Service design: tuning the industrial design profession

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Abstract: Design is not only about the design and production of goods, but is increasingly addressing complex social issues nowadays. Roles of designers are becoming more and more varied, and at the same time other professionals are increasingly using design tools in their business, organizational or other innovation projects. New terms such as 'service design', 'design thinking', or even 'co-creation' are quite popular at the moment, but confusing as well: depending on the discipline people mean very different processes or methodologies with these terms. In this paper, we zoom in on the rise of service design. Service design is a user-centred approach to design, just as industrial design is. The contexts of users and their needs, motivations and feelings are starting points for the design process. In the form of a think tank, we critically reflected on current developments in design practice in order to tune the industrial design profession to the latest developments of design practice. Besides a better understanding of what service design brings and how it relates to industrial design practice, we explicitly formulated suggestions for current industrial design curricula, since many new graduated design students do projects in, and find jobs in service design projects.

Key words: service design, industrial design, roles of designers, design education

1. Introduction

The field of industrial design is dynamic and constantly changing, as are the roles of designers in design practice. Since design is a multidisciplinary discipline from origin, it is constantly challenged by developments in society, by technological developments, by the needs of people which need to be served and within the various disciplines. In this paper we refer to 'industrial design' as the practice of 'creating successful products people love to use'[1]. Some might also call this product design, or more specifically user-centred design.

1.1 Industrial design history

Industrial Design became a professional discipline after the industrial revolution. New technologies were used to create mass-produced consumer products to serve people in their everyday lives. The discipline started with giving form to products and producing methods, but soon other disciplines were added to the industrial design profession such as marketing, sales, ergonomics etc. Attention paid to people, the end-users of the to be designed solution, was introduced to industrial design from the beginning, although through different perspectives. This started in the mid-1940s with new disciplines

such as ergonomics and human factors, which focused on the fit of technology and human performance. During the Second World War, a considerable body of knowledge about human performance in aviation was generated, when engineers and psychologists worked together for the first time. Participatory Design emerged in 1970s, aiming to involve various stakeholders in the product development process in order to integrate more aspects, e.g., the users' needs, beside technology alone [2]. In the Human Computer Interaction (HCI) field, the 'user experience' (often abbreviated as UX) appeared and soon became a main focus for designing websites and product interfaces. Industrial design started by creating products, but with the rise of digital technologies, the design space was broadened by designing the interactions between 'user' and 'product' as well. At the same time a more holistic view on the user, taking into account his everyday contexts, motivation and needs became a central element in design [3]. Sub-disciplines emerged such as interaction design, experience design, empathic design since the nineties.

In the last ten years, we have noticed new changes in design practice. The applications of design skills, knowledge, activities and processes are becoming wider. Increasingly designers are tackling complex societal issues, and apply their design skills to projects where product development no longer plays the main role. The solution space is enlarged by possible networks of different stakeholders, service elements and organizational structures. Many refer to these applications as 'service design'. But what is service design exactly and how does it relate with the industrial design profession?

1.2 Views of service design

The term service design is used for a variety of activities, as well as for mindsets by various disciplines, ranging from management, marketing, communication, logistics, social sciences, business administration and design. Depending on the context and discipline it refers to many different things (see figure 1).
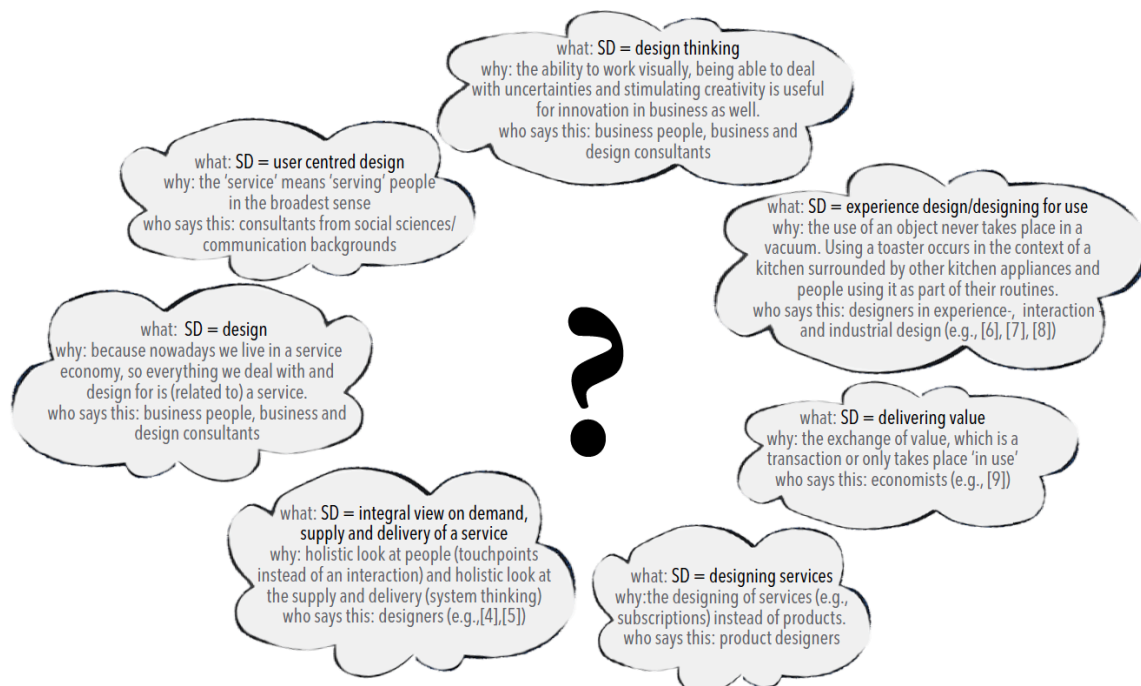

Figure.1 A sampler of different explanations by different practitioners and academics what they mean with 'service design

As such, it does not make sense to try to come up with one definition. In general, it is an approach to design in which the holistic perspective on the end-users has become everyday practice, but which also pays attention to the complex system and possibly involved stakeholders to produce the new design, regardless the production possibilities of the client [10].

1.3 Industrial Design Curricula

Industrial design is being taught at various schools and on different levels. Industrial design programmes are usually closely linked to either fine arts, engineering and/or business, determining their focus within the design domain. In this paper, we take the curriculum of the Faculty of Industrial Design Engineering of Delft University of Technology in The Netherlands as a starting point for this exploration. Practically, because the author works at this school and is therefore able to involve various students, staff and practitioners through the school's network. Moreover, it is one of the largest industrial design schools worldwide and ranked in the top 30 business and design schools worldwide [11]. The gained insights from this study will be compared with other developments in prominent design schools for generalization.

The bachelor programme of the Faculty of Industrial Design Engineering of Delft University of Technology provides a general, all-round education in industrial design. The master programmes offer in-depth knowledge and training in 'Integrated Product Design', 'Strategic Product Design' and 'Design for Interaction'. Students are trained to design products 'people love to use'. A product does not necessarily mean a physical object in the traditional sense. The result of a graduation project can, for example, be a strategy, a concept, and/or a prototype. This can make it quite difficult for other people to recognize the object of design. Or, in other words, what exactly is being designed. An overarching quality of our graduates remains the training in analytical and creative processes, and their focus on people. A core aspect in their design projects is the holistic perspective on the end-users through the entire process. Moreover, students are trained to become T-shaped designers [12], which means having an in-depth expertise combined with crossdisciplinary skills and knowledge. They get a strong training in visualizing skills (also of the intangible), in teamwork and in creating integral solutions [10]. Although the master programmes are specialisations, students are still educated as all-round designers. It is up to the individual students to decide how to specialize themselves further. The wide range of elective courses offered allows students to specialise in their own area of interest.

It seems that service design and industrial design are quite close. What is the difference exactly? Can we learn from new developments in service design and fine-tune industrial design education to the current challenges in design practice?

2. A think tank construction to explore the relation of service design with industrial design

An explorative research was set up to learn more about the overlaps and differences of service design and industrial design. The author conducted literature review, visited service design related conferences and interviewed some prominent service design practitioners and academics over the last four years [13]. Moreover, the author organized working sessions with several staff members of our design school, to promote discussion about these developments and to trigger the school to act upon these developments by

critically looking at the education it currently offers, and if it needs adaptation of new methodologies to support graduates to be successful in their future jobs. Notes were made of all sessions, and constantly shared by a blog.

It soon became clear the service design is an umbrella term, and depending on the discipline it refers to a variety of things. Just as in the outside world, the views and opinions varied widely within the school as well about what service design comprises. Some made a differentiation between products, product service systems, and merely digital services. Others differentiate on individual, business or societal goals. We felt the need we need to clarify this and take position as a design school.

A think tank was set up with design practitioners, students and staff. The design practitioners were selected on their specific mindset or methodology they are deploying in their everyday design practice, of which much could fall under the umbrella of service design. Each guest speaker had his/her own particular interest and described service design from his/her own view (see table 1). About half of the guest speakers have a design background themselves, and were explicitly asked to reflect on current practices and their views on what design students should be able to do after graduation. For example, one design practitioner explained *'In public service design, I often take the role of an entrepreneur, as well as a researcher and designer -perhaps even a bit of an activist. Whereas during my studies I thought I would be the designer.'* The roles of designers were much discussed, and what skills and tools should be for these various roles such as collaborator, facilitator, visualizer, researcher, entrepreneur, provocateur etc.[15], [16].

Table 1. Points of departure on service design by the various guest speakers

Guest speaker	Emphasis in their lecture
Independent public service designer	Designing the organization behind a concept: as a designer you are always dealing with more than one party
User-centred design managers in real estate	Incorporating the voice of many different end users into the design solution
Design research specialists	Understanding the users' point of view
Business developer internet	Using social media to smooth the connection between user and provider
Design thinking consultant	Managing change within organisations
Design strategy consultant	Acknowledging differences between service realization and product realization; the human side of back-end design (such as trainings)
Strategic designer	Considering business models at an early stage of the design process

25 design students of all master programmes were selected for participation based on personal motivation letters. These students would receive 3 ECTs for their participation. The majority of them were international students. All were in the last year of their studies and were actively forming ideas about

profiling themselves in design practice. Many of them had prior work experience in the design field, and could therefore build and reflect on their own experiences with design methods and processes. Also 8 staff members involved in research and/or education in service design related projects participated.

The think tank consisted of a series of lectures by the guest speakers, followed by plenary discussions. In a period of 10 weeks, each session would start with one of the guest speakers presenting his/her cases and their views on designing, followed by a plenary discussion. The entire group discussed the aspects mentioned and we critically reflected how the methods/methodology addressed in the presentation relate to what the current education our school offers. In the remainder of the week one team of about 4-5 students and/or staff would further zoom in on the topic addressed and would shortly present that the week after. Each team explored the topic further by either a literature review, interviewing the guest speaker(s) or other practitioners or academics, and/or reflecting about their own challenges they experienced as practicing designers. Each team was asked to formulate a statement about the topic addressed in relation with industrial design education. The resulting insights were compared with the discourse in three other prominent design schools about the education of the next generation of industrial designers.

4. Topics addressed

In setting up the think tank, we selected seven topics which featured heavenly in the service design debates, and which we defined as important topics by the internal staff sessions and by discussions with the involved design practitioners about the challenges they are facing currently. The selected topics were:

1. **Public service design**: Public service design often deals with institutions, organisations and policy makers. These are different 'materials' for the solution space than in traditional product design. The guest speaker presented cases in which he explained the process and challenges of inclusion of other professions, such as e.g., a policy expert or social workers.

2. **Involving users**: The guest speakers presented a case in which the interior of a new hospital was designed in close collaboration with nurses, doctors and managers. By several prototyping iterations and even a 1:1 prototyped operating room, these users could role play how they use the room and equipment. This process led to several groundbreaking insights which would not be obtained if the users were not involved during the design of the interior.

3. **Prototyping**: The guest speakers presented several cases in which they used all kinds of materials and props to explore possible needs of users. At our school, we don't consider this as 'prototypes' but as 'generative tools' [14]. This brought a lively discussion about the definition of prototyping. Our students are taught that a prototype is created to explore and/or evaluate the context, interaction, experience and/or the concept itself. As services are more intangible than products, it is not surprising that each possible concrete part of a potential service, such as a generative session with users to identify needs, is referred to as a prototype. So jargon was quite confusing in this topic, but the value of prototyping and the different aims (for exploration or for validation) in several stages of the design process was recognized.

4. **Social media in design**: Social media can be used to involve various users and other stakeholders. The guest speaker showed cases in which social media was used in various

phases of the design process and with different goals. He emphasized the many pitfalls of using social media and suggested tips for successful use.

5. **Stakeholder commitment**: When designers are tackling complex issues facilitation skills become important. These skills can be learned from e.g., change management. The guest speaker had a background in business administration and elaborated on his challenges to engage and commit stakeholders within organisations. This session emphasized the importance of designers being able to speak business language in order to get the (right) stakeholders involved.

6. **Back end design**. The guest speaker presented a case about changing the mindset of employees of a call centre for a telecom company, resulting in higher customer satisfaction rates. The solution space was in this case human resources. Besides human research, the back end of service elements consists of database management systems and several IT solutions. We extensively discussed if this should be included in the education of industrial designers or just train students in the basics.

7. **Business models**. Industrial design students learn some basics of business models, but need other others to make a professional business model. The guest speaker showed several cases in which business models were generated in the early stages of the design process in order to explore possible stakeholder networks and revenue models parallel to the concept design. These sketchy tools of playing with business models could be of great use for industrial designers.

This is not a comprehensive list, but a first attempt to address some of the important topics.

5. Insights

During the think tank we soon realized that it is not that important to focus on overlaps and differences. We found that the basic design processes, methods and tools are similar, often identical, although some of the 'materials and mechanics' and jargon are different. Overall, the following insights were distilled about the relation of service design and industrial design:

- **Service design is not just about services**

In industrial design, the outcome of a design process is often a potentiality, a meaning, and not necessarily a 'thing'. This is even more the case for service design: we learned that service designers do not necessarily design services. Outcomes from service design processes can be anything: products, services, interior designs, buildings, organisations, new connections between stakeholders, IT solutions, HR management plans, or even more likely a combination of these. As a consequence, design projects are characterised by the openness of their outcomes. Instead of distinguishing between design processes by their outcomes, whether product or service, it makes more sense to distinguish on mindset or type of design approach.

- **Solution space is huge & complex**

As more and more product solutions have service components, and service solutions almost never exist

without physical artefacts, it is educational to learn more about the production of product and service components and how to integrate them in design processes. Most noticably in service design projects, the solution space becomes increasingly wider and often cannot be clearly framed beforehand.

In traditional industrial design, the solution space of a new waste bin, for example, is bound by the possibilities of manufacturing (e.g., bending steel). In a service design project, for example, that deals with patients entering the hospital to visit a doctor, the solution space could consist of, to name a few, a front desk or a waiting area (interior design), a routing programme, software programmes, employee training, apps for end-users, or even a set of networked products and services.

This is a true challenge for designers since clients often want certainty and clarity about the end results of design processes. Designers have great difficulty to make clear how their processes benefit the organisation and its business in terms of concrete end results or even in monetary terms (e.g., Return on Investment). Because of this multitude of possible solutions, the inclusion of multi-stakeholder approaches, required to create and implement the suggested solutions, is more prominent in service design.

- **UCD has become established practice**

In all cases discussed the design process was user-centred. The cases took the users, their everyday lives, contexts, motivations, needs and aspirations into account. This holistic view on people in their everyday lives is exactly in line with the core of industrial design projects. Industrial design students are taught to design concepts (either products, services, or, increasingly, combinations in product-service systems) by involving users, for example, through contextmapping, observations, iterative prototyping and many other user-centred design methods. So what industrial design has embraced all along has gotten more attention beyond the discipline; other disciplines such as business, marketing, communications, social sciences also began to see the value of putting people first in innovation projects of any type and use design-inspired methods. Taking into account the users' context has become an inherent part of design processes. Design practitioners no longer need to justify every detail of their user research and co-creation: it has become an accepted part of designing.

- **From one to multiple touchpoints**

The service design wave introduced the term touchpoints into the general design vocabulary. Touchpoints are all the points (moments) when a user comes into contact in one way or another with the service. Creating customer journeys helps to identify these touchpoints. In almost all discussed design projects, customer journeys and touchpoints were being created and used as anchor points for several design activities along the process. Industrial design students are trained as user-centred designers, but from the traditional industrial design background they still often focus on one user, one moment and one interaction. Taking multiple touchpoints into account helps to regard the experiences of users over time and thus contributes to the holistic user-centred mindset.

- **Spotlight on provider**

Over the past decades, industrial design has intensified its understanding of users and their everyday contexts. With service design, a new complexity needs to be addressed: that of the provider. The use-time

complexity can no longer be adequately understood as a user-product interaction, but becomes (sometimes through products) a user-provider interaction. This development signals that industrial designers have a new field to explore, a field that hasn't received much attention yet: that of the provider's side. To ensure that their concepts can be implemented, designers need to better understand the complex networks in which multiple stakeholders and organisations are interrelated and collaborating, which is also emphasised by [17].

To conclude, we found it most helpful to regard service design as a perspective to design rather than a distinct discipline next to industrial design. This perspective comprises two main aspects: (1) the holistic perspective on the user, (2) the approach to take into account the complexity of multiple actors, providers, users, and other stakeholders over a longer period of time.

6. Implications for the Industrial Design curriculum

How can we tune in, as a industrial design school, to provide the next generation of designers with an appropriate 'backpack' to face the challenges their future career will bring? In answer to that question, we formulated a set of recommendations for design education, particularly suited for the educational programme of our design school. There does not seem to be a case to set up an entirely new master programme for service design. Students in the current programmes are already equipped to a great extent to operate in the service design arena. At the same time, there is no single set of skills that can be attributed to 'the' service designer, in the same way as to 'the' industrial designer, product designer, and interaction designer. Instead of setting up an entirely new programme, we should provide interested students with the additional means required to work in this arena, for example by offering additional electives such as 'early business modeling' and 'facilitation skills for collaboration'.

More practically, for the basic design programmes, we recommend the school to integrate more theory on prototyping, involve as much design practitioners into education as possible, and support students actively in positioning themselves in their professional life, knowing what roles they can play, and being able to 'sell' their skills. Students need ways to communicate their other skills and achievements on levels of interaction, experience, strategy, and clarifying method, process, and justifications thereof. The latter include experience in facilitating stakeholder collaboration, being ambassador or even becoming an 'intrapreneur' to champion an idea further into an organisation.

These suggestions were written for the curriculum of the Faculty of Industrial Design Engineering at the Delft University of Technology in particular, and the educational board is currently taking these recommendations into account in our new strategy. To evaluate if the insights in this paper are generalizable for other design schools in Europe, three other prominent academics in design education who are dealing with the new challenges of service design for the design profession were asked to share their current thoughts on this topic. We focused on the developments in Europe, since the service discourse is most prominent in Europe at the moment. All three experts agree with the main finding that there is a large overlap of industrial design and service design (see table 2). As there is such a large overlap, they do not feel the need for a specific 'service design' programme, in addition to their current

programmes. But what they all agree on is the need to integrate some of the service design aspects into their current design programmes in order to provide design students with skills and knowledge they need in finding their future jobs.

Table 2. Reflections of three other design schools about the service design discourse in design education

Quotes:	Academics:
"I agree with you that many of the skills required for designing services are already central to good design programmes and in many ways it is a refocusing that is required rather than a new course in service design…Rather than developing a separate service design programme, we initially integrated service design in a project-based course in the third year of our Product Design Bachelor programme.''	Stuart Bailey from Glasgow School of Art (UK) is teaching at the Product Design programme and Product Design Engineering programme (both bachelor), and is subject leader for the master programme Design Innovation and Service Design
"We come from a strong foundation of collaborative design, empathic design and user-centred design. Service design builds upon these fundaments, but also addresses new challenges such as designing for the public sector. In our design programmes we focus on public services and have included topics such as organisational transformations, co-production, value co-creation, and new kinds of collaborative models like creative communities."	Tuuli Mattelmäki is associate professor at the department of Design at Aalto University (Finland). Her research interests concern creative co-design methods in design for services, as well as the new application contexts of designerly approaches.
"For a long time I have argued that there is no need for a specific 'service design' programme as a complement to existing design programmes. These are all built on the same fundaments. When it comes to courses, that might be different. Especially if you think of how to create arenas where different competences can come into play."	Stefan Holmlid is associate professor at the department of Computer and Information Science at Linköping University (Sweden) and heading the Design Master. He is teaching human-centred, interaction and service design.

7. Conclusions

This paper aimed to describe the mindset and methodologies industrial designers face nowadays. By investigating the service design wave and trying to understand how it relates to service design, we have defined a set of aspects to improve design education for the next generation of designers. We did not try to define service design, but rather to understand its dynamics better, in order to apply the service design perspective to more industrial design projects, which are becoming more and more complex. A main finding is that many people use the term and the way they do differs a lot. As the work done under the flag of service design is so multidisciplinary in nature, such differences often lead to misunderstanding. These differences, though, are difficult to overcome, as each hinterland understands their local jargon. However, the most important finding of this investigation is what distinguishes the work conducted in practice under the flag of service design is not its result, but its user-centred mindset and process. Both in service design as in industrial design the outcomes are often a combination of various product and service components. To conclude, we found it most helpful to regard service design as a perspective to design rather than a distinct discipline next to industrial design.

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