



# Legal Design Patterns: New Tools for Analysis and Translations Between Law and Technology

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Received: 24 April 2024 / Accepted: 30 April 2024  
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## Abstract

Design patterns, a concept originated in urban architecture and adopted also in software engineering, provides a potential approach also for translations between law and technology. This approach will be examined and elaborated from various viewpoints in this topical collection, for which this introductory article provides an overall framework. Here, we discuss design patterns as documentations of living practice, which embed legal concepts, rules, and thinking and between internal and external perspectives to law. We argue that design patterns provide a structured format for interdisciplinary discussions and enhance problem-solving and self-reflecting capabilities of legal scholarship.

**Keywords** Law · Technology · Design · Design patterns · Interdisciplinarity

## 1 Introduction

Technological design is increasingly becoming an object of legal regulation. Recognizing that law is also the process and product of conscious and unconscious design—and not simply a tool for attempting to control technological design—, this special issue adopts a design approach to law. Our objective is to understand law as a reflexive design activity as well as production of various outcomes (e.g. concepts, legislation, procedures, structures) that can be applied in different ways. Thus we hope to improve not only reflection on law-making but also socio-legal scholarship, with particular focus on the dynamics of law, technology, and society, and even technology design, where it is or should be informed by law. Taking into consideration the politics of design, *i.e.* all design is normative, there is an urgent need for socio-legal and technico-legal research. This special issue approaches these topics

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from the perspective of [legal design patterns](#) that can support analysis, self-reflection, problem-solving, and better translations between law, technology, and design.

Although design patterns are an established concept and practice within urban planning and software engineering, they remain an underdeveloped area in socio-legal research, which we hope to remedy for our part. Understanding the concept's origins is vital for this development, although the unique characteristics of the legal domain need to be taken seriously as well.

The original concept of design patterns was introduced by architect and urban design theorist Christopher Alexander in the late 1970s, as a tool towards better design of interactional physical spaces (Alexander, 1979; Alexander et al., 1977). Alexander defined design patterns as reusable problem-solving models that can be employed to classes of recurring design problems. The concept of design patterns was later adopted by software developers to enhance their problem-solving through collection of functional design solutions (Beck & Cunningham, 1987; Gamma et al., 1994). In software engineering, the concept of design patterns is used to design better solutions by providing a common language and set of best practices for solving common design problems. The use of design patterns in software engineering enables developers to create more maintainable and extensible software systems but also requires a certain distance from Alexander's original idea, which emphasised the connection between physical space and social action (for more description, see Riikka Koulu's article in this collection). Design patterns have since spread to other, decidedly interdisciplinary fields, e.g. security and privacy analysis and design, human-computer interaction design and business process design (cf. Koulu et al., 2021). As design patterns have been successful for interdisciplinary collaboration, then why not for law?

This introduction to our collection of articles serves two objectives. First, we hope to provide an overview of the concept and some overarching theoretical and methodological insights that inform all contributions and which have been discussed during the production of this collection. This description is not a blueprint as much as a discussion item, and Individual contributions may have adopted a very different conceptualisation of design patterns than the editors. In these cases, this introduction serves as a sounding board against which such alternative framings can be presented and elaborated. As our approach is still exploratory, there is particular value in making explicit the open questions and uncertainties.

Second, we elaborate and reflect on our particular ways of working, i.e. how the concept itself has steered the production of this collection. Throughout the process, we have placed emphasis on the importance of the collective iterative process to discuss and improve both the concept of legal design patterns, the theory behind it, and its application in the discovery of individual design patterns, taking inspiration from the writers' workshops used to mine software design patterns (Coplien, 2004; Dearden & Finley, 2006; Gabriel, 2002), but reinterpreting and developing the process as we went.

Being informed by science and technology studies (Garforth, 2011) and reflective engineering (Wiener, 1950), we consider such reflection necessary not only for understanding how scientific knowledge is produced and expertise claimed but also

for elaborating on the complex socio-legal realities that are entwined with the use of digital technologies in the legal domain. This reflection is hopefully useful also for readers, at least as documentation but ideally also as inspiration for rethinking ways of organising interdisciplinary research collaboration as well as practical translations between law and technology.

## 2 Legal Design Patterns

Our on-going work to investigate this potential of design patterns approach to law originated in our discussions in spring 2019 on the similarities and differences between legal structures and technological systems. The concept of design patterns is a way to describe law so that it does not lose its essence—we won't go here now to those various strands of centuries-worth of legal thought about the true essence and sources of law—when it is implemented into digital information systems. Understanding such design as a process of communication helped us to conceptualise the challenges of translating what the AI & Law field refers to as law's open texture (Gardner, 1987; Pohle, 2022; Koulu et al., 2024, forthcoming) into the operating logic of digital technological systems. The question remains how to operationalise law into technology without reducing it to something it is not, the answer to which might inform us of many aspects of technology regulation and legal socio-technical change, e.g. the feasibility of 'by design' approaches that emphasise the need to implement legal values into technological design (Rubinstein, 2011; Hartzog & Stutzman, 2013; Schartum, 2016; Motzfeldt, 2017; cf. Koops & Leenes, 2013), and different implementation strategies, governance structures and processes, such as impact assessments.

### 2.1 Design Patterns as Documentations of Living Practice

Design patterns are documentations of living practice (Coplien, 2004) that are put in the format of a pattern description. A design pattern description consists of a name, a context and its conflicting forces that contribute to a problem, and a solution (Alexander, 1979; Gamma et al., 1994). They provide generalisations through formalising complex knowledge practices, which produces a pattern description which can be collectively discussed and improved (Koulu et al., 2021).

There is to some extent an undertone of Luhmannian systems theory in our approach, which can be seen in our focus on the legal system instead of placing law's human subjects at the centre of our examination. In systems theoretical terms, there can be structural couplings between systems, such as law and technology, but each system interprets them to their own logic, begging the question how to ensure that the thing gets understood similarly enough across the boundaries of different societal subsystems and their respective rationalities (Denga et al., 2021). There is a resemblance between social systems theory and design patterns, as both approaches embrace the metaphor of organic matter and biology for social organisation, e.g. Luhmann's autopoiesis, law's autonomous self-production through interlinked communications, and Alexander's principle of organic order that

emergences gradually from local acts (cf. Luhmann, 1995, 466–468, 475; Alexander et al. 1975, 26).

These theoretical influences also set our approach to legal design patterns apart from the US-focused **legal design**, which has begun expanding legal methodology towards human-centric design thinking. Legal design builds on multidisciplinary teams and explorative design experimentation, promoting human-centred design methodology for the legal domain. Although its focus has been mostly on practical design guidance for better legal products and services for lawyers and lay people, it provides groundwork also for more-theory oriented pilots (Hagan, 2020; Hagan & Kim, 2018; Ross, 2020; Rossi & Palmirani, 2020), discussing, for example designing more accessible courts for self-representing litigants (Hagan & Kim, 2018; Sela, 2019).

We look at law on a more systemic level: at the conceptual, structural and operational relationship between regulatory intentions, goals or aims, regulatory architectures, and legal mechanisms that implement them. Simply put, we examine how law, that is the actions of law-makers and interpreters, conceptualises and identifies problems that require solutions; what are the different solutions to these problems and conditions for applying them; and how, where, and by whom the solution is implemented. This is to say, in our conceptualisation legal design patterns consist both of procedural and substantive elements.

But as documentations of practice, design patterns are not only theoretical by nature but there is a connection to empirical knowledge. In *The Oregon Experiment*, Alexander et al. document applying this design pattern approach to designing a campus for the University of Oregon. Here, they point to formalisation and empirical evidence that both contribute to enabling public debate and consensus:

Let us begin with a brief definition of a pattern, remembering that from our present point of view, the essential feature which every pattern has, is that it forms the basis for a shared agreement in a community. Each one is, therefore, a statement of some general planning principle so formulated that its correctness, or incorrectness, can be supported by empirical evidence, discussed in public, and then, according to the outcome of these discussions, adopted, or not, by a planning board which speaks for the whole community. (Alexander et al. 1975, 101)

We return to public representation later on in relation to Scandinavian participatory design, but at this point, it suffices to highlight the importance Alexander gives to the community in identifying and describing design patterns. As a communal practice, the pattern creation becomes a tool for inclusion of various voices and experiences. Design patterns are both descriptive and normative, already in Alexander's original conceptualisation. The normativity is justified through the communal participation and negotiated agreement, and becomes to describe what is desirable for social (and legal) interaction.

## 2.2 Balancing Internal and External Perspectives to Law

Although we editors do not approach law from an empirical sociologist's viewpoint, we see the value and necessity of empirical inquiry into legal practices and their social implications, transitions of legal work, access to justice, and democratic representation also for conceptualising the relationship between law and technology. Such theoretical and empirical insights should also inform the formulation of legal design patterns—and hopefully they will, in return, provide new insights into socio-legal implications of digital technologies and their design.

The integration of empirical knowledge into socio-legal scholarship comes with certain tensions between internal and external perspectives to law, much debated in socio-legal scholarship (e.g. Cotterell, 1995; van Hoecke, 2011). Without engaging in these debates in any detail, we consider legal design patterns as a process and a product that combine these internal and external perspectives to law, its structures, and practices. If we were to conceive legal design patterns simply as internal to law, this would lead us to legal dogmatics by another name, whereas a purely external perspective would lose sight of law's own rationalities and normativities, which are at the core of our interest in analysing and translating between law and technology. Furthermore, legally oriented Science and Technology Studies have drawn attention to the dynamic reciprocal relationship between law and technology (Cohen, 2019) and the roles different media technologies play in shaping the production and communication of law in doctrine, in theory, and in practice (see e.g. Latour, 2010).

Thus, legal design patterns ideally capture both (compatibility with) legal rules and doctrines as well as the law-on-the-ground materialisation of those rules in legal, social, and institutional practices. But by doing so, we hope to avoid simply repeating what's in the law or how it is enacted but to deconstruct legal structures for reconstruction by various disciplines. As we describe in the next section, design is always political and normative, and legal design patterns, too, include a normative dimension, as the objective is to perpetuate “good” design.

The notion of normative patterns has been used before to describe socio-legal change. In the 1990s, the Swedish Professor of Private Law Anna Christensen developed her theory of law as normative patterns, a series of studies in which she described, mainly using materials customary to legal dogmatics to look at tenancy law, how the legal norms and rights that constitute the society have been formed in relation to two opposite normative ideals (Christensen, 1994, 2000; Hydén, 2022). There is much similarity between Christensen's theory and our approach when it comes to understanding the dynamics of law and society. The difference lies mostly in the objectives: Christensen's theory does not see patterns as *design*, and her objective is more about law's self-understanding, as she analyses the long historical trajectories and developments of various legal ideologies and principles.

Instead, our focus is not on the long-term normative developments or mechanisms of socio-legal change but at the intersection between law and technology, understanding of which we hope to contribute to by improving mechanisms of communication and translation. Our focus on technological design might be useful also for internal socio-legal debates and law's self-reflection, as legal scholars used to the internal perspective might find something new by looking

at the same legal phenomenon through the lens of legal design patterns. But legal design patterns should not be understood as exclusive of established legal concepts, doctrines, and languages. Instead they might open up new dimensions for legal scholarship, and perhaps even provide new means to incorporate these established forms into the documentation on the living practice and to acknowledge the normative role they play in shaping such practice. Ultimately, our objective is to develop ways to conceptualise and communicate law in a way that does not lose its identity and its embedded rationalities in translations with technology.

### 2.3 Inclusion and Exclusion: Level of Abstraction

This choice for synthesis entails advantages, which double as limitations. By expanding the scope too broad, we risk overinclusion, which would render the concept of a legal design pattern unable to say anything and limit the usefulness of individual patterns as translation tools. By focusing too narrowly on law's internal coherence, we might end up in reinventing existing legal concepts, without any gained insight into their operationalisation in technology. In other words, through the lens of design patterns, anything might appear to the casual observer as a pattern to the point it is patterns all the way down; whereas the other extreme would lead to no pattern description being sufficient to meet the criteria imposed by the concept. Ultimately, we perceive the open-endedness of the whole concept of legal design patterns as rather liberating.

This is to say that legal design patterns may describe many things. Much depends on the level of abstraction chosen by the author, who names, elaborates, and formulates a legal design pattern to be discussed communally. Some legal patterns are overarching; for example, see the discussion on rule of law as perhaps the highest-order pattern behind our current Western legal systems. Whereas Tuomas Pöysti offers an example of a somewhat less abstract, mid-level pattern in his examination of the precautionary approach as law's mechanism to mitigate uncertainty of scientific knowledge.

Legal design patterns are not exclusionary in the sense that application of one would lead to forgoing others. Instead, it becomes obvious quite soon, once one starts to seek patterns, that there are overlaps as well as tensions between different patterns, alternative and complementary patterns, and whole clusters, families, and hierarchies of patterns. Simply put, one starts to see patterns everywhere, which may lead, on one side, to conceptualising the relationships between various mechanisms and practices of law, but on the other, to cacophony. To make sense, that is, to avoid too comprehensive patterns (that are too abstract to be understood through design) and the inflation of the concept's theoretical value, descriptions of patterns are subjected to discussion. But perhaps the legal scholar, who wants to be careful of making too hasty normative recommendations and thus craves for a clear scope of application, feels put at ease by the fact that the value of the pattern lies in its analytic strength. If the identification and elaboration of a legal design pattern offers new insights or formulations that make sense, it also entails promise for better operationalisation in technological design.

As stated, we hope design patterns provide options to better interface and translate between computer science and socio-legal scholarship. Our previous work on legal design patterns (Koulu et al., 2021) has led us to believe that they are especially useful for identifying and elaborating procedural structures present in law, both explicit and implicit. We believe that as textual artefacts and communicative tools, legal design patterns might help us describe law so that it allows for easier implementation of legal requirements into technological design and better understanding of the mechanisms at play in socio-technical change of law. Furthermore, the discussion on functional and dysfunctional design patterns, what has proven over time to be successful and what has not, may also prevent the spread or perpetuation of (often ideologically grounded) dysfunctional patterns, or AntiPatterns (Akroyd, 1996).

### 3 How We Understand Design

Typically, design is associated with images of architecture, blueprints or flow charts. For our purposes here, design can be seen as a product or result, and design(ing) as a practice. Law is designed in the very broad sense of the word, as products and artefacts as well as processes of meaning-making, self-reflection, and interaction.

Design studies have two dominant paradigms of describing design activity. From 1960s onwards design was perceived as a rational problem solving process, building on positivist notions of objective observation and generalisability of results. Challenging this, from the 1980s constructivist design theory conceptualised design as a process of reflection-in-action (Dorst & Dijkhuis, 1995).

While these paradigms have mainly industrial design, the distinction between problem-solving and reflection-in-action perspectives is also helpful for elaborating the design of law. This is to say that legal design patterns may be conceptualised both as produced objects as well as systemic reflection. One perspective might be more useful for some legal issues and structures, whereas the other may be more useful for other situations, depending on the author's perspective. However, one should acknowledge the difficulties in defining and framing a problem and how problem representations are also political. Problems are always fabricated and produced, although they often are represented as objective and rational (Bacchi, 2009).

As described, design theory has shifted its focus from problem-solving towards improving human experiences. Originally published in 1988, design theorist and usability engineer Don Norman's book *The Design of Everyday Things* popularised the concept of human-centred design and has since become seminal reference to both academic scholars and practising designers alike. Norman on human-centric design:

Human-centered design is a design philosophy. It means starting with a good understanding of people and the needs that the design is intended to meet. This understanding comes about primarily through observation, for people

themselves are often unaware of their true needs, even unaware of the difficulties they are encountering. Getting the specification of the thing to be defined is one of the most difficult parts of the design, so much that the [human-centered design] principle is to avoid specifying the problem as long as possible but instead to iterate upon repeated approximations (Norman, 2013, 9).

Although various aspects from design need to be incorporated, Norman distinguishes between *industrial design*, which he defines as focused on the optimization of function, value, and appearance of products and systems, *interaction design*, which strives to enhance people's understanding of what can be done, what is happening, and what's just occurred, and *experience design*, which places emphasis on the quality and enjoyment of the experience (Norman, 2013, 5). For Norman, design is ubiquitous and good design requires multiple viewpoints:

Because everything is designed, the number of [sub-fields of design] areas is enormous, ranging from clothes and furniture to complex control rooms and bridges. This book covers everyday things, focusing on the interplay between technology and people to ensure that the products actually fulfil human needs while being understandable and usable. In the best of cases, the products should also be delightful and enjoyable, which means that not only must the requirements of engineering, manufacturing, and ergonomics be satisfied, but attention must be paid to the entire experience, which means the aesthetics of form and the quality of interaction. (Norman, 2013, 4)

The legal, social and political implications of technological design are broadly discussed in research (e.g. Cohen, 2019; Hildebrandt, 2016; Lessig, 1999; Winner, 1980). These perspectives often remain beyond the software engineering debate on good design. In this parlance, design is perceived in a more “technical” sense, which means interest-based clashes are rare and design remains distanced from value decisions, making it relatively easy to find consensus on what constitutes good design. However, this should not be understood as downplaying the political dimensions of design. Instead, values are embedded in the process and the product as in Alexander's original conceptualisation.

#### 4 Methods for Identification and Elaboration of Legal Design Patterns

In our previous work on legal design patterns (Koulu et al., 2021), we argued that it would make sense to learn from the software engineering community and their methods and processes of “mining” design patterns. In contrast to the visible parts of urban design, which according to Alexander (1979) can be experienced by all human beings who then would be able to identify “good” design patterns, either individually or collectively, many software design patterns describe abstract architectural characteristics of software systems that are largely invisible to lay people. This explains why the software engineering community focuses on workshop



formats that bring together members of the community with expertise and extensive experience in software design and development to collectively identify and elaborate on software design patterns (Dearden & Finley, 2006). It is only the human-computer interaction (HCI) community, whose main interest is in understanding, designing and implementing user interfaces, which explicitly call for formats that effectively allow for end-users, i.e. non-experts or lay people from the perspective of the software engineering community, to participate and contribute (Coplien, 2004; Dearden & Finley, 2006; Mor et al., 2012). As we consider the inclusion of both the internal and external perspective to law of particular importance, we propose to follow the HCI community's practices rather than the software engineering community's sole focus on experts. We have to admit, though, that we took our first steps in identifying and elaborating on legal design patterns among academics, i.e. experts, only. Only in the second step did we manage to involve practitioners as well.

The process for identifying and elaborating on design patterns in the technical community is organised around writers' workshops and the practice of 'shepherding' (Dearden & Finley, 2006). A writers' workshop is a workshop format for thoroughly discussing texts, much more extensively than at usual academic workshops or conferences, that are either prepared beforehand or written at the workshop, sometimes even revised and discussed again during the workshop. A 'shepherd' is a special sort of (not anonymous) reviewer, whose job is to help the author make the best work possible in a short time by overseeing at least one, but preferably more revision cycles (Gabriel, 2002). A writers' workshop shepherd does the same for authors preparing papers for the workshop as well as chairing and facilitating the workshop, maintaining a constructive atmosphere and ensuring that the comments are always constructive, as the authors don't participate in the discussion of their papers but are present and listen and then take the comments of the workshop into account in finalising their papers for publication (Dearden & Finley, 2006).

#### **4.1 Finding Legal Design Patterns as Methodological Experimentation**

Taking note of our own difficulties in finding the very legal design patterns that we presented in our previous work (Koulu et al., 2021) and elaborating their use cases and boundaries, we opted for organising a physical workshop, building on the idea that shared physical place also supports cognitive presence and engagement. The objective of this workshop was to examine the feasibility of the whole concept of legal design patterns and make headway into making explicit the theoretical and methodological underpinnings that inform our approach. We made this explicit to all workshop participants and invited them to jointly reflect on our experience in our collaborative endeavour and the methodology of legal design pattern identification and elaboration.

The workshop in Berlin in June 2022 brought together invited researchers from law, technology and sociology to discuss several design pattern proposals, prepared both by the editors as well as ones identified during group discussions. This current collection of articles includes legal design patterns, some of which were brought to

the table already at the 2022 workshop, while others were chosen based on an open call for papers in late 2022. The “sense-making” of all the legal design patterns presented in this special issue was organised around the iterative authors’ workshop in Helsinki in June 2023.

The 2022 workshop was structured around some legal design pattern proposals that were circulated at the beginning of the workshop as handouts. At the beginning of each pattern mining session, the group first chose which pattern will be examined next. The selected design pattern was then introduced to the participants by their author(s) and discussed by the group. The free flow of discussion was highly creative and suited well the exploratory objectives set for the first workshop. In addition, the participants experienced the discussions as particularly rewarding for shifting perspectives from dominant legal framings to their alternatives. However, the unstructured discussion also led to significant cognitive load.

Based on these experiences, we decided to make two changes for the 2023 workshop. First, we opted for the inclusion of practitioners’ perspectives, which was considered highly useful and valuable by the academic participants, as the legal practitioners, who all worked with constitutionality and legality control of public administration and courts, helped to ground the more theory-oriented abstract discussions and produced both validating and challenging insights, which help to position the scholarly interventions. Second, we introduced more structure to the workshop by organising the discussions around the production of this special issue and using rough sketches of the papers as starting points for the iterative process. As expected, this led us to a more predictable and streamlined workshop process, yet reduced the space for structureless brainstorming.

Our experiences with the second workshop show how helpful it was to ask participants to submit rough sketches and read other authors’ papers in advance. This extensive preparatory work and the very text-focused discussions helped substantially to find a common language and shared understanding, which went well beyond how participants had approached the issue when writing their drafts based on the call for papers and our 2021 discussion paper, as many admitted during the workshop. We also learned that it would be advisable to include even more practitioners, not the least as it helped to continuously move back and forth between the internal and external perspectives on law, law-making and legal practice, which we consider at the same time the source of considerable methodological difficulties. An important open question is what materials are to be used for legal design pattern identification, in particular the role of legal sources and doctrines as well as what amount of empirical research on the law on the ground.

## **4.2 Methodology of Legal Design Pattern Mining Still Work in Progress**

We keep making a virtue out of necessity, because we develop the overall concept and approach, its methods, and its substance at the same time. It can even be plausibly argued that the methodology will remain permanently in progress because that is most consistent with the very exploratory nature of legal design pattern mining.

We expect our next workshop, which will take place in 2024, to provide a deeper understanding of the methodological approach and its possible limitations. We aim for having at least as many practitioners present as scholars, and we will carefully reflect on the implications of this setting on legal design pattern identification and elaboration. As legal design patterns exist on many if not all levels, from abstract legal theory all the way down to administrative regulations and statutes, we have to reckon with the possibility that on different levels of abstraction, different processes and methods for identifying and elaborating, including the proportion between scholars and practitioners as well as the allocation of discussion time to individual design patterns and their relations to other patterns nearby or even ‘above’ or ‘below’ in a possible pattern language (Alexander et al., 1977).

## 5 Contributions and Their Connections: The Emerging Bigger Picture

The contributions in this topical collection investigate the concept of legal design patterns and apply it as an analytical tool for rethinking the relationships between law, technology, and society. Some articles focus on the theory and methodology of legal design patterns, to provide the foundation for more practice-oriented applications of the approach. Other authors will contribute to the discussion by examining legal design patterns in different fields and at various levels, drawing examples such as rule of law, proceduralization, courtroom publicity, algorithmic impact assessments, and pre-emptive risk mitigation. Together, these contributions draw out the many possibilities of legal design patterns in analysing the shifts between different legal domains and regimes, between theoretical, empirical, and politico-legal research, as well as between law and technological design.

To conclude, we believe that legal design patterns could be powerful tools for analysing and translating between law and technology. By providing a common language and set of best practices for solving common legal design problems, legal design patterns can help to improve the quality of legal systems and increase their effectiveness. Together, these contributions investigate the concept of legal design patterns and apply it as an analytical tool for rethinking the relationships between law, technology, and society, forming also the foundation for more practice-oriented applications of the approach.

**Author Contributions** Both authors have made substantial contribution to the conception, design, and execution of the work and have given explicit consent to submit the manuscript to Digital Society after approving the version. There has been no requirement for obtaining consent from institutional/ organisational authorities for the submission or publication.

**Funding** Open Access funding provided by University of Helsinki (including Helsinki University Central Hospital). Partial financial support was received from Academy of Finland under grant decision no. 341434.

**Data Availability** The manuscript has no associated data.

## Declarations

**Competing Interests** On behalf of all authors, the corresponding author states that there is no conflict of interest.

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