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Design prototyping for policymaking

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Abstract: Design has an increasing role in the development of public services and policies. The implementation of policies is now considered a matter of design, especially in the field of public services. Moreover, design has been slowly entering the process of policymaking. Meanwhile, policy scientists' promoters of Policy Design have started to analyse design discipline's approaches on the design of policies. Among design activities, prototyping has been recognised as a valuable instrument for policy, also aligned with the new experimental approach in the public sector. However, it is still unclear how prototyping could intersect formal administrative and bureaucratic structures, including their traditional processes for policy analysis and experimentation. This research identifies frameworks for prototyping drawing on relevant authors in design-related disciplines in Europe. Then it characterises these diverse perspectives and suggests the benefits of design prototyping for policy analysis, to communicate, explore, evaluate and refine policy options before decision making.

Keywords: design prototyping; policymaking; policy design; policy implementation

1. Introduction

Over the last ten years, *design* has been contributing to public sector innovation, increasingly positioning its role in the implementation of public services and policy (Bason, 2014; Design Commission, 2013; Junginger, 2014; Kimbell & Bailey, 2017; Mager, 2016). In this regard, typically contributing to implement policies by creating and developing products and services (Junginger, 2013). More often, this collaboration involves service designers working both from outside the public sector (e.g., FutureGov, IDEO, LiveWork, The Australian Centre for Social Innovation -TACSI-) and from inside (e.g., Government Digital Service -GDS- and Policy Lab in UK) (Design Commission, 2013; Mager, 2016; McGann, Blomkamp, & Lewis, 2018).

Lately, design scholars and practitioners have started to reflect on this phenomenon mainly empirically by collecting and sharing their experiences in these collaborations (e.g.; Junginger (2013); Bason (2014); Software Acumen (2014); Kimbell (2015); Siodmok (2017); McGann, Blomkamp & Lewis (2018); Mortati, Christiansen & Maffei (2018); Kane & Jordan (2019)).

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Notably, the arguments concern the analysis of the strategies and methods used to guide civil servants in creating more citizen-centric policies and services (Junginger, 2017, p. 298; Mortati, 2019, p. 2).

Furthermore, these publications document the evolution of the role of design in the public realm, describing how the collaboration between designers and civil servants is transitioning from implementing public services and policies to informing and envisioning policies (Junginger, 2013). On this subject, the idea of thinking the process of policymaking as designing has been argued (Junginger, 2013, 2014) and design approaches in public policymaking have been exemplified (Bailey & Lloyd, 2017; Kimbell, 2015, 2017; Policy Lab, 2019).

Among the design approaches, prototyping has been gaining attention in policy (Kimbell & Bailey, 2017) and its potential benefits for the public sector have also been described for a wider non-academic audience (e.g., Appadoo, 2019; Bloomberg Cities, 2019; Buchanan, 2018; Holliday, 2019; Leurs & Duggan, 2018). For instance, Bloomberg Cities presents examples of design prototyping for policymaking in policy areas such as child arrest and citizens participation in city's development. These examples use prototypes as role play and storyboarding (respectively) to test a policy idea or pieces of it (Bloomberg Cities, 2019).

Prototyping is an iterative cycle with a significant role in the design process. In this cycle, designers build representations such as *prototypes* which are used to understand, learn and refine design ideas (Blomkvist, 2014; Floyd, 1984; Gero, 1990; Stickdorn, Hormess, Lawrence, & Schneider, 2018b). Generally in design, prototyping supports communication, both within the team and with external actors (Blomkvist, 2014, pp. 24–25; Floyd, 1984, p. 3), and it saves money and time by identifying problems and permitting to fail earlier in the process (Blomkvist, 2014, pp. 24–25; Ulrich & Eppinger, 1995, pp. 298–300).

Likewise, in the public sector *design prototyping* has been recognized as a valuable instrument (Clarke & Craft, 2019; Howlett & Mukherjee, 2018; Mager, 2016). It can help to mitigate the fear of failure to innovate, for example by testing new policy options and service models before a large-scale roll out (Clarke & Craft, 2019, p. 12). Furthermore, by focusing on users, prototyping can offer a method to adapt the policy to its diverse targets (Clarke & Craft, 2019, p. 12-13; Bloomberg Cities, 2019; Kimbell, 2017, p.216).

Correspondingly, in the context of policymaking and policy implementation, public servants are also addressing uncertainty with other methods for policy analysis and initial roll out. Terms like *policy experimentation*, *evidence-based policymaking* and *policy piloting* populate literature, while *prototyping in policy* is only beginning to gain attention (see Figure 1). Building on this, the current research developed within a doctoral study, investigates how the practice of prototyping, typical in design, could complement traditional policymaking processes and methods: what are the valuable elements of design prototyping for policymaking? What is a prototype for policymaking? How can prototyping contribute to building a practice of *policymaking as designing*? This paper focuses on the exploration of the first of these questions.

Figure 1 Issue Mapping of design prototyping in the experimentation landscape in policy. Visualization elaborated by the authors. Terms: policy experimentation, policy pilots, prototyping in policy, evidence-based policy, experimenting in policy, experimenting public and innovation pilots.

Performing a literature review, this research identifies, compares and analyses a series of frameworks of prototyping in design to propose a theoretical intersection between design prototyping and the policy cycle. The study adapts primarily *the service prototyping framework* (Blomkvist & Holmlid, 2011), complementing it with the *framework for prototyping in policy-making* (Kimbell & Bailey, 2017) and focusing on the purposes for prototyping.

The resulting framework is then presented to propose how prototyping could be used along the policy cycle according to the different purposes of each stage. The paper thus

argues that, just like in the design process, prototyping could facilitate the understanding of users. Moreover, policy prototypes could be used to learn about future policy options, helping to refine them for policy implementation. Finally, prototyping in the policy cycle could also complement current policy experimentation approaches such as evidence-based policymaking and policy piloting in understanding *how* a policy *could work* in the future.

2. Context

2.1 Design in policymaking

Design researchers adopt *the policy cycle* to reflect on the role of design approaches in the policy process (e.g., Junginger, 2013, 2014; Kontschieder, Vaz, & Sonalkar, 2018). The *policy cycle* model (see Figure 2) generally includes five stages composed by *agenda-setting*, *policy formulation*, *decision-making*, *policy implementation* and *policy evaluation* (Araral, Fritzen, Howlett, Ramesh, & Wu, 2012, p. 17). During the first three stages, a variety of solutions to a problem are proposed, developed and filtered to be finally adopted as a policy in the stage of decision-making. Consequently, during the implementation, different bureaucrats interpret the public policies to develop programs and projects, and influence the outcomes of these policies, which are evaluated at the end of the cycle (Araral et al., 2012, p. 17).

Figure 2 The policy cycle. Visualization elaborated by the authors from the description of Howlett and Giest about the policymaking process in Araral et al. (2012).

However, scholars have also critiqued this way of understanding the process for developing a policy. For instance, Junginger (2013, 2014) argues that the policy cycle is a fragmented policy process as it divides *the realm of policymaking* from *the realm of policy implementation* (see Figure 3), while considering “policymaking as designing” would integrate these realms in a single process (Junginger, 2013, 2014).

Furthermore, Junginger sustains that designers have been active in “implementing existing policies” by designing and developing products and services. However, their role is transitioning to “informing new and existing policies” with the insights gained during the implementation. In this emerging role, design can also help to “envision future policies”, enhancing the process with the “design inquiry” and *human-centred approaches* (Junginger, 2013, 2014).

Figure 3 The policy design cycle adapted from Howlett and Ramesh (2003) in Junginger (2014, p.58) presents the policy cycle divided by the realms of policymaking and policy implementation. In contrast, thinking on “policymaking as designing” integrates these realms.

2.2 Policy Design and Design discipline

Designers in policymaking practice are starting to name their activities in this emerging role as policy design. However, it is important to acknowledge that the term *policy design* has been used in the past by policy scientist without a direct relation to the design discipline itself. The term *policy design* emerged in policy studies in the 1950s (Dahl & Lindblom, 1953; Kirschen et al., 1964; Tinbergen, 1952. As cited in Howlett & Mukherjee(2014)), and it “involves the deliberate and conscious attempt to define policy goals and connect them to instruments or tools expected to realise those objectives” (Howlett, Mukherjee, & Woo, 2015, p. 291).

This approach, proposes to think about policies “in design terms” (i.e., as a process) (Howlett & Mukherjee, 2018, p. 3; Peters, 2018, p. 3). Only recently, these scientists have started to mention the design discipline in their discourse, making a clear distinction between these two diverse design approaches to policy, and analysing concepts familiar to the design discipline such as *user experience* and *prototyping* (e.g., Clarke & Craft, 2019; Howlett & Mukherjee, 2018).

2.3 Prototyping in policy

Notably, policy scientists find value in design prototyping. In their perspective, prototyping can allow civil servants to improve new policy interventions earlier in the process: experimenting before investing in a large scale implementation can mitigate the “fear of failure” to innovate (Clarke & Craft, 2019, p. 12). Furthermore, the iterative cycles of prototyping with users favour the adaptation of policy designs to diverse target populations

(Clarke & Craft, 2019, p. 12; Howlett & Mukherjee, 2018, p. 288).

Likewise, from the design discipline, Kimbell and Bailey (2017) investigate the implications of prototyping in policy and propose a framework describing this approach. Concluding their investigation, they raise the question of “how small-scale prototyping can relate to concurrent forms of democratic participation producing ‘mass’ policies that can [be] delivered at scale” (Kimbell & Bailey, 2017, p. 222). This question becomes the starting point for the current research and is developed through the analysis of design prototyping.

2.4 Prototypes in design

Designers externalise ideas and concepts by creating visual representations (see some examples in Figure 4). Generally, design representations appear in two moments of the design process. In early stages, to communicate (Ulrich & Eppinger, 1995, p. 173), “experience, test, transform, develop and complete” initial ideas (Sanders & Stappers, 2014, p. 6); and later, as an approximation to the final artefact (Ulrich & Eppinger, 1995, p. 291), which are used to test whether or not the concept should be developed further (Sanders & Stappers, 2014, p. 6). In both moments, there is an iterative process seeking to refine and evolve ideas and concepts into products (or services, spaces, etc.) (Sanders & Stappers, 2014; Ulrich & Eppinger, 1995).

Figure 4 Taxonomy of Visual Design Representations (Pei, Campbell, & Evans, 2011, p. 7) used by industrial designers and engineering designers mainly in creating physical artefacts. However, each design branch has its own variety and terminology.

Among the design representations, the notion of prototype is probably one of the most popular. A *prototype* is “any shared physical manifestation externalising an otherwise internal

or unavailable vision of a future situation” (Blomkvist, 2014, p. 23). Whether physical or digital (analytical), prototypes represent future versions of *design artefacts* (e.g., physical or digital artefacts, spaces, services, etc.) such as:

- “prototypes of physical objects” (industrial product design);
- “prototypes of environments, spaces, and architecture” (interior design and architecture);
- “prototypes of digital artefacts and software” (UX design, interaction design, software or web development);
- “prototypes of (inter)actions, service processes, and experiences” (service design, interaction design);
- “prototypes of ecosystems and (business) value”. Stickdorn et al., 2018b, pp. 67–74).

An additional type could be added to this typology:

- “*holistic prototypes*” which are composed by more than one type of prototype (e.g., prototypes of space and service) (Blomkvist & Holmlid, 2010, p. 6).

Many other dimensions to classify prototypes are portrayed in the literature (e.g. *role, look and feel, and implementation* (Houde & Hill, 1997), *filtering and manifestation dimensions* (Lim, Stolterman, & Tenenberg, 2008), *fidelity and representation* (Blomkvist & Holmlid, 2011);. All these dimensions serve to define the characteristics of prototypes according to the purposes of prototyping.

3. Method

In order to explore the encounter between the understanding of prototyping in design and in policymaking, this paper identifies, compares and analyses a series of frameworks to characterise prototyping in the literature. This analysis is later adopted to propose a hypothesis of how prototyping could intersect current practices and theories of policymaking and policy implementation.

This review started from previous research on “prototyping” found in databases such as *Web of Science*, *Scopus* and *Google Scholar*, as well as articles recommended by researchers on the topic. A general overview lead to identify a reduced set of authors proposing prototyping frameworks (See Table 1). These authors mainly characterise prototyping in design-related fields.

However, the work of Floyd (1984) in the area of software development is the exception to the rule. Her introductory paper for the *Working Conference on Prototyping* in the 80’s has also become a reference in design. Indeed, Floyd’s paper is cited by Blomkvist & Holmlid (2011) and Kimbell & Bailey (2017) whose work was also selected for the framework analysis.

Table 1 Overview of the authors selected to characterise the framework of prototyping for policy. *Number of citations taken from Google Scholar (Updated in March 27, 2020). Source selected because of its coverage on academic publications but also books, thesis and technical reports (Yang & Meho, 2007).

Source	Area	Prototyping Framework	Prototyping Purpose	Secondary Research	Primary Research	Number of Citations*
Floyd (1984)	Software Development		x	x	x	708
Buchenau & Suri (2000)	Experience Design		x		x	1427
Blomkvist & Holmlid (2011)	Service Design	x		x		50
Camburn, Viswanathan, Linsey et al. (2017)	Mechanical Engineering, Engineering Design	x	x	x		52
Kimbell & Bailey (2017)	Design for Policy	x		x	x	37
Stickdorn, Hormess, Lawrence et al (2018)	Service Design		x		x	148

The analysis of these studies resulted in the combination of the frameworks of Blomkvist & Holmlid (2011) and Kimbell & Bailey (2017) as well as the diverse perspectives in a more detailed framework proposal. Furthermore, this new proposal focuses on the *purpose* of prototyping as the most important guidance for the additional layers of the prototyping framework.

An initial assumption in this research is that the frameworks of prototyping selected are complementary to each other and facilitate the study of holistic prototypes. This type of prototypes is relevant because it comprises diverse prototypes and it could resemble the prototype of a policy. An additional assumption is the general notion of prototyping, which in this research involves other techniques for creating representations such as sketching, drawing, modelling and theatrical methods, among others.

4. Design prototyping framework

The term *prototyping* refers to the creation or building of a prototype (e.g., rapid prototyping techniques (Thomke, 1998, p. 747)); or to the use of prototypes for generating knowledge (Blomkvist, 2014, p. 23). Nevertheless, in this research, *prototyping* implies a specific cycle within the design process where a prototype is made, used for testing and learning (Floyd, 1984, p. 2; Stickdorn et al., 2018, p. Chapter 7). Thus, using prototypes to explore or demonstrate specific characteristics of a future artefact, rather than the technique and tools used to create the prototypes (Houde & Hill, 1997, p. 2).

The *prototyping cycle* is generally described in three steps: build, run and analyse. Some authors also suggest a preliminary step to prepare the experiment (Thomke, 1998, p. 744), choose the functions of the prototype (Floyd, 1984, p. 4) and formulate prototyping questions (Stickdorn et al., 2018b, p. 214; Ulrich & Eppinger, 1995, p. 303). This cycle provides a method based on trial and error, to learn in each of the iterations until the prototype evolves into the final artefact. This is based on the assumption that it is “unlikely to come up with a complete, effective design in a single iteration” (Wheelwright & Clark, 1992, p. 223).

In order to characterise prototyping, Blomkvist & Holmlid (2011) developed a five-level framework from literature review (See Figure 5). This was considered the most clear and comprehensive model reviewed. According to it, the decisions about prototyping are taken orderly, and they start by defining the stage in the design process in which prototyping will happen.

Figure 5 Service Prototyping Framework. Perspectives on prototyping and prototypes (Blomkvist & Holmlid, 2011, p. 7).

Alternatively, this paper proposes a *design prototyping framework* composed by four layers: *purpose*, *participants*, *activity* and *prototype* (see Figure 6). This framework adopts as referents the frameworks of Blomkvist & Holmlid (2011) from the service design field, and Kimbell & Bailey (2017) from the design for policy area, to define the steps (see Table 2), and then details the purposes of prototyping by combining the proposals of Floyd (1984), Buchenau & Suri (2000), Stickdorn et al (2018) and Camburn, Viswanathan, Linsey et al. (2017) (see Table 3).

Table 2 Comparison of prototyping frameworks ordered according to the proposal of Blomkvist & Holmlid (2011).

Framework/ Aspects	“Service Prototyping Framework” Blomkvist & Holmlid (2011)	“Framework for describing and assessing prototyping in policy-making” Kimbell & Bailey (2017)
Position in the process	<i>Position in the process</i> : “an event that happens at a particular time in the process, following a research phase and possibly a phase of idea generation, and preceding the implementation phase” (p.4).	<i>Uses</i> : potentially contribute to all phases of the policy cycle to explore, validate, understand and communicate.
Reason for prototyping	<i>Purpose</i> : exploring, evaluating, and communicating.	<i>Logics</i> (experimental logic): exploratory (“inventive moment of synthesis”) or experimental (to create evidence or validate requirements) (p.219).
People involved	<i>Stakeholder</i> : <i>author</i> (the creator of the prototype) and <i>audience</i> (clients, users/customers, and colleagues).	<i>Participants</i> : policy ecosystem (users, citizens and beneficiaries, experts and policy implementers).
Method/ Technique	<i>Activity</i> : <i>technique</i> (tool or method e.g., sketches, mock-ups, paper prototypes, video prototypes, wizard of Oz and scenarios) and <i>validity</i> (similarity to the test and implementation contexts).	<i>Pace</i> : <i>fast</i> (validate quickly the user experience) or <i>slow</i> (explore adaptation).
Prototype / Object	<i>Prototype</i> : <i>fidelity</i> (level of refinement or degree of detail displayed by a prototype) and <i>representation</i> (appearance and materialisation).	<i>Objects</i> : “policy is a complex assemblage” of objects and interfaces in systems and processes (p.221).

Unlike the work of Blomkvist and Holmlid, the first perspective in the proposed framework is not the position in the process but the purpose. This choice is due to different reasons. First, because purpose is considered the most important step for defining the strategy of prototyping and it also affects the decisions taken in the next steps. Second, because Floyd and Stickdorn et al. relate the purpose to a particular position in the process (Floyd, 1984, pp. 6–11; Stickdorn et al., 2018b, pp. 212–214); and third, because prototyping is nowadays an activity performed along the design process (Blomkvist & Holmlid, 2011, p. 4; Sanders & Stappers, 2014, p. 6). Thus, starting from the first level of purpose, the steps of the design prototyping framework are described as follows.

Figure 6 Design prototyping framework for policymaking. Visualization elaborated by the authors adapting the framework of Blomkvist and Holmlid (2011).

4.1 Purpose

The purpose is a prioritized perspective because it also determines how the prototypes will be built (Blomkvist & Holmlid, 2011, p. 4). The preparation to prototyping, as well as the formulation of prototyping questions can ensure a common understanding of the goal (Stickdorn et al., 2018b, p. 214; Ulrich & Eppinger, 1995, p. 303).

According to the literature review, prototyping has four main purposes: communication, exploration, evaluation and experimentation, followed by learning, evolution, understanding, demonstration, integration, piloting and milestones (see table 3). A single prototyping session is frequently developed with multiple purposes (Stickdorn et al., 2018b, p. 212). Therefore, the boundaries among them can be sometimes fuzzy (Floyd, 1984, p. 6). The four main purposes are described hereunder.

Table 3 Prototyping purposes found in the literature review. Excerpt from the authors' purpose matrix providing a focus on the work that characterises prototyping more extensively. In grey, the main selected sources used in this study.

Author/ Purpose	Floyd (1984)	Budde et al. (1990)	Ulrich & Eppinger(1995)	Baumer et al. (1996)	Buchenau & Suri (2000)	Stowe (2008)	Blomkvist & Holmlid (2011)	Passera, et al. (2012)	Blomkvist (2014)	Camburn et al. (2017)	Stickdorn et al. (2018)
Understanding					X						
Learning			X			X				X	
Communication	X	X	X		X	X	X	X	X	X	X
Demonstration						X					
Exploration	X	X		X	X		X	X	X	X	X
Evaluation		X			X		X	X	X		X
Experimentation	X	X		X							
Piloting		X									
Evolution	X	X		X						X	
Integration			X			X					
Milestone			X								

- Prototyping for communication [presentation and persuasion]:
Prototyping supports internal and external communication, and serves for “sharing information about the design” (Camburn et al., 2017). Moreover, *communicative prototyping* seeks to present features of the proposed solution to a key audience in order to clarify aspects and perspectives, support decision making and facilitate collaboration on a common understanding (Stickdorn et al., 2018b, p. 213). Furthermore, it is also oriented to persuade the audience (Blomkvist & Holmlid, 2011, p. 4; Buchenau & Suri, 2000, p. 429; Stickdorn et al., 2018b, p. 214), reason why the prototypes created resemble closely the final proposed solution.
- Prototyping for exploration
Exploratory prototyping (Floyd, 1984, pp. 6–7) or *explorative prototyping* (Stickdorn et al., 2018b, p. 213) (see Table 4) is used in early stages of the process to generate new options and compare alternatives. In this prototyping, an initial idea, concept or prototype “serves as a catalyst to elicit good ideas and to promote a creative cooperation between all parties involved” (Floyd, 1984, p. 6). Explorative prototyping could be used by the design team (only internally) or also by users, so the team can gain knowledge about the proposal from the potential users.

This type of prototyping allows to learn about opportunities and challenges of the solution (Stickdorn et al., 2018b, p. 213) and aids to establish the features, requirements and specifications the solution should offer (Floyd, 1984, p. 7). Regardless of its informal nature, the characteristics of the prototype should be strategically selected to generate explicit feedback from users (“likes or dislikes”) (Floyd, 1984, p. 7), “inspire and reveal new information” (Blomkvist & Holmlid, 2011, p. 4), guide the team on “the user experience and the tangible components which create it” (Buchenau & Suri, 2000, p. 428), as well as generate hypothesis about how the future solution “might create value, might work or might feel” (Stickdorn et al., 2018b, p. 213).

When prototyping for exploration, the prototype is built to be discarded. Accordingly, the construction of the prototype should require a minimum effort (Floyd, 1984, p. 7) and use techniques for creating prototypes quickly (Stickdorn et al., 2018b, p. 213).

Table 4 Summary of Exploratory and Explorative purposes described by Floyd (1984) and Stickdorn et al (2018), combined into one in the framework proposal.

General Purpose	“Exploratory Prototyping” Floyd (1984)	“Explorative Prototyping” Stickdorn et al (2018)
Specific objectives	Clarify requirements and desirable features Discuss alternative possibilities for solutions Communicate with prospective users	Create new options and new future solutions Compare quickly different options
Evaluation	Informal: what the users like or dislike about a proposed feature. To reach a common understanding	Creates many insights, new questions, and hypotheses
Participants	Developers and users	Core project team
Type of prototype	Normally thrown away Built with minimum effort	Built to be thrown away Built quickly Low fidelity
Stage in the process	Early stages	Early stages

- Prototyping for evaluation:
Evaluative prototyping is used to understand the user experience with the proposed solution, to filter down the number of options and take decisions on what to focus on (Stickdorn et al., 2018b, p. 213). In this prototyping, hypothesis and alternatives are tested with potential users or external selected participants by means of “qualitative research and analysis methods that can provide some hard facts and metrics (e.g., contextual & in-depth interviews, observation)” using a prototype that resembles the final solution as much as possible (Stickdorn et al., 2018b, p. 213).
- Prototyping for experimentation:
In *experimental prototyping* a proposed solution is evaluated in terms of “transparency [of the interface]”, acceptability or feasibility (Floyd, 1984, pp. 8–10). Here, the representation of the solution could be a partial prototype or a simulation that could serve as a specification, a refinement of specifications, or a transition between specification and implementation (Floyd, 1984, pp. 8–10).

4.2 Participants

The participants in a prototyping session can range from the authors of the prototype (the design team), to an external audience (colleagues, intended users, clients and supporting organisations) (Blomkvist & Holmlid, 2011, p. 5; Houde & Hill, 1997, p. 2). In these sessions, participatory (“i.e., user as a partner”) and human-centred (“i.e., user as a subject”) approaches could take place in form of collective creativity (co-creation) and creative collaboration along the design process (co-design) (Sanders & Stappers, 2008, pp. 5–6).

4.3 Activity

The activity includes the *technique* (tool or method) for prototyping and the *validity* of the prototyping context (similarity to real people and context of implementation) (Blomkvist & Holmlid, 2011). Some techniques are: *modular design* (dividing the solution representing it in different prototypes); *simulation* of a real activity (Floyd, 1984, pp. 12–13) and *pace* - *fast* or *low* speed - (to validate the user experience or to explore the adaptability of the idea to a particular context) (Kimbell & Bailey, 2017, p. 221).

4.4 Prototype

“The best prototype is one that, in the simplest and the most efficient way, makes the possibilities and limitations of a design idea visible and measurable” (Lim et al., 2008, p. 4). The idea *representation* (e.g., drawings, models, or prototypes presented above in Figure 4), the materials used and the *fidelity* - *low* or *high* - (resolution, refinement and precision of the prototype in comparison to the final (Blomkvist & Holmlid, 2011, p. 5)) could vary according to the purpose of prototyping.

Alternative to this classification, “The Anatomy of Prototypes” (Lim et al., 2008) suggests to consider “filtering dimensions” (appearance, data, functionality, interactivity, and spatial structure) and “manifestation dimensions” (materials, resolution, and scope) in order to take decisions about the prototype.

5. Towards design prototyping for policy

The policymaking process depicted in the policy cycle model commonly comprises five stages. First, in *agenda-setting* the policy actors examine a problem and then present possible solutions. Second, in *policy formulation* diverse actors evaluate and rank these solutions to narrow down the possibilities and develop specific policy options. Third, in *decision-making* the government moves forward with a course of action. Fourth, in *policy implementation* the action is developed combining public administration tools; and finally, in the fifth stage the results of the action are monitored for *policy evaluation* (Araral et al., 2012, p. 17).

According to Kimbell and Bailey (2017), “prototyping has the potential to contribute at multiple points in the policy cycle” (Kimbell & Bailey, 2017, p. 221). Building on this statement, prototyping can contribute to envision future policies in the policy process. The Figure 7 illustrates how different purposes of prototyping could be considered in each of the stages of the policy cycle.

For instance, in agenda-setting, explorative prototyping could aid to rapidly represent possible solutions and policy options coming from different policy agendas. Then, these could be tested by using evaluative and experimental prototyping in policy formulation, in order to produce qualitative evidence for decision-making. This qualitative evidence would comprise the insights of diverse actors such as potential users, policymakers and policy

implementers. In this scenario, prototyping could coexist with other approaches such as evidence-based policymaking, contributing to the understanding of how a policy option could work in the future.

Figure 7 Prototyping in the policy cycle. Visualization elaborated by the authors to illustrate the hypothesis of prototyping for policymaking where different purposes of prototyping could be applied to some of the stages of the policy cycle.

In this regard, Kimbell (2015) exemplifies how prototyping was used by the UK Policy Lab on the policy area “people in work who have long-term health conditions”. In this case the team used exploratory prototyping by creating prototypes (scripts and visualisations), trying them with people and getting feedback from them. The prototypes consisted in a script of a potential interaction between the user (people with a health condition) seeking for support and the service; and a service blueprint visualising the resources supporting the user. These prototypes were useful to discuss with people “with first-hand knowledge of the issue” the elements of the concepts in order to generate insights about the user’s experience and “what would make the service concepts work in practice”. These service concepts for the policy area were later revised and iterated for a next stage of prototyping (Kimbell, 2015, pp. 28–29).

6. Discussion

The concept of the policy cycle offers designers a simple and appealing model to illustrate the role of design in the policymaking process. However, Cairney (2019) argues that in real practice, the policy process is considerably more complex and is affected not only by a “multilevel policy process” but also by a wide variety of influential factors (Cairney, 2019a, p. 18, 2019b). Therefore, policymakers have less control over the policy process which is rather a “complex policymaking system” (Cairney, 2019a, p. 18). Instead, Cairney suggests the notion of *policy learning* as “acquiring new knowledge to inform policy and policymaking” (Cairney, 2019a, p. 1).

Considering this scenario and the correlated political processes, further analysis is required

to describe how policy prototyping can contribute to a more complex policy process and define what policy prototypes could be. Consequently, additional research in the practice of policymaking and policy design needs to be developed to verify the hypotheses presented in this paper. For this purpose, cases of current practices of policy prototyping will be selected, and then studied to analyse the purpose, technique, audience, constraints and results, among other factors of each context and organisation.

7. Conclusions

The prototyping cycle offers to policy actors a model to learn from future policy options in a trial and error cycle, which allows to select and refine policy interventions earlier in the policy process. Moreover, prototyping provides a space for experimentation to “fail early” and identify difficulties with the implementation of the policy, resulting on time and money savings. Furthermore, involving different actors in the process of policy design can feed each iteration with insights from diverse actors such as prospective users and policy implementers. This allows to adapt the policy to the people who will be targeted and part of the implementation. Moreover, it facilitates communication, creativity and collaboration among all the parties involved.

Nevertheless, prototyping in policy must deal with political issues and a complex policymaking system that can restrain the adoption of experimentation practices. Similarly, current policy experimentation practices such as evidence-based policymaking and policy piloting can be complemented by prototyping. However, it is not (yet) clear how learning-oriented feedback gained in the cycle could be integrated to more rigorous evaluation processes and communicated properly to the policy actors.

Likewise, the framework proposed refers mainly to the preparation of the experiment in the cycle of prototyping. For the following stages of building and running a prototype there is design-literature already available on methods and tools (e.g., Stickdorn, Hormess, Lawrence, & Schneider, 2018a, pp. 115–166). Nevertheless, little is said about formative and summative evaluation of prototyping. Further research is required to study evidence and measurements that, in contrast, are particularly valued in policymaking.

Finally, the perspectives presented can be applied in policy processes to define clearly the strategies for prototyping and the types of prototypes to be made. For policy actors this could be a source to gain a clearer understanding of prototyping approaches available. Besides, for design practitioners and researchers, this could be a subject for discussion to enhance the collaboration with policymakers in the design of future policies. The understanding of the practice of design prototyping for policymaking and its relation to current policy analysis and experimentation approaches may be a useful step towards building a practice of *policymaking as designing*.

8. References

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