



What Got Us Here, Won't Get Us There

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Design research between the social worlds of academia and organisations: Experience feedback from setting up and supervising French industrial PhDs

Estelle Berger^{a*}, Ioana Ocnărescu^a

^aStrate School of Design, France

*Corresponding author e-mail: e.berger@strate.design

Abstract: Responding to the call for grounded feedback on the social impacts of design doctoral research beyond academia, this paper reports on our experience as a design research department embedded in a French design school. Over the last six years, ten cross-disciplinary industrial PhDs were conducted in our research programs. This case study analyses the ecosystems involved and projects pursued, in order to better understand the stakes, issues and avenues for research in/with/for design, and in/with/for organisations. First, a state-of-the-art on the different approaches mobilising design in doctoral research is given, with our own positioning mapped on a matrix. In the second part of the paper, it feeds discussion on the profiles and roles of stakeholders, their embodied postures, relationships, and competences. Finally, the outcomes of research and their impacts are analysed.

Keywords: Doctorate degree in Design, Cross-disciplinary research, Industrial PhD, Action research, Experience feedback

1. Introduction

Embedded in a French design school, our design research department arranges programmes bringing together academic and industrial partners interested in exploring topics together, through design and cross-disciplinary research. Since 2017, ten cross-disciplinary industrial PhDs have been conducted in this framework¹.

This paper reports on our experience in setting up and managing these projects, in which design research is involved both as a discipline and as a mediator between the social worlds of academia and industry. We aim at contributing to a dialogue among our research and teaching communities, on the social impacts of doctoral research in/with/for design, within and beyond academia. Through

¹ Some of them are conducted by designers, others by students with a different degree of design knowledge. All PhDs are supervised by two academic tutors: one from design, the other from another discipline judged relevant regarding the topic.

critical reflection, in an experimental approach, we also expect to fine-tune our vision of doctoral supervision, and make the most of design's potential to impulse, accompany, and amplify trajectories of change (for organisations as well as in society). Beyond the framework of mere industrial PhDs, this study invites further exchange of practices and ideas on how design contributes to cross-boundary knowledge building.

The paper is structured as follows. First, we position our work within a state-of-the-art on the different approaches mobilising design in doctoral degrees. From this overview, we propose a working model mapping the PhD projects conducted in our research programmes. This matrix is used to analyse the profiles and roles of stakeholders engaged in a PhD project, their embodied postures, relationships, and the skills expressed and developed. Finally, we discuss the outcomes of students' experience in a cross-disciplinary doctorate involving design: what forms do they take, how to assess their quality and impacts for design research, organisations, and society?

2. PhD in/with/for design?

2.1 Various research environments

There is extensive literature on the possible relationships between design and research. Fallman (2008) identifies areas in "Design Practice", "Design Studies", and "Design Exploration". From an epistemological point of view, Findeli (2005) distinguishes between research "for", "on", and "through" design. The latter, assuming that design practice can generate new knowledge, gained some legitimacy in the international community. Though, it has been branching into different versions in which practical and/or theoretical overspinning may vary, such as "Practice-Led Research", or "Project-Grounded Research" (Chow, 2010).

In the specific framework of the PhD, some projects qualify as "research through design" wherein designers "design things *as usual* but consider their results research" by consolidating knowledge to other corpus of research (Faste & Faste, 2012). Other projects, even conducted by non-designers, might contain a subset of possible design-oriented strategies. Faste (2017) highlights the generative and evaluative activities of design and design research: "experienced designers leverage intuition to guide both expressive and judgmental act". This continues Donald Schön's theory on improvisation developed in practice (Schön, 1983). Faste suggests that "reflection in action" and "reflection on action" are difficult to separate, tightly coupled within an "intuitive experience (that) is both generative and evaluative: it is the generation of an intent based on an (internal) evaluation about what to intend" (Faste, 2017). For our investigation of cross-disciplinary industrial PhDs connected to design, we retain the poles of "research in/with design", and "reflection in/on action" to frame analysis (see matrix in section 3.2).

2.2 A lens on industrial PhDs in France

It should be noted that our doctorates are framed within the French "CIFRE" framework, launched in 1981 by the Ministry of Research². The aim of this 3-year programme is twofold: first, to place doctoral students in the conditions for scientific employment, and second, to encourage research partnerships between the academic and business spheres. Between 20% to 80% of the time is spent in the company (depending on the advancement of the PhD project), and the rest in the supervising research laboratory. This context is particularly interesting for design, as it implies three types of

² https://www.anrt.asso.fr/sites/default/files/cifre_plaquette_2019_eng.pdf

stakeholders working on a situated topic (practical issue), but also oriented towards generalised knowledge (research question). Though, only few French universities are granted to offer PhDs in Design, and most doctorates conducted by designers are hosted in at least other disciplines, ranging from Sociology, Anthropology, Philosophy to Psychology, Computer Engineering, Ergonomics, Geography, Architecture, Arts and Sciences of Art (De Mourat & al., 2015).

Consequently, we don't fit with all the conditions identified by the DoCS4Design Map & Glossary (2022) as ingredients for a "PhD in Design":

- It is pursued at an institution where design is taught and researched
- It is aiming for increased design competencies
- Its research project is about design
- Its research leverages a design background.

As design research is an emerging field which has not yet gained legitimacy in France, our projects are not always design-centred, addressing issues directly connected to our discipline. Therefore, conducting a PhD in/with/for design necessarily involves collaborations, both in academia and professional contexts. In this line, design research is twofold, on the one end conducting a body of knowledge towards the stabilisation of its own discipline, on the other hand playing a mediating role between different social worlds.

Since 2018, we have thus partnered with several host laboratories (in Management Sciences, Information and Communication Sciences, Cognitive Psychology, Robotics & AI, Social Sciences), in order to compose appropriate supervising teams for each of our PhDs. As a result, these research projects necessarily involve at least four stakeholders: student, company tutor, and two professors building the cross-disciplinary stand of this research (see Figure 1). Such diversity is a source of richness, but also of potential friction. It is important to note that the companies involved in our research programs do not solely provide technical and financial support (as in most academic chairs). As fully fledged partners, they commit to concrete work and exchange. These organisations joined because they shared issues of concern regarding the evolutions of markets and/or society in a specific field related to our research programmes. They have different activities (distribution, banking/insurance, consultancy, mass transportation...) and profiles (major companies, SMEs, start-ups) but all of them were also interested in how design research, in collaboration with another discipline, could address their issues of concern. If a joint research programme to some extent drives the agenda, by providing shared lines of inquiry and background references; cultural and structural diversity among stakeholders challenge our team when it comes to facilitating peer exchange and collective learning.

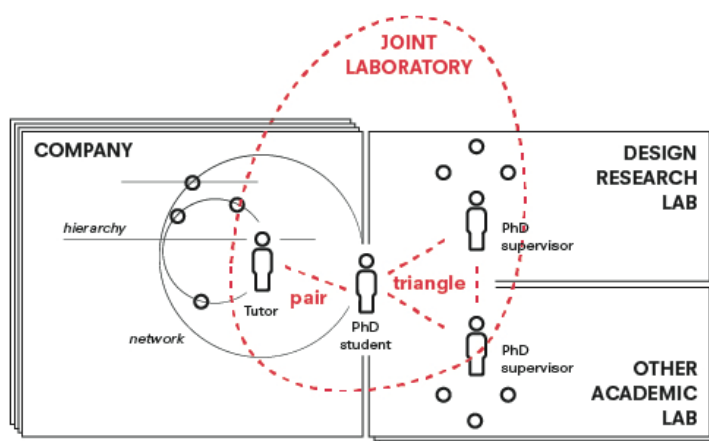


Figure 1. The ecosystem of a PhD student in our research programmes.

3. Ten cross-disciplinary industrial PhDs: a case study

Each industrial PhD project articulates at least two academic cultures and an organisational one, which are tangible through different languages, methods, references, but also sensitivities and ways of seeing the world... In a constructivist and action-oriented approach (Piaget, 1970; Hamel, 2002), we aim at truly integrating these diverse sources of knowledge through close collaboration, to address shared complex issues (Mitchell, 2005). The mindsets required to this end are both cooperative and critique (Klein, 2008; Kleinpeter, 2013). Studies demonstrated that bilateral exchange of knowledge is facilitated by a sense of proximity, fed by informal relationships (Zuscovitch, 1998; Boschma, 2004). In this line, knowledge is not to be “acquired” or “held”, it emerges in context, from interactions that make sense for all actors. This ecosystemic view is at the core of our research programmes, to reconcile the division Western sciences created between “subject” and “object” of knowledge (Morin & Le Moigne, 1999). Such a dialogical way of navigating complexity, we believe, is particularly aligned with design, a relational discipline concerned with how meaning is created in the flow of everyday experience (see for instance Escobar, 2018).

3.1 Analytic overview

In order to write this paper, we analysed how design is mobilised in the PhD projects conducted within our research programmes (in students’ training, supervision, role on the field, contributions). Table 1 displays this data, demonstrating the diversity of cases and configurations of cross-disciplinary industrial PhDs. Then, in the following sections, a matrix supports discussion on the identities, relationships and competences enacted, as well as the outcomes of research and their impacts. Both opportunities and limitations for design research are identified.

Table 1. List of our PhD students (2017-2023). The code [D] or [NonD] indicates whether the student was trained as a designer or not. [ICS], [Mg], [Erg], [Soc], [Psy] or [AI] refer to the host disciplines of the PhD project.

Code	Student's background, work experience before PhD (years)	Disciplines of the PhD	Company	Role in the company	Design-related contributions
NonD-ICS	Trained in Anthropology (university), 1 y	Information & Communication Sciences (ICS)+ Design	Design & Human Sciences consultancy (SME)	Embedded in design teams (pairing on projects)	Guidelines on the use of design tools
D-Mg	Trained in Design (school), None	Management Sciences + Design	Insurance (major company)	Embedded in strategic/UX design teams	Model on the implementation of design capabilities
NonD-Mg	Trained in Management Sciences (school), None	Management Sciences + Design	Mass-market distribution (major company)	Embedded in design teams (management role)	Model on the institutionalisation of design
D-ICS	Trained in Design (university), None	Information & Communication Sciences + Design	Industry (major company)	Embedded in an innovation unit, besides engineering teams	Guidelines on the use of design tools, reflection on professional skills
D-ICS	Trained in Design (university), None	Information & Communication Sciences + Design	Communication consultancy (SME)	Embedded in design teams (pairing on projects)	Reflection on professional skills
D-Erg	Trained in Art & Computer Science (PhD), self-trained in Ergonomics and UX design, 12 y	Ergonomics + Design	Telecom (major company)	Permanent position in the company, embedded in Innovation Labs	Process for design & ergonomics applied research project (including longitudinal field studies, contribution to a "behavioural object")
D-Soc	Trained in Engineering and Interaction Design, 2 y	Sociology + Design	Nursing home care (major company)	Design researcher in charge of a Robotics programme	Methodology for "co-design fiction" (including studies with functional robots)
NonD-Psy	Trained in Social Psychology, 1 y	Cognitive Psychology + Design	Railway (state-owned major company)	Embedded in a team from the Research Department	Model of a design process + contribution to the design of a robotic tool
NonD-AI	Trained in Biology & Neuroscience, None	AI + Design	Innovation & consultancy (SME)	Researcher in a Research programme	Development of a prototype + in-situ study
NonD-AI	Trained in AI & Robotics, no prior work experience	Robotics & AI + Design	Robotics & AI (start-up)	Engineer in R&D projects	N/A (PhD stopped by the student)

3.2 Discussion on identities

Coming from diverse backgrounds, half of our PhD students had some work experience (at least one year) while the other half was continuing initial studies. Only one of them chose to write in English, the others in French, with punctual conference contributions or journal publications in English. Indeed, the PhD projects are rather grounded in local contexts, with little implication of our industrial partners in international communities. It is interesting to note that the most mature profiles are non-designers, who chose to embark for PhD studies after having discovered design and action research in their professional environment. They were mostly motivated by the opportunity to pursue a longitudinal project enabling time to reflect and build knowledge in a specific field.

Figure 2 below proposes a visual representation of the 10 PhD students placed on two axes. The “PhD in/with design” axis represents the expectations associated with design in the research project: is it the disciplinary framework employed to address an issue (*in design*), or rather a set of means used to move forward (*with design*)? The “reflection in/on action” axis refers to rhythms and accents in the approach: is the PhD student mainly contributing at an operational level for the company (*in action*), or in a more distanced manner (*on action*)? Obviously, our mapping does not reflect fixed positions, but trends in 3-years projects involving different stages and rhythms.

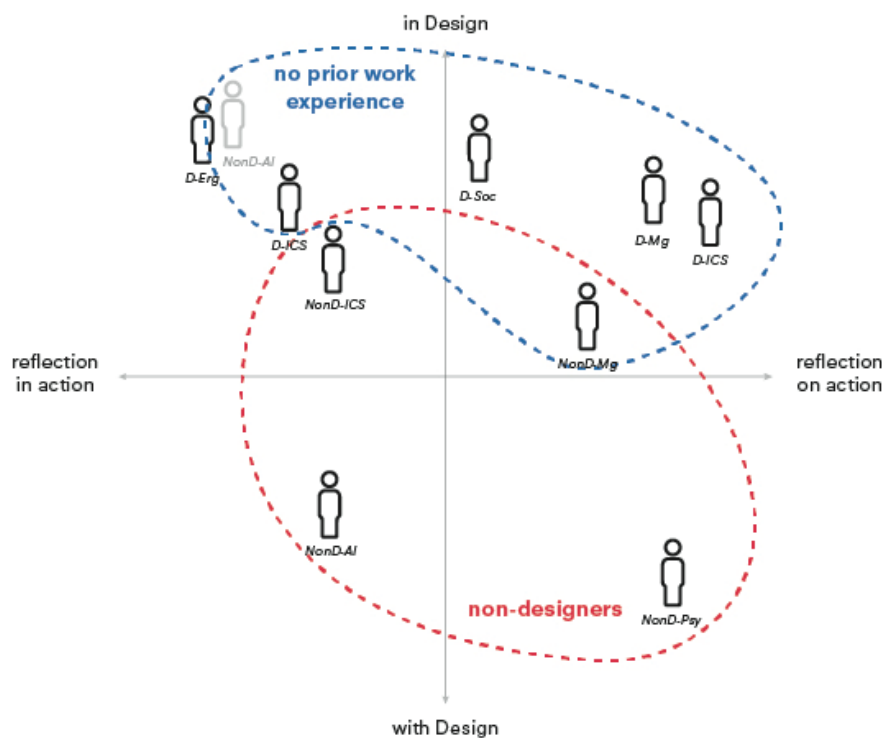


Figure 2. Map of the 10 PhDs along the “in/with design” and “reflecting in/on action” axes. NonD-AI is represented with low opacity as he did not pursue the PhD project. We underlined the non-designers and PhD students having no prior work experience.

Those who were trained as designers had slightly different motivations, mostly towards acquiring critical and reflexive competences about design, and interested in approaching design research communities. Surprisingly, it is not in these projects that the most significant design contributions are to be found (this point will be discussed in section 3.4). We observed that most designers had a tendency to adopt the standards of the disciplines hosting their PhDs, sometimes to the point of

neglecting their own skills. This observation might be explained by the weight of the other institutionalised discipline, taking over design (see section 2.2).

As design researchers, our accompaniment thus focused on highlighting the singularity they could bring in highly normalised academic environments. Indeed, design contributions towards research are various: grounding research questions in key issues associated with human experience, passing through thinking by doing and visualising, and combining approaches for new collaborative work style (Hassi & Laakso, 2011). These skills are sustained by specific cognitive approaches: abductive reasoning, integrative thinking, explorative and ambiguity tolerant mindsets are not exclusive to designers, but particularly tangible in their ways of doing (Hassi & Laakso, 2011). Combining them with traditional academic requirements, based on intellectual rigour and filiation, is an interesting challenge. How to promote design in research, not only as a secondary but as a main discipline?

Our insights point towards a limitation in design students themselves. Despite our interest in promoting towards doctoral studies, their willingness to embrace an academic career appears quite low. Our hypothesis related to this matter includes three aspects:

The writing effort implied in conducting a PhD project³

The mostly professional scope of design training

The image of doctoral studies in France, associated with theory more than with practice.

Indeed, as a research team in a design school, we witness a remaining perceived dichotomy between “professional training” and “the academia”, that we are committed to overcome through interdisciplinary collaborations with tangible outcomes. This includes enabling students to conduct a PhD “as designers”.

3.3 Discussion on relationships and skills

We define skills in a general sense, as the acquisition or development of specific capacities, abilities, aptitudes or competencies (Gilbert & al., 2004). Even when they fall within the scope of well-defined R&D programmes, all research projects in close relation with the field trigger some kind of learning, which may be manifest in novel ways of doing and/or relating, inside and/or outside the frontiers of the host organisation. It may also be much more diffuse, making it more delicate to evaluate the implications of design (Senge, 1990 ; Nonaka, 1991 ; Argyris, 1993 ; Garvin, 1993). Before attempting to assess any impacts of research, it is therefore necessary to understand and qualify what kind of transformation is engaged, under which conditions: what are the triggers, the stakeholders and their roles? What is the visibility of design and design research in this process?

At the forefront, PhD students have been compared to a sort of cognitive platform between the worlds of research and industry, capable of facilitating their rapprochement and knowledge transfers (Levy, 2005 ; Mangematin, 2003). This requires ability to navigate sometimes conflicting social worlds, with translation and mediation competences that might outreach a traditional researcher’s profile. Our PhD students are selected upon their willingness to play this role, and we do our best to tool and accompany them. However, tension between operational and academic requirements remains a matter of concern in almost all doctorates – regarding timeframes, languages, tools, or tacit injunctions.

³ A discussion is open with our colleagues in charge of the Master Thesis. We are aware that not all design students are to pursue research, and that dissertation is a difficult exercise for many; though, we are wondering how this format could be adapted to make room for several approaches, including a valid academic one.

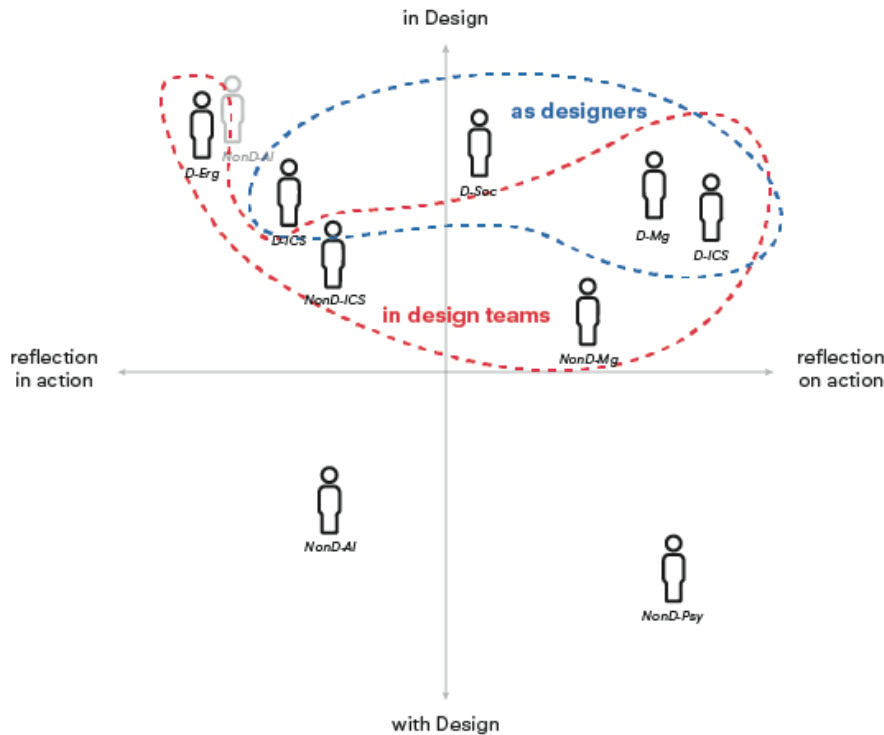


Figure 3. Map of the situation of the PhD students in companies.

Firstly, rhythms and scopes are difficult to reconcile. Addressing a practical issue in the field requires adaptability, responsiveness, and adjustments. Especially in unstable times, most companies tend toward the paradigm of agility. In contrast, a research question matures over time, with reflection on experience put in perspective within a wider state of the art. Defining a scope, means and ambitions for doctoral research and experiments is thus a delicate balancing act. On the one hand, experiencing paradoxical tensions and learning to manage them is an integral part of the industrial PhD experience. According to the conclusions of a thesis conducted within our laboratory, it would even be a key competence for today's designers in organisations. In fact, reflection on the roles and skills associated with mediation are at the heart of several of our doctoral students' work (see Figure 4). That being said, the necessary part of "voluntary intoxication" with practice (Sloterdijk, 1999; Berger, 2017) must remain under control. To this end, our supervisory teams keep a watchful eye on the daily life within host organisations. Sometimes, we put in place support in the form of research residencies: researchers and other PhD students come in the company to participate in an experiment, help elaborating a research protocol, analysing results, or refining artefacts... this is also a way to make visible what design researchers do in the field, while enforcing necessary hindsight from the operational. But, in some cases of especially pressing work conditions, a few PhD students were rather temporarily removed from their environments. One of them experienced such burn out that he came to abandon his doctorate project (NonD-AI). This leads us to the conclusion that this type of PhD experience is not suited for everybody as it demands maturity, autonomy, and organisation. Certainly, a PhD program is a "formative developmental process of acquiring intellectual virtues"⁴ (Mowbray & Halse, 2010); but we noticed that these skills and dispositions are not only outputs of the PhD experience, but also a priori required.

⁴ The authors list: "disciplinary knowledge; research and technical skills; project management and leadership skills; teaching competence; the capacity to communicate verbally and in writing; effectiveness as a team

In the case of industrial PhD projects, it is delicate to discriminate between “acceptable” and overwhelming discomfort. Peer exchange among doctoral students is helpful to this end, as well as the strength of the pair formed with their company tutors. A trusting relationship, where doubts and fatigue can be shared, helps resist the potential tensions and paradoxes met in the organisation. Together, they should act from within to maintain a protected space for experimentation and/or critical distance. But in our cases, several project holders found themselves isolated, being too different from the company culture, the existing ways of doing, and the decision-making processes (Berger, 2022). Some of them even left before the end of the doctoral programme. In such cases, the PhDs were not threatened, and most of our students reacted calmly and professionally. But the lack of strategic support in the organisation hindered the diffusion of their outcomes.

Expanding the student / advisor collaboration into a larger ecosystem of relationships was a topic at the DRS2022 discussion convened by DoCS4Design project holders (Stappers & al., 2022), with the model of networking proposed as a condition for a successful PhD. This was the ambition of our research programmes, bringing together plural perspectives in a shared learning community. We observed that the involvement of actors in these structures was sustained by favourable conditions both at the individual, organisational, and ecosystemic level (Berger & al., 2018). The relevance of these three scales is maintained throughout the programme. Research projects are not merely conducted side by side, but also cross-fertilized by different means: PhD students’ monthly seminars, thematic work groups, annual workshops with shared activities and invited speakers... We set up these formats to complement the longitudinal work pursued in each doctorate with other kinds of exchange, creating occasions for knowledge sharing and creation.

3.4 Discussion on research outcomes and impacts

All doctoral projects produced tangible outputs (prototypes, scientific publications, tools and/or processes to be deployed in companies) but also other kinds of contributions that are more difficult to assess. Those may relate to evolutions at systems level: novel organisational routines, novel relationships between actors (as accounted for in previous section). They may also concern individual transformation. Discussion at DRS2022 mentioned that “a trained researcher with particular competencies” is an integral part of research outcomes (Stappers & al., 2022). Is the development of leadership and soft skills today’s main challenge in doctoral education, until overshadowing more traditional deliverables of research?

Assuming this, our aim would be to foster the evolution of disciplinary identities, until hybridisation (Sedooka & al., 2015). At this stage, individuals are no longer defined by their background, but develop a singular way to navigate different social/technical/cultural worlds. Is this the case for our PhD candidates, and for the other stakeholders of our research programmes? From interviews, we confirmed that they all started some evolution. Though, back in their usual context, such learning proved difficult to share and diffuse. This gap corresponds to the challenges identified by (Nonaka & Takeuchi, 1995) at the “combination” phase of their knowledge creation model. Articulating and translating knowledge gained from experience requires time and support, to reach beyond the first circle and activate an actual transformation loop. In our cases, the limits met in organisations were either horizontal (siloe activities) or vertical (decision chain). We retain the need to assess the strength of the links in the organisation, and beyond, in the network. Isolated project leaders, even at a high hierarchical level, are unlikely to have a strong impact.

player and as an autonomous self-manager; administrative competence; and the capacity to be an ethical, adventurous, innovative, motivated, creative and flexible individual”.

This is also a practical concern before, during, and after industrial PhDs, which need to be supported by close presence of supervisors and researchers in the field, to highlight and reinforce students' academic work, especially in the last year of their doctorate. The formats vary depending on companies' resources and expectations, but also on the type of doctoral research deployed. Indeed, some are based on a specific project; others integrate different pieces of experience into their contribution. This corresponds to different ways to consider the field: as a territory for research, or as a soil above which to raise. This posture naturally influences the type of design-related outcomes:

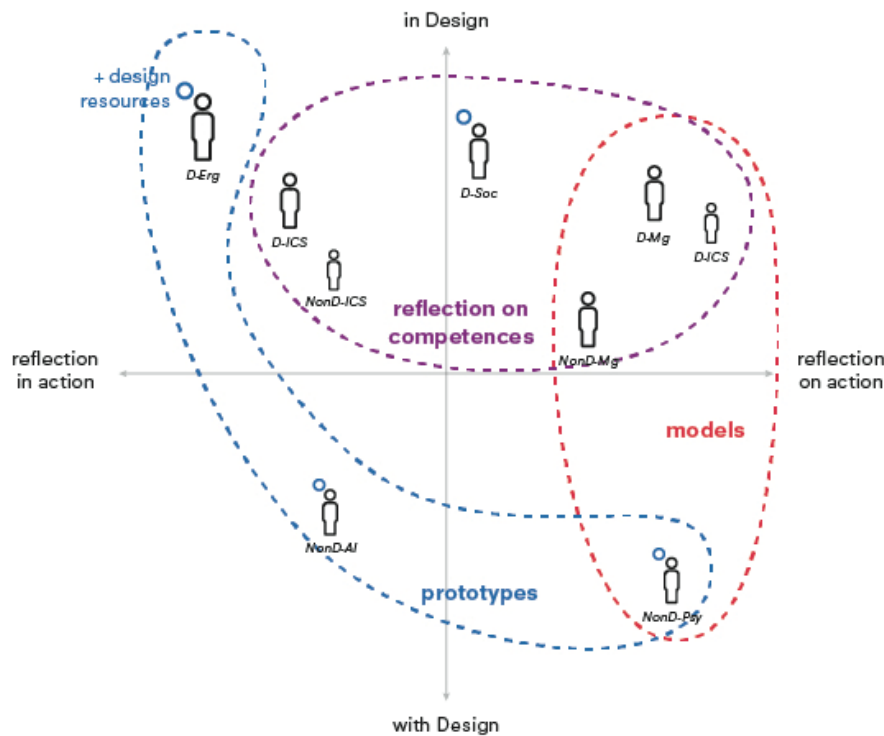


Figure 4. Map of the main design-related contributions of the PhDs. Circles close to the head of PhD students indicate additional design resources deployed to produce the outcomes of research. The size of characters varies according to the importance of the design-related contributions of the doctorate for the host companies (central / peripheral).

In all cases, we observed a paradox regarding the effective impact of the outputs of research. PhD candidates generally leave their host companies once their doctorate is completed (even before, considering the distance usually associated with the writing phase). In those conditions, how to accompany the deployment of tools, models, artefacts... which were precisely meant to address practical issues? The appropriation of research outcomes, and the continuity of the processes engaged are not natural. More widely, the temporal framing of PhDs (sequenced, with a pre-programmed ending) calls into question the relevance of a project-based framework for truly transformative research. We are therefore looking at ways to stimulate more feedback loops towards companies. As academic frameworks above all value crystallised and communicable results, we could only find scarce relevant models and indicators in the literature.

But, besides a structural issue, this difficulty to maintain openness also relates to the posture of PhD students. The academic expectation of producing a doctoral thesis pushes them towards an analytic and distanced stance ("researcher"), rather than an experimental and abductive one ("designer"). This is for instance illustrated by a frequent reluctance to show the backstage work of research in their manuscript. The PhD thesis is an object that will remain, and students want to be "perfect", purified of hesitations, redirections, and renunciations. However, such traces have a real heuristic value. They bear witness to both choices and contingencies, making it possible to argue inevitable

biases and prejudices; but also to ensure true reflexivity, in response to the lack of hindsight sometimes reproached to action research in/with/for organisations. Considering the rules and norms attached to PhDs, it is highly probable that this could only be achieved through the combination of forces, formats, and media. How to promote a more “designerly way of writing”?

Conclusion

We are convinced that PhD students with a design background have a lot to bring to research. Their mediation skills are already acknowledged in cross-disciplinary environments: they can blend within; they can understand and translate languages with the help of their materialising skills. Though, while they navigate social worlds, some might remain quite powerless facing boundaries. The transformative impact of action research depends on the commitment of all stakeholders to take a step towards each other and imagine novel ways of acting and creating knowledge together. To our eyes, cross-disciplinary industrial PhDs constitute an interesting nexus for inclusive and systemic research programmes: both academic and professional environments contribute to the student’s growth, and at the same time, the doctoral project embeds situated knowledge that benefits both the host company and the wide complex territory of design research. We do not argue for a generic model to drive those collaborations, preferring to keep a close look at the scene (reflection in action) then map and compare cases to identify patterns and suggest future avenues (reflection on action). The matrix proposed in this paper is such an object, which helped reveal a few favourable conditions for doctorate research in/with design.

Now, interviews with the doctoral students, the companies and the academic professors involved would probably usefully complement this study based on our point of view as research programme investigators. This plurality of voices, after a few years of hindsight, would allow deepen the perspectives on the actual societal impacts and academic import of our initiatives.

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About the Authors:

Estelle Berger pursues research on the transformative power of design, bridging experience and strategy, building on practitioners' reflection in/on action. In a cross-disciplinary perspective, her initiatives more specifically aim at accompanying organizations in their paths towards sustainable futures.

Ioana Ocnărescu encourages design research for students and instructs courses in experience design and robotics. Her research focuses on the following areas: experience design, low-tech prototyping, in-vivo and in-situ experimentation, living labs, transdisciplinary research, simulation by design, and research management.

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