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# From Words to Images Through Legal Visualization

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**Abstract.** One of the common characteristics of legal documents is the absolute preponderance of text and their specific domain language, whose complexity can result in impenetrability for those that have no legal expertise. In some experiments, visual communication has been introduced in legal documents to make their meaning clearer and more intelligible, whilst visualizations have also been automatically generated from semantically-enriched legal data. As part of an ongoing research that aims to create user-friendly privacy terms by integrating graphical elements and Semantic Web technologies, the process of creation and interpretation of visual legal concepts will be discussed. The analysis of current approaches to this subject represents the point of departure to propose an empirical methodology that is inspired by interaction and human-centered design practices.

**Keywords:** privacy, legal design, visualization, legal XML, Legal Semantic Web, interpretation, interaction design, human-centered design

## 1 Introduction

It is a common experience that legal terms, licenses, consent requests and in general any legal notice overload web applications. At the same time, they are ignored by most users, especially by digital natives. This is a paradox: on the one hand, overregulation. On the other hand, individuals' disregard. For these reasons, interest towards the visualization of legal clauses is growing with the aim of capturing and retaining individuals' attention, while providing intelligible and effective communication. In this light, the current research aims to model a theory for the visual representation of legal documents, with a concrete application to privacy terms.

To create visualizations in our research, we intend to leverage the different layers through which legal documents can be represented in the Semantic Web: text, structure, legal metadata, legal ontology and legal rules [32]. After having offered a complete and correct representation of a privacy policy on all these levels, we plan to build an additional layer on top of them: the visualization. However, it can be argued that it is indispensable to address the topic of visual representation of legal knowledge and its interpretation, specifically by answering the following questions:

1. What are the benefits and the risks of visualized legal information?
2. How can legal visualizations be generated?
3. How can machine-readable legal data be leveraged to create visualizations and what are the advantages?
4. Is it possible to ensure a correct interpretation of legal visualizations?

In the present position paper, we intend to provide a preliminary answer to these questions. Firstly, after having outlined the research scenario, some successful cases of legal visualizations will be presented. Next, the possibility to build semi-automatic visualizations on semantically-enriched legal data will be discussed. Then, the connection among communication theories, interaction, design and legal hermeneutics will be briefly introduced, alongside the interpretative process carried out when legal information is transformed into a machine-readable format. Current approaches for the generation and interpretation of visualizations adopted by legal scholars and legal designers will also be examined. Finally, some empirical design-oriented suggestions to address this topic will be made. Our intention is to implement and test them in the ongoing research described below.

## 2 Research Scenario

During an ongoing research, we propose semi-automatic visualizations of privacy policies and consent agreements (see also [31]). The debate around data protection is extremely topical: concerns about the practices of collection and processing of personal data are spreading, while regulations to protect data subjects are enforced. In the European Union, the principle of transparency laid down in Article 12 of the General Data Protection Regulation [13] (hereafter, GDPR) mandates the provision of intelligible and easily accessible information on data practices. The aim is that of empowering individuals to be knowledgeable about how their data is used and, as a consequence, to make informed decisions [2], for instance when they choose a certain service over another or when they consent to certain processing operations.

However, privacy disclosures are typically not read or not understood [37]. The use of visual cues has been proposed as a possible solution [17, 33], since it has been demonstrated that they can enhance the effectiveness of legal communication (see next Section). Furthermore, it is the GDPR itself that suggests the use of icons “to give in an easily visible, intelligible, and clearly legible manner a meaningful overview of the intended processing” [13, Article 12(7)]. For these reasons, a privacy icon set is under development [23]. But its creation has raised some questions about the possibility of misrepresenting the legal terms during their conversion into visual elements, as well as the possibility of misinterpreting the visualizations (as it has emerged from some studies, e.g. [19, 30]).

## 3 Background

### 3.1 Legal Visualizations and Legal Design

The discussion on the comprehensibility of legal sources must be understood as a part of the emerging research area of Legal Design, which is “the application of human-centered design to the world of law, to make legal systems and services more human-centered, usable, and satisfying” [18]. Thanks to the online environment, the legal message has exited the exclusive realm of lawyers. This means that new methods of communication must be considered to allow any individual, even a layperson, to access and understand legal information. In some contexts, as pointed out earlier, this is mandated by the law. We have entered a new era where design, communication and information technology must produce novel, user-friendly interfaces to the law [10].

Although the total absence of graphics is typical of modern legal texts, with exceptions such as the highway code and patents [6], this tendency is changing. For instance, principles of information design and graphic design have been applied to contracts [26,27,28], in order to produce user-friendly legal documents that are able to elicit information effectively, easily and quickly. As for what concerns the privacy ecosystem, innovative ways of communication and presentation are arising, although these attempts are rare and scattered [16]. In these experiments, visualization is crucial. Indeed, the support of visual elements helps unburden the cognitive load that derives from reading, navigating and understanding cumbersome documents, such as legal texts. There exist several different visual representation techniques, depending on the type of information, on the addressee, on the context, on the goal etc. For instance, flowcharts (Fig. 1) can express complex conditional structures that are typical of legal texts better than prose, whereas swimlane tables (Fig. 2) can highlight vis-a-vis the roles, rights, and responsibilities of different stakeholders [27]. Graphical symbols, such as icons (Fig. 3), can also be used in legal texts to foster understanding, memorization, and quick information retrieval. The present research around the generation and interpretation of visual elements focuses on this latter type of visualizations.

### 3.2 Legal Visualizations and Legal Informatics

Legal visualizations can be integrated into legal informatics. In fact, both research areas are concerned with the management of the complexity of legal knowledge [15]. Moreover, both disciplines deal with the representation of legal information: one in a visual format, the other in a machine-readable format. Semantic Web technologies allow the automated processing of semantically-enriched, machine-interpretable information, that can even be rendered graphically. For instance, visualizations were generated from XML marked-up legislative data to display the complexity of legal order overtime<sup>1</sup> [22] and of the Italian legislative procedure<sup>2</sup>.

<sup>1</sup> <http://lodpiemonte.cirsfid.unibo.it>

<sup>2</sup> <http://code4italy.cirsfid.unibo.it>

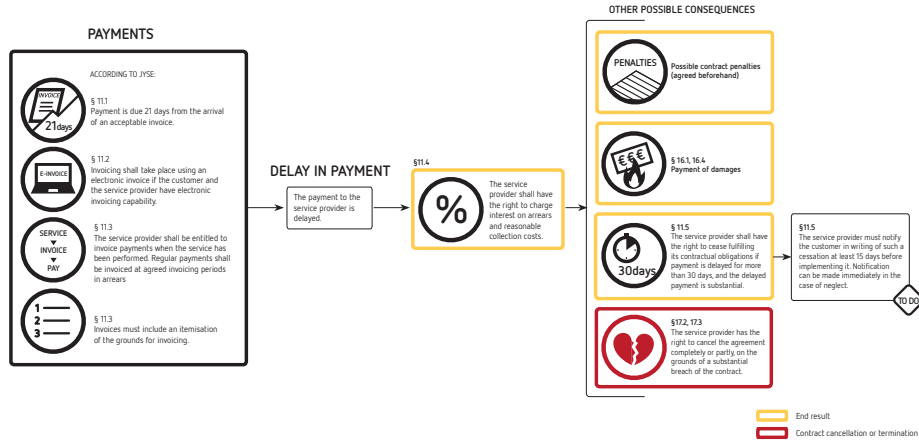


Fig. 1: Example of flowchart used to elicit payment procedures and consequences of delayed payments in the Visual Guide for the Finnish terms of public procurement [27]. ©2013 Aalto University & Kuntaliitto ry. Licensed under CC-BY-ND 3.0.

The legal XML standard Akoma Ntoso [25] offers unique opportunities to model the structural and semantic content of legal documents, so that it can be processed by software applications. Furthermore, the metadata layer of Akoma Ntoso allows great flexibility and, therefore, adaptation of any legal document to any ontological representation of concepts [4]. The machine-readable information that is captured by the mark-up enriches and is in turn enriched by the resources available on the (legal) Semantic Web [32], thus creating a complex network of sources and information. Legal ontologies enrich the Akoma Ntoso XML representation with the necessary semantic level that permits the connection between text and legal rules. Another legal XML language, LegalRuleML [3], can integrate Akoma Ntoso for what concerns the mark-up of the logical structure of legal rules. For instance, it can model deontic norms (obligations, permissions, prohibitions, rights) and can manage negations.

The structural, semantic, logical and ontological layers of a legal document can, thus, provide the information needed to propose a semi-automatic visualization of its content [31]. Furthermore, the encoding of legal content in a machine-readable format provides the opportunity to interact with it in order to customize its presentation for an intended audience and in a certain context. For instance, automated tools have been proposed to build interactive visualizations of contractual terms according to the input provided by users [29].

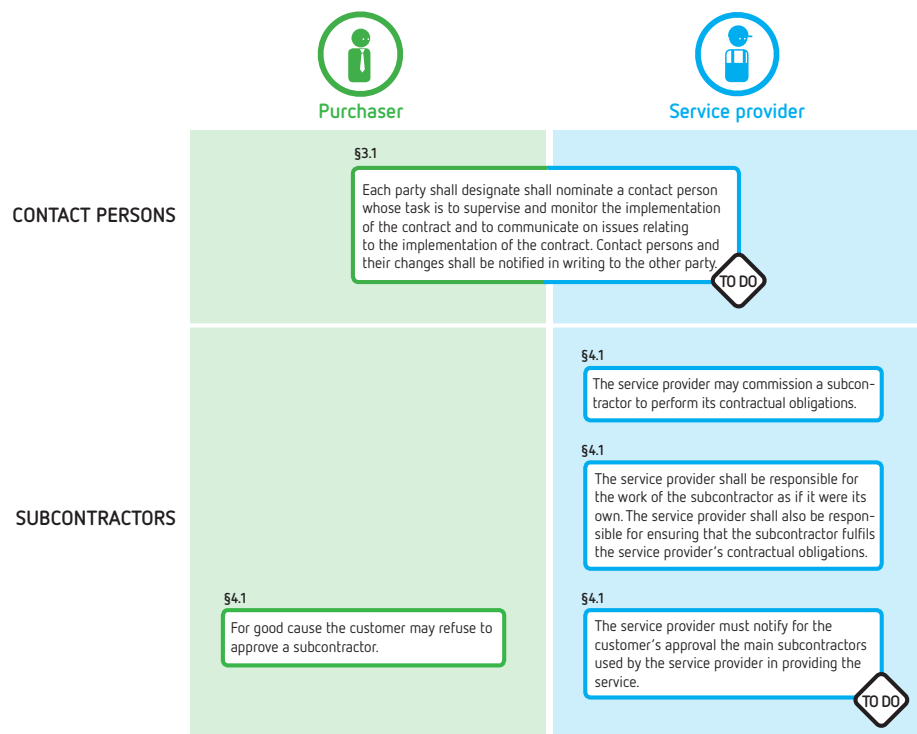








Fig. 2: Example of swimlane table used to illustrate the parties' rights and responsibilities in the Visual Guide for the Finnish terms of public procurement [27]. ©2013 Aalto University & Kuntaliitto ry. Licensed under CC-BY-ND 3.0.

*Annex 1 - Presentation of the particulars referred to in Article 13a (new)*  
*1) Having regard to the proportions referred to in point 6, particulars shall be provided as follows:*

ICON	ESSENTIAL INFORMATION	FULFILLED
	No personal data are <b>collected</b> beyond the minimum necessary for each specific purpose of the processing	
	No personal data are <b>retained</b> beyond the minimum necessary for each specific purpose of the processing	
	No personal data are <b>processed</b> for purposes other than the purposes for which they were collected	
	No personal data are <b>disseminated</b> to commercial third parties	
	No personal data are <b>sold or rented out</b>	
	No personal data are retained in <b>unencrypted</b> form	

COMPLIANCE WITH ROWS 1-3 IS REQUIRED BY EU LAW

a)



b)



(b) Graphical symbols to signal the fulfillment of the conditions laid down in the second column

(a) Privacy icons and their description in a table

Fig. 3: The tabular format proposed in Annex 1 of the Draft report on the Proposal for the GDPR [14] for standardised information policies. The first column contains privacy icons, the second column contains the conditions represented by the icons, while the third column must be filled by the data controller with either one of the graphical symbols of Fig. 3b, depending on whether the condition is fulfilled.



## 4 Legal Visualizations: from Representation to Interpretation

### 4.1 Communication, Design, Hermeneutics, and Visualizations

Visualization provides an alternative, supplementary manner of conveying legal content (concepts, norms, etc.) to the traditional text-based legal communication. The nature of communicative processes must be briefly introduced<sup>3</sup> in order to analyze the role of interpretation in legal visualizations. Communication is basically constituted by an encoder (the addresser) who sends a message to a decoder (the addressee) who receives and makes sense of that message (and reacts according to her sense-making) [20]. However, communication does not merely correspond to the exact match between the encoders' intended meaning of the message and the decoders' sense-making result: it is rather a continuous process of meaning negotiation between them. Design can be considered as a sort of communication: the designer gives a certain meaning to an artifact (e.g. a certain element of a graphical user interface) and the user interprets how, where, and when the artifact can be used [35]. However, no matter how carefully an artifact is designed, its meaning is not objective nor static: users unfold and decode the message (embedded by designers in signs like words, icons, command buttons, interface layouts etc.) while they interact with the system [36]. This is why, designers should provide users with all possible means (e.g. hints, explanations, etc.) to facilitate their sense-making of interface signs.

A comparable interactive meaning negotiation activity takes place in legal hermeneutics. Meaning does not derive solely from the intentions of the legislator nor from the activity of the legal interpreter: meaning is constantly produced within an interpretative dialogue among author, text and interpreter in specific contextual conditions. Thus, interpretation cannot be unique, it can only be coherent and correct according to shared criteria [38]. The theory of legal interpretation provides not only an explanation for one of the possible meanings, but also a methodology based on arguments, reasoning and values, that can justify one possible interpretation in the light of a certain social context and of a certain case [1]. On the other hand, common sense or preunderstanding can support legal experts to carry out their analysis to obtain a correct interpretation [9].

Similarly, the visualization of legal content should be sufficiently evocative to produce in its addressees a visual perception comparable to the preunderstanding activity, in order to ensure a correct decoding of the visual legal message. In fact, the graphical representation has the goal of making legal terms more accessible and understandable. However, if wrongly interpreted, it would create obscurity in lieu of transparency. It is one thing to rely on a shared visual vocabulary (e.g. the Highway Code) and to depict concrete objects (e.g. patents or technical regulations). It is another thing to represent abstract or complex concepts with arbitrary symbols. For instance, user studies reveal that misinterpretation of

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<sup>3</sup> A comprehensive approach to communication theories goes well beyond the scope of this paper.

privacy icons can occur [19], [30] (the latter on the icons in Fig. 3). In these cases, the designer embedded a certain meaning in a symbol, which however did not meet other individuals' expectations and understanding, for instance due to different cultural backgrounds. Moreover, the visualization should also provide the necessary information to account for the methodology used to obtain a graphical representation of a certain legal concept.

In this scenario, two different issues must be addressed: firstly, define the criteria for the choice of a certain visual representation for a legal concept and, secondly, define a methodology for the induction of the correct legal concept in the decoder of a legal visualization.

## 4.2 Machine-Readable Representation and Interpretation

Even the analysis and consequent XML mark-up of legal documents cannot abstain from interpretation. Although the expertise of legal knowledge engineers who mark up the text guarantees the reliability of the annotation [25], in some cases multiple semantic annotations which represent different legal interpretations are unavoidable [3]. This is why the metadata section of the XML documents provides relevant information on the interpretation (for instance about the authoritativeness of the annotator) [24]. Furthermore, multiple metadata layers about different interpretations of the same document are possible [4]. Despite the possibility of multiple annotations, legal mark-up disambiguates uncertain concepts and clarifies meanings [25], thus it can represent a solid basis to build visualizations. Finally, the concepts of a certain domain, that are captured by the document mark-up, can be formalized and organized in an ontology, which lowers the personal bias in the selection, interpretation, and representation of legal knowledge. This shared formalization can also contain the graphical representation of its concepts, that will thus have a precise, stable, and machine-interpretable meaning [23].

## 4.3 Iconography, Legal Design and Interpretation

Nevertheless, although it is a common understanding that images are a universal language [7], [12], visualized legal content allows greater freedom of interpretation than written text: indeed, “[i]mages are potentially more anarchic than words” [6, p.89]. Because of the lack of a comprehensive theoretical framework for visual legal communication, methodological questions on the creation, analysis and evaluation of legal visualizations have been raised [8], [11] and some (yet incomplete) answers have been suggested.

Iconographical and iconological methods developed by image disciplines have been compared to legal hermeneutics, on the grounds that these disciplines aim to uncover different layers of meaning and discover the deepest one [6]. Image disciplines and hermeneutics have developed similar interpretative approaches: the pre-iconographic description of the image elements resembles the preliminary analysis of individual words and sentences of the legal text; the iconographical

analysis recalls the interpretation of the historical development, systematic analysis and context of the norm; finally, the iconological interpretation looks for the deeper meaning and purpose of the picture, similarly to the teleological interpretation of the law. Brunschwig’s seminal work [7] originates from the same premises, but she also proposes a sound methodology for the creation of legal visualizations. The author applies methods of “visual rhetoric” derived from classical rhetoric (in particular from the *elocutio* process), to the Swiss Civil Code and transforms norms into drawings, especially through the application of “visual figures of speech” (i.e. visual association, visual synecdoche, visual symbolization, etc.). The transformation process of text into pictures is inherently arbitrary, but the correctness and understandability of the images depend on the following principles: 1. application of graphical elements drawn from traditional legal iconography; 2. their appropriateness to the time and place; 3. their appropriateness to the target audience (e.g. age, background, etc.); 4. compliance with Gestalt psychology principles (e.g. simplicity, clarity, organization, etc.); 5. aesthetics.

The same principles are usually respected by legal designers. They draw best practices from human-centered design and they usually cooperate with legal experts and other individuals with diverse backgrounds [5], [10] to graphically elaborate concepts with the end-user of the legal document in mind. Although legal design does not explicitly tackle legal interpretation, this approach guarantees, on the one hand, the correctness of the visual representation of legal concepts thanks to the knowledge of legal experts [7] and, on the other hand, it considers the characteristics of the user that could influence the interpretation (i.e. age, education, culture) [33]. Indeed, the design process starts with empirical studies (e.g. surveys and interviews) and observations that reveal users’ needs and characteristics, so that designers do not project on them their own beliefs and assumptions [5]. The process ends with user-testing, which is an empirical evaluation of the legal visualized document, e.g. in terms of comprehension of the legal meaning embedded in visualizations [26].

## 5 Suggestions for a Visual Legal Interpretation Framework

As illustrated above, there still lacks a comprehensive framework for legal text interpretation with the explicit aim of generating visualizations and for the interpretation of visualized legal content. However, the approaches illustrated above (cf. Subsect. 4.3) represent an essential point of departure to propose empirical solutions to the interpretation of legal visualizations, which is essential to our current research. Brunschwig [7] proposes clear, practical guidelines for the legal design process, but some aspects must be re-elaborated and integrated for our particular research topic. Firstly, this approach was proposed for paper documents, whereas privacy policies live in an online and interactive environment. Secondly, despite her sound methodology, the author does not offer a solution to the possibility of multiple interpretation of pictorial norms. Thirdly, the de-

gree of comprehensibility and engagement of the legal drawings was not studied. By contrast, the effectiveness of legal design principles and practices has been proven [26,27,28], but a couple of aspects must be stressed to guarantee an appropriate representation and interpretation of data protection notions. In the first place, participatory design [34] must be the preferred framework so that ordinary users are consulted not only before and after the design process, but also during it. Should this not be the case, if a legal visual message is clear and unambiguous for its creators (e.g. legal and design experts), all the other users (the message decoders) will not necessarily assign the same meaning to it. In the second place, the graphical creation cannot only represent the view of one single group. Although less personal than the work of one person, it would not be representative of all the user-groups (e.g. designers, lawyers, computer scientists, laypeople, etc.) and, thus, its meaning could be ambiguous.

### 5.1 Moving Forward: Participation, Representativeness, Customization

We now propose an empirical methodology that is inspired by the aforementioned approaches and by current design practices to visualize the information expressed in privacy policies. The methodology is based on three pillars, that we believe should be integrated to propose an answer to the questions raised in the introduction: participation, representativeness and customization.

**Participation** The knowledge of legal experts ensures the correct interpretation of the privacy concepts that must be rendered graphically, whereas the expertise of graphic designers together with existing good practices guarantee the quality of visualization. Since privacy and data protection notions are legal but also technical in nature, in this specific context even the knowledge of IT professionals is valuable. However, even ordinary users need to be involved in the creation stage to ensure that the graphical representation of the legal concepts mirrors their mental model. For instance, a technical expert and a layperson might represent the concept of “personal data” differently<sup>4</sup>, because diversity in experiences and knowledge produces different mental images of it. “Participation stands in contrast with the cult of the specialist” [34, xi]: during the design process, users should cooperate with experts to reach a compromise that considers as many different points of view as possible. In this way, ordinary users become message encoders who will probably shape the visual message in a more comprehensible way for ordinary message decoders like themselves.

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<sup>4</sup> Indeed, this tension became visible during a participatory workshop that we organized for the generation of privacy icons [21]. “Data” was initially represented as a cylinder, which is part of a shared visual vocabulary in computer science. It was, however, not understandable by those without technical background, thus it was transformed into the less specialist, but more widespread representation of a file folder.

**Representativeness** It is questionable whether the legal graphical representations will be interpreted in the same way as intended by the group of creators, even if this is multidisciplinary and takes into account expert as well as non-expert views. To reach the greatest level of agreement among message encoders and decoders, an open consultation or a crowdsourcing experiment about the correspondence between a certain graphical element and a certain legal concept could be launched. Then, an accuracy measurement of image-concept matching and of interpersonal agreement must be applied, in order to determine which visualizations can be considered the most representative of certain concepts for a significant number of individuals. Of course, it is necessary to determine what this means according to the specific context. In the case of the data protection icons, they aim to become a EU standard: they should, therefore, be sufficiently and consistently evocative for individuals with dozens of different nationalities, different ages, different backgrounds, etc., which is no easy task.

**Customization** Although the outlined suggestions aim to find the highest degree of agreement to ensure correspondent interpretations, it is objectionable whether one single representation is ideal for every typology of user. Unlike contracts that are usually destined to a specific user-group (e.g. businesspeople, engineers, etc.), privacy policies address any type of person: from well-educated teenagers to technology-illiterate pensioners. This is why a unique interpretation is difficult to achieve, while customization could provide a viable solution. Privacy policies are not fossilized on paper, but can be rather conceived as online graphical, possibly dynamic, interfaces. Thus, a certain degree of customization that responds to the different needs and characteristics of different users can be envisaged. Culture, age, technical proficiency, linguistic proficiency and legal knowledge are some of the features that must guide the creation of the visualization and, consequently, its interpretation. At the same time, users themselves must have the possibility to initiate the customization. For instance, different users could choose between different degrees of visualization: from a maximum of textuality (e.g. for lawyers) to some degree of pictoriality (e.g. for teenagers).

Moreover, as seen above, interaction is a fundamental part of the interpretative process: the user assigns meanings to the elements of an interface while using it (in our case, the privacy policy) and can even adjust the meanings as the interaction proceeds. Users could be given the opportunity to opt for the kind of visualization they will better understand and remember, as exemplified by the online learning platform Memrise<sup>5</sup>. For instance, an old user and a young user might need two different representations of the “justice” concept in order to interpret it correctly: one might prefer the long-established, traditional sign of a scale, whilst for the other the icon of Batman might be more meaningful. All the information gathered from the interaction of users could then be sent back to the source, confirming or rejecting the visualization proposed by the encoders. The results of this iterative process can be considered for subsequent re-elaborations (e.g. all children interpret the image of “Batman” as “justice”).

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<sup>5</sup> <https://www.memrise.com>

## 5.2 A Methodology for Legal Visualizations

In the current research, different disciplines interlace to offer a methodological framework (see also [23]) for the generation and interpretation of visual elements that represent legal information of many kinds. The proposed framework is open to argument and does not intend to provide any final solution to the debate. However, in this specific context of research, it does provide an answer to some of the questions raised throughout the article.

First of all, the appropriateness of the visualization of a certain concept is supported, to a certain extent, by the legal XML mark-up of the privacy policy, the metadata that provides information on the mark-up process (e.g. annotations, exceptions, context, jurisdiction, etc.), and by the legal ontology that organizes and formalizes the meanings of a certain legal domain, e.g. the EU data protection laws. Semantic web technologies that transform information into a machine-readable format can, thus, provide a first layer of interpretation of a certain legal domain knowledge in a specific context that can inform the generation of visual cues. Even the specific legal framework can provide direction for the visualization of legal notions: for instance, it is the GDPR to mandate which information must be provided to the final user and how they must be visualized (e.g. through icons, as opposed to other visual elements).

Moreover, interdisciplinary cooperation of (design, legal, technical) experts and non-experts in the stage of transforming concepts into visualizations also decreases the chances of personal bias [5]. The expertise of designers ensures that the proposed visual representation is coherent with the lessons drawn by previous experiments and good practices in legal design. Moreover, even the sense-making process of end-users (typical message decoders) is considered: in the first place, by involving them in the design phase; in the second place, by carrying out user testing to establish whether a certain image is as evocative as intended by those who created it; in the third place, by allowing customization that depends on the users' profile and on their interaction with the graphical interface.

Nevertheless, there exist cases where these measures could be insufficient to guarantee easy recognition. For instance, if the concepts are abstract, visualizations can be arbitrary and only their standardization and widespread adoption can guide a correct interpretation. The same holds when the symbol is comprehensible, but it is the notion to which it refers to be unfamiliar for the addressee (e.g. the notion of "pseudonymization"). In the best case, the image will be sufficiently evocative to suggest its meaning and create a preunderstanding in the user's mind. Should this not be the case, this can be solved only through education to privacy and data protection.

## 6 Conclusions and Future Work

In this position paper, the topic of interpretation of legal visualizations has been discussed. We have illustrated the shortcomings of traditional legal communication and, on the contrary, the many advantages that the visualization of the

law grants. However, the pictorial representation of concepts opens up multiple interpretations and, in the legal domain, this ambiguity must be faced. This is why we have suggested an approach based on Semantic Web technologies and human-centered design that aims to guarantee representativeness of privacy pictorial representations to the highest possible degree, also through engagement and participation of multiple stakeholders in the design phase. Equally, some practical considerations on the role of interaction to realize customization and tailored visualizations have been proposed to address individual differences. In conclusion, the generation of one single “right” image is not desirable: there might be more than one easily interpretable picture, but it depends on the context, the type of representation, the background of the decoder, etc. The proposed methodology is being currently implemented and integrated with best practices already in use, in order to test whether it can represent a solution for the generation and interpretation of legal visualizations.

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