

Range: PatentWithdrawal



Property: limitesScopeOfPatentProtection (prefLabel: limites scope of patent protection)

Domain: PatentLimitation

Range: ScopeOfPatentProtection

Property: generatesLimitation (prefLabel: generates limitation)

Domain: PatentPartialInvalidity

Range: PatentLimitation

Property: grantsPatentLicence (prefLabel: grants patent licence)

Domain: PatentOwner

Range: PatentLicence

Property: grantsTrademarkLicence (prefLabel: grants trademark licence)

Domain: TrademarkOwner

Range: TrademarkLicence

Property: protectsIndustrialProperty (prefLabel: protects industrial property)

Domain: IndustrialPropertyRight

Range: IndustrialProperty

Property: hasIndustrialPropertyUse (prefLabel: has industrial property use)

Domain: IndustrialProperty

Range: IndustrialPropertyUse

Property: hasRegisteredSignUse (prefLabel: has registered sign use)

Domain: RegisteredSign

Range: RegisteredSignUse

Property: hasOwnerOfIndustrialPropertyRight (prefLabel: has owner of industrial property right)

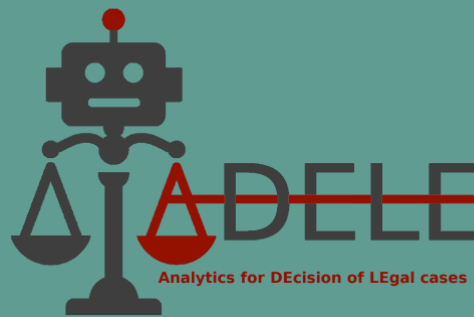
Domain: IndustrialPropertyRight

Range: OwnerOfIndustrialPropertyRight

Property: hasRegistrationNumberOfIndustrialPropertyRight (prefLabel: has registration number of industrial property right)

Domain: IndustrialPropertyRight

Range: RegistrationNumberOfIndustrialPropertyRight



Property: hasTerritorialityOfIndustrialPropertyRight (prefLabel: has territoriality of industrial property right)

Domain: IndustrialPropertyRight

Range: TerritorialityOfIndustrialPropertyRight

Property: hasValidityOfIndustrialPropertyRight (prefLabel: has validity of industrial property right)

Domain: IndustrialPropertyRight

Range: ValidityOfIndustrialPropertyRight

Property: hasApplicationFilingDateOfIndustrialPropertyRight (prefLabel: has application filing date of industrial property right)

Domain: ApplicationOfIndustrialPropertyRight

Range: ApplicationFilingDateOfIndustrialPropertyRight

Property: hasPatentApplicationFilingDate (prefLabel: has patent application filing date)

Domain: PatentApplication

Range: PatentApplicationFilingDate

Property: hasBeginningFromApplicationFilingDateOfIndustrialPropertyRight (prefLabel: has beginning from application filing date of industrial property right)

Domain: DurationOfIndustrialPropertyRight

Range: ApplicationFilingDateOfIndustrialPropertyRight

Property: hasTrademarkApplicationFilingDate (prefLabel: has trademark application filing date)

Domain: TrademarkApplication

Range: TrademarkApplicationFilingDate

Property: hasPatentPart (prefLabel: has patent part)

Domain: PatentText

Range: PatentPart

Property: hasPriorityDate (prefLabel: has priority date)

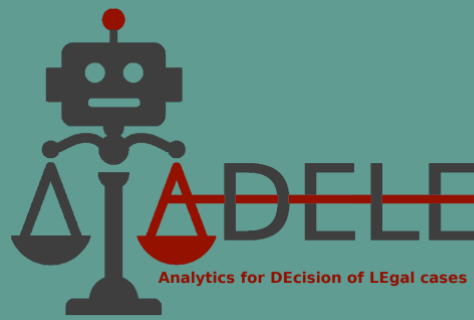
Domain: Patent

Range: PriorityDate

Property: hasInventor (prefLabel: has inventor)

Domain: PatentedSolution

Range: Inventor



Property: determinesTrademarkValidity (prefLabel: determines trademark validity)

Domain: RegisteredSignRequirement

Range: TrademarkValidity

Property: hasLicenceDurationOfIndustrialPropertyRight (prefLabel: has licence duration of industrial property right)

Domain: LicenceOfIndustrialPropertyRight

Range: LicenceDurationOfIndustrialPropertyRight

Property: hasPatentLicenceDuration (prefLabel: has patent licence duration)

Domain: PatentLicence

Range: PatentLicenceDuration

Property: hasTrademarkLicenceDuration (prefLabel: has trademark licence duration)

Domain: TrademarkLicence

Range: TrademarkLicenceDuration

Property: hasExclusivePatrimonialRightToPatentedSolution (prefLabel: has exclusive patrimonial right to patented solution)

Domain: PatentOwner

Range: ExclusivePatrimonialRightToPatentedSolution

Property: hasMoralRightToPatentedSolution (prefLabel: has moral right to patented solution)

Domain: Inventor

Range: MoralRightToPatentedSolution

Property: hasExclusiveRightToRegisteredSign (prefLabel: has exclusive right to registered sign)

Domain: TrademarkOwner

Range: ExclusiveRigthToRegisteredSign

Property: lapsesOnLapseCauseOfIndustrialPropertyRight (prefLabel: lapses on lapse cause of industrial property right)

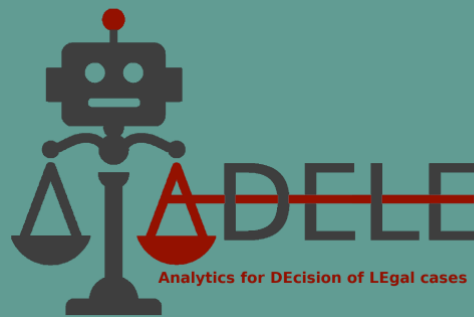
Domain: EffectivenessOfIndustrialPropertyRight

Range: LapseCauseOfIndustrialPropertyRight

Property: lapsesOnPatentLapseCause (prefLabel: lapses on patent lapse cause)

Domain: PatentEffectiveness

Range: PatentLapseCause



Property: lapsesOnTrademarkLapseCause (prefLabel: lapses on trademark lapse cause)

Domain: TrademarkEffectiveness

Range: TrademarkLapseCause

Property: determinesValidityOfIndustrialPropertyRight (prefLabel: determines validity of industrial property right)

Domain: IndustrialPropertyRequirement

Range: ValidityOfIndustrialPropertyRight

Property: determinesPatentValidity (prefLabel: determines patent validity)

Domain: PatentedSolutionRequirement

Range: PatentValidity

Property: authorisesTrademarkThirdPartyUse (prefLabel: authorises trademark third party use)

Domain: TrademarkLicence

Range: AuthorisedThirdPartyUseOfRegisteredSign

Property: hasEndFromTrademarkExpiration (prefLabel: has end from trademark expiration)

Domain: TrademarkDuration

Range: TrademarkExpiration

Property: causesPatentInfringement (prefLabel: causes patent infringement)

Domain: UnauthorisedThirdPartyUseOfPatentedSolution

Range: PatentInfringement

Property: causesTrademarkInfringement (prefLabel: causes trademark infringement)

Domain: UnauthorisedThirdPartyUseOfRegisteredSign

Range: TrademarkInfringement

Property: strengthensSignDistinctiveness (prefLabel: strengthens sign distinctiveness)

Domain: SecondaryMeaning

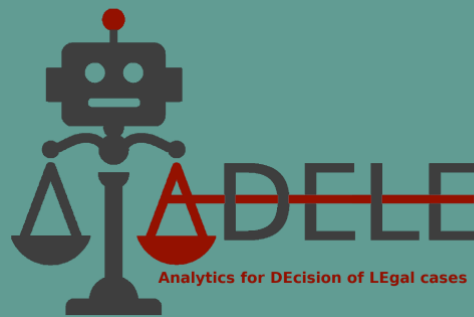
Range: SignDistinctiveness

Property: hasIndustrialPropertyRequirement (prefLabel: has industrial property requirement)

Domain: IndustrialProperty

Range: IndustrialPropertyRequirement

Property: hasPatentedSolutionRequirement (prefLabel: has patented solution requirement)



Domain: PatentedSolution

Range: PatentedSolutionRequirement

Property: hasRegisteredSignRequirement (prefLabel: has registered sign requirement)

Domain: RegisteredSign

Range: RegisteredSignRequirement

Property: establishesAnObjectiveTechnicalProblem (prefLabel: establishes an objective technical problem)

Domain: Problem-SolutionApproach

Range: ObjectiveTechnicalProblem

Property: startsFromPriorArt (prefLabel: starts from prior art)

Domain: Problem-SolutionApproach

Range: PriorArt

Property: isReferredToTechnicalField (prefLabel: is referred to technical field)

Domain: Problem-SolutionApproach

Range: TechnicalField

Property: isEvaluatedBasedOnPriorArt (prefLabel: is evaluated based on prior art)

Domain: PatentedSolutionNovelty

Range: PriorArt

Property: startsRegistrartionOfIndustrialPropertyRight (prefLabel: starts registrartion of industrial property right)

Domain: ApplicationOfIndustrialPropertyRight

Range: IndustrialPropertyRight

Property: startsRegistrartionOfPatent (prefLabel: starts registrartion of patent)

Domain: PatentApplication

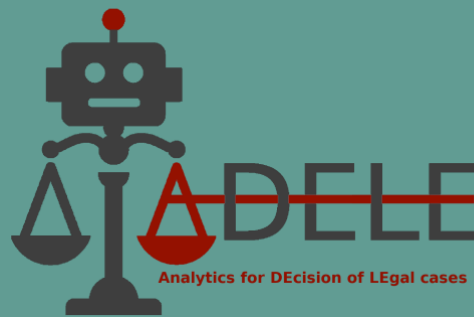
Range: Patent

Property: startsRegistrartionOfTrademark (prefLabel: starts registration of trademark)

Domain: TrademarkApplication

Range: Trademark

Property: isSentToIndustrialPropertyAuthority (prefLabel: is sent to Industrial Property Authority)



Domain: ApplicationOfIndustrialPropertyRight

Range: AuthorityOfIndustrialPropertyRight

Property: isSentToPatentAuthority (prefLabel: is sent to Patent Authority)

Domain: PatentApplication

Range: PatentAuthority

Property: isSentToTrademarkAuthority (prefLabel: is sent to Trademark Authority)

Domain: TrademarkApplication

Range: TrademarkAuthority

Property: hasBeginningFromPatentApplicationFilingDate (prefLabel: has beginning from patent application filing date)

Domain: PatentDuration

Range: PatentApplicationFilingDate

Property: hasBeginningFromTrademarkApplicationFilingDate (prefLabel: has beginning from trademark application filing date)

Domain: TrademarkDuration

Range: TrademarkApplicationFilingDate

Property: hasEndFromExpirationOfIndustrialPropertyRight (prefLabel: has end from expiration of industrial property right)

Domain: DurationOfIndustrialPropertyRight

Range: ExpirationOfIndustrialPropertyRight

Property: hasEndFromPatentExpiration (prefLabel: has end from patent expiration)

Domain: PatentDuration

Range: PatentExpiration

Property: isEvaluatedBasedOnPublicDisclosure (prefLabel: is evaluated based on public disclosure)

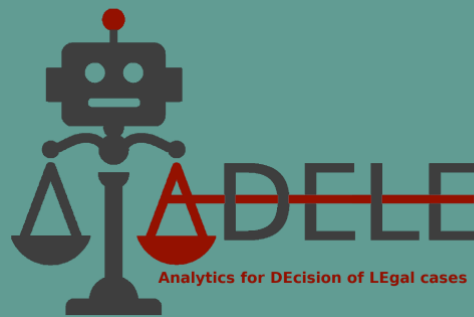
Domain: PatentedSolutionNovelty

Range: PublicDisclosure

Property: isEvaluatedBasedOnProblem-SolutionApproach (prefLabel: is evaluated based on problem-solution approach)

Domain: InventiveStep

Range: Problem-SolutionApproach



Property: hasPatentRegistrationNumber (prefLabel: has patent registration number)

Domain: Patent

Range: PatentNumber

Property: hasTrademarkRegistrationNumber (prefLabel: has trademark registration number)

Domain: Trademark

Range: TrademarkNumber

Property: protectsIntellectualProperty (prefLabel: protects intellectual property)

Domain: IntellectualPropertyRight

Range: IntellectualProperty

Property: involvesSkilledPerson (prefLabel: involves skilled person)

Domain: Problem-SolutionApproach

Range: SkilledPerson

Property: hasPriorUse (prefLabel: has prior use)

Domain: DeFactoTrademark

Range: PriorUse

Property: hasReputation (prefLabel: has reputation)

Domain: DeFactoTrademark

Range: Reputation

Property: hasRegistrationDateOfIndustrialPropertyRight (prefLabel: has registration date of industrial property right)

Domain: IndustrialPropertyRight

Range: RegistrationDateOfIndustrialPropertyRight

Property: hasPatentGrantingDate (prefLabel: has patent granting date)

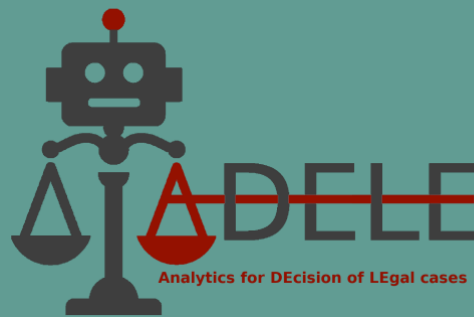
Domain: Patent

Range: PatentGrantingDate

Property: hasTrademarkRegistrationDate (prefLabel: has trademark granting date)

Domain: Trademark

Range: TrademarkRegistrationDate



Property: hasEffectivenessOfIndustrialPropertyRight (prefLabel: has effectiveness of industrial property right)

Domain: IndustrialPropertyRight

Range: EffectivenessOfIndustrialPropertyRight

Property: hasPatentEffectiveness (prefLabel: has patent effectiveness)

Domain: Patent

Range: PatentEffectiveness

Property: hasTrademarkEffectiveness (prefLabel: has trademark effectiveness)

Domain: Trademark

Range: TrademarkEffectiveness

Property: hasDurationOfIndustrialPropertyRight (prefLabel: has duration of industrial property right)

Domain: EffectivenessOfIndustrialPropertyRight

Range: DurationOfIndustrialPropertyRight

Property: hasTrademarkDuration (prefLabel: has trademark duration)

Domain: TrademarkEffectiveness

Range: TrademarkDuration

Property: hasPatentDuration (prefLabel: has patent duration)

Domain: PatentEffectiveness

Range: PatentDuration

Property: isDeterminedByClaimsIn (prefLabel: is determined by claims in)

Domain: ScopeOfPatentProtection

Range: ClaimsPart

Property: precludesValidityOfIndustrialPropertyRight (prefLabel: precludes validity of industrial property right)

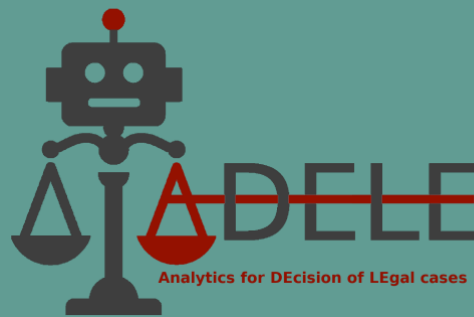
Domain: InvalidationOfIndustrialPropertyRight

Range: ValidityOfIndustrialPropertyRight

Property: precludesPatentValidity (prefLabel: precludes patent validity)

Domain: PatentInvalidity

Range: PatentValidity



Property: precludesTrademarkValidity (prefLabel: precludes trademark validity)

Domain: TrademarkInvalidity

Range: TrademarkValidity

Property: annulsRelativeInvalidity (prefLabel: annuls relative invalidity)

Domain: TrademarkValidation

Range: RelativeInvalidity

Property: weakenedByGeographicalIndication (prefLabel: weakened by geographical indication)

Domain: SignDistinctiveness

Range: GeographicalIndication

Property: weakenedByCommonlyUsedDenomination (prefLabel: weakened by commonly used denomination)

Domain: SignDistinctiveness

Range: CommonlyUsedDenomination

Property: weakenedByDescriptiveIndication (prefLabel: weakened by descriptive indication)

Domain: SignDistinctiveness

Range: DescriptiveIndication

Property: weakenedByGenericDenomination (prefLabel: weakened by generic denomination)

Domain: SignDistinctiveness

Range: GenericDenomination

Property: assessesInfringementByEquivalents (prefLabel: assess infringement by equivalents)

Domain: TripleIdentityTest

Range: InfringementByEquivalents

Property: hasPatentText (prefLabel: has patent text)

Domain: Patent

Range: PatentText

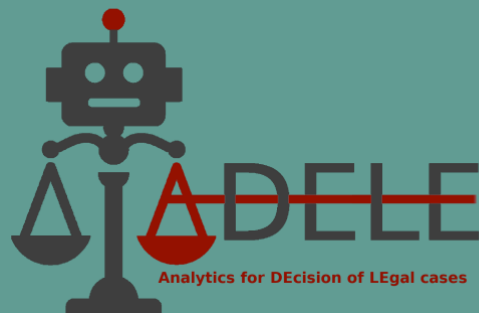
Property: hasPatentTextTranslation (prefLabel: has patent text translation)

Domain: PatentText

Range: PatentTextTranslation

Property: dependsOnPatentTerritoriality (prefLabel: depends on patent territoriality)

Domain: PatentTextTranslation



Range: PatentTerritoriality

Datatype property: isDenominative (prefLabel: is denominative)

Domain: Sign

Range: boolean

Datatype property: isFigurative (prefLabel: is figurative)

Domain: Sign

Range: boolean

Datatype property: isWeakSign (prefLabel: is weak sign)

Domain: Sign

Range: boolean

Datatype property: isStrongSign (prefLabel: is strong sign)

Domain: Sign

Range: boolean

Datatype property: isCompositeSign (prefLabel: is composite sign)

Domain: Sign

Range: boolean

Datatype property: exceedsMaximumNumberOfYears (prefLabel: exceeds maximum number of years)

Domain: ExcessiveUnutilization

Range: PlainLiteral

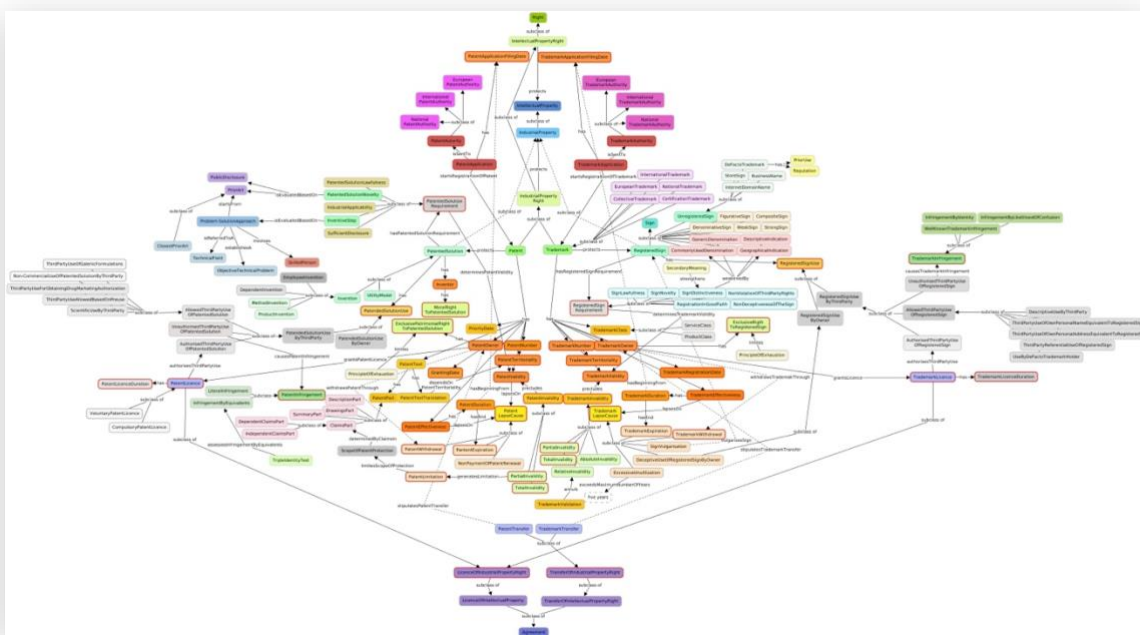
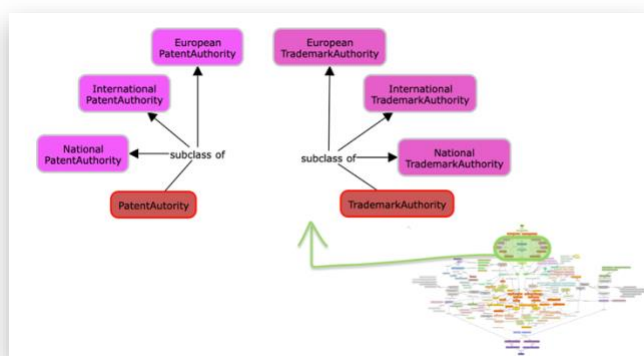


Figure 10-1. A simplified overview of the structure of PaTrOnto concepts. Some are not depicted for simplicity (the boxes having a red border have hidden superclasses/subclasses). A better-quality version of this map can be found in Appendix A

4) Scope and commitments

To grant ontological robustness across the conceptual framework, most classes in PaTrOnto are designed to be disjoint. However, we decided to keep some potential overlaps within some classes.

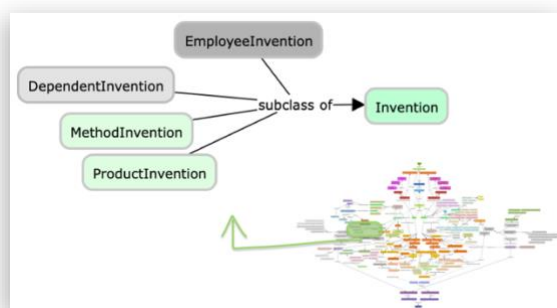
For example, we did not disjoin all the subclasses of AuthorityOfIndustrialPropertyRight, since the same industrial property right (IPR) authority can deal with both patent and trademarks. Moreover, the same authority can be considered European and International. We only disjoined national



authorities (from European and international ones).

Figure 10-2. Portion of PaTrOnto related to the IPR authorities

We also allowed potential overlap under the class Invention, because an instance can belong to all



the subclasses:

Figure 10-3. Portion of PaTrOnto related to the class Invention

We also allowed overlaps under the class *Trademark*, since an instance can belong to all the subclasses:

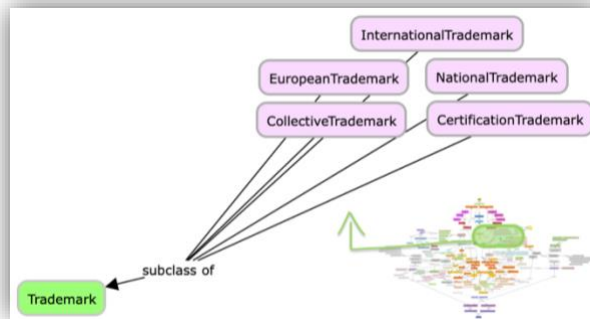


Figure 10-4. Portion of PaTrOnto related to the class *Trademark*

Other overlaps are allowed under class *Sign*, where we applied disjointness (i.e., prevented the overlap of instances) only in three cases:

- **denominative, figurative, and composite**
- **unregistered and registered**
- **strong and weak**

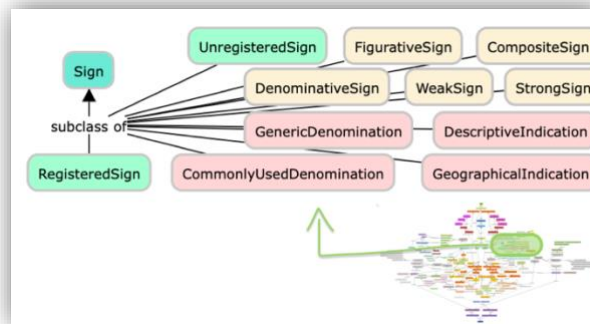


Figure 10-5. Portion of PaTrOnto related to the class *Sign*

Regarding the *Invalidity*, please note that *InvalidityOfIndustrialPropertyRight* is the superclass for the *PatentInvalidity* and *TrademarkInvalidity* (which are disjoint). Under *PatentInvalidity*, we disjointed:

5) Language-specific concepts

In PaTrOnto we decided to add a class which is not present to the Bulgarian law, since it is very often taken into account within the reasoning of judges of other non-Bulgarian judgements. This class is the Problem-Solution Approach, which is a way to evaluate the Inventive Step of a Patentable Solution. In Figure 10-7, we put in evidence the relative concepts and relationship between concepts.

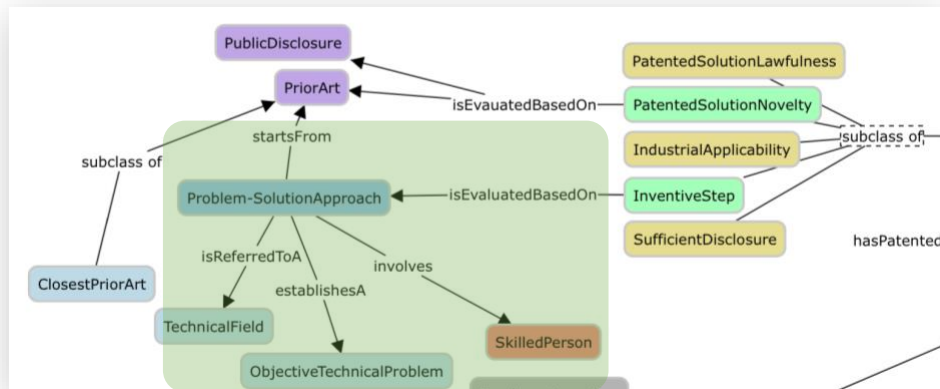
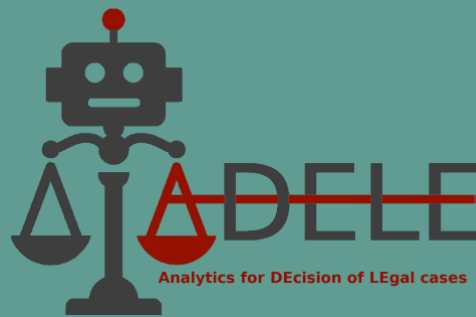


Figure 10-7. Portion of PaTrOnto specific to the Italian Law (see green area)

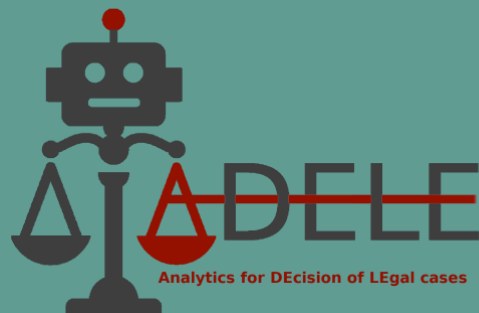
6) Commitment with upper ontologies

To make PaTrOnto more robust and interoperable, we are exploring alignments to other well-known legal upper ontologies, in particular LKIF (Legal Knowledge Interchange Format). We list the alignment of our classes:

PaTrOnto class	Aligned with class	In	Comment
Agreement	Legal-action:Legal_Document	LKIF	
Application Filing Date of Industrial Property Right	top:Spatio_Temporal_Occurrence	LKIF	

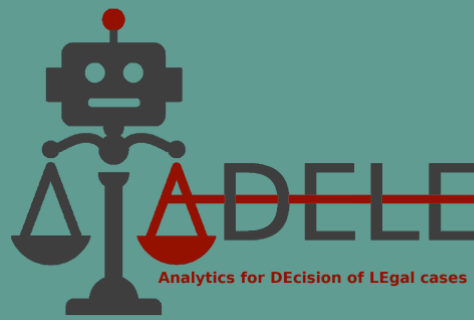


Application of Industrial Property Right	Legal-action:Legal_Document	LKIF	
Authority of Industrial Property Right	action:Agent	LKIF	
Duration of Industrial Property Right	time:Temporal_Occurrence	LKIF	
Effectiveness of Industrial Property Right	norm:Norm	LKIF	
Exclusive Patrimonial Right to Industrial Property	norm:Right	LKIF	
Industrial Property Requirement	norm:Norm	LKIF	
Industrial Property Use	action:Action	LKIF	
Infringement of Industrial Property Right	action:Action	LKIF	
Intellectual Property	action:Creation	LKIF	
Intellectual Property Right	norm:Right	LKIF	
Invalidity of Industrial Property Right	norm:Norm	LKIF	
Inventor	core:Agent	LKIF	
Lapse Cause of Industrial Property Right	top:Spatio_Temporal_Occurrence	LKIF	
Licence Duration of Industrial Property Right	time:Temporal_Occurrence	LKIF	
Moral Right to Patented Solution	norm:Right	LKIF	
Objective Technical Problem	top:Mental_Entity	LKIF	
Owner of Industrial Property Right	legal-role:Legal Role		
Patent Limitation	norm:Norm	LKIF	
Patent Part	Owl:Thing	/	/
Patent Text	Owl:Thing	/	/
Patent Text Translation	Owl:Thing	/	/
Principle of Exhaustion	norm:Norm	LKIF	
Prior Art	expression:Observation	LKIF	
Prior Use	action:Action	LKIF	
Priority Date	top:Spatio_Temporal_Occurrence	LKIF	
Problem-Solution Approach	process:Process	LKIF	
Public Disclosure	action:Action	LKIF	



Registration Date of Industrial Property Right	top:Spatio_Temporal_Occurrence	LKIF	
Registration Number of Industrial Property Right	Owl:Thing	/	/
Reputation	expression:Observation	LKIF	
Scope of Patent Protection	norm:Norm	LKIF	
Secondary Meaning	expression:Observation	LKIF	
Sign	Owl:Thing	/	/
Skilled Person	core:Agent	LKIF	(fictional agent)
Technical Field	expression:Qualification	LKIF	
Territoriality of Industrial Property Right	place:Place	LKIF	
Trademark Class	expression:Qualification	LKIF	
Trademark Validation	expression:Observation	LKIF	
Triple Identity Test	process:Process	LKIF	
Validity of Industrial Property Right	norm:Norm	LKIF	

Table 10-4. Classes' alignment with the upper ontologies



11 Network analysis techniques

The network analysis task carried out in the context of the ADELE project focuses on the citations (of both case-law and legislation) contained in the cases of the ADELE dataset.

The work on network analysis can be split in different tasks: 1) the extraction of citations; 2) the generation of a graph with the citations and the relations between them, 3) and finally the extrapolation of new information forms the graph. We will first look at how we realised task n. 1 and in the subsequent paragraph, tasks n. 2 and 3.

11.1 Citation extraction

To deal with citation extraction from the Italian decisions, we have first worked on the structure of the documents used as input. In particular, since the cases in the ADELE datasets were not marked with the citations and contained some errors in parsing due to the OCR process used to digitalise them.

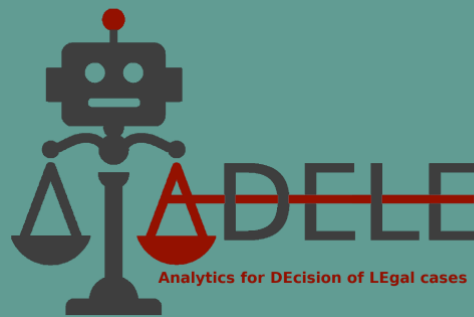
Initially this task was carried out by looking for common structures used in the citations, that could be used in order to extract the necessary information from the text, with sufficient detail for an accurate identification of the cited source.

This process was generally successful, but the multiple distinct modes of citations used in Italian case-law were complex to encode without enough previous knowledge on the matter. To address this issue, we decided to reuse *Lincoln*, a piece of open-source software developed at IGSG-CNR (Istituto di Informatica Giuridica e Sistemi Giudiziari del Consiglio Nazionale delle Ricerche) for the automatic detection and linking of legal references contained in legal texts written in Italian¹.

By slightly modifying the library for the specific needs of the task, we were able to exploit its capabilities to identify citations in the text of cases in the ADELE dataset. This information was then modified to display the desired metadata for the citations and encode them in the ADELE platform.

For both legislative and case law references, we restricted the citation extraction to the part of the decisions tagged as *<courtmot>* (for the meaning of this tag, see the annotation guidelines on outcome prediction explained in D2.1 and as updated in D2.2), as we wanted to highlight the references found only in the reasoning part of the decisions, and not those included in the requests

¹ The software can be found at <https://gitlab.com/IGSG/LINKOLN/linkoln/>.



of the parties, which may not necessarily be relevant to the legal questions decided in the case. Moreover, for case law references, we further limited the extraction to those sentences in `<courtmot>` marked as `<prec>` (for the meaning of this tag, see the annotation guidelines on argument mining explained in D2.1 and as updated in D2.2). This choice was justified by the fact that we needed to distinguish between the citations connected with the procedural history (e.g., the reference to the decision at first instance) and those cited by the judges as a valuable precedent.

While we were able to identify the citations, we were not able to extract the text of the cited document, since there is no easy open access to most cases cited in the dataset. Problems regarding data accessibility in the two legal systems have been analysed in Section 4 of Deliverable 2.3 (Final annotated corpus).

The citation extraction from Bulgarian decisions was greatly facilitated by the fact that the responsible partner APIS has a ready-made software module for recognition of legal references used in its legal information systems. However, some adjustments were needed in order to apply a common approach for visualisation of citations in Italian and Bulgarian documents. This included mainly changes in the representation format of citations' metadata and the subsequent citation analysis with methods of the Elasticsearch engine. In ADELE, the latter was used by APIS for the first time in the application development process.

11.2 Citation graph and analysis

With the citation data extracted and stored in a JSON structure, we then imported it in a GQL (Graph Query Language) compatible representation which we used to visualize the citation network and see what possible relationships or metrics could be of interest to the users of the ADELE platform.

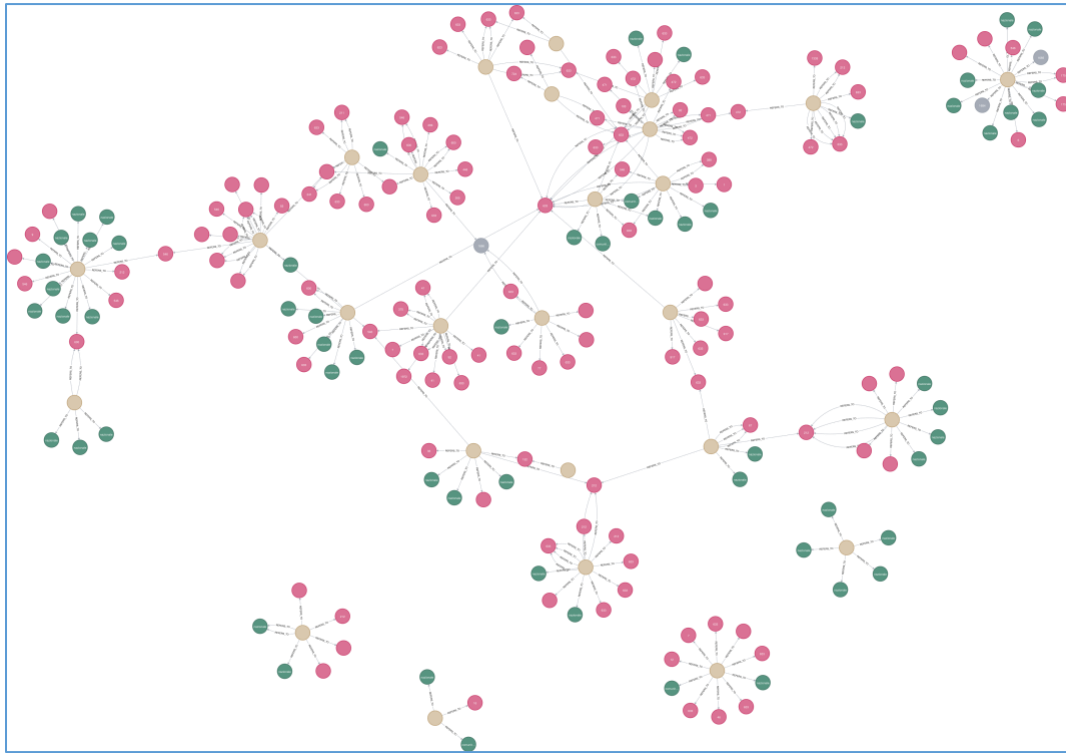
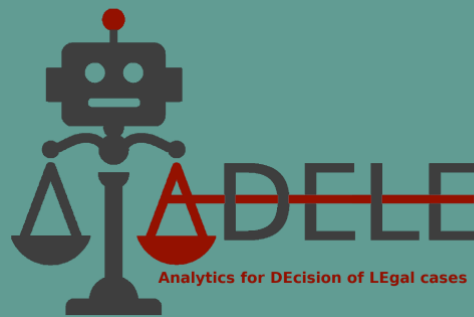


Figure 11-1: Section of the citation network

While the analysed graph is not very deep (it contains only the cases in the ADELE dataset and their citations), it was still possible to identify some recurring patterns.

Figure **Error! Reference source not found.** portrays an extract of the citation network, with the ADELE cases in light brown, the cited case-law in pink, and the legislative citations in green. The relation between a case and its citations (represented in the figure by the arrows) has been labelled as *REFERS_TO*.

While the image contains an excerpt of the full graph, the distribution of relationships is in line with the full graph. The first thing to note in the distribution is that there are clusters of cases that have a number of common citations, and others that are instead isolated from the main section of the graph. This is in part due to the fact that the analysis has been carried out with a limited dataset available, but this information may be useful to determine cases that are similar because they share a subset of citations, or to identify citations that are more important.



The latter is in fact what has been carried out in the analysis phase, by identifying those citations that appeared more frequently in the ADELE dataset. By using a degree centrality metric, measuring the number of incoming *REFERS_TO*-relationships for the citation nodes in the graph, we have compiled a list of more relevant citations, divided in four categories: national case-law, European case-law, national legislation, and European legislation.

The result of this work can be seen on the ADELE platform in the “Citation analysis” module. More information on this module can be found in D4.2 (*Demo Version of the Pilot tool*) and in D4.3 (*Final Version of the Pilot Tool*) under the heading “Network and citation analysis”.

12 Link between ontological framework and case law

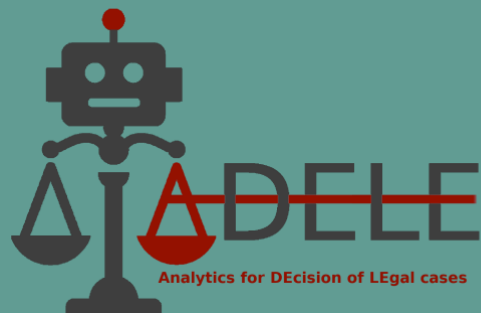
12.1 Through extracted citations

Our proposed goal was to link the ontological framework with extracted citation to provide a first layer of relevance between the concepts targeted in the ontology and the case law contained in the dataset.

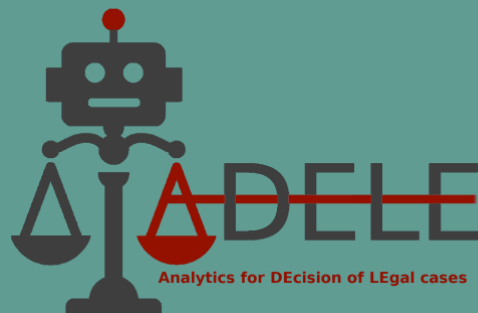
In order to do this, legal provisions defining ontological concepts have been added in the ontology. Then, each decision in the dataset citing one or more legal provisions contained in the ontology was connected to the related ontological concept. This means that, if a decision cites a legal provision, and that legal provision contains a definition to a concept, then the case can be marked as “related to” a certain concept. This link is based on the assumption that if a decision cites a legal provision containing the definition of a legal concepts, then the decision also is relevant for that concept.

All this information was saved in a JSON structure as follows:

- *filename*: case in the ADELE data set
- *citations*: list of citations with metadata, among which:
 - *id*: identifier unique to the provision (e.g., containing the article, comma)
 - *origin*: section of the case in which the citation was found;

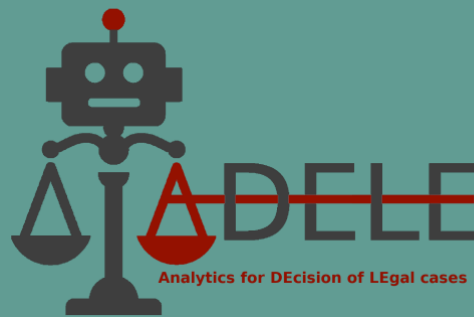


-
- *concepts*:
 - *from_references*: concepts extracted from the link with the ontology;
 - *id*: identifier as in the citation list;
 - list of concepts from that reference.



```
{
"filename": <file of the case in the ADELE dataset>
"references": <list of references, as example>
[
{
  "number": "633",
  "doc-date": "1972-10-26",
  "ref-scope": "italian",
  "partition": "articolo-19",
  "year": "1972",
  "doc-type": "DECR",
  "authority": "PRES_REP",
  "context": "art.19 del DPR.n.633/1972",
  "id": "DECR_633_1972_articolo-19",
  "text": "art.19 del DPR.n.633/1972",
  "ref-type": "legislation",
  "url": "...",
  "short_name": "Dece Pres della Repubblica 633/1972",
  "name": "Istituzione e disciplina dell'imposta sul valore aggiunto.",
  "origin": "prem_L"
}
]
"concepts": {
  "from_references": {
    "DECR_633_1972_articolo-19": [
      "RightToDeduction"
    ],
    "DECR_633_1972_articolo-1": [
      "TaxablePerson",
      "TaxableTransaction",
      "TaxableSupplyOfServices",
      "TaxableSupplyOfGoods",
      "TaxableIntra-CommunityAcquisitionOfGoods"
    ]
  }
}
}
```

Listing 1: Example of citation item in database



For example, in the code section above, it is possible to infer that, since the case cites refers to Article 19 of the Italian VAT law and the latter deals with the taxpayer's right of deduction, the concept of *Right to Deduction* is possibly relevant in the case.

This functionality can be used to group cases with similar “relevant” citations and is available on the ADELE platform as explained in D4.3 (*Final Version of the Pilot Tool*) under the heading “Search similar cases”.

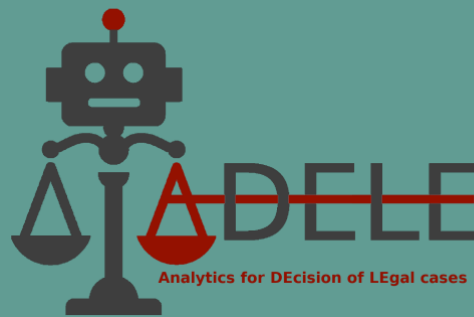
12.1 Through text similarity

We are also implementing other connections between the ontological framework and the case law. We are currently working on a natural language processing pipeline which has the purpose of predicting whether a specific ontological concept is relevant in a specific legal decision.

On the one side, this pipeline tries to assess whether a concept is relevant in a given legal decision by leveraging the information contained in the ontology, which might include the definition of the target concept (contained in the `skos:definition` property, and sometimes also in the `skos:scopeNote` property), its synonyms (contained in the `skos:altLabel` property), examples (contained in the `skos:example` property), and the previously mentioned hidden terms (contained in the `skos:hiddenLabel` property).

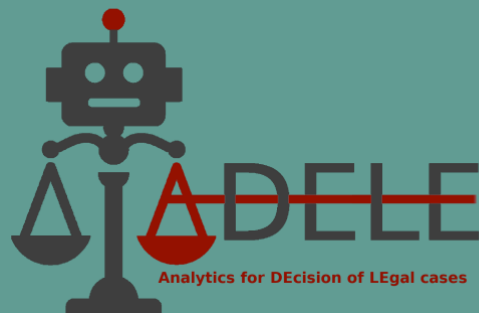
On the other side, the natural language processing pipeline envisages the use of different large language models which are particularly suited for providing meaningful numerical vector representations (sc. embeddings) for our textual data. In this regard, we are converting both the information contained in the ontology and the text of the legal decisions into these numerical representations. Thanks to this conversion into numerical embeddings, we are performing some experiments to study the similarity scores between the text of each legal decision and the texts related to each ontological term (which, as mentioned before, include the text contained in the `skos` properties related to each term).

This experiment of similarity calculation is currently focused on the use of cosine similarity, which is one of the most popular methods for calculating similarities between vector representations. Moreover, to make our experiments more robust, we created an annotation which involves around 70% of the Italian legal decisions, where we stated which ontological concepts are relevant for each legal decisions, considering a selection of targeted concepts (this selection has been provided by our experts of domain). This annotation can be used both to evaluate the capacity of our natural language processing pipeline to predict well, as well as for potential future classification tasks.



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