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From Abstractness to Concreteness – experiential knowledge and
the role of prototypes in design research

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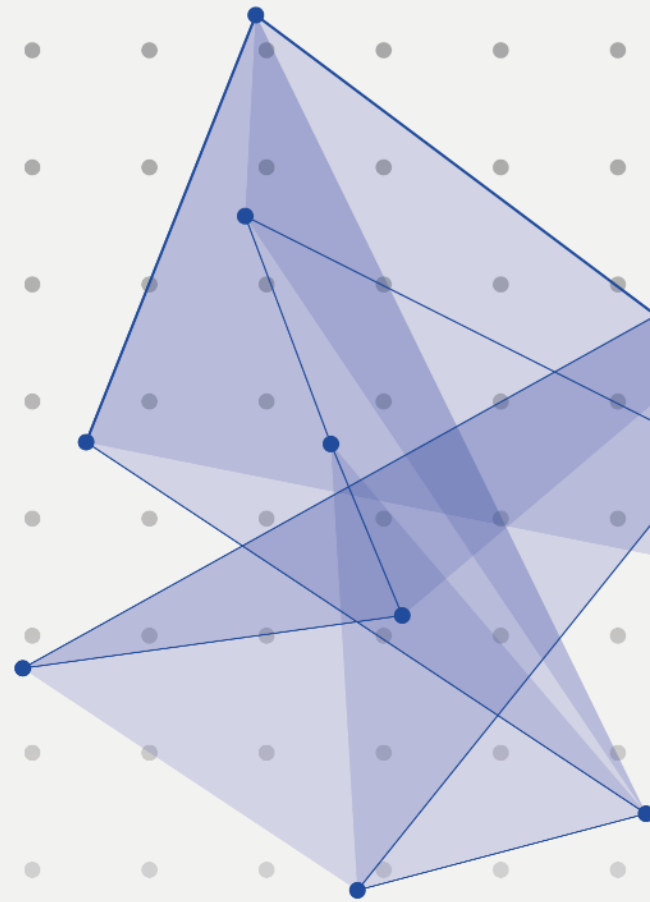
Department of Design, Politecnico di Milano, Italy

Editors: Silvia Ferraris, Valentina Rognoli, Nithikul Nimkulrat

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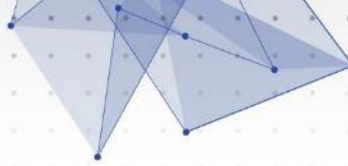
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Track 9: Research processes and methods 2

- Origins of design choices: retrospective analysis of the resulting prototype of a Research through Design project
- What is Your (Freaking) Problem? Prototypes for problem exploration on early stages of design
- Process as prototype: exploring complex knowledge exchange in the production of low-cost buoyancy aids in Zanzibar through the participatory design of a 'workflow system'
- The prototype-evaluation choreography



Origins of design choices: retrospective analysis of the resulting prototype of a Research through Design project

Audrey Mertens, University of Liège

Çiğdem Yönder, University of Liège

Yaprak Hamarat, University of Liège

Catherine Elsen, University of Liège

Abstract

This paper presents the co-design process implemented throughout a project called “My Architect and I” and the prototypes of tools that emerged from it. These prototypes aim to improve the interactional practices between architects and user-clients in the context of private housing projects in Belgium. The purpose of this study is to identify the roots and triggers shaping the artefacts designed throughout the process. This paper focuses on one of the prototypes brought up by the project. This tool was put together in a short amount of time, under the pressure of the codesign workshops schedule. It results in a paper booklet imagined as a form to be filled in by user-clients in order to inform the architects on their desires and needs. As we take a step back and reflect on the overall outputs from this research through design, we break down each aspect of the booklet to identify the origin of the design choices. This may inform broader design criteria to imagine other tools or strategies to facilitate the interactions between an architect and user-client. This method of deconstructing an artefact is an attempt at objectifying the codesign process’ added value. The evolving prototype isn’t considered as an end in itself, but rather as a mean to reflect on the facilitation process.

Interactional tool; Codesign; Research through design; Architectural practices; Contact form

Architects too often rely on their own experience as the main reference when designing (Cuff, 1991) and rarely go beyond the brief conversational interaction at the beginning of a project to capture the needs and expectations of their user-client (Norouzi et al., 2015; Van der Linden et al., 2017). This traditional model is now being challenged (Macaire, 2009; Siva & London, 2011; McDonnell & Lloyd, 2014). The involvement of users in this process is essential to the success of the project (Lawson, 2006; Sarkar & Gero, 2017; Arboleda, 2020). A recent systematic literature review highlighted the current struggles these actors still encounter, confirming bottlenecks lying in the architects’ assumed roles and in the current expectations and needs of their clients (Mertens *et al.*, 2022a).

Overview of the project “My architect and I”

This research is based on a project called “My Architect and I”. The context is that of housing in Wallonia and Brussels, in Belgium, where any construction work affecting the envelope or structure of a building legally requires the services of an architect. Local researchers have shown how that the experience can bring stress and struggles to both architects and user-

clients¹ in that process (Nauwelaers & Rossini, 2014; Stals et al., 2016). Based on the assumption that there is an opportunity there for improvement in terms of satisfaction, we address the interactions between these two parties. The primary goal is to identify consequences of this habitus shock (Siva & London, 2009), issues and points of friction, and potential levers for change. The researchers investigate needs and desires that might still not be met in that relationship.

The “My Architect and I” project consists of a two-phase research: (i) a research and preparation phase, and (ii) a codesign process informed by the latter. The second phase can be understood as Research through Design (RtD), "a way of doing research in which design activities play an essential role in the generation of knowledge" (Boon & al., 2020, p.139). In this case, the artefact is not the final target of RtD; knowledge and understanding of interactions remain the main goal pursued (Godin & Zahedi, 2014). Table 1 sums up the phases of the project (also presented in Mertens *et al.*, to be published).

Table 1: Phases and activities of the project

Research and preparation phase (i)	Systematic literature reviews (SLR)	SLR conducted on interactions between architects and user-clients during housing design processes (Mertens <i>et al.</i> , 2022a)
		SLR conducted on matters of knowledge in codesign and their methodological implications (Yönder <i>et al.</i> , [to be published]a)
	Interviews	15 interviews with architects
		14 interviews with user-clients
		17 interviews with designers
Planning & designing the workshops	4 researchers, three team sessions to design the codesign process itself	
Codesign process (ii)	Restitution & Sharing (1)	A two-hour long online workshop; 16 architects, 8 user-clients. Goal: share insights gathered from interviews
	Ideation & Design (2)	5 face-to-face workshops in 4 different cities in Belgium (5x2h). Total of 12 architects (including representatives of the local association of architects) and 9 user-clients
	Tests of the prototypes & iterations (3)	(a) 4 tests with 4 tool prototypes during a public event; 4x1h; a total of 21 architects (including students, academics, representatives of the local association of architect and professionals from the construction industry), 8 user-clients
		(b) 2 tests with 2 tool prototypes in architectural agencies; 2x1,5h; 4 architects and 2 user-clients
		(c) Test in a design conference; 1,5h; 8 designers/researchers (Mertens <i>et al.</i> , 2022b)

(i) To construct a better understanding of the field, we conduct: systematic literature reviews; interviews with architects (n=15); with user-clients with an experience of interaction with architects for a private housing project (n=14); and designers practising human-centred design or codesign (n=17). Further detail on that phase of the research can be found in the specific papers written by the authors (for instance: Mertens *et al.*, 2022a; Yönder *et al.*, [to be published]a).

¹ In this paper, as we focus on private housing projects, the clients and end-users of the building coincide. Therefore, we use the term “user-client”.

(ii) The co-design process consists of a series of workshops of three types: (1) Restitution & Sharing; (2) Ideation & Design; (3) Tests of the prototypes & Iterations. The aspiration pursued is to develop some tools to help architects and user-clients facilitate interactions throughout private housing designs. Intrigued readers can find further details of these workshops in specific papers by the same authors (for instance: Mertens *et al.*, to be published).

The whole workshop series is designed by the team of researchers (n=4) prior to the launching. Some workshops build on the content of a previous workshop. In between sessions, meetings are held in order for the researchers to make sense of the data collected and inject the results of this analysis in the next phase, much as practising designers would.

(1) The first workshop, hosting 16 architects and 8 user-clients, consists in a two-hours online audiovisual exhibit (January 2022). The journey presented broadcasts insights extracted from the interviews, organized in ten chapters to sensitise the participants and build empathy between the two parties. At the end of this session, participants select what they consider to be the most pressing challenge regarding interactions between architects and user-clients (amongst 12 themes put together by the research team based on phase 1's data). Top rated challenges are then refined by the researchers to be used in the next series of workshops (e.g. (2) Ideation & Design).



Figure 1: Examples of the inspirational TTSM cards given to the participants during the Ideation & Design activities (2)

(2) The second type of workshop (spring of 2022) consists of five workshops held for about two hours each. These workshops take place in various locations in Belgium (Brussels, Liège (n=2), Namur and Arlon). Altogether, 11 architects, 9 client-users and 1 representative of the *Order of Architects* participated in 8 mixed groups. Participants are invited to adapt, revisit and develop a tool based on inspirational tools, techniques, strategies and methods (TTSM) cards used as probes (also referred to as “provotypes” in Mertens *et al.*, to be published) or to develop a brand-new concept. These cards (Figure 1) introduce and

describe tools extracted from a grey literature benchmark², from the interviews conducted with the designers (cf. phase 1 (i)) and from an inhouse brainstorm session organised by the researchers. These prototypes “evoke a focused discussion in a team”, being “on the table” (Sanders and Stappers, 2014).

The artefacts cocreated by architects and user-clients result in “pretotypes” of the tools, imagined to facilitate architect/user-client relationships.

An in-between task completed by the researchers consists of merging the results into four tools (version α) as a synthesis of the eight groups’ “pretotypes”. These tools are presented to two architects for a unique feedback session to help shape a realistic prototype for the following steps (version β) (see Fig.2).

(3) Tests of these prototypes are then conducted to obtain feedback and iterate/develop them further. Three types of testing sessions are organised: (a) during a public event (conference + testing sessions) at the University of Liege, Belgium, in small groups (4 sessions with 29 participants: architects, architecture students, user-clients or curious citizens, and representatives of the Order of Architects); (b) in architectural practices by practitioners architects and clients (2 tests, 4 architects, 2 client-users); (c) at a design conference (2 prototypes tested by 8 designers and/or design researchers, (Mertens *et al.*, 2022b).

These tests are based on role-playing games through which participants – impersonating architects and user-clients - improvise a first meeting. This method is inspired by design fiction (Sanders and Stappers, 2014), to help participants envision a possible change in their routine practices and enable to test and obtain feedback rapidly on the prototypes.

The two architectural agencies in the test (b) are presented with all four prototypes (versions β) and are asked to pick which tool they would like to test. The results of this session are implemented and lead to the prototypes of two tools (version δ).

Focus and Approach

This paper focuses on one of the tool prototypes (version δ) developed during the codesign process, i.e. a paper booklet imagined as a form to be filled in by a user-client, mainly in order to inform the architect about his/her desires and needs. An updated pdf version of this tool can be found on Inter’Act Lab’s website (Inter’act, n.d.). The other tool selected for the (version δ) prototyping is presented in another paper (Yönder *et al.*, [to be published]b).

Analysis conducted in between workshops are design-driven – quick and pragmatic – alike a design practitioner’s. The purpose of this paper is to take a step back and reflect on a

² Collection of data outsourced: 40h paid mission, carried out by a master student. Job description: identify existing tools and strategies in the field of "architect-client relations / structuring of the architectural mission", from "grey literature" (i.e. non-scientific publications, websites; YouTube channels; etc.). The main goal is to create a "database" of existing tools, as well as a small reading grid (excel type) with a mini summary of a few lines for each tool. This research is conducted in French and English, both locally and internationally and results in a list of 85 tools. This database is browsed by the first author of this paper, revising all the tools and strategies, who then retrieves a relevant selection - in regard to the challenges raised in the first workshop (1) - for the inspirational TTSM cards to be used in the workshops (2).

prototype and deconstruct it, a posteriori, in a research-driven approach. As we take a step back and reflect on the overall outputs of this research through design, we break down each aspect of the booklet to identify the origin and targeted outcome of the design choices.

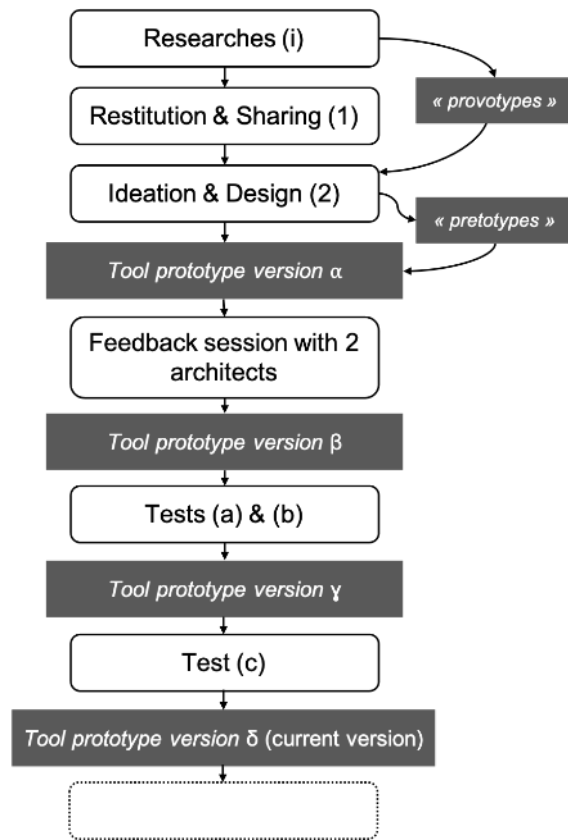


Figure 2: versions of the prototype in regard of the tests

We question the elements of the process that nourishes the current prototype (version δ). In order to deconstruct and analyse it, the booklet’s content and characteristics are broken down step by step: its base concepts, materiality, chapters, and contents. For each of these elements, we look back on the process to find its origin and purpose.

Findings

This paper booklet prototype is based on an archetypal tool found in the grey literature, developed by Donnell and Day Architecture (2020).

The tool is a pdf booklet, downloadable on the website of the architects. It is a guide, namely “How to write a brief for an architect” that can be used as a template for the user-client to fill in and to brief an architect for a project, as well as inform themselves on important aspects of the process. The New Zealand architectural firm presents their “Ebook” as a way to facilitate communication to the architects “the core goals of what [they] want to achieve in [their] new build or renovation, in the unique way that you love to live life”. They also promote it as a way to “learn how to summarise [their] vision and mission statement for the build, record (...) functional brief in the editable PDF form included, manage budgets, dreams and design expectations, and understand how to work collaboratively with your Architect to achieve your goals” (Donnell and Day Architecture, 2020). These are challenges that have been brought

up in phase (i) of our research, highlighting this tool as particularly relevant as a baseline to reflect on and adapt. Bogers *et al.*'s (2008) recommendations are beared in mind to develop the tool (versions α and β) in-between the workshops (2) and the tests (3): making priorities and essence of the project explicit, as for the requirements, and including qualitative information about the user-clients' needs on top of quantitative requirements. According to the authors, "figures about square meters, temperature levels, etc, are important, but they tell a very limited story about the accommodation needs of the client", recommending to encourage the user-clients to share "culture, attitudes, ambitions and desires, activities and business processes, scenarios and forecasts for the development of the business, and the "feel" for the project" (Bogers *et al.*, 2008, p.115). The briefing process, among the most essential parts of the design stages (Bogers *et al.*, 2008; Côté *et al.*, 2009; Hershberger, 2015), should identify "values, goals, facts, and needs" (Hershberger, 2015, p.336) and could help diminish cost overrun due to design mistakes (Côté *et al.*, 2009).

This literature, together with the data collected throughout both phases of the project (i) & (ii), is embedded in the latest version of the tool (version δ). The tool manifests as a synthesis of several design criteria raised over time during the whole process. The table below displays the characteristics and contents of the booklet, analysed point by point, chapter by chapter, and identifies their provenance and aim.

Table 2: Analysis of the content and characteristics of the booklet prototype

	Content	Origin & purpose
Concept	Contact form / Brief template for specific private dwelling projects	The systematic literature review (Mertens <i>et al.</i> , 2022a), particularly Bogers <i>et al.</i> 's work (2008). Grey literature (Donnell and Day Architecture, 2020), inspirational TTSM card selected by 1 of the tables during the (2) Ideation & Design activities. Testimonies from architects throughout interviews and workshops converge, highlighting the fact that architects are already overworked and have no time to spend on yet another tool. This supports the choice of a user-client led tool to fill in.
Materiality	Paper	Five tables (out of eight) during the (2) Ideation & Design discussed a paper support option vs. the numeric version, through an app or an online form. Three of these tables reveal a need for an easily "carry-on" type of tool, converging with insights gathered during the interviews (research phase i).
Visual aspect	Colours and typo	Based on the lab's graphic charter for consistency of the tools, considered as a toolkit. The δ version of the tool is visually linked to the research lab. Customization by the architectural offices has been raised and debated. We settle on a non-customised artefact, visually identified as a third party's (Inter'Act's, neither architects' nor user-clients').
Front page	Title of the tool & contact information of the user-clients	Thought as a way to make things very simple and clear for user-clients, as their testimonies (in both the interviews and the workshops) point out that they are

		often overwhelmed with documents that are not user-friendly. The contact information aims for the architects collecting the booklet to gain time in their note taking regarding the users, thus in their overall briefing process.
Page 2	Chapter including an explanation of why the user-client needs an architect, his/her role and expertise. Link for more information on the web.	Originates from the interviews with users and architects, showing a lack of understanding of the architect's role. This problem is validated by the co-design participants as a major problem.
Page 3	Chapter: Guide for the first steps	Based on user-client testimonies during the interviews, confirmed and developed by several user-clients during the workshops (2): user-clients feel left to their own devices, very lost at the beginning of the process, not knowing where to start, what they are expected to do or what can be expected from an architect.
Pages 4-9	Chapter aiming for all the future occupants of the project to be presented; for desires, dreams, tastes of the participants to unfold. Six pages left almost empty, with just a few sentences to help ideas emerge (questions about their ways of living, habits, hobbies, dreams, future...)	This section is based on two success stories encountered in the interviews during phase (i): the suggestion of a blank A3 page left by one of the architects on the clients' kitchen counter, as a way for them to doodle, annotate and suggest ideas to the architect; and user-clients spontaneously creating a visual presentation of their family with enough detail for the architect to really capture all the requirements for the project. It is further developed during the feedback session with the two architects. It is particularly appreciated during the tests. Feedback during several tests points out the need for a lot of space for the client-users to express themselves (drawings, collage, text...) and present several profiles of a single family, for instance.
Page 10	Chapter: "Priorities"	Raised by architects in the interviews and further discussed during the three phases of the workshops, as both parties often fail to align their preoccupations. User-clients tend to forget to mention what matters the most to them and the architects sometimes fail to meet crucial demands because they do not consider some things as priority. Architects keep in mind technical priorities to ensure the project to follow through, whereas user-clients are often unaware of these details. This also stirs up discussions about what the architect has to consider as essential for the good execution of the project, and what he/she might have to discard if the budget doesn't allow to realistically meet all the expectations of the user-clients.
Page 11	Chapter: "Fears & Budget"	This is a major challenge brought up by the research phase (i), voted for during the first workshop (1) as essential and developed during the following workshops. This chapter aims to open the discussion about taboos

		that often bring frustration between architects and user-clients.
Pages 12 & 13	Chapter: "Expected program"	Aiming to gain time for overworked architects (cfr. interviews and codesign process) while insisting on the fact that this might still evolve and could also have to be downsized if not realistic in regard to the budget.
Pages 14 & 15	FAQ and explanations	Answering the issues due to misunderstandings at the beginning of a project, raised mainly during the interviews (similarly to the origin of the page-3 Chapter: Guide for the first steps)
Pages 16 & 17	« Questions you want to ask your architect » notebook page, mainly blank	Interviews and workshop testimonies raised the fact that user-clients often have a list of questions they want to raise and discuss with their architect. Tests highlight the need for space for the user-clients to write down their concerns.
Pages 18 & 19	Another notebook page mainly blank (left page lined, right page blank page) Details of the funds that supported the research that led to the booklet, and disclaimer highlighting the fact that the booklet is not a legal document but a support document	Tests (particularly the (b) test) highlighted the need for space for the architect to take additional notes (text and sketches) throughout the conversation with the user-clients, adding up on the information contained in the booklet. The issue of the booklet as an informal document was raised during the workshops and tests: architects want it to be clear that the booklet is not a legal document and that they might not be able to answer every demand requested by clients in the booklet. The booklet is to be considered as an aide to facilitate conversation and keep track of the desires of the user-clients, help them navigate the overwhelming and complex launch of a project.
Back page	Logos and space left blank	Tests (particularly the (b) test) highlighted the need for space for the architect to take additional notes (text and sketches) throughout the conversation, the back of the booklet being very convenient to do so.

This tool retains the researchers' attention as it echoes Bogers *et al.*'s conclusions, arguing that "to improve the everyday practice of briefing, it is important to realize that architects cannot produce a good design, when clients fail to be clear about what they want" (2008, p.115). This booklet concept is hardly innovative but it answers multiple challenges brought up through the research phase and testimonies shared by the participants during the codesign process as well. This low-tech tool enables easy implementation of multiple solutions to facilitate communication between architects and user-clients upon various identified friction points.

The main limit of this paper lies in the fact that we do not track the elements that have been abandoned in previous versions of the prototype. We rather focus on content validated throughout the tests.

Discussion

This paper considers the artefact as a way to look back on the process. Deconstructing the prototype retrospectively aims to understand its essential components, their purpose and their origin(s). This method, inspired by retro-engineering, enables us to evaluate the various phases of the Research-through-design project; how those phases impacted the artefact and to track down the researchers' choices.

This work (i) helps better understand how choices are combined together to generate an artefact throughout such a codesign process; (ii) raises the question of how each profile contributes, in a complementary way, to the process (both designers and non-designers, as well as researchers); (iii) increases a critical and objectified glaze of such codesign processes, pinpointing actual key moments springing positive effects; (iv) and therefore demonstrates the concrete added values of codesign. This "deconstruction" is a method in itself that the researcher would like to replicate on other projects, which could perhaps ultimately lead to a model for the evaluation of processes such as codesign.

Once the content is broken down, the origin and purpose of each section can be looked up and heightened. This highlights the importance of the research phase and the elaboration of the workshops, especially the interviews and development of the inspirational TTSM cards that set the ground to numerous elements constituting the booklet. However, it is mainly the workshop sessions that validate the concerns brought up in the research phase and confirm the most pressing content the tool should hold. The test brought up a few simplifications, space requirements for an ergonomic use of the tool, and re-phrasing of some of the content. However, the changes or additions were rather limited to subtle refinements.

We want to insist on the primary purpose of RtD which is to produce knowledge and understanding (Godin & Zahedi, 2014). In this specific project, there are no deadlines nor final product expected by the funding agency. This allows the created artefact to evolve and not clot. The understanding of the interactional practices between actors will extensively be developed in other papers by the same authors.

However, this paper highlights the added value of the artefact itself. Even if pursued as an additional bonus or "side-effect" in parallel to the research, we believe the prototype could be very useful to support architectural practice. This tool can help empower user-clients and bring them a step closer to being co-creators in the design process, as they are already considered experts on use and on their own ways of living, learning, working, etc. (Sanders and Stappers, 2008).

Moreover, participants are reaching out to have access to this tool (Mertens *et al.*, to be published). Therefore, they are now accessible online so participants and the general public can benefit from them.

To further iterate on the tool, it is now essential to confront it with real-life conditions. The question arises as to the method. Several options are considered: (i) observe and monitor (without taking part in the action) the use of the prototype; (ii) identify agencies willing to use the tool but without interfering/observing, and conduct feedback interviews with end-users (architects and their user-clients) *a posteriori*; (iii) return (as first author) to professional

architectural practice in the years to come and test the tool first-hand. This may be an opportunity to continue the research through use in action, equipped with prototypes developed in the research as a toolkit.

This last point raises the question of finality: a prototype developed in RtD is potentially never "done" and delivered. This last round of tests could be a means to iterate to reach an improved version of the prototype. But the research team could also let go of the ownership of the artefact, accepting and encouraging end-users to take hold of their own versions of the tool as they see fit. In this last scenario, ideally, researchers would perhaps observe and document its organic evolution.

Conclusion

This paper is an attempt at deconstructing the artefact resulting from a codesign process. Probes inspired by scientific and grey literature were adapted by participants (architects and user-clients) and researchers to the concerns and struggles specific to the design of architectural dwellings in Belgium.

The latest version of the prototype consists of a booklet to support user-clients in the initial phases of their private housing project, specifically during the first contact with an architect and through the formulation of a brief. We advocate that a well-supported briefing process can prevent further struggles in the following stages of the design and construction processes.

The results may also inform broader design criteria and enrich other tools or strategies aiming to facilitate the interactions between an architect and user-client. The evolving prototype isn't considered as a finished product, but rather as a base to reflect on the needs in terms of facilitation, and as a still-evolving template for architects, designers and client-users to build on and take ownership of. At last, this method of deconstructing an artefact helps objectify the codesign process' added value and could be replicated and expanded to other cases.

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Audrey Mertens

Audrey holds an MS degree in Architectural Engineering from ULiège. After some field experience in architectural agencies, she takes a step back from the profession as a Ph.D. student, studying the interactions between architects and their end-users.

Çiğdem Yönder

Çiğdem Yönder is a designer and researcher holding a MA in Interior Architecture and Environmental Design from Hacettepe University. She focuses on collaborative and participatory design and creation processes. Currently, she is pursuing her Ph.D. at ULiège as a researcher of Inter'Act Lab.

Yaprak Hamarat

Yaprak's works unfold in two intertwined axes: pragmatic aesthetics and social design, both driven by ethnographic fieldwork and research through design. Through a politico-anthropological approach, her research and practice investigate the engagement between humans and non-humans for the ecological transition of the artificial.

Catherine Elsen

Catherine Elsen is Professor at University of Liège and former Research Affiliate at MIT. She holds a Ph.D. in Engineering Sciences and MS degrees in Social Sciences and Architectural Engineering. Her research interests cover design processes and the impact tools and methods have on such processes.

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