Anna Valtonen, Petra Nikkinen (Eds.)

Designing Change

New Opportunities for Organisations

Aalto University

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Foreword

Many things are changing, in our everyday lives, work and society. Technological development, digitalisation and climate change have brought about challenges related to social inequality, business operations and environmental issues, which have been further exacerbated by the pandemic and political havoc of recent years.

However, change is always also an opportunity. Many organisations are now trying to respond to changes surrounding them. What can we do to change? How should we question and challenge existing structures and practices? What concrete ways are there for creating something new? How can we develop new practices? Or, broader yet: what do we want for our future?

Design, too, has changed. In recent decades, design has expanded from the design of objects and products into more strategic approaches, with new foci on leadership, sustainable development, social innovation and societal transitions. We have also seen the emergence of new forms of value creation beyond profit, engaging leaders, industries and communities.

The design research conducted at Aalto University is broad and multifaceted. We are proud of the outcomes of our work and excited about the new opportunities it creates. We also realise that people coming from outside academia can some-

times find it hard to grasp recent research outcomes in order to implement them in practice. So where should one start?

This book provides solutions for taking the first steps in implementing design research and recent design thinking. Its authorship includes 30 professors, teachers and researchers at Aalto University, who introduce the latest ideas in design research with a hands-on approach. The book is intended to open doors to new opportunities for transformation and to provide inspiration and ideas to any organisation thinking about change.

This book is a curated menu of the design field, allowing the reader to pick and choose topics according to their own interest. Articles therefore include reading tips for those who want to learn more. You are also welcome to contact the researchers at Aalto; we are happy to discuss how design expertise could be put into use and how change could be initiated in your organisation.

We hope our book will introduce you to interesting new perspectives and researchers whose work you want to take a closer look at. We also hope that the examples in the book will give you the courage to embark on transformative projects, however small. It's taking the first step that matters.

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Change requires creative experimentation

The design field has been criticised for fuelling over-consumption and creating diversions from real-life problems. Sustainable design has long sought to mend the damage by creating more environmentally benign material and service alternatives. In many sectors, the underlying reason for stubbornly enduring problems is that individual alternatives developed by design simply cannot compete with established industrial structures and manufacturing technologies. The permanence of these problems is further reinforced by the environment created by consumption and investment habits, research steering, institutions and market mechanisms.

But there is hope. Design research has long applied creative, experiential and participatory approaches to facilitating collaboration, supporting social change and creating imaginative alternatives and scenarios. These kinds of approaches can prompt critical as well as imaginative

thinking, initiate wider reflections on sustainability concerns and inspire the adoption of new ways of action. Collaboration and reflections on meaning are the essential driving forces of change.

Any transformation must be imagined and envisioned before it can be realised. Realising transformative potential also requires creative understanding that goes beyond rational thinking, as well as involving emotional and personal components in the transformative work. Transformation is furthered by inviting people from various backgrounds to reflect, experience, do and agree on solutions for more sustainable ways of living. In implementing changes that affect local cultures and people, it is important that scholars focus on engagement and the actual content, rather than solving issues only through technical processes. The rich and multifaceted driving force of creative practices cannot be flattened into simplified guidelines.

İdil Gaziulusoy

Optimisation, strategies and visions

As we prepare to address pressing sustainability and climate-change challenges, large-scale and systemic transformations are urgently needed. These processes are known as 'sustainability transitions', and businesses play key roles in the whole. Although business has been a central topic in sustainability innovation research for decades, the research agenda has not studied and enabled transformative sustainability innovation to a sufficient degree. Businesses need to find ways to break away from 'business-as-usual' and develop strategic visions and plans for long-term transitions. They have to develop parallel strategies that enable them to manage 'normal business' while keeping up with the dynamic transition.

Businesses have three levels of sustainability innovation: operational *optimisation*, organisational *transformation* and *system-building*. At the level of *optimisation*, the purpose of innovation is mainly complying with rules and regulations, responding to current market demands as well as improving the efficiency

of processes, products and services. Organisational *transformation* requires a fundamental shift in the mindset and purpose of businesses in order to create shared value and deliver wider benefits for society. At this level, the focus of innovation is on new products, services and business models. The *system-building* level entails developing radical innovations that seek to transform key interactions between industry, consumer behaviour, lifestyle and even fundamental business logics. At this level, innovations are developed within highly collaborative networks, with a focus on creating new products, services and business models that cannot be achieved by any individual business.

There is an abundance of studies on the optimisation level, and research on organisational transformation is also on the rise. Studies focusing on the most radical, system-building level, on the other hand, are few. System-building sustainability innovation is experimental by nature, and activities are scattered across businesses and industries, which makes this level difficult, if not downright impossible, to trace and study empirically.

Engaging with visionary questions is critical for businesses in order to discern, motivate and manage their role in transition development.

Social change calls for collaboration

The Department of Design at Aalto University offers businesses in-depth expertise in order to help them to develop strategies for transformative sustainability innovation. The collaboration focuses on identifying and specifying the key questions that businesses need to address. These questions can be mapped across three time horizons: *operational* (short-term), *strategic* (medium-term) and *visionary* (long-term).

The operational-level questions revolve around risks, vulnerabilities, strengths, and opportunities that are faced by businesses operating in short-term contexts. The activities of these businesses are characterised by reactive decision-making. If businesses are engulfed in dealing with operational matters, they most likely will not be able to respond to medium- or long-term strategic issues. Addressing strategic and visionary questions is necessary for businesses both to navigate unfolding transitions and proactively influence these long-term, societal and systemic processes. Questions relating to strategic and visionary time horizons influence businesses' capacities to organise internally, locally and globally during the transition. The responses influence the decisions that are, in the operations of these businesses, mostly adaptive. Questions relating to the strategic level may result in conceiving new business models

→ **The temporal-strategic framework helps to understand how businesses can engage with the questions relevant to each level – and to co-create methods and tools for generating and exploring questions relevant to them.**

OPTIMISATION
DOING LESS HARM

Incremental improvements to business-as-usual

Innovation objective: compliance, efficiency

TRANSFORMATION
CREATING SHARED VALUE

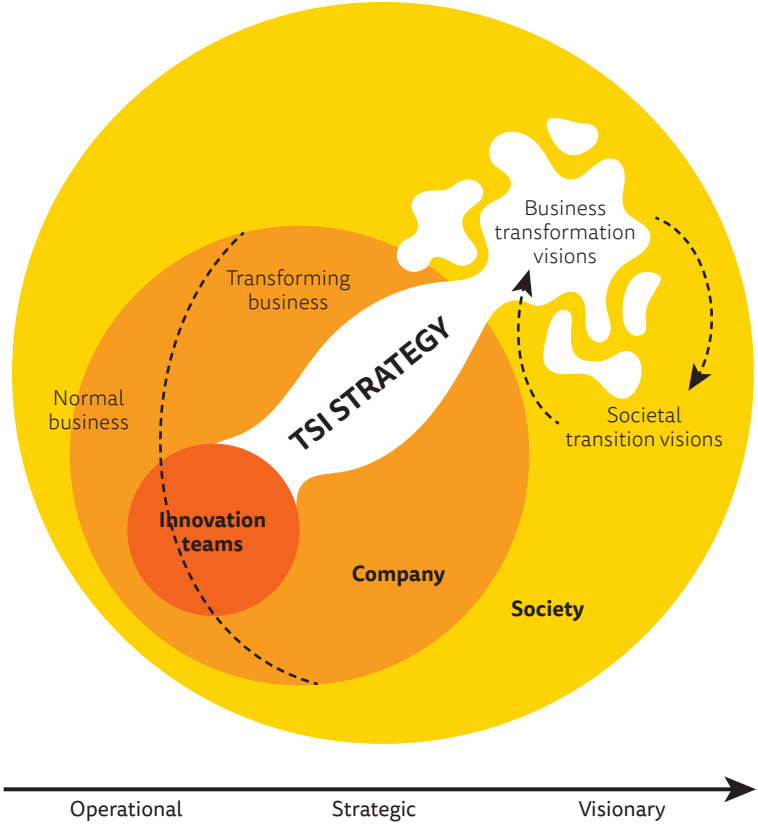
Fundamental shift in purpose

Innovation objective: new products, services and business models

SYSTEM BUILDING
CREATING NEW POSITIVE IMPACT

Co-creating institutional change together with others

Innovation objective: new products, services and business models that are impossible to achieve alone



and product and service innovations that will be relevant for unfolding transitions.

Visionary-level questions concern societal futures, and they are key in envisioning new sociotechnical and ecological systems. Engaging with visionary questions is critical for businesses in order to discern, motivate and manage their role in transition development. These questions need to be pursued in collaboration with all relevant societal stakeholders, including other businesses, researchers, policy-makers, citizens and non-governmental actors. The collective responses to these questions should be fed back into strategic-level discussions of businesses, forming the foundation as businesses formulate key strategies for their individual operational interests.

Read more:

Ceschin, F. & Gaziulusoy, İ. (2019). *Design for Sustainability: A Multilevel Framework from Products to Socio-technical Systems*. Routledge. https://doi.org/10.4324/9780429456510

Sampsa Hyysalo &
Tatu Marttila

An arena of transformation

What if design contributed to sustainability with more than 'less bad' products and services?

Half a century ago, Victor Papanek famously lamented that design was one of the most harmful professions to nature. It fuels over-consumption and creates diversions from real-world problems. Sustainable design has since sought to mend the damage by creating more environmentally benign material and service alternatives. However, their potential has often gone untapped. We have seen an unending stream of new circular product-service systems, revolutionary sustainable design concepts and initiatives for behavioural change, and yet the environmental sustainability problems in production and consumption remain and persist.

Indeed, in many societal sectors, the root cause behind the permanence of these problems is that individual alternative design solutions simply cannot compete against an unwavering system built and established over the decades by indus-

try structures and production technologies, consumption and investment patterns, scientific bases, institutions, policies and market mechanisms. In many well-established sectors, these closely interlinked aspects form a shared and unflinching operating logic.

But what if design could be used for the long-term transformation of those logics? Climate change, biodiversity loss, pollution and slowly advancing resource scarcity are exerting growing pressure to make thorough changes in several sociotechnical systems, such as energy, transport and water use. Granted, long-term society-wide changes are not 'designable' as such, as they result from a number of intertwined actions. They span technological development, altered consumer practices and new business creation, among others. They require different types of actions by different groups of actors, which also need to be coordinated. The actors include decision-makers, experts, civil servants, citizens, NGOs, and business leaders (to name but a few). A number of models for coordinating long-term change have been put forward, including transition management, transition design and sustainable social innovation.

Catalysing long-term sociotechnical change is, however, easier said than done. Thus far, only a few projects have been realised and approaches tested globally. They require a substantial investment of time, resources and new methods of design engagement. In other words, initiating long-term change requires an approach that goes beyond merely rebranding existing design approaches, drawing armchair models or pursuing pedagogical programmes.

Speeding up change management through co-design

Our solution at Aalto University has been to cross-breed co-design with social science intervention approaches. Transition management has been practised for close to two decades, particularly in the Netherlands. Participatory design offers a repertoire of approaches and tools for democratising multiparty envisioning and negotiation processes, which can be adapted for transition contexts, as well.

Our work is best exemplified by the *Mid-Range Transition Pathway Creation Toolset (MTPT)* and associated workshop procedures. It has thus far been used for running envisioning processes in Finnish energy transition, managing aquatic resources, low-carbon traffic, preparing biodiversity strategies and preparing Finland's sustainable development strategy. The method has been implemented successfully on the national, regional and urban scales.

Our approach has had observable social impact; for example, the current government programme of Finland includes direct quotations and measures from our report on Finnish energy transition. This is not to be interpreted as 'the lobbying work of designers'; rather, it points to a multidisciplinary group of experts successfully formulating the necessary actions and raising the level of ambition in a way that was recognised by the majority of parties during the regimes of both the current and previous governments.

Practical tools

The aim of MTPT is to clarify mid-range transition vision and goals, produce concrete pathways and build capacity in a multi-

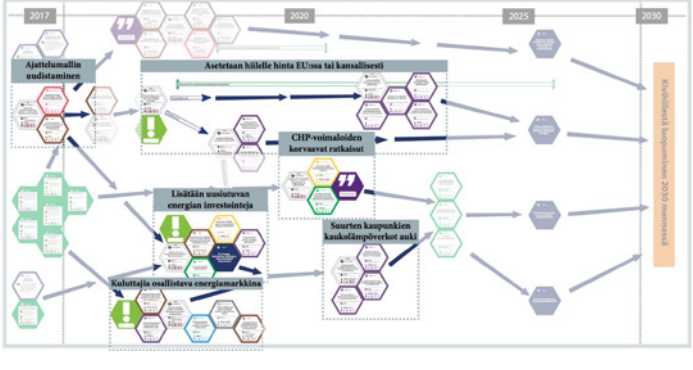
disciplinary group of 15–30 participants. The group goes through a facilitated process to determine goals for change as well as sociotechnical pathways leading to them from the present state. MTPT has a set of forms and categories that participants use to add content and arrange the actions to be taken.

The forms are usually deployed as magnetic elements on a large metallic board, so that 3–5 people can work simultaneously on one pathway without flapping post-its and messy ink-marks. The work typically proceeds both forwards from the present day and backwards from the mid-range target (e.g., from 2035). The results are typically comprised of a few key clusters of pathway steps, typically 15–25 steps, and 40–70 identified actions necessary for those steps. This enables identifying gaps in knowledge as well as action en route to the envisioned mid-range goal.

Processes vary in length

The MTPT process can vary considerably in length, from a single day to several half-day workshops accompanied by digital commentary rounds. Versatility in implementation is important, as using the participant's time efficiently is key to the process, seeing as it often involves attracting busy people like MPs, CEOs, activists and research directors. At best, MTPT processes provide new ideas and visions, clarifying how the actions are interrelated in wide-spanning long-term changes.

For design, comprehensive sociotechnical change calls for new sensitivity in bringing together and facilitating wider and more diverse participant groups and in designing new tools. Change cannot be 'designed' on behalf of others, but necessary



↑↑ Clearly structured and hands-on tools facilitate the creation of new insights and ideas.
Photographer Sofi Perikangas.

change also does not come about unless co-designers are catalysed into action. It is not trivial to decide which models and tools are used for designing a setting that prompts participants and their interest groups to respond to change and envision solutions, even difficult ones, with an open mind. At the same time, it is important to respect the participants' own views and choices in how they discuss the outcomes with different expert and citizen groups, for example.

Managing and expediting sustainability transitions is indeed an area where designers have the opportunity to do much more than merely produce 'less bad' products and services. MTPT is only one of many design responses necessary for steering and orchestrating sustainable change. It focuses on envisioning goals and pathways and on empowering change-makers. Designing for experiments and change in practice, or anticipatory strategic design, requires its own means and approaches.

Tuuli Mattelmäki,
Andrea Botero,
Namkyu Chun,
Markéta Dolejšová,
Kirsi Hakio &
Julia Lohmann

Creativity and participation

Sustainability-related challenges are wicked. Sustainable living encompasses the entire life spectrum, and not only the life of humans, but other creatures, too. How should we co-exist, how should we care and receive care? What do we eat and with whom? How can we envision a way forward, when the future seems to bring so many uncertainties and concerns?

Art and design examine sustainability questions from thought-provoking perspectives. Design research has long applied creative, experiential and participatory approaches to facilitating collaboration, supporting social change and creating imaginary alternatives and scenarios. These kinds of approaches can prompt critical as well as imaginative thinking, initiate wider reflections on sustainability concerns and inspire the adoption of new ways of action. Collaboration and reflections on meaning are the essential driving forces of change.

These kinds of questions and settings were the starting points of the *Creative Practices for Transformational Futures (CreaTures)* research project. It is led by Aalto University and brings together creative practitioners and researchers in order to further eco-social sustainability. In the CreaTures project, creative practices are understood as skills and ingenuity to create new individual, shared, societal and emotive experiences, introduce new themes and, as a result, engender meaningful impacts.

The creative practices in art and design are perceived as transformative potential in the CreaTures project. However, they are often fragmented, meagrely resourced and poorly understood. Creative practitioners are not able to harness their activities for maximum impact, for example, by reaching important stakeholders. Furthermore, even like-minded practitioners have difficulties in joining forces, due to challenges like lacking a shared understanding of practices or difficulties in receiving funding. CreaTures addresses these problems by studying and developing the prerequisites and capacities of creative practitioners to utilise their skills.

The research is constructed around a so-called *laboratory of experimental productions* (ExPs) that supports experimentation and engaging different stakeholders in a variety of productions, large and small. The topics range from social sustainability to the relationship between humans and nature, from art installation to service design, and from individual events to organisational change. The laboratory experiments are followed by the CreaTures observatory, which defines and maps out existing but hidden creative practices. Activities are also evaluated. The aim is to make creative practices more visible, as well as developing tools and frameworks for engaging in better discussions

Realising transformative potential requires creative understanding that goes beyond rational thinking, as well as involving emotional and personal components in the transformative work.

about the transformative potential and value of creativity not only for the practitioners themselves, but also for stakeholders, like policy-makers.

In the following sections, we will introduce some examples from the Department of Design illustrating how designers and other creative practitioners explore how creative practices can stimulate imagination, contribute to hopeful futures and have an impact on eco-socio sustainability.

Baltic Sea Lab

The *Baltic Sea Lab* develops creative methods and tools for activating people to protecting sea health and engaging communities to take action for their local sea. The Baltic Sea Lab hosted a multi-sensory seaweed pavilion named *Hidaka Ohmu*, designed by Julia Lohmann. The work was also displayed at the World Economic Forum 2020 in Davos, Switzerland. Hidaka Ohmu prompts conversation by bringing the sea, its materiality, textures and scents into a human-made environment. Artists and researchers have worked inside and around Ohmu and invited

others inside for one-to-one discussions. The Baltic Sea Lab also engages 'sea stewards', individuals who want to protect their local sea environment and are interested in approaching this work creatively.

These experiments have unfolded three notions of how creative practices engage the community with the ocean and its transformation.

Knowing – awareness of ecological and cultural issues, science-based knowledge and understanding the topic;
Caring – empathy, anchoring values, and emotional and concrete understanding of what is at stake;
Action – active participation and collaboration to enable change.

Fashion Confession to the Sea

Fashion is a consumption-driven business that influences our environment and society in various ways. Creative design practices enable tapping into individuals' experiential knowledge of fashion.

Fashion Confession to the Sea was an intervention that invited diverse fashion actors to the seashore. By Julia Lohmann's seaweed pavilion, participants were prompted to reminisce on the generous yet wounded nature. The participants not only confessed mistakes in fashion consumption anonymously but also proposed possible solutions. The wisdom of individuals has the potential to challenge and change current unsustainable practices in the fashion system, as well as generating actionable and scalable alternative scenarios for fashion.

The project's results were presented at an online event during Helsinki Design Week 2020, which inspired local and global audiences to participate in the discussion by questioning the prevailing fashion system and speculating on new, sustainable practices for fashion.

Open Forest

Open Forest is an inquiry into forests and forest datasets. The production consists of a series of performative actions and speculative research instruments that come together in an interactive installation. The project includes acts like walking in various forests, from a forest field station in Finland to an urban forest in Australia, from a protected forest area in the Czech Republic to forest gardens in Colombia. Participants reflect on their relationship with forests and the living, technical and other entities that inhabit and influence them. This exploration aims at expanding the debate on forests and their meaning.

Sustainable Futures Game

Design games are one of the co-design methods studied and developed at the Department of Design. They are used for starting conversations and stimulating the imagination. In CreaTures,

← **Detail of Julia Lohmann's work, Hidaka Ohmu.**
Photographer Mikko Raskinen.

the game approach is used for creating narratives of alternative futures.

The *Sustainable Futures Game*, designed by Helsinki-based service design agency Hellon, facilitates and enables players to co-create a desirable future for 2030 where the United Nations Sustainable Development Goals have been achieved. The game inspires creative thinking, prompts change in action and ignites conversations about strategies for the near future. The game includes unexpected features to further support and boost diversity and creativity, in addition to creating hopeful pathways for reaching sustainability goals.

Stimulating imaginaries of preferable futures

Any transformation must be imagined before it can be realised. Realising transformative potential requires creative understanding that goes beyond rational thinking, as well as involving emotional and personal components in the transformative work. Transformation is furthered by inviting people from various backgrounds to reflect, experience, do and agree on solutions for more sustainable ways of living. Transformative processes relating to local cultures and people, in particular, should focus on participatory engagements and meaning rather than solving technical challenges. The rich and multifaceted driving force of creative practices cannot be flattened into simplified guidelines.

↑ **Fashion Confession to the Sea offered participants an opportunity to confess mistakes in fashion consumption anonymously, as well as to propose possible solutions anonymously. Workgroup member Namkyu Chun is listening to the suggestions inside the Hidaka Ohmu pavilion.**
Photographer Andrea Botero.

Núria Solsona Caba,
Ramia Mazé &
Seungho Park-Lee

Civil servants as designers

Design for Government (DfG) is a course in the Creative Sustainability multidisciplinary Master's programme at Aalto University. The course develops solutions for select challenges faced by ministries and public agencies. Students collaborate with civil servants in order to address contemporary national-level policy challenges in Finland, by applying the design approach with a set of tools and methods.

The Design for Government approach is based on three core approaches: *human-centred design* (understanding and engaging people with different perspectives), *systems thinking* (systemic analysis of the problem) and *behavioural design* (identifying behaviours to inform effective change).

DfG was founded in the 2014–2015 academic year with the objective to develop and demonstrate what design can offer to public governance. The course emerged in an international wave of interest in creative innovative approaches, which is evi-

dent, for example, in the proliferation of design and innovation labs in government – notable examples include the Strategic Design Unit at the Finnish Innovation Fund, Sitra (also known as Helsinki Design Lab), Inland Design at the Finnish Immigration Service, the Policy Design Lab and Behavioural Insight Team in the UK, the MindLab in Denmark, and the Public Policy Lab in New York City.

Additionally, DfG takes part in building the research and practice-based communities with other like-minded institutions, such as the independent think tank Demos Helsinki, the ORSI Research consortium or Työ 2.0 Lab, to join our efforts of bringing design in the government agenda.

The following are some examples of DfG projects from previous years:

DfG 2021:

- "Personal Budgeting and Mobility Services" – pilot project for persons with disabilities in collaboration with the Finnish Institute for Health and Welfare (THL), the Finnish Social Insurance Institution (Kela), the City of Espoo and the ORSI research consortium.
- "Reducing Carbon Footprint Procurement, Using the Kela Maternity Box Example" – in collaboration with the Finnish Social Insurance Institution (Kela), the Ministry of Economic Affairs and Employment and the ORSI research consortium.
- "Strategy for Expatriate Finns" – in collaboration with the Ministry of the Interior and the ORSI research consortium.

DfG 2020:

- "Just Transition to Post-Oil Heating in Homes" – in collaboration with the Ministry of Environment and the ORSI research consortium.
- "Boosting Climate Education" – in collaboration with the Ministry of Environment, the Ministry of Education and Culture, the Finnish National Agency for Education and the ORSI research consortium.

Design in public governance and policy-making

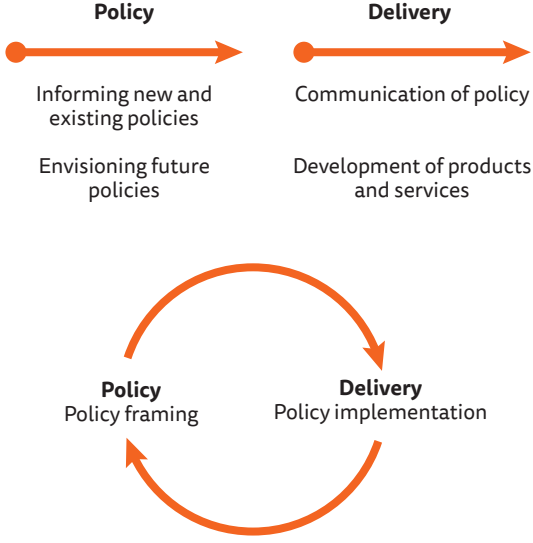
We citizens interact with policies in our everyday lives, for example, by using the designed seatbelts or adhering to speed limits indicated by signs. More recently, design has also been recognised as a strategic approach. Human-centred design and service design have brought about new roles for design in the fields of policy and governance.

The policy-making process is often described as two separate stages: the planning stage (policy intent, strategy or policy framing) and the delivery stage (policy implementation). This division is also reflected in government structures, but the separation between the policy and delivery silos creates challenges for responding to a rapidly changing society.

From a design perspective, policy-making can be seen as a cycle that connects policy (intent and framing) with delivery as a continuum. Designers talk to people and observe them, which allows them to illustrate practical manifestations of policy-making. By observing how policies influence everyday lives, designers gain insights into the implementation, purposes and goals, which in turn can inform the design of future policies.

New models of governance

Conventional policy instruments are limited in their efficacy in complex transitions with high degrees of uncertainty, which is why such challenges cannot be solved with government alone. When design tools and methods are implemented as early as in defining challenges and goals in the policy process, it creates opportunities for re-thinking and envisioning more sustainable and efficient societal outcomes.



↑ **The figure above represents the policy-making process in two stages and the roles of design below. The figure below represents the policy-making process with the help of design. The process is a continuum between policy (strategy) and delivery (implementation). Figures are adapted from Sabine Junginger´s study *Design and Innovation in the Public Sector: Matters of design in Policy-Making and Policy Implementation*.**

Human-centred and future-orientated approaches support governments in building a more collaborative and networked future.

The Design for Government approach
The DfG course structure and design approach combining ***human-centred***, ***systems thinking*** and ***behavioural-based*** design approaches.

Qualitative research with ethnography-inspired methods
In framing the problem, we firstly aim to gain a comprehensive understanding of the causes and consequences behind a policy change. We gather data through fieldwork, interviews, observations or design probes. The aim is to identify the problem to be solved by gathering insights from different user groups, service actors and experts. The gathered data is analysed, and stakeholders are invited to co-create shared meanings.

System models to identify effective interventions

Public governance has a strong silo effect tendency, meaning that a policy area is handled within one ministry or even a single department. Systems thinking can help in creating connections between organisations by understanding the underlying linkages behind the prevailing practices. A systems model facilitates identifying what needs to change across all administration levels and service providers as well as making informed decisions on the necessary actions and understanding solution alternatives.

Low-cost experiments with behavioural design

Behavioural approaches in governance have improved impact and efficiency. They capitalise on the principles of psychology in order to reliably influence human decision-making or behaviour by tapping into unconscious habits, thereby nudging citizens and the whole of society without forcing. Examples of this approach include experiments conducted by the UK Government in partnership with the Behavioural Insights Team, where tax return letters used different types of messages to nudge citizens to pay their taxes on time. This behavioural and low-cost trial resulted in millions of pounds in savings in a short period of time.

Design not only requires the public administration to be able and willing to try something new, but to recognise and use 'design for behaviour change' in policy experimentation and implementation.

To learn more, please visit https://dfg-course.aalto.fi/

Kirsi Niinimäki

A more sustainable textile and fashion industry

Sustainability is a complex problem, where quick and easily reached solutions are rarely enough. Textile and fashion companies focus on better and more ecological material choices, for example, but this approach alone does not constitute a particularly large shift towards a more sustainable and responsible operating model. Sustainability therefore requires companies to adopt a broader perspective on their business and how they design and manufacture products, as well as the courage to step into an unknown future. In the following, I will discuss temporal perspectives in design work, as well as illustrating how design professionals can help companies in their endeavours towards changes that lie far ahead in the future.

Design work is always strongly connected to the business model, strategy as well as the goals and outcomes of a company (see Table 1, p. 40). Design work can involve various temporal

aspects, and the conceptual design approach, in particular, can reach far into the future. Concept design is a process linked to a company's strategy building, and it is not as specific as traditional product design. Concept design can be understood as a process or a path which sets the stepping stones into the future in co-creation with stakeholders. It can outline development paths of the future and seek or define future opportunities. The same approach can be used in strategic sustainability work, which can involve, for example, long-term goals as well as more concrete annual goals, which step by step take the company towards a larger sustainability shift. Annual goals should be defined and written down, and the end of the year entails evaluating how they were reached as well as setting new goals for the following year. This work is reported in the company's sustainability and environmental responsibility report, and it by and large defines the concrete product design work. Examples of such processes include the Finnish companies Reima and FRENN; their sustainability work is presented on their respective websites.

Change requires taking large steps

The business operations of a company exist on three temporal levels: in the traditional level of the past, the transitional phase of the present, and the transformational zone in the future. The traditional way of doing business asks, "What is the business?" The transitional looks forward from the present, asking, "What will the business be like?" Companies with a transformational approach peer yet further into the future and are faced with the most challenging question, "What should the business be like?" This even radically reforming question is a necessary approach

	Stepping into tomorrow with analytical design	Building the future with iterative design	Jumping into unknown future with visionary design
Attitude	Traditional: "what is the business" Quick profit with successful product	Transitional: "what will the business be" Forward leaning attitude, learning process	Transformational: "what should the business be" Creative, bold and experimental mindset
Goals	Short-term goals	Mid-term goals	Long-term goals
Market/product	Well known markets/clients, modified product	New market areas or new product to previously known markets	Unknown markets, new product, unknown future
Brief	Tight brief, clear and easy to reach goals Company is feeding the process with background knowledge	Middle tight brief Some new external research information is needed to feed the design process	Open brief Research information feeds creative thinking
Design process	Analytical design Product development concepts or product design Often one time projects	Iterative design Emerging concept design Continuous development process	Visionary design Vision concept design Opportunities seeking
Risks	Low risk	Middle risk	High risks
Opportunity	Increasing sales and profit in a short term	Increases sales, improves practices in industry or improves brand value and business value	Big opportunity for success with new innovation
Outcome/ Value of design	Well selling product Deeper customer satisfaction	Design is more a development process than a final outcome "Out of box" thinking	Design opens future opportunities

in sustainability transformations. It is a question companies must be willing to pose, since they are faced with such a variety of multifaceted changes that affect business realities, which in effect means that companies simultaneously exist in the past, in the present and in the future. This applies particularly to the textile and fashion industry, which is faced with immense pressure for change. This arises from recent scientific evidence on, for example, the environmental load and climate-change impact of the textile industry, as well as changes in consumer attitudes. Consumers are demanding more information and transparency in terms of where and how clothes have been manufactured, and the environmental impact or carbon footprint of the piece of clothing they have just bought.

Design and design research can envision opportunities of the future by linking opportunity searching to business strategy and product design. Sustainability and responsibility often lead to new avenues in design, and novel business models as well as fresh operating strategies. This change often leads to more environmentally friendly manufacturing practices and products, which at best also direct consumers into more sustainable consumption. Currently, a larger transformation is underway, as the industry is transitioning to the circular economy, which entails designing products that can be used for longer, be put through more cycles, be repaired and, at the eventual end of the product's life cycle, be used in material recycling.

In visionary processes, strategy can be more of an image than a specific and detailed plan. A company can foresee an

← **Table 1. The temporal aspects in design.**

expected future, or, when gazing yet further into the future, it can construct a desired future and reflect on actions for meeting this goal. Sustainable development is based on the same principle: in order to achieve genuine change, drastic leaps as uncertainty prevails are necessary.

Sustainable development requires large-scale change. It demands wider collaboration between academic disciplines, but also between different industrial, business and policy-making stakeholders. Rapid changes in different industries and business operations can have a sharp impact on visions of the future. For example, the textile and fashion industry has suffered dramatically from the Covid-19 pandemic, particularly in its global supply chains. As the European Union simultaneously pushes for a new Green Deal in the textile sector, the industry is being strongly steered towards the circular economy. While the new policies and practices are setting the field on a path towards a more sustainable and responsible textile and fashion system, businesses are uncertain about what measures are necessary in order to actually make the change.

At this point, designers can help by approaching visions of the future by observing them through the lenses of product design, concept design and visionary design. Visionary design, in particular, requires the ability to cross boundaries and engage all stakeholders in collaborative problem-solving. It is also worth remembering that sustainability is a learning path. New knowledge and skills are constantly emerging, and this new know-how will be reflected in business realities and consumer acceptance. This results in a solid understanding of a sustainable textile and fashion industry of the future.

↑ **The *FINIX* project involved designing the concept 'Prototypes of the Future 2030', which brings together several fields of research and describes the change that lies ahead for the textile industry. Prototypes of the Future 2030 includes various pieces of information, from textile material recycling and novel technologies to the manufacturing of recycled materials, lifecycle analysis and the data it requires, to a system for lifecycle information management. Furthermore, the concept offers information on possibilities for encoding lifecycle into garments as well as a designer strategy for adopting recycled fibres, but also on modifying discontinued clothing for the purposes of the fashion industry.**
Designers Elina Onkinen and Kasia Gorniak.
Photographer Diana Luganski.

The Department of Design at Aalto University is currently participating in two large research projects which focus on initiating change in the textile and fashion industry through co-creation. The FINIX project works for sustainability transformations in collaboration with various academic disciplines and companies. Research topics include sustainable and environmentally friendly materials, digital innovations for increasing transparency in supply chains, new design and business strategies, management in the circular economy and environmental impact. The *NEW COTTON* project is constructing an ecosystem in accordance with the principles of the textile circular economy, and the circular economy of textiles is demonstrated on an industrial level. A number of international textile and fashion companies throughout the textile value chain are involved in the project.

Read more:

The FINIX project: https://finix.aalto.fi/
The New Cotton Project: https://newcottonproject.eu/
Niinimäki, K. (Ed.) (2018). *Sustainable Fashion in a Circular Economy*. Aalto ARTS Books. https://aaltodoc.aalto.fi/handle/123456789/36608
Publications within the FINIX project: https://finix.aalto.fi/resources
Read more about companies' sustainability work:
https://www.reima.com/int/our-responsibility
https://frennhelsinki.com/pages/sustainability

← **Designers Elina Onkinen and Kasia Gorniak designed a clothing collection using Lindström Group's disused work clothes as its material.** Photographer Diana Luganski.

İdil Gaziulusoy &
Claudia Garduño García

Experiential futures

We are facing significant social changes. It is critical that we focus our endeavours on a sustainable and post-carbon future. Sustainability goals require us to make significant, even radical changes in our socioeconomic and ecological structures. Our ways of producing, sharing and using knowledge in society all have an impact on processes of change. As we move towards more sustainable development, there is an increasing emphasis on policy-relevant co-creation with societal actors.

Currently, societal transitions are mostly handled by select expert groups. Experts develop visions, scenarios and applicable pathways, then feed their findings into policy-making processes, thereby also locking in solutions on behalf of the wider public. However, citizens should be involved in processes for developing sustainable futures. Since the inclusion of the general public is essential, new innovative participatory methods are necessary. This is not only a requirement for democratic policy-making, but is also crucial for the necessary and

significant lifestyle and behaviour reforms that all members of society are facing. A further requirement is multidisciplinary collaboration between scholars in order to find and develop more effective means for citizen engagement.

Experiential futures is an emerging field that connects experience design and futurology, i.e., the study of futures. The methods used in experiential futures emphasise human experience and meanings derived from experience. They are combined with futurology methods, like scenarios, and human-centred, experiential and empathy-inducing approaches of artistic and design research. Experiential futures projects have been used to examine approachable models of alternative futures. However, they have not yet been utilised in more evolved transition projects marked by high complexity and uncertainty.

Design can play an important role in creating future experiences: firstly, through compelling descriptions of details that constitute the mundane everyday in the future; secondly, by evoking emotions that could prompt people to change their beliefs and thereby also their behaviour. This implies anchoring experiences of the everyday future to the present, which is based on two interrelated ideas: first, by committing to change and by making the transition process available to all; and second, by providing tools for envisioning what futures might bring about. This process involves designing scenarios that situate the future as part of everyday activities and experiences.

The Department of Design at Aalto University is currently part of two large, international research projects that use design and its creative practices to influence transformations to a sustainable future. One of them is the European Union-funded *CreaTures* project led by the Encore research group. CreaTures

Citizens should be involved in processes for developing sustainable futures. It is a requirement for democratic policy-making, but also crucial for the necessary lifestyle and behaviour reforms that all members of society are facing.

(Creative Practices for Transformational Futures) brings together creative actors and scholars from various disciplines to find the best creative practices for furthering eco-social sustainability.

The second is the *NorDark* project, funded by Nordforsk and the NODUS Research Group. NorDark brings together experts in environmental psychology, sleep studies, urban and wildlife ecology and lighting design, among others, to study the impacts of light on humans and animals in urban environments during the Nordic Polar night. The goal is to produce new know-how for sustainable design in northern cities during the dark season. Both of these projects will generate evidence on the impact of experiential futures for sustainable development as well as developing and testing new practices and methods for experiential futures.

Read more:

Garduño García, T. & Gaziulusoy, İ (2021). Designing future experiences of the everyday: Pointers for methodical expansion of sustainability transitions research. *Futures*, Vol. 127, 102702. https://doi.org/10.1016/j.futures.2021.102702

II
Cross-cutting collaboration as a prerequisite

Our constantly changing operating environment demands that we are alert and able to act as pioneers in change. Courage and willingness to change are necessary for creating visionary futures, but so is boundary-crossing collaboration. Change also calls for implementing innovative methods. There are visual and tangible ways to encourage collaboration, open for various interpretations, involve experimental elements and strive for mutual learning.

Multidisciplinary breakthroughs might occur even when the prevailing uncertainty is intimidating. Fruitful collaboration between all parties requires learning each other's methods of working and thinking. At best, open collaboration leads to knowledge exchange, mutual learning and new modes of action, benefiting all participants. Stepping out of one's comfort zone might feel daunting at first, but cross-sectoral collaboration can spark completely novel ideas and a deepened understanding of problems.

The following chapter illustrates multidisciplinary collaboration in leadership, research and innovation projects, product design and the public sector. The examples showcase different forms, challenges, opportunities and results of collaboration.

Taija Turunen

Leading by design

Many of the challenging and constantly changing problems of today require interdisciplinary collaboration. However, traditional bureaucratic structures can be too rigid or slow for organising interdisciplinary work. Self-managed teams appear promising as a means for supporting creativity and networking, but unfortunately there is still little knowledge on such practices. Management nonetheless also plays a role in self-managed organisations, which begs the question of how an organisation can be managed without traditional forms of direct monitoring or control.

Boosting action through interdisciplinary collaboration

Many contemporary problems are better solved through collaboration between experts in different fields. At the same time, it has also been recognised that interdisciplinary work runs the risk of becoming messy, chaotic or even quarrelsome if it is not

properly organised and managed. Collisions between different fields and **approaches do not always make for smooth sailing**.

The legacy of industrial work prevails in hierarchical forms of organisation in the name of economic efficiency, yet excessively hierarchical structures hamper flexibility and innovation, and some studies suggest they are also detrimental for the wellbeing of employees. Powerful top-down steering can undermine the ability of employees to combine existing ideas in novel ways. This has sparked a quest for alternative approaches that enable coordination but allow room for creativity. Lighter and more democratic models of organisation offer a sufficient level of flexibility and freedom to gravitate towards new challenges, as well as making way for the problem-solving skills of people from different backgrounds and with different experience.

Self-managed teams

Decentralising decision-making supports creativity, as it supports employee participation and equality. Furthermore, it encourages not only independent thinking, but also taking leaps over the walls of silos. As hierarchies and silos are dismantled, previously smothered voices and views can be harnessed for tasks and duties that have traditionally been the responsibility of the senior management.

In self-managed teams, programmatic collaboration is not transformed into chaos, but power is instead decentralised systematically and deliberately throughout the entire organisation. Tasks are allocated in interaction between employees, salary levels and bonuses are determined through a jointly

agreed process, and much of the emphasis is on the intrinsically rewarding qualities of work itself. These factors have been demonstrated to have a significant impact on achieving creativity goals and increasing employee wellbeing.

Such organisational forms might seem somewhat ideal, if not **downright** utopian? Who wouldn't enjoy having the freedom to decide on their own compensation, partners and working practices? Yet, as we are human, even these organisations need mechanisms for settling conflicts and defining the course and speed of the organisation's activities. It calls for openness and transparency; all key information should be accessible to everyone. In these contexts, solutions are developed by interacting with people having differing preferences, values and behavioural norms. Self-managed organisations respond to management needs by adopting clearly defined conflict-resolution strategies, making the reasoning behind decision-making transparent. As a result, the ability and desire to reach collectively beneficial decisions is evoked in all employees. As self-managed models of management become more commonplace, the role of design is strengthened.

Designers' capability to design objects for action and inactivity

Designers develop products that enable desirable actions as well as restricting activities perceived as inappropriate. This form of design has been seen as an opportunity for solving a number of social problems. However, let us examine how such skills **could come in useful for self-managed organisations by taking a closer look at an example case**.

In 2016, the Washington Post reported about the 10-year-old Christian Bucks and his mother, who had found a design solution against loneliness in the school playground. The German school had introduced a bench that would be placed in the playground, and students could indicate that they felt lonely and needed someone to play with.

The idea is simple: the student sits on the bench, and a group of designated students ensure that the bench occupier finds friends to play with. The bench indeed seems to work, and since the idea went viral, these benches have been introduced to thousands of playgrounds around the globe. This very simple but powerful idea has since been extended to conflict resolu-

Decentralising decision-making supports creativity, as it supports employee participation and equality.

tion: if two students cannot resolve **their quarrel** on their own, they indicate that they need a mediator by sitting on the bench. The bench thus acts as a tangible and material platform for a social behavioural norm. The managerial role is dismantled: the teacher is no longer required to monitor and control everything, as the responsibility for asking for and offering help is decentralised to larger community.

This is just one simple example of what can be achieved with object design, when its purpose is reconsidered. The idea of including objects in definitions for collaboration and coordination is in fact quite old. Yet, the potential and capacity of different materials, structures and concepts to lead to a functional organisation without designated leaders is interesting, but underutilised.

Tapping into the full potential of objects in management work requires novel approaches. When purposely designed, objects can enable and restrict activities in self-managed organisations as well. New, looser organisational forms should be accompanied by material platforms that facilitate natural but deliberate social activity.

A particularly interesting aspect of collaboration-supporting objects is their perceived nature as 'epistemic things', whereby they are associated with observation-based preconceptions. Objects become epistemic when they embody the yet unknown. By giving shape to the emerging shared understanding and decisions, concepts, materials and structures form part of the core of strategic work.

We know that placing a coffee machine in an organisation is a strategic question; in other words, how do we facilitate occasional interactions that are unintentional yet meaning-

ful? We also recognise the impact symbols can have in encouraging action or discouraging undesired action. If a person is walking a dog that wears a yellow ribbon, they should not be approached as the dog might be aggressive. In a similar way, we could design symbols to social order, to communicate unavailability to co-workers or to indicate that we need help. We could also design benches, **be they** virtual or material, to signal loneliness, conflict or simply the need for help, as tools for organisations that are not hierarchically managed. Material objects and related social processes can be linked in a variety of ways, but systematically recognising and illustrating them as part of self-management is still in its very early days.

Intelligent design allows things to happen without deliberate control or continuous supervision. Objects, artefacts, materials, infrastructures, symbols – they are all examples of design and great works of designers, influencing our actions. Gaining an understanding of how design can be harnessed for coordinating and controlling work in non-hierarchical organisations would thereby be to our benefit, in order to proceed in a creative and tolerant manner, without slipping into chaos.

Pirjo Kääriäinen &
Kirsi Niinimäki

Designers – the agents of change

Our society and its various industries are faced with increasingly complex material-related problems. Tackling them calls for versatile and multidisciplinary collaboration. Multidisciplinary collaboration enables approaching the problem from various perspectives, which inspires new ideas and solutions. Designers are increasingly often collaborating with materials researchers in developing attributes for materials and their innovative applications. In addition to their core skills, collaboration skills and the willingness to work together with other disciplines are becoming part of a designer's core competencies. But what does collaboration in material development look like in practice?

"How can we design anything if the material properties are unknown?" This question was posed by a designer in the early stages of an international material research project. Aalto University initiated the still-ongoing collaboration between designers and material researchers in 2010, and it has been a long learning process, as the disciplines have different practices

in working with materials, conducting research and producing knowledge. The question above can indeed be seen as one of the main challenges in material-centred research and development projects.

Another challenge is the scale; for example, fundamental research projects have access to very limited material supplies, if any are available at all, which makes it impossible to make the prototypes necessary for the design process. In the quest for material innovations, we need new knowledge-production methods, design thinking, new understanding and novel methods for crossing disciplinary boundaries.

Multidisciplinary breakthroughs might occur even when the prevailing uncertainty is intimidating. It is impossible to fully understand another discipline, but it is also not necessary. Adapting to another field's disciplinary practices can be challenging, but it might deepen the understanding of the problem and prompt new ideas. The co-learning process is based on openness and respect, but the process might nonetheless benefit from intermediators who are able to bridge knowledge and communication gaps between disciplines.

Towards a responsible material future

Designers have always been interested in exploring materials in the product design process, but as we are entering into the circular economy, this is no longer enough. The environmentally most important decisions are made as early as in the initial stages of the design process, whereby material flows and product lifecycles need to be designed in parallel with the traditional product design process. This work requires a broad knowledge of materials, their origins and their usage. Furthermore,

it demands closer collaboration between scientists, engineers, designers, business experts and recyclers.

Currently, many designers are enthusiastically developing ideas for new sustainable materials by using raw materials or waste streams in their living environment. Interesting material experiments are presented in both traditional and social media channels. The majority of these creative ideas are do-it-yourself experiments, and only a fraction have the opportunity to evolve into actual research projects, in which experts collaborate in developing materials for industrial and commercial applications. Not all ideas will fly, but the curiosity, creativity and braveness to try things – and to fail – displayed by designers is opening new avenues for a more sustainable material world.

In scientific material research projects, design professionals might work as a designer and/or as a design researcher. The role of the designer typically involves developing ideas, concepts and prototypes, engaging future users in the development process (e.g., through joint workshops), as well as science communication, for example, through exhibitions and events. If there is access to the material, the designer uses hands-on experiments, gaining an understanding of its properties, and possibly tests and develops suitable processing methods and applications. At best, these experiments provide new perspectives for materials researchers in both basic and applied research, as well as contributing to developing material properties in the desired direction.

→ **Hands-on experiments with bio-based materials. The multidisciplinary Nordic Biomaterials with CHEMARTS Summer School 2021 organised by Aalto University. https://chemarts.aalto.fi**
Photographer Petri Anttila.

The established tools for communication in the field of design are also suitable for disseminating knowledge to other fields, even beyond materials research. Tangible prototypes, experimental material samples, visualising concepts and ideas as well as professionally produced videos, photographs and infographics enable all stakeholders to imagine a possible future, which makes future-related decision-making a bit easier. However, communication is only one aspect of the opportunities provided by design. It is crucial that designers are involved in putting the future into practice, for example, by expanding materials and technologies from the laboratories into meaningful and sustainable applications, and by highlighting possible problematic aspects.

An illustrative example of the opportunities of interdisciplinary materials development is *CHEMARTS*, the Aalto University collaboration between the School of Arts, Design and Architecture and the School of Chemical Engineering. It was initiated in 2011 with the purpose of inspiring students and researchers from various fields to co-develop new concepts and applications for biomaterials. The goal is to open views and paths into a future where natural resources, agricultural and industrial side streams and manufactured products are used in more efficient ways than today – be it in the bioeconomy or circular economy. Experimental interdisciplinary work on materials enables things to be observed simultaneously from various perspectives as early as in the development phase, which also helps designers to understand how they could contribute to building a better material world.

← **Material and colour experiments with flower waste being created by Irene Purasachit and Bingdie Huang at the CHEMARTS Summer School 2020.** Photographer Esa Kapila.

Severi Uusitalo

Multidisciplinary knowledge creation: Case AMRI

Technology development requires collaboration between multiple disciplines. Design has proven to serve as a useful knowledge-creation approach in multidisciplinary projects. Knowledge creation refers to collaborative work with the aim of developing and modifying, for example, theories, ideas, models or projects. This article illustrates multidisciplinary knowledge creation by describing the ongoing *Accessible Magnetic Resonance Imaging (AMRI)* project at Aalto University.

Case AMRI

AMRI is a research project between two Aalto University schools, the School of Electrical Engineering (ELEC) and the School of Arts, Design and Architecture (ARTS). Its roots are in the decades-long research on medical imaging at ELEC and its preceeding organisations within the Helsinki University of Technology.

The project aims to bring Magnetic Resonance Imaging (MRI) out of the conventional hospital environment and closer to the patient, as well as finding new applications for medical imaging. The objective for the new solution is to decrease local and global inequalities by providing high-quality healthcare with imaging equipment which can be used even in crisis zones and remote areas that are difficult to reach. This is also in line with the United Nations Sustainable Development Goals.

In the scope of the AMRI project, the goal is reached by designing a research platform for a very low field MRI scanner. The medical community strives for more accessible diagnostics, and lowering the magnetic field strength improves the adaptability of MRI for applications that serve needs and circumstances beyond its current use. Design researchers gather information on potential application domains (e.g., healthcare and wellness), application areas (e.g., mobile and hospital), and uses (e.g., pulmonary imaging and cerebrovascular emergencies). The multidisciplinary team can then use the gathered information for extrapolating and developing solutions.

Students involved in the development work

The AMRI project has also been incorporated into Master's-level teaching. During the Emerging Designs course in autumn 2020, design students created product service system (PSS) proposals for six AMRI applications in the fields of healthcare and wellness. Technology researchers provided knowledge of and insights into medical imaging and its technologies to the students. Design researchers mentored the students and supervised the project.

While the six-week course was rather short, some student proposals have proven very valuable for the project.

A student team focusing on AMRI applications for emergency vehicles interviewed healthcare and rescue professionals, which led them to identify acute cerebrovascular conditions as the focus of their concept. The students conducted a co-design workshop with paramedic students at Metropolia University of Applied Sciences. This involved testing and developing the diagnostics protocol with a mock-up of the system in a real ambulance interior. The workshop revealed various aspects of the diagnostics situation that needed to be taken into account, such as the content and means of communication on-site, and with off-site parties, the impact of various physical elements

Design has proven to serve as a useful knowledge-creation approach in multidisciplinary projects.

and, essentially, what kind of system layout should be taken as the starting point for the future development work.

The involvement of design students in the project enabled the exploration of a wide variety of solutions and domains where the new technology might fit. The students' ability to innovate, research and network has broadened their information gathering.

Co-evolution of defining problems and finding solutions

Design activity has been described as a co-evolution of problem definitions and solutions: defining the problem guides the problem-solving process, and measures for finding solutions lead to a better understanding of the problem. In AMRI, much of the designers' efforts have been directed at identifying and clarifying suitable problems for the technology. This involves gathering further information on a limited range of imaging applications in order to map the conditions for the design work. The conditions are related to the users, uses and operating environments, objectives and constraints, as well as suitability criteria for all the identified aspects.

Designers must be able to develop the requirements, objectives and boundary conditions into concept proposals. The proposals act as 'boundary objects', shared reference points or platforms that support multidisciplinary collaboration by enabling validation of partial solutions as well as facilitating documentation and communication. In the AMRI project, the prototype developed by the technology researchers is technically de-coupled from the solution proposals created by the designers. On one hand, this allows sufficient room for planning and

designing solutions and, on the other, it shields the imaging technology research and prototype building work from conflicting and changing requirements. In a later stage, the designs are again re-coupled together.

Measures that facilitate the interaction between the different involved parties, such as the AMRI research platform prototype and the related design solutions, blueprints, customer journeys and interview reports by the designers, play a significant role in developing novel solutions. Interaction often requires motivation to meet halfway. Technology researchers have to steer away from their task at hand and participate in co-design workshops. Designers, for their part, have to adapt their processes to the realities of prototype building. One of the designers' tasks is to provide a vision for the future when the prototype is still in the planning or trial stage.

Co-design

According to the study of Michael Muller, co-design with partners from different fields can at best generate a conceptual 'third space', which merges the participants' knowledge and uses it for developing new insights and practices.

The value and impact of co-design has been recognised in medical device and service research and development. For example, at Oulu University Hospital (OYS), the AMRI team had the opportunity to gather insights from the management and in-house service designers of the hospital, who had played key roles in the design and construction efforts of their new hospital. By October 2021, they had organised over 400 co-design workshops, large and small, which were attended by 5,600 par-

ticipants consisting of clinical staff and other stakeholders. The service designers developed a strategic design platform for the OYS2030 construction project, which was used for co-designing hospital operations and spaces. Service designers were able to arrange workshops and spatial mock-ups for creating or ensuring operations and spatial solutions. This efficient, flexible, experimental and inclusive design model will have a significant impact on the resulting hospital design.

The Product-Service-System concepts proposed by the designers in AMRI also reveal the need for further multidisciplinary collaboration: healthcare services are interlinked with complex technological, professional, political, economic and other systems. This calls for yet wider cross-sectoral collaboration, which not only can inform of potential problems, but also create new opportunities for innovation. Innovation can surge from the work of designers, technology researchers or health economics scholars. In AMRI, we are betting on its roots also residing in collaboration between different fields.

Read more:

Moultrie, J. (2015). *Understanding and classifying the role of design demonstrators in scientific exploration*.

Salu Ylirisku

Language games in design

The previous article showed how knowledge production is essentially cross-sectoral collaboration. Smooth collaboration requires good communication. Designers have to interact with various people. The three most important groups are *users*, *engineers* and *managers*. Designers have to develop adaptive skills for communicating with each group, since what matters for one's operating environment and culture varies. Simply put, *users* want to handle their everyday tasks, enjoy life and stay healthy. *Managers* are interested in the effective use of available resources, schedules, and impact. *Engineers* focus on understanding the nitty-gritty of a design problem, in order to develop an optimal practical solution. Designers have to bring all of these perspectives together.

Clear communication can save time, money and effort. In the best case, good communication can help avoid producing an altogether useless result. For an innovation organisation,

nothing is more expensive than producing the wrong product! Typically, smooth communication helps designers to identify central challenges and reach a working balance between conflicting wishes and demands. To borrow a philosophical concept developed by Ludwig Wittgenstein, designers must take part in the language games of their stakeholders.

Dialogue with the engineer

The outcomes of design, such as Internet-connected devices, are complex. Their development processes require meticulous and knowledgeable design, whereby the designer must be able to express their ideas in very clear terms. The engineer responsible for the device's functionality hates ambiguity, since they need to explicitly specify how a device performs. Designers, however, are skilled in interpreting open-ended and subjective meanings, such as user needs. Engineers expect designers to be thorough and, in particular, for their demands not to change randomly under some mythical intuition.

If we invite the designer into the project only in its final stages, their task becomes reduced into the wrapping up of the readymade decisions into as attractive a package as possible. To get the most out of the designers' skills, we should include them from the get-go to make sure that key decisions are on the right track. If we leave the designer with merely applying final cosmetic touches, there is little they can do for the design outcome's viability if it is based on impractical, unnecessary or even harmful product ideas.

Crystallising the key requirements for an innovation is an extremely demanding process, since it involves taking the design

outcome's entire life cycle into account. No one designer can single-handedly conceptualise superior solutions, but they must work in collaboration with engineers and pay close attention in order to grasp the technical possibilities. Besides words, this dialogue involves bodily and visual communication. Designers illustrate and concretise observations and experiences in order to translate them into the framework of technical capacities. This allows designers and engineers to work on a shared understanding on the ideas worth pursuing further.

'Design' is an ambiguous term causing confusion in cross-sectoral communication. Talking about 'design thinking' could clarify the distinction between the abstract, ideational dimension and the more practical and concrete level. It would send engineers the message that the designer is not threatening their expertise by barging into their field, in which 'design' usually refers to a very specific, clearly defined and measurable aspect, like 'electronic circuit design', which enables entering dialogue from a more fruitful starting point – namely, how design thinking can bring in added value.

Dialogue with the user

Designers usually create things for other people than themselves, whereby they conduct research into the world of the intended user. The functionality of things is always in relation to the operating environment, activities, objectives and experiences of the activity. The notion of 'functionality' carries very different meanings in open houses and GPS navigation, for example. In design, a functional solution is one that serves practical and experiential purposes under a specific situation.

Without dialogue with the user, the designer could end up with a vision that does not resonate with users at all. Since the users are situated outside the designer's own bubble, their preferences and vocabularies might differ significantly from the designer's own. Designers must therefore be able to communicate their vision to users so clearly (e.g., through visualisations, contraptions and prototypes) that they can grasp the idea, approach it from a relevant perspective and provide meaningful feedback.

Technology has opened the avenue for such radical possibilities that users might have trouble identifying what the new idea could mean for them. Just like in the dialogue with the engineer, the designer must translate ideas into concrete, real-life terms for the user. We should focus concretisation efforts on experiential and practical aspects in which the users are experts. The way an idea presented should reflect its maturity, i.e., how far developed the idea is. An experimental idea is best presented as rough sketches, in order to avoid the user's focus being misdirected by less relevant superficial features.

Depending on the project, the circumstances and reasons for engaging dialogues with users vary. At an early stage, the dialogue might be about gaining general understandings of the user culture. Later on, feedback on preliminary plans might be useful for improving the plans, and yet further on, tests with potential users can reveal important aspects about prototypes and even final products.

Dialogue with the manager

A relevant and well-designed output is ultimately meaningless if we cannot make it accessible to the wider public. The designer must convince managers that ideas are worth investing in. They must be able to argue in concrete terms why carrying out the idea is desirable from a financial perspective. Managers who carry financial responsibility are interested in return on investment, whereby the designer must also speak the language of money.

Managers also have a tendency to seek ways to drive down the costs for implementing the idea. They might suggest changes to plans, and sometimes these changes have a negative impact on the experiential quality of the product from the end user's perspective. Designers must therefore ensure that the suggested changes do not damage the user experience, for example, by making the product impractical to use. The eventual result could remain unutilised, which translates into wasted investment in manager-speak.

The designer must be able to justify higher investment costs, for example, by pointing to the customers' willingness to pay more for the suggested output; or collaborate with engineers to find more cost-effective means for creating sufficient added value for the end user. Good managers are quick to grasp wider wholes, whereby the designer's task is to communicate clearly why a particular investment is necessary. Since nobody has experience of the future, the designer must be able to illustrate things that do not yet exist to the manager, and the manager's job is to decide which investments to give the green light.

To get the most out of the designers' skills, we should include them from the get-go to make sure that key decisions are on the right track.

Read more:

Ylirisku, S. (2013). *Frame it Simple! Towards a Theory of Conceptual Designing* [Doctoral dissertation]. Aalto University. https://aaltodoc.aalto.fi/handle/123456789/20082

Tuuli Mattelmäki,
Annukka Svanda &
Kirsi Hakio

It takes two to tango – when design meets the public sector

The collaboration between the City of Helsinki and the Department of Design was initiated in 2009. The early days are characterised as adventures, as the ground between design education and the public sector was uncharted territory. As Helsinki served as World Design Capital in 2012, the term 'service design' became more familiar to the wider public. It was a buzzword that also evoked frustration, since it lacked concrete examples. Today, the public sector is familiar with service design, many public servants are knowledgeable and trained in service design practices, and service design research has progressed.

In the following, we will illustrate the importance of service design research and education for municipalities through a couple of example cases. We will also shed light on factors that either discourage or facilitate collaboration. Finally, we will outline how design work has been used in municipal collaboration to address topical themes and social questions.

Developing human-centredness, participation and collaboration

The research collaboration with the City of Helsinki focused on methods for improving participation, human-centred design and collaboration. A prerequisite for developing better customer journeys and human-centred solutions was facilitating collaboration and interaction between different units and stakeholders.

Fruitful collaboration between designers and municipalities required learning each other's methods of working and thinking. Designers are in general comfortable with applying innovative methods. They are visual as well as tangible, encourage collaboration, are open for various interpretations, involve experiential as well as empathic elements and strive for mutual learning. Previously, public-sector organisations were not particularly familiar with the experimental approaches of design. Furthermore, the hierarchical culture of the organisations has been recognised as a barrier to creative joint activities.

Human-centred design and empathy are at the core of service design. Empathic design emphasises the relationship between the designer and the user, in which the designer strives to understand the world from the user's perspective and implement this knowledge in design work. The focus has been on the empathic abilities of the designer and the crucial importance of relating to the users in order to create experiential content. In projects with municipalities, the attention needed to be directed elsewhere. Service development in the municipal sector often requires a complex network of organisations and individuals, including experts in various organisational units and partners from various sectors as well as citizens. Building and fostering empathic interaction within these networks therefore became a goal.

The designers' repertoire for furthering an empathic approach and innovative collaboration includes co-design workshops. These events strive to create a fruitful setting for the participants, who represent various backgrounds, motivations and opinions.

The workshops are spaces for expressing thoughts, sharing experiences and creating ideas and solutions jointly with the other participants. They help in building a shared understanding of the current situation and envisioning potential solutions of the future.

The novelty of the early co-design experiments stemmed in part from applying tools and processes to the public sector and civil servants. On the other hand, the enchantment was also related to new ideas and methods for furthering collaboration, participation and human-centred solutions. This entailed new ways of crossing departmental and sectoral boundaries and adopting experimentation. In addition to collaboration between different actors, a customer perspective and human-centredness are essential aspects of service design.

Service design co-developed with municipalities should involve a particularly strong culture of communication. A balanced discussion entails an exchange of ideas, in which the roles of listener and speaker rotate on an equal basis.

Small but steady steps along with societal change

The Department of Design at Aalto University has a long-standing collaborative relationship with the City of Espoo. The collaboration includes an annual service design course, during which design students are engaged in addressing challenges

proposed by the municipality. The course themes are designed to be topical and have social impact, ranging from citizen participation and fostering care to diversity and inclusion, among others. Over the years, the courses have become a collaborative platform that allows teachers and students to address and develop solutions for real-life challenges jointly with civil servants. It has also served as a channel for civil servants to work with design students and become familiar with practices in design. Furthermore, this collaboration has offered an arena for researchers to explore research questions.

In 2018, the course theme was 'fostering care'. It addressed service design as a dynamic academic discipline that focuses on responsibility, for example, as well as how we are connected and related to each other when shaping the future. Combining the perspectives of care and service design provided both the city representatives and design educators with an opportunity to recalibrate the focus of service design from customer needs to a more relational and responsible world view.

The education collaboration was further strengthened through a research project which focused on immigrant employment in municipalities where the proportion of foreign residents is rapidly increasing. Such forms of collaboration are interesting and rewarding from several perspectives: on one hand, they develop service design research in relation to societal change, on the other, they are about developing municipal services. The holistic approach to service design benefits both perspectives. The ultimate goal is a more equal and just society.

The transformational power of service design has been recognised, and it can also be harnessed to initiate and develop reforms in wider social issues. However, there are factors that

have to be taken into consideration in order to achieve lasting changes in the desired direction. Smaller changes can be sufficiently powerful for bringing about long-term impacts, but in order to accomplish enduring and fundamental transformation, the parties must commit to the work and have an in-depth understanding of the organisational structure. In our research project during the 2020 course, we assessed which prerequisites for change were present in the collaboration, as well as reflecting on whether they could be used as support for achieving the set

objectives. As we were outlining these prerequisites for change, we simultaneously identified related challenges. These can be characterised as critical junctures. They are moments when a small shift in a single matter can lead to significant overall changes. Promising research ventures in our collaboration include tackling challenges on the path to change and the role of service design in addressing them.

Municipality representatives have recognised that engaging in critical analysis is a necessary ability. The best results are achieved when service design is incorporated into an ongoing development process, during which a mindset of change still prevails in the municipality. The organisational culture should simultaneously be developed in line with the transformation under development. The development is facilitated by recalibrating the ideational models of the organisational representatives, and this process can be further supported with coaching, participation and hands-on support materials. People need support and tools in order to avoid unconsciously reproducing and reinforcing institutionalised social structures, and to spread awareness of the transformation These aspects can also be developed through service design methods. We have observed that long-term collaboration with municipalities yields better opportunities for supporting this development while we simultaneously educate future service designers and develop service design research.

← **The workshops are spaces for expressing thoughts, sharing experiences, and creating new solutions jointly with the other participants.**
Photograph workgroup Annukka Svanda, Chiayu Chang, Saga Santala, Siiri Lepola, Tilda Jyräsalo and Xinyue Du.

III
Design and its many values and materials

The field of design is heading towards designing transformations. The underlying idea behind this shift is the notion that design has a strong influence on consumption habits and thereby also the environment. Design is a method for moulding the world. It is a form of activity that strives to make the end result better than the starting point. In the work for a viable future, it is important to reflect critically on attitudes and modes of action that we take for granted.

Value diversity is the carrying force behind contemporary design. According to the texts in this chapter, design is necessary for steering technological development in a direction desirable for humans; for confronting social inequality and understanding the essence of being human. It is also needed for creating wellbeing within the limits of this planet, as well as value discussions on environmental protection and respecting the needs of future generations.

Interlinking micro- and macro-level activities, ideas and understanding is also one of the core goals of university-level design education. Aalto University aims to expand students' mindset, stretch their ability to reflect on their own impact, build awareness of their responsibility as designers and encourage them to engage with empathy.

Design has long been understood merely as a value-adding activity – it improves things, it makes products more efficient or desirable. But as design practice has expanded to include management, social innovation and sustainability, new design expertise has also developed that can support governments, industries and communities to create other forms of value beyond profit.

Mikko Jalas &
Heidi Paavilainen

Building blocks for an engaging everyday life

Everyday life is the starting point, and also the target, of a designer's work – the preciousness and richness of life, extending deep into the experiential world and senses, all the way to aesthetics and ethics. Design is, in other words, not just about functionality, gadgets, user interfaces or customer journeys, but it operates yet deeper in our culture, on the level of values, where the principles of a good life and the relationships between humans and their living environment are defined.

While this kind of everyday design is necessary, an ideational shift in design is also necessary. The increasingly severe environmental crisis, deepening social inequality and alarming decrease in biodiversity would strongly suggest that there is something fundamentally awry in design: it is failing in its endeavours towards sustainability and instead even causing serious harm.

How could this be? After all, the practices and professional ethics in design have a long tradition of working against

unsustainable design. For decades, eco-design and green design have stressed the importance of reducing the harmful effects of manufacturing. Yet it seems the design field must do better. The problem must be approached from an opposite perspective: we have to develop new criteria that not only emphasise the ability of design to reduce unsustainability, but also the ability to create sustainability, creating sustainable development action that goes beyond simplistic problem-solving and gradual improvements to the prevailing system.

This is why contemporary designers have to understand everyday life, rely on cultural traditions and values, and make stronger efforts towards influencing behavioural models. This means adopting a new approach to the everyday and its technologies. It also entails new design products. These issues are usually solved by designing digital or physical products or services, but it can also take the form of helping people to understand their own role in their living environment, in order for them to be able to produce sustainable development themselves.

In the following sections, we outline three design principles that crystallise an appreciative and day-to-day design ideology:

1. Design spans across time, as it is based in history and gazes far into the future.
2. Design is frugal, humble and minimalistic. It appreciates the material world and emphasises maintenance, repair and care.
3. Design is living and dwelling in the everyday life, and at its core lie meaning, purpose, beauty, virtues and the intrinsic value of life.

Memory and vision

Designers are part of technology, even if the technological results do not always deliver on their promises. For example, while modern kitchen technologies were marketed to lessen the domestic work of women, the complexity of recipes and increasing expectations about food ultimately resulted in an increased workload. Domestic technologies also have a political dimension. It was related to emerging ideas of equality. Novel technologies not only promised to decrease domestic work, but also to produce a more equal society, in which one would not serve the other, but technology served humans.

The above examples also illustrate contemporary design work. In developing progressive technologies, designers should take into account technology-related social and cultural changes. For example, automated vehicles should not only be seen as an engineering challenge, but as a change in the demand for and access to mobility. Technology can bring about wanted benefits, decrease workloads and make society more equal, but as the previous examples show, technology has a tendency to surprise. Part of the designer's professional skillset is to anticipate surprises and produce technologies that meet human needs.

Design is an integral part of wanting things – and an increasing part of the diversity and volume of goods and services to be consumed, digested and disposed of. This is part of the history of design, but also of the present state of the profession. However, an increasing number of designers are challenging this line of thinking. What could human existence be besides material growth? How do we lead a satisfactory life? How can we be connected with the environment and our fellow humans in a mutually supportive way? How do we regenerate and sustain

these changes rather than just consuming? And how could a design professional participate in such a world view and ethics?

These types of questions are not the most familiar terrain for designers to tread, but through their work with everyday aesthetics, they nonetheless play an important role. In the rapid flux of novelties, design can make room for pausing.

Repair and care

'Repair and care' represents a new trajectory in the field of design, which has traditionally rather been known for shaping the new. Architects already deal with repurposing and repairing buildings, and the design profession has made a similar move, albeit on a smaller scale. The durability and repairability of objects are accepted design objectives, and some designers work to support and build a repair culture, for example by creating new aesthetics of reused materials. Repair cafés are communal spaces for repairing everyday objects, and they exist in several countries. They are part of urban development, and even branded globally. Even if the activity is still miniscule in scale, it is gaining momentum. In this context, designers could be inspired to advocate for sustainability and to create new avenues for, for example, communality and urban development.

'Repair and care' also leads designers to recognise and represent different stakeholders and their interests. This of course relates to the users of goods and services, but also more distant and more silent stakeholders. Such stakeholder categories – such as future generations – require new sensibilities from design. Designers are creating something new for these groups under topics like design for sustainability and bio-in-

A new and humble orientation of design not only develops new sensitivities, but also facilitates dialogue on how design can have an impact throughout society and far into the future.

clusivity. This new and humble orientation of design not only develops new sensitivities, but also facilitates dialogue on how design can have an impact throughout society and far into the future. This new mode of action will hopefully substitute the designers' need to surprise, impress and strike their audiences.

Living and dwelling in the technosphere

We live – and according to projections, will continue to live – in diverse and complex urban environments. As living environments are not 'mass-produced' but gradually put together from products and services owned, occupied and regulated by a variety of actors, designers should be able to facilitate development dialogues. And in order to address challenges such as global warming, designers must be able to bring in different actors

and interests in order to create legitimacy and transparency for processes that may be controversial and even staggering.

The city is part of everyday life, but also a collection of densely interlinked technological structures. There is a long tradition of designers, creative writers and photographers exploring the city by walking, giving it meaning and zooming into the lived experience. Such interpretations create value for the environment. The complex layers of contemporary technologies might lead to different questions and approaches. For example, what is it like to rely on electrical networks, 5G technology, sewage systems or road networks, and to live amidst such systems? Using technologies, and even 'living' and becoming 'embedded' in them, are part of the cultural questions related to design.

Turkka Keinonen

Human-centred design and equality

Designed products and product-service systems are everywhere in our daily lives. They set the frames, or even define, what we can do and what we actually do – and eventually, who we want to be and who we actually are. The things we can effectively and enjoyably do without products are few. *Human-centred design (HCD)* defines our relationships with present and future products as well as systems. It defines how we behave and who we are on our own and with others. HCD creates benefits and opportunities, responsibilities and struggles, and it also influences how these are distributed in our society. Consequently, human-centred design has an impact on inequality and equality.

Inequality shames individuals, destroys healthy self-respect and corrupts trust in social justice. It erodes quality of life and comes with a number of harmful impacts, like substance abuse, lower life expectancy, obesity and illiteracy. Socially responsible design and design for behavioural change are

HCD approaches that address many inequality-related social issues. However, even they do not focus on the fundamental link between design and equality as a strategy for improving quality of life.

Human-centred design has focused on the interaction of individual users and small teams with products. It has succeeded in improving the usability of many industrial and office systems, as well as the user experience of numerous consumer products and services. Design and evaluation methods have become more developed, and the human aspects of technology are essentially better understood than a few decades ago. The design approaches of leading technology companies have matured, and long-term collaboration with product users has become standard practice for the simple reason that it leads to better products and business. However, more long-term impacts of design tend to be overlooked by the HCD community.

Equality in human-centred design

There is a long tradition of research on equality and justice developments in society. The field is often referred to as 'distributional justice'. Justice typically refers to distributing something among a group of people. Philosophers and economists have tried to address the key question of what exactly is distributed, among whom and on what grounds. The most well-known and influential approaches to distributional justice include Jeremy Bentham's and John Stuart Mill's classical utilitarianism, John Rawls' justice as fairness and Amartya Sen's and Martha Nussbaum's capability approach. Each of these approaches is linked to human-centred design and can guide design professionals

to become more socially responsible and increase the quality of product users.

According to the philosopher John Stuart Mill, classical utilitarianism is based on the fundamental principle that "actions are right in proportion as they tend to promote happiness, wrong as they tend to produce the reverse of happiness". Nineteenth-century utilitarianism stood for radical equality in its notion that the happiness of all individuals was equally important. In HCD, utilitarianism is easily linked to the aspect of user experience (UX), in which the ultimate goal is to provide comprehensive, often emotive experiences of using a product. While UX has developed in a more ethical direction, questions of inequality are still mostly uncharted territory.

The philosopher John Rawls has criticised utilitarianism for its focus on happiness, arguing that happiness is a subjective experience and as such impossible for society to distribute. That is why a just societal order should be based on the fair distribution of essential resources. While Rawls acknowledges that unequal distribution is sometimes unavoidable, he emphasises that it should always be organised to the benefit of the most disadvantaged in society.

In the field of design, Rawls' strict notion of justice has been applied in arguing for the necessity of accessible and inclusive design. People living with various disabilities need accessibility solutions, which often benefit everybody. Sometimes, ensuring equal access to environments and information can come into conflict with the interests of others. Rawls' principles of fair distribution can be used to articulate and solve such value conflicts.

According to the capability approach developed by Amartya Sen and Martha Nussbaum, society should offer all individuals the capability to be themselves and make their own choices. They argue that happiness is too volatile and narrow a basis for a good life – therefore, the most appropriate thing to distribute equally is the capability to reach goals that people consider valuable, be they positive experiences or important achievements at the cost of personal sacrifice. Usability is the HCD branch that focuses on the abilities of users and products to achieve goals together.

Design creates benefits and opportunities, responsibilities and struggles, and it also influences how these are distributed in our society.

Human-centred design in flux

A key research interest of the Department of Design at Aalto University is equality and distributional justice through human-centred design, user experience, accessibility, usability and collaborative design. During the last decade, HCD has undergone a significant ideational shift. Instead of professional designers designing for users, they now engage in collaborative design with users – and in end user innovation, the users take the lead. Technology development has branched out from corporate product development and strategy departments to individual consumers and communities of practice. Even though this change has balanced the power relation between consumers and the industry, not all consumers still have the equipment, knowledge and social capital to become end user innovators. How collaborative and user-driven design practices distribute happiness and capabilities among consumers is a question that remains unanswered.

Read more:

Keinonen, T. (2017). *Designers, Users and Justice*. Bloomsbury Academic.

Maarit Mäkelä &
Riikka Latva-Somppi

Encountering soil matters

The field of design is heading towards designing transformations on a larger scale. The targets of design become systems and processes, such as activities that impact the state of the environment. At the moment, our greatest concern is the carrying capacity of the Earth, and how we respond to climate change, decreasing biodiversity, the over-consumption of resources and the waste problem.

Aalto University wants to solidify the role of art and creativity in society, thereby making space for change and new ways of thinking. In recent years, topical issues have brought together communities consisting of experts from various academic and creative fields.

Soil Matters is an interdisciplinary project at Aalto University, in which personnel, researchers, students and external partners come together to examine the meaning of soil and land. It introduces experimental design projects that look at the materiality of soil and how it is intertwined with anthropogenic activity, that is, human action. The topic is important

from the perspective of design, as the discipline has significant influence over consumption patterns, thereby also affecting the environment. The most meaningful aspect of the project has been the opportunity for collaboration with different actors to work with interesting matters that widen our perspectives.

Encountering the soil

The *Empirica* research group in the Department of Design at Aalto University showcases the human impact on soil and land through artistic work and research. The group consists of design, art and craft practitioners. In recent years, the group has led projects that engage with unfired earth in the context of artistic research. The projects have reflected on how ecological perception and sensitivity are intertwined in craft processes. They have drawn on ceramic craft knowledge in materials and critical design thinking in order to reach for a wider understanding of the mutual human–soil relationship.

Awakening to the critical status of the Earth has made it clear that attention should be redirected from the human-centred perspective to a more encompassing environmental approach. Instead of focusing on finished artefacts, the research group has steered its interest towards processes that are connected with the various material aspects of the soils and their associated meanings.

Ceramic art processes as discourse generators

Our understanding of the field of ceramic art is built, in particular, on the traditions of ceramics, silent knowledge, bodily experience, materials chemistry and aesthetics. In our recent

projects, we have made changes in the soil visible by combining ceramic art methods with scientific knowledge. As the seed project of Soil Matters, we conducted the *Traces from the Anthropocene: Working with Soil* project, which was exhibited at the Research Pavilion in the context of the Venice Biennale 2019.

In the project, we studied the contaminated soil of the Venice Lagoon area by taking soil samples and analysing them for heavy metals at Aalto University School of Chemical Engineering, in the laboratory of the Department of Chemical and Metallurgical Engineering. The analyses revealed, among others, how the glass art industry had contributed to the contamination of the soil in Murano. The soil samples were used for painting large ceramic vessels. The vessels were created from local clay with the help of students. We also organised a discussion on the topic of soil contamination in collaboration with soil contamination experts from the Finnish Environment Institute SYKE. Combining soil contamination analyses and a public discussion with design research represented parallel ways of understanding the impact of human activity on the soil: on the one hand, it showcased the importance of environmental scientific knowledge, while on the other the meaning of experiential knowledge was made accessible through art.

The Venice project generated the *Soil Matters exhibition* at the Design Museum Helsinki, which also featured eight other

↖ **Artists and designers from the of the Soil Matters project visiting the Kultela clay pit in Somero, Finland.**
Photographer Pertti Mäkelä.

← **Soil processed into fine slip was used for making ceramic test pieces, which then served as visualisations of the transformation from soil to ceramic.**
Photographer Amedeo Martines.

works or projects that approached the relationship between humans and soil through design. One of the projects was the *Soil Laboratory*, which showcased soil research through science and art. In the Soil Laboratory, we continued working with soil materials, such as local soil samples and clay. The laboratory also served as a meeting place for people to reflect on the impact of anthropogenic activity on soil and soil ecologies through science, art, and personal stories.

In the Soil Laboratory, we worked with soil samples collected from around Finland and analysed their heavy metal content. As in Venice, the exhibition at the Design Museum included the creation of large ceramic vessels, this time using Finnish red clay from Somero. The vessels were painted with slip made from soil samples that were collected during the exhibition. The paintings represented Finnish endangered species. Artists familiarised themselves with the topic through studies conducted by the Finnish Environment Institute SYKE and then selected critically endangered insects and plants which are dependent on the wellbeing of the soil.

In addition to student groups from the Department of Design at Aalto University, the exhibition was visited by researchers and experts, who engaged in discussions on the Earth's ecosystems and how land and human activity are inseparably linked. During the exhibition we collaborated with the

↗ **At the Soil Laboratory, ceramic vessels made of Somero red clay were painted with soil samples collected from around Finland.**
Photographer: Riikka Latva-Somppi.

→ **Critically Endangered Species, a series of works created in the Soil Laboratory during the Soil Matters exhibition, highlight critically endangered species.**
Photographer: Anne Kinnunen.

Geological Survey of Finland (GTK), the Forum for Environmental Information and experts in the field of ecology from the University of Helsinki.

The vessels created during the exhibition continued their journey to the Espoo Museum of Modern Art EMMA to be displayed as part of the *Ceramics Facing the New* exhibition. The exhibition uses ceramic materials to explore the wider themes of fracture and reconstruction – the relationship of humans with the soil and land, the environment and each other. Specimens of critically endangered species from the collections of the Finnish Museum of Natural History were displayed side by side with the vessels. The same species were showcased in the vessels' motifs.

As a result of the projects, meanings associated with soil and land have become interwoven into a complex network involving social, political, ecological and cultural aspects. The role of personal experiences and emotions as the basis for discussions on values has become more pronounced. We have documented all our activities and read a wide range of literature on the topic. This enables us to reflect critically on our own actions and situate them into a wider discourse on the environment, soil and land use, for example, in the form of conference presentations or academic publications. The projects have also generated the university-led *Working with Soil* working group, which instils experimental ways of working into the next generation of students and thereby future actors in the field.

Design as political action

In her recent works, British science and technology researcher Maria Puig de la Bellacasa has focused on care on a level extend-

ing beyond the wellbeing of individual people. She is interested in constantly transforming ecological cultures and the human role in this dialogue. At the centre of these reflections lies soil, and the fact that what we think of soil influences how we care for it – and vice versa. Puig de la Bellacasa refers to traditional craft skills as she urges us to relearn the skills that once allowed us to cultivate land. She laments that what might appear slow or old-fashioned could help us to perceive soil as a living community to be cared for, instead of focusing on maximising production capacity.

In this ideational whole, doing things by hand becomes an important part of our everyday life. It is an activity intertwined with the everyday and how it is performed, which plays a role in the wellbeing of the individual as well as the planet. Interlinking micro- and macro-level activities, ideas and understandings is also one of the core goals of university-level design education.

Read more:

Working With Soil https://workingwithsoil.aalto.fi/

The Soil Laboratory https://soil-laboratory.aalto.fi

The Soil Matters exhibition https://empirica.aalto.fi/news/soil-matters-exhibition

Latva-Somppi, R. & Mäkelä, M. (2020). Exploring ecological and material sensitivity through craft practice in the context of the Venice Lagoon. *Aisthesis*. Vol. 13, No. 1, pp. 31–46. https://doi.org/10.13128/Aisthesis-10916

Latva-Somppi, R., Mäkelä, M., Lindström, K. & Ståhl, Å. (2021). Entangled materialities: Caring for soil communities at glass industry sites. *FormAkademisk*, Vol. 14, No. 2. https://doi.org/10.7577/formakademisk.4180

Anna van der Lei &
Julia Lohmann

At the roots of design

It is a Tuesday morning, and the weather is typical of September: rainy, windy and colder than the body is used to after a warm summer. We are all new to each other, standing in the middle of a forest in Nuuksio, Espoo. It is the first day of the course, and we are accompanied by a mycologist, who introduces himself and the surrounding forest to twenty-five design students and us, the teachers.

As we start walking, we are surrounded by the overwhelmingly powerful smell of the wet forest. Students were asked to bring baskets, paper bags and small containers. They are wearing boots and rain jackets and carrying lunch in their backpacks. Already after 100 metres of walking, the mycologist stops, gathers the students around him and introduces us to a tiny, barely noticeable, endangered mushroom growing not far from the path we were just walking along.

→ **Design students exploring fungi in Nuuksio forest.**
Photographer Anna van der Lei.

Every step leaves a trace

As we design products, we tend to consider what we need for producing them. This could be energy, labour, money or materials. What we tend to forget is that many of those resources are extracted from the planet, be it raw materials for mobile device components or energy for processing and storing data. Indeed, we often overlook the fact that all of this comes at an ecological cost. Design students and even professionals tend to spend more time thinking about material properties than pondering how a particular material came into being in the first place.

Materials and Living Systems (MaLS) is a course in the Master's Programme in Contemporary Design at Aalto University School of Arts, Design and Architecture, which introduces living organisms in their eco-systemic context. Going back to the rainy Tuesday morning in Nuuksio, as we were walking in the seemingly untouched forest, the students were asked to harvest mushrooms and put them in their baskets, bags or containers. These mushrooms will be used to cultivate mycelium, which will be used as the main material for the course. But before we start exploring the potential of the material, we should build a sense of connection. By making the forest our classroom, we hope the students are able to relate to the natural habitat of the organism we are working with, in this example the mushroom

→ **Freshly harvested mushrooms were brought to the Aalto University Biofilia (Base for Biological Arts) laboratory, where students worked under the supervision of Pyry Veteli, James Evans and Anna van der Lei.**
Photographer Anna van der Lei.

or fungi. By introducing these almost invisible but endangered species, we realise that every step we take matters, and that not all mushrooms are there for us to consume.

A connection with nature inspires new thinking

Engineers and material scientists have traditionally been responsible for the development of new materials. However, designers are now expanding their roles beyond modifying current materials to inventing and growing new ones. But as we co-create with nature, we also need to rethink our teaching and learning processes. The circular economy should be embedded into a wider understanding of ecology – circular by nature, but often endangered by humans. That is why we are in the forest now; in order to understand and to let this reflection of our impact guide our design decisions. Our aim is to expand the students' mindset, stretch their ability to reflect on their own impact, build awareness of their responsibility as designers and encourage them to engage with empathy. We want to instil a regenerative mindset so that they are able to avoid over-harvesting and over-using materials.

The forest is a setting for our mindset: we come as guests, some of us way outside their comfort zone. We are there as curious learners, understanding how little we know and striving to connect with nature. The mycologist helps us to expand

← **Johannes Kaarakainen created a mycelium bird's nest as an outcome of the Materials and Living Systems course in 2020.**
Photographer Johannes Kaarakainen.

our ability to understand what we encounter and to zoom from macro- to micro-awareness. As we walk on, we become acutely aware of the footprints we leave, of our own presence as part of this complex ecosystem. The experience in the forest helps us to tune in to our empathy for another species when we later engage with it as a material in the making. And that is one of our most important assets as designers.

The Materials and Living Systems course is framed around fungi or algae. When we work with fungi, the forest is our classroom; when we focus on algae, we find ourselves at sea.

Materials and Living Systems (MaLS) is a course in the Master's Programme in Contemporary Design at Aalto University School of Arts, Design and Architecture, which introduces living organisms in their eco-systemic context. The course is taught by Lecturer in Contemporary Design Anna van der Lei and Professor in Contemporary Design Julia Lohmann.

↖ **Building the bird's nest started with filling the moulds. The structural material consists of a straw pellet-based medium, in which the mycelium spreads and acts like a binding agent.**
Photographer Johannes Kaarakainen.

← **Pieces removed from the moulds on their way to the oven.**
Photographer Johannes Kaarakainen.

Elina Ilén

Valuable measurements with electronic textiles (e-textiles)

Wearable technology refers to products that measure and analyse the wearer's vital functions or their environment. When electronics are integrated into textile products, they are called electronic textiles (e-textiles) or smart textiles and clothes, among other names. Multidisciplinary collaboration is essential when designing and developing e-textiles. It involves product design, material science, textile and clothing technologies and electronics, as well as information and communication technology.

Textile based electronics have been commercially available for decades in sport and wellbeing applications. E-textiles have a high potential in medical and health applications and in professional wear. The e-textile garment is capable of measuring the body's vital signs long term in a unobtrusive and even invisible way. The wireless system enables the garment and the

patient to communicate with the medical personnel remotely either from home to hospital or inside hospital environment. In occupational health, e-textile garments could both protect workers from health risks, such as harmful chemicals or advise employers to improve ergonomics at work.

However, in the case of clothing, electronics is not sufficient on its own: the clothing should also be aesthetically pleasing. Currently, ICT does not impose any significant restraints, as the components are small and lightweight, and data transmission is increasingly energy efficient. This is also the benefit of the development of applications in smart textiles. The technological reliability and usability of a product is not the only criterion, but the more important question for the user can be, for example, "*How do I look*?" The role of design is to produce visually attractive and acceptable products. It is commonly expected that the designer understands the needs of the end user.

Wearable technology solutions can be extremely valuable for their users. However, the development journey from brilliant concept to commercial product might be challenging or even impossible, because of multidisciplinary character of e-textiles. Hence, the designer has a strong role as a collaborator in guiding experts of multiple disciplines through the processes and tasks.

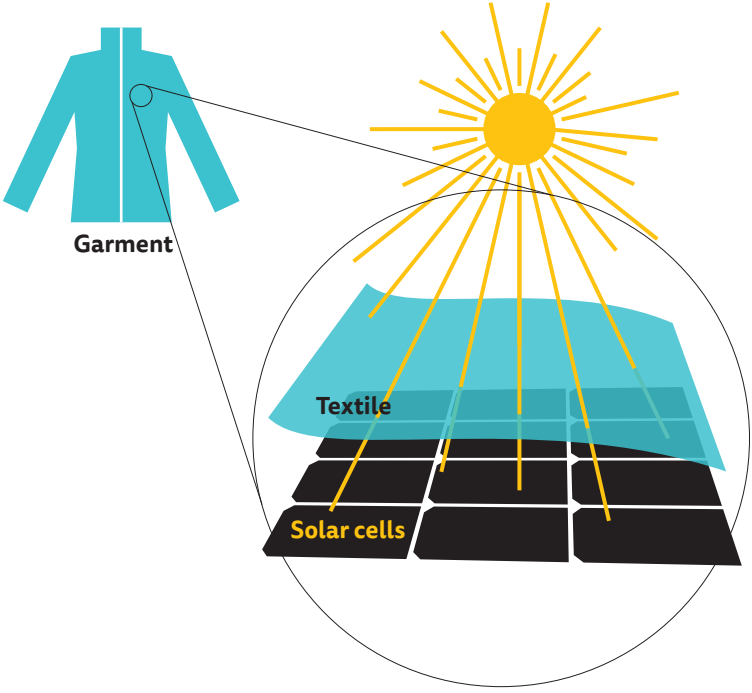
In the following, two case projects present the results of the successful multidisciplinary collaboration, and how the design is integrated into the processes.

Project 1. Sun Powered Textiles

Textiles are capable of passing the sunlight through them when they are designed for that purpose. Hence, when a textile is placed on top of commercial solar cells, the resulting textile-cell module can generate energy. This eliminates the need for battery recharging or replacement in wearables. The energy autonomous product can generate its own energy by using light as a renewable energy source. In addition to sunlight, it can generate energy from artificial light too.

The project has designed and developed a fabric collection, which is suitable for solar energy harvesting. The second design driver has been the effective concealing of the integrated solar cell by the fabric. A key objective of the textile-cell module development has been the development of a scalable manufacturing technology and the product which stands for the domestic machine washing. The fibre material, textile structure, density, colour and after treatments all impact the optical properties of textiles.

The textile-cell energy harvesting module can be widely applied towards smart textiles and wearable technology solutions, such as occupational and professional wear, sportswear, wellbeing and fashion. The project produced a show case jacket, containing a temperature and humidity sensor that is powered by textile-integrated solar cells. The jacket was designed for a worker whose work includes various inside and outside tasks, whereby data on temperature and humidity could be used to improve occupational wellbeing.



↑ **The solar cell, underneath the surface fabric of a jacket, can produce enough energy for powering wearable devices.**

Results through collaboration

A multidisciplinary approach is essential for the study of textile-integrated solar cells, to merge the physics and electronics expertise from the Department of Applied Physics with the textiles design and manufacturing insight from the Department of Design. This multidisciplinary approach allows tackling the challenge of powering wearable sensors while ensuring that the textiles are visually aesthetic, and the solar cells are concealed.

In the multidisciplinary project, conversations were at the core. Understanding what others were talking about was vital in terms of communication, but also took the project further towards the common goal. For instance, the understanding of how textile structures are created from the view of the designer helped to understand the physics of light behaviour in the textile. Both were needed to find the optimal cover fabric. It was interactive learning – each group member brought something to the table that helped the other to look at their own work from a different point of view. In addition to experienced researchers, the project included students from both fields in various roles, from research assistants to Master's students writing their theses on the project.

The jacket was designed by Lindström, the fabrics by Foxa, Lindström or Aalto University, and humidity temperature sensors were selected by Haltia.

← **Fabric design Zuzana Smatekova (jacket on the left) and Bettina Blomstedt (jacket on the right). Product design of the jacket: Lindström Oy.** Photographer Anne Kinnunen.

Project 2: Rhythms in the Infant Brain (RIB)

The Rhythms in the Infant Brain (RIB) project has been developing textile based wearable electronics for monitoring neurological development of infants (0–12 months). The target group infants were premature born, suffered from lack of oxygen or had an infection at birth. This group has an increased risk of developmental disorder. An early diagnosis enables starting appropriate therapeutic treatment earlier, which leads to improved treatment intervention.

Currently, the receiving diagnosis might take a year, as assessment is challenging: the time for appointment in the clinics is limited, the child can be stressed, tired, or hungry, which might lead to uncompleted assignments.

The monitoring of infants in their natural environment, home, is essential to achieve objective information of their neurological development. The failures in motility development and abnormal sleep cycles are the biomarkers of disorder. Currently, brain signals, EEG, recorded at the hospital with subdermal needles (i.e., needles placed under the skin), is only used for monitoring children in a life-threatening condition. The complex sleep monitoring process is only performed for children with serious illnesses. The movement and posture detecting of the infant has no quantitative solution. Hence, infant wearables would provide a comfortable and reliable solution to monitoring infant quantitatively.

The project is developing three products:

- a multi-sensor movement measuring bodysuit (MAIJU; Mobility Assessment in Infants with a JUmpsuit),
- sleep monitoring pants (NAPPA; NAPping Pants), and
- EEG beanie for monitoring brain signals.

MAIJU and NAPPA have been developed for home use, whereas the EEG beanie would be used in hospital settings. The aim is that products accelerate the diagnosis and monitor the effect of therapeutic treatment. The succesful outcomes will have a significant social impact. Furthermore, the same technology could be applied, for example, in determining sleep disorders in older children.

The product must meet the requirements of different users

The product design process ensures wearing the products is comfortable for the child and cannot inhibit their natural movements. In addition, the parent or caretaker must be able to dress the child up easily and correctly, while medical personnel require reliable data.

In the early stages of the project, the designer has gathered all relevant information on the current situation and studied the child's journey from birth to diagnosis. This was achieved by interviewing nurses, neurologists, and therapists, among others. The gathered information translated into product requirements, which started the actual product design process. The design process was accomplished through multidisciplinary workshops focusing on design, prototypes, testing and feedback. The role of the designer has been fundamental in developing an idea into a tangible product, which for its part enables the research work of the hospital.

Guy Julier &
Elise Hodson

Design and value diversity

We stand at a historical juncture. The global climate, health, social and financial crises have made visible the inequitable distribution of value. Discussions about value and values have entered mainstream media as people seek to understand why systems have failed and how things could be done differently in the future.

Design plays a key role in this conversation. Design has long been understood as a value-adding activity – it improves things, it makes products more efficient or desirable. But as design practice has expanded to include social innovation and sustainability, new design expertise has developed that can support governments, industries and communities to create other forms of value beyond profit.

At the same time, we need to take a closer look at what positive and negative value design is in fact generating. As shifts in value are expressed at the level of policy and corporate practice, we need new methods for assessing value. This is a cue

for design research which can offer new perspectives on how value is experienced.

The social value of design

Design itself has long been evaluated through financial indicators, but it is now recognised that they only tell part of the story. At Aalto University, we are interested in how to assess the social value of design by following how design projects unfold and analysing their impacts, intended and unintended, and within and outside of projects. This research could support organisations in evaluating how they use design, and the value of design work.

In addition to designers, policy-makers, heterodox economists and activists have also called for the recognition, assessment and characterisation of a wider set of values from more diverse perspectives than just economic impact. What is meant by this has, however, remained hazy. Certainly, other measurement systems exist, not least in terms of assessing environmental impact. Yet in circumstances where non-mainstream values work together, there has been little progress in academic or policy thinking. Change can be achieved by reflecting on value, and by introducing alternative possibilities into the discussion as well as practical use.

The currently prevailing notions of value are framed within a business logic (e.g., shareholder value) that has gained increasing traction over the last 40 years. Determining value and, more broadly, measuring many aspects of everyday life, has become increasingly dominant in our culture. The measurement of value is also manifested in rankings and assessments: the happiest or most secure country, the best place to live and so on.

Whether social goods or outcomes can be expressed in terms of 'value' has been questioned. Some sociologists argue that as soon as we start talking about value, we cannot avoid fitting the topic into a financial frame. So let's not do that! Others suggest that we might talk about livelihoods rather than jobs. Here, all aspects of work life come into view – our sense of belonging, supporting each other, caring for the environment – rather than calculating everything in terms of work/hours. This approach shows that some things cannot be measured, and instead must be valued through other means. This is where design might have a role by bringing qualitative and quantitative aspects together.

The many indicators of design value

New forms of design practice and research are constantly emerging. Most recently, *transition design*, *transformation design*, *organisation design* and *social design* have attracted wider attention, which has brought about wider and more complex outcomes. However, it is worth remembering that design has long been associated with the notion of 'value' without actually defining or critically discussing it.

Design value has been expressed in terms of design's ability to, for example, generate profit, improve public services, support social innovation and, more broadly, address complex global problems. While positive results are reported from investments in design, it can be challenging to credit the design process with specific outcomes. Many designers struggle to describe the value of their work to clients, and clients maintain that they have no indicators for assessing the impacts of how they use

At Aalto University, we are interested in how to assess the social value of design.

design. This is an increasing concern for governments that have invested in design over the past decade, in particular.

New endeavours are currently underway for understanding the value of design. The UK Design Council has explored how the social and environmental impacts of design could be recognised by combining quantitative data based on monetary value with qualitative case studies that account for diverse perspectives of value. Their work demonstrates that continuous growth is no longer the single goal, that value is subjective and that design does not only have a positive impact, but can also bring about negative and invisible ripple effects.

Value diversity

The implications of our approach for design and value are twofold. Firstly, we encourage policy-makers, entrepreneurs, designers and others to abandon restricted mindsets in determining

and measuring value. This means that we stop using spatial or temporal constraints, such as 'annual happiness in country X'. Instead of 'following the money', we must recognise the value shifts that occur in various times and places of a design project or its end result.

Secondly, design work can also include explorations into what value and its many forms could mean for different people or interests. When the process engages multiple stakeholders and collaborators, competing accounts of value will almost certainly arise. Developing shared understandings of the different types of value at play and how they should be taken into account would then be part of the project. Understanding externally imposed value expectations might also be relevant. Finally, we embrace the idea that other forms of value may also reveal themselves along the way – and some might escape our awareness altogether.

Read more:

Scoping Project. Environmental and Social Value of Design (2021). https://www.designcouncil.org.uk/sites/default/files/asset/document/Design_Economy_2021_Papers_Paper_1.pdf

Mazzucato, M. (2018). The value of everything: Making and taking in the global economy. UK: Hachette UK.

IV
Join the change!

Design fosters new skills and means for organisations to pursue strategic goals. As the previous chapters have shown, design has found its way into a variety of projects and applications, for example, by deepening the understanding in sustainable development and by prompting discussions on where this know-how should be put into use. However, the successful application of design also requires the ability to implement design in different organisations. This is a transformation process in and of itself.

As an increasing number of organisations turn to design, both designers themselves as well as their colleagues and management have to adopt new skills for making the most of design. Examples of successful paths and leverages of change can be found in Finland as well as elsewhere in the world. Individual designers are able to advance a number of aspects, but harnessing the full capacity of design calls for significant investments in design skills. For example, incorporating strategic levels of design in predictive and futuristic work is still largely unheard of beyond leading global actors.

Both designers and design thinkers need new skills, such as more specific vocabularies and an understanding of strategic work, business expertise, research skills and transformation skills. Recruitment processes often involve long wish lists of skills that design professionals are assumed to master. Implementing design thinking in organisations, for its part, often requires adopting the role of agent of change, since participatory, human-centred actions differ from the prevailing organisational culture.

On the other hand, locating and holding on to experts requires a lot from organisations, as well. Indeed, the foundation for successful design extends beyond individual designers. Management has to recognise and support opportunities for hiring designers, learning design thinking and providing resources for design activities. After these initial steps, the incorporated design practices and design thinking should also be used as agents of change for developing the organisational culture, strategy and operations.

Tua Björklund

Expedite change

The past decade has seen a stark rise in the reach of design, as organisational leaders have increasingly turned to design for innovation and new customer value. Indeed, creative practices offer a much-needed addition to organisational capabilities in the face of an uncertain and volatile future. However, to make the most of the potential of design, investments in deep and wide design capabilities are necessary in order to avoid typical pitfalls in transformation.

The global rise of design thinking and service design has moved design upstream into the attention of many organisations and leaders. Investments in design have paid off, with estimates ranging between 200 % and 300 % for the return-on-investment in design. However, these benefits are disproportionately reaped by organisations that have been able to incorporate design in a comprehensive manner into both their offerings and operations. Many organisations new to design approach it with an unnecessarily narrow perspective, falling into a few common pitfalls.

New tools for transformation through design

Design approaches offer human-centred perspectives on creating and implementing new solutions, but new ideas and practices can also cause friction. As we interviewed over a hundred designers, design managers and innovation leaders working in or with global technology organisations in nine countries, the role of design was highlighted in problem-finding in addition to problem-solving. In practice, this meant questioning the given problem and coming up with alternative perspectives. In other words, design thinking initially introduces more uncertainty into development efforts in order to learn from it, whereas typical organisational processes seek to minimise risks by steering clear of uncharted waters.

Different approaches to managing risks and uncertainty cause friction as design is brought into organisations. However, they can also bring out new capabilities for transformation that reach far beyond individual product or service development projects.

In interviewing designers in over a hundred organisations, we identified four types of value that were highlighted in organisations:

1. **Design as a way to enhance organisational capabilities in exploration**

   Design typically brings in new methods and tools, which the organisation can use in research, prototyping and testing, such as use case scenarios, visualisations and low-fidelity prototyping. Designers also promote organisational readiness to engage in exploration. For example, at the Finnish Social Insurance Institution (Kela), design-

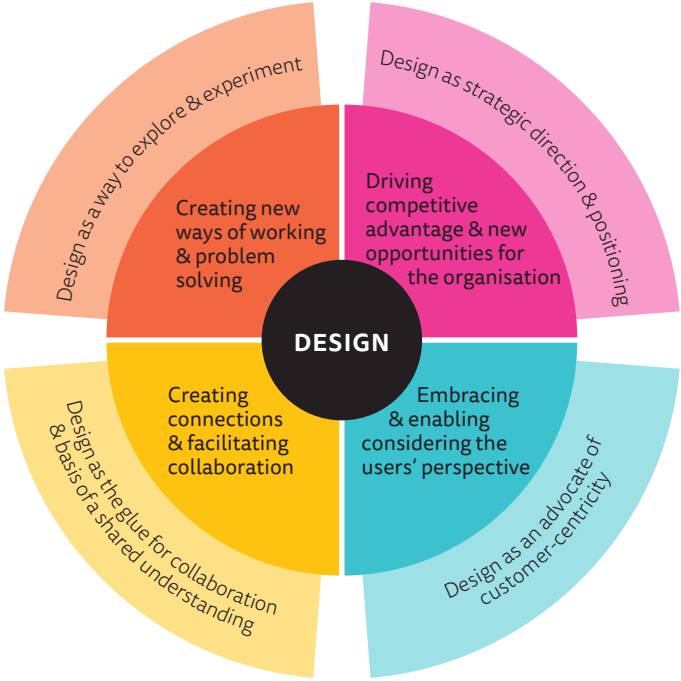
ers have championed foresight work, marketing agency Avidly has incorporated experimentation into employee objectives and key results (OKRs), and for food venture Gold&Green, design thinking has fostered an 'early and often' prototyping culture.

2. **Design as a way to discover strategic direction and positioning**

   Design also contributes to the strategic goals of organisations by identifying relevant issues and new business opportunities. Design managers from the financial company OP Financial, IT consultancy CGI, retail corporation SOK and Aava Medical Centre alike highlighted the role of design in enabling efficient prioritisation through an in-depth understanding of the organisation, its customers and the industry. Business model design and good design in organisational offerings also serve as bases of differentiation in the market.

3. **Design as a way to facilitate collaboration and understanding**

   Design professionals play an active role in creating opportunities for joint discussions. For example, designers have broadened employee participation in service and product development work at Posti postal services and Vaisala measurement technology and instrumentation. Design also promotes shared understanding through visualising and concretising abstract and complex issues under discussion. Examples include visualising real-time customer data at the consultancy Vahanen Group for



better situational awareness, or placing user journey maps as the focal point of developing projects at Ponsse forest machines.

4. **Design as a way to advance customer-centricity in the organisation**
   Design can help bring customer-centricity from organisational visions to everyday practices by providing tools, methods and increased contact with users and customers. For example, designers at the IT software and service com-

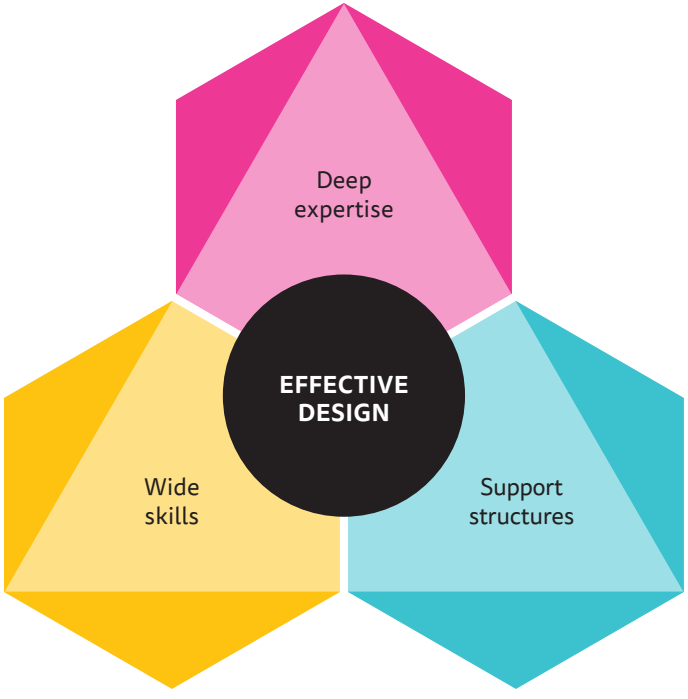
pany TietoEVRY have created pitch templates that help to redirect the focus from technology to the customer value it creates, and the telecommunication company Elisa's designers aim to widen fluency in customer perspectives by partnering up with non-designers in their projects.

Systematic steps towards change

Investing in design can start small. However, whether the scale is measured in individual designers or in business units, our research shows that three types of capabilities need to be addressed simultaneously for effective change.

1. **Deep expertise** in design and its practices is introduced and ensured in the organisation by hiring and contracting design professionals with the needed skills. Mastering different types of situations requires specialised design skills from, for example, industrial design, service design and user interaction design. Furthermore, designers can take on different types of roles, ranging from explorers to co-creators, depending on what is needed in the organisation.
2. **Wide skills and understanding** of design within the organisation are necessary. Understanding the basics of design approaches and their applications facilitates collaboration with in-house designers or buying design services externally. Furthermore, design thinking and design approaches can be leveraged throughout the organisation, which increases the reach of design beyond the scope of individual design professionals.

3. **Support structures and scaffolds** across the organisation are needed to align efforts and remove organisational blocks to practising design. Many organisational incentives and processes can inadvertently discourage problem-finding and experimentation. This renders practising design a risky endeavour for employees, and designed outcomes are less likely to gain traction in the organisation. Shared goals, vocabularies, processes and leadership help to get more mileage out of design expertise and understanding in the organisation.



How do you avoid the typical hurdles for transformation?

In our extensive interviews, we saw organisations struggle with three common pitfalls. When deep, wide or supportive design expertise were not in balance, lagging investments in one or two of the three key capabilities hampered transformation efforts.

Winning over hearts to avoid boxing in designers

In organisations that are still new to design approaches, designers spend a considerable amount of time 'selling' design internally to create space for practising their profession. If the organisation does not have a sufficient understanding of design approaches, design professionals may be invited onto projects too late or excluded altogether, or be boxed in with rigid roles offering little opportunities in problem-finding.

To make the most out of investments in design expertise, support and understanding are needed across the organisation. Connecting design to the bigger picture of organisational strategies, goals and values can help, as can building momentum with small but visible initiatives that deliver first-hand results. For example, Cisco created Cisco Hyperinnovation Living Labs and brought employees together with customers, partners and other stakeholders to find new business opportunities. In addition to discovering new opportunities, these labs offer familiarity and tangible stories of the benefits of adopting new ways of working.

Low-threshold support to avoid unactionable design thinking

Another route to increasing design capabilities comes from training existing staff. This should, however, come in tandem with investments in design expertise. If sufficient support structures are not in place, employees might get excited about new design approaches, only to be let down by the lack of opportunities to practise what has been preached in training. At its worst, this can lead to employees going elsewhere in search of greener pastures for innovation.

To make the most out of investments in wide design skills and understanding, organisations need supportive operating models for achieving fluency in new ways of working. Here, low-threshold opportunities to apply design approaches with the input, guidance and facilitation of professional designers can help. For example, the technology company Intuit increased the number of in-house designers and introduced design into the company's events. They also came up with 'design thinking coaches' for work groups and a new team to support middle management in adopting and leveraging design.

Creating a shared framework to avoid fragmented design outputs

Finally, organisations could hire in-house designers and even train a portion of employees in design thinking, but then scatter these people far and wide within the organisation. This could lead to disorganised efforts and fragmented customer experiences. Furthermore, the isolation could demotivate designers, who tend to thrive in collective efforts, which can ultimately lead

Design promotes shared understanding through visualising and concretising abstract and complex issues under discussion.

to challenges in talent retention. Designers often represent less than one per cent of the total workforce in organisations, which highlights the need to pool scarce resources in order to create an impact. Particularly without a visible and clear mandate from senior management, design could be watered down into occasional bright spots here and there, rather than an organisation-level capability.

To make the most out of investments in design expertise and skills in the organisation, design scaffolds are necessary for aligning efforts. Here, shared tools, goals and design language can help. For example, IBM has constructed its own design framework to support a shared understanding for teams to assess and deliver user experiences. Furthermore, IBM Design Language offers a shared vocabulary for designing harmonious user experiences without resorting to strict patterns and templates.

Future-proofing organisations with sustainable values

In conclusion, simultaneously investing in deep and wide design capabilities in the organisation promotes a myriad of positive organisational outcomes, ranging from customer satisfaction to attracting talent and increasing the resiliency of operations. On the other hand, the uncertainty brought about by the pandemic and rising awareness of climate and biodiversity concerns emphasise the importance of new and agile methods for sustainable solutions. Thankfully, design has long traditions and an extensive toolkit for navigating uncertain and complex situations, identifying underlying needs and experimenting with new solutions – in other words, just what we need to tackle the complex issues organisations and society face going forward. Research-based insights on design expertise and design thinking offer an excellent addition to the repertoire of organisations seeking to thrive in the future.

Read more:

Björklund, T.A. (ed.) (2021). Design + Sustainability 101. Aalto University. ISBN 978-952-64-9606-1.

Björklund, T.A., Keipi, T. & Maula, H. (2020). Crafters, explorers, innovators, and co-creators: Narratives in designers' identity work. Design Studies, 68, 82–112.

Björklund, T.A., Maula, H., Soule, S. & Maula, J. (2020). Integrating design into organizations: The coevolution of design capabilities. California Management Review, 62(2), 100–124.

Anna Valtonen

Insight and foresight

Organisations use design in a variety of ways. Traditionally, it is used for designing physical products, user interfaces and services. The last decades have also seen the emergence of the notion of design as a tool for organisational strategies and future activities.

Many organisations recognise the need for change. However, over the course of time, many organisations have developed extensive structures and rigid practices that now form obstacles for change. There is rarely enough time or resources to develop something new, although old ways are no longer able to generate the results that the organisation needs. This is when organisations turn to design approaches to reform organisational cultures from within.

The situation surrounding the organisations also change. They have to adapt to new circumstances of economic competition, social expectations and consumer desires. When everything changes, it is not easy to discern the desirable future

to aim for. It calls for courage to make decisions that are not yet mainstream. In these situations, design approaches can be useful. They enable, for example, collaboration in multidisciplinary groups as well as debates, often even provocative, when no obvious answers are available.

In the early 2000s, a growing number of global brands noticed the value of mapping potential futures as a way of anticipating shifts in consumer needs. This introduced a whole new menu of tools, practices and design-based foresight activities, which help to understand cultural shifts in people's behaviour. In addition to design-driven foresight, design and communication tools were used to a greater extent for getting a sense of possible futures and alternatives. Concrete prototypes, even hypothetical ones, could facilitate discussions and anchor participants to the transformation better than mere data.

In the book *How to Future*, Scott Smith gives a very thorough review of the different tools and practices involved in sensing and sense-making in large organisations. He defines *sensing* as "understanding what's emerging, changing or staying the same". He relates it to scanning for signs of the future in the present, further dividing the building blocks for understanding futures into signals, trends or larger societal drivers. This data and insight can be transformed into useful patterns and themes, which the organisation can act on. The process is thus linked to a broader discussion of sense-making in many other fields and points at how challenges should or could be addressed. This shift in focus brings design closer to management.

What does this change entail in practice?

Design-driven futures

For the most part, new organisational practices are developed internally. Large and international organisations, in particular, have recognised the role of future-oriented design-based practices. Since they have been perceived as critical competitive factors, they are usually not disclosed to outsiders. The largest organisations have established units for supporting change. For example, Google's parent company Alphabet founded the 'moonshot factory' X, whose personnel of thousands are encouraged to identify and experiment with potential future business opportunities. In smaller companies dedicated future-focused in-house units are still rare. As an increasing number of organisations now seek to draw more strategic benefit from design, it creates further demand for new, specialised expertise in a broad range of organisations.

Much can be learned from the examples of others, which is why we have conducted research to identify practices and to gain a better understanding of the opportunities that design can offer. This endeavour has included gathering interview material on strategic design activities in large, global organisations.

Strategic design activities come in many forms. Many of the interviewed organisations have a future-orientated 'insight and foresight' unit, which does not focus on creating imaginary solutions or approaches, but on research. These often transdisciplinary units provide material for organisational strategies and further development work. The units often apply research methods that range from ethnography-based user studies to observing, analysing and identifying larger societal trends.

This line of work has been pursued, among others, by Rita Parada, who previously worked at Twitter and is currently

employed at Facebook. Parada defines her work first and foremost as insight-orientated research. She says that the current focus of her work is to understand women in emerging markets. This task can range from grasping socio-normative barriers to Internet use to practical insights on how women use language in their daily life. This involves a lot of fieldwork, including interacting with potential future users and understanding cultural factors. Observations from a broad set of sources are pooled to form a set of data to be analysed, which the organisation can then use for making more informed choices, for example, in regard to product development.

Design-driven futures work can be approached from many angles. Even if organisations rely on design-related research knowledge, their staff can actively develop their own tools, processes and frameworks. Meaningful foresight tools are often developed in accordance with the precise needs of the organisation. For example, the health technology company Philips has five areas they focus on to understand people, context and future change through their insight and foresight activities: people, culture, life stages, society and paradigms (i.e., systemic macro-level change). These range from a short to a very long-term approach.

Gazing into the distance

Some 'insight and foresight' units direct their future-orientated gaze far into the future. Reon Brand is Senior Director of *Foresight, Socio-Cultural Research and Innovation Strategy* at Philips Design. In 2019, he published the report *Co-Emerging Futures: A Model for Reflecting on Streams of Future Change*, in which he outlines

two possible trajectories, which in total offer organisations four different worldviews that span decades ahead.

Brand states that the report has three purposes:

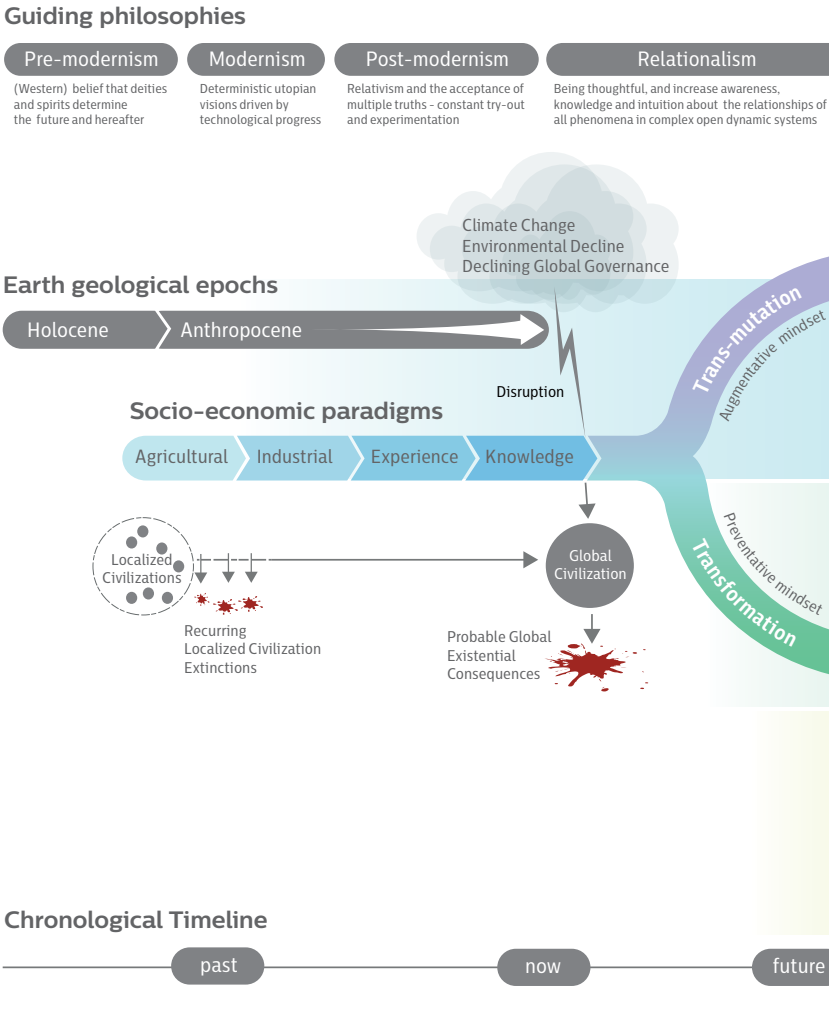
1. To provide a framework for public debates on the future of humanity, the ecosystem and the planet at large.
2. To provide inspiration and meaning for innovating and designing for the future and for questioning prevailing approaches of design and innovation.
3. To provoke by calling into question the sensibility of existing global initiatives.

Brand's model challenges dominant models of thinking, even if they are considered the norm in the organisation. It also offers means to see alternatives by pointing to factors that will transform our world.

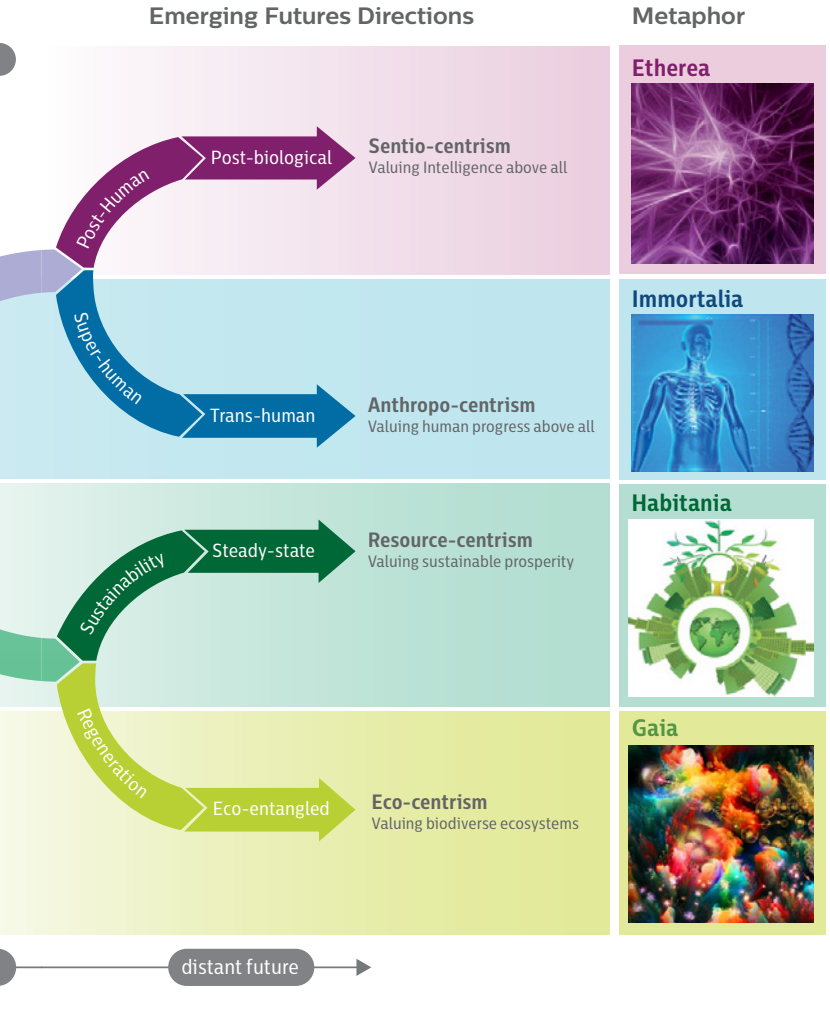
Gaining insight and foresight around opportunities in the surrounding world requires that organisations expand their own understanding. In addition to research-based information, more tangible approaches are also needed. Far-spanning thinking is typically supported by smaller and more hands-on projects that help in increasing a wider understanding, but also encourages seizing new realisations, ideas and approaches. Transformations are huge opportunities for organisations to develop their own activities and create new and productive business operations.

This also relates to developments in design and design research. Broad and theoretical thinking should be supported by hands-on examples, so that more and more organisations are able to develop their own strategic design competences.

↑ **In 2001, long before the emergence of cat videos and social media, designers tried to envision what future products might be like and how consumers might want to follow what their pets were up to and share their experiences with other users.**
Photo Aalto University Nokia Design Archive research project.



↑ **Overview of the 'Co-Emerging Futures' model by Reon Brand.**
Picture copyright Philips Design.


Emerging Futures Directions
Metaphor
Post-Human
Post-biological
Sentio-centrism
Valuing Intelligence above all
Etherea
Super-human
Trans-human
Anthropo-centrism
Valuing human progress above all
Immortalia
Sustainability
Steady-state
Resource-centrism
Valuing sustainable prosperity
Habitania
Regeneration
Eco-entangled
Eco-centrism
Valuing biodiverse ecosystems
Gaia
distant future

In Finland, Nokia has thus far been the only organisation to employ a design team of several hundreds, including dedicated units for design-driven insight and foresight. In *The Nokia Design archive – Exploring unseen concepts of design and opportunities of design-driven transformation and change*, a project funded by the Academy of Finland, we investigate the role of design within Nokia in 1995–2015. We will use a previously unexplored archive from the company's design department, consisting of thousands of concepts, prototypes, documents, and videos.

The material offers a chance to produce new knowledge on how the company used design as a tool for envisioning futures and impacting decision-making. The aim is to share these examples through an open database. We hope that this new academic knowledge, together with the practical examples, will encourage yet further actors to embrace design practices in creating change.

Read more:

Valtonen, A. (2020). Approaching change with and in design. She Ji: The Journal of Design, Economics, and Innovation.

Brand, R. (2019). Co-Emerging Futures: A Model for Reflecting on Streams of Future Change. Philips Design. https://www.researchgate.net/publication/333972702_Co-Emerging_Futures_A_model_for_reflecting_on_streams_of_future_change

Nokia Design Archives research project: https://nokiadesignarchive.aalto.fi/

Smith, S. with Ashby, M. (2020). How to Future. Leading and sense-making in an age of hyperchange. London: Kogan Page Limited

Paulo Nicoletti Dziobczenski

Diversify your skills

The articles by Tua Björklund and Anna Valtonen illustrate the role of design in organisations on the strategic level. The shift from outcome-based design to strategic design affects the skillset carried by design professionals. This shift also changes the expectations organisations have when recruiting design professionals. By examining job advertisements for graphic designers, for example, we can see how skillset requirements have expanded from visual design to encompass business, coding and research skills, among others. Graphic designers are traditionally known for the visual outcomes they create, like websites, posters and books. In line with the overall development in design, the nature of the work performed by these professionals is also changing. Nowadays, designers have a more strategic role in organisations, which also affects the skillset required for carrying out their professional tasks.

The role of design in organisations

The role of design in organisations is an ongoing and frequent topic in the design management literature. An important aspect of design management involves whether to position design internally or externally: should the organisation recruit an in-house design professional or outsource the design function to a design consultancy? What kinds of skills does the organisation need?

A number of studies have noted that recruiting a design professional is often an important first step in developing design capacities and managing design. Recruiting a design professional can thereby be seen as an early-stage decision on an organisation's path in adopting and managing design. Examining the skills and characteristics expected from design professionals also serves as a channel for observing these decisions. In the following sections, I use graphic designers as an example, but similar skills are also expected when recruiting professionals in other design specialities.

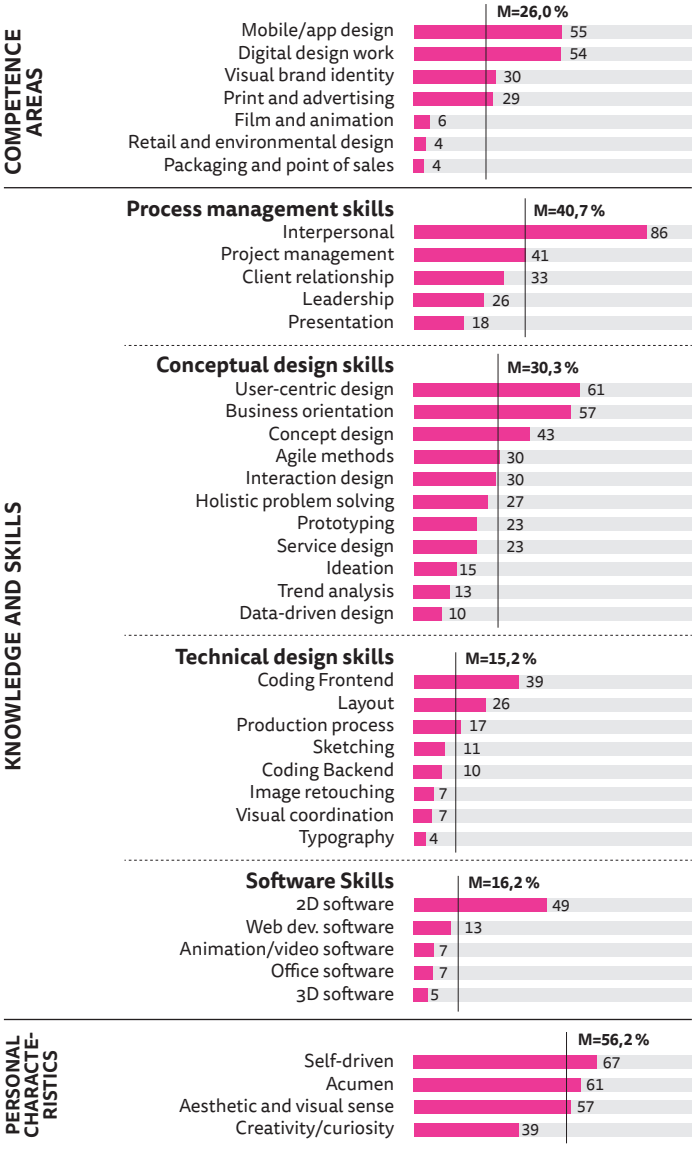
What do Finnish job advertisements reveal about the skillset of graphic designers?

In job advertisements, organisations describe the skills they are looking for in a graphic designer. In describing the ideal candidate (qualifications, educational requirements), job advertisements also provide information about the recruiting company (size, location) and job terms (e.g., salary, benefits). Our study showed that design professionals operate in a rather small labour market, as they tend to tap into personal networks rather than seeking new positions solely through external recruitment processes.

In this chapter, I draw from findings on my previous study done in the Finnish job market for designers, published in 2018 (see reference at the end of the book). The studied job advertisements demonstrated the emergence of new job titles, mainly related to digital graphic design (e.g., interaction designer, UX designer, UI designer and web designer). During the observation period, there were 55 job advertisements for positions in traditional graphic design, and almost twice as many (102) for positions in digital graphic design.

Organisations in Finland require a variety of skills in their job advertisements (see Figure 1). The large variety of skill requirements demonstrates that organisations have differing notions of what a graphic designer is capable of: whereas one organisation might be on the lookout for designers knowledgeable in agile methods, business and coding, another might not acknowledge these at all, but instead focus on other skills like service design, prototyping and typography. The most requested characteristics were related to social skills and abilities in team work, self-direction and professional development, as well as enjoying challenges. The frequent requests for 'user-centric design' and 'business orientation' also demonstrate how graphic designers are expanding their professional role from designing visual materials to more strategic outcomes. In line with this observation, only a quarter of job advertisements called for visual skills like layout, sketching and typography.

→ **Requirements stated in job advertisements by companies in Finland.**
M = Mean in the category.


COMPETENCE AREAS
M=26,0 %
Mobile/app design 55
Digital design work 54
Visual brand identity 30
Print and advertising 29
Film and animation 6
Retail and environmental design 4
Packaging and point of sales 4
KNOWLEDGE AND SKILLS
Process management skills
M=40,7 %
Interpersonal 86
Project management 41
Client relationship 33
Leadership 26
Presentation 18
Conceptual design skills
M=30,3 %
User-centric design 61
Business orientation 57
Concept design 43
Agile methods 30
Interaction design 30
Holistic problem solving 27
Prototyping 23
Service design 23
Ideation 15
Trend analysis 13
Data-driven design 10
Technical design skills
M=15,2 %
Coding Frontend 39
Layout 26
Production process 17
Sketching 11
Coding Backend 10
Image retouching 7
Visual coordination 7
Typography 4
Software Skills
M=16,2 %
2D software 49
Web dev. software 13
Animation/video software 7
Office software 7
3D software 5
PERSONAL CHARACTE-RISTICS
M=56,2 %
Self-driven 67
Acumen 61
Aesthetic and visual sense 57
Creativity/curiosity 39

Professionals of many talents

Challenges faced by contemporary societies push designers to collaborate with professionals in different fields, which requires them to expand their skillsets beyond their core specialty. Robert Harland, Senior Lecturer in graphic design at Loughborough University, describes the change in graphic design as follows:

"Clearly, the idea of graphic design is continually evolving and the range of activities and intentions undertaken in its name diminish and increase. No longer is calligraphy significant [...], but typography remains central. No longer is printing the dominant media, but screen communication, is in the ascendant. No longer is graphic design undertaken only by individuals, but also by large teams who fulfil multiple junior and senior roles across a spectrum of expertise."

When organisations seek to recruit a graphic designer, they also look for skills beyond the field of design. In addition to mastering traditional graphic design, i.e., layout and typography, candidates are also requested to be versed in business operations, coding and research. This is a demonstration of organisations seeking ever-broader benefits through design professionals. In addition to contributing visual outputs, graphic designers are involved in the development, research and concept stages of products and services.

This change in the skillset of designers also affected the way designers work. For example, graphic designers are increasingly moving towards working as in-house. This points to organisations seeing design as a critical competitive factor worth developing internally. Furthermore, the emergence of new job titles, like user experience (UX) and user interface (UI)

designer, reflect how graphic designers are orientating to positions requiring specialised digital skills.

In conclusion, the nature of the graphic design profession is in a state of flux, and professionals' skills and organisational roles should be monitored constantly. Receiving recognition for the value that graphic designers contribute to their organisations empowers them to further expand their role and tasks. Having an increasingly diverse role also drives them to develop their own expertise in order to be able to offer even more comprehensive and relevant know-how for organisations.

Read more:

Dziobczenski, P.R.N. (2021). Graphic designers' work and skillset – What companies talk about in their job advertisements. Doctoral Dissertations. Aalto University, Department of Design. https://aaltodoc.aalto.fi/handle/123456789/110482

Anna Valtonen &
Núria Solsona Caba

Approach the future with design thinking

Creative problem-solving processes used by designers were popularised in the early 2000s as the notion of 'design thinking' – as hands-on toolkits that offered a structured design process for managers in any field. Design thinking introduced human-centred and exploratory approaches into corporate strategies, which further birthed a new operating culture with its workshops, brainstorming sessions, sticky notes and mock-ups.

Design thinking was critiqued by many designers for oversimplifying the more profound dimensions of design work. However, it is noteworthy that the concept of design thinking is one of the few aspects of design that quickly became mainstream across the globe, even outside the discipline. Many organisations now placed more focus on the process itself, and designerly ways of working were introduced. Design approaches are now used in organisations on a strategic level – not just as part of product development – and many organisations have become more design-driven. Internal corporate training and executive

education programmes, such as *Design Thinking for Business Innovation* by Aalto EE and ESADE Business School, increasingly focus on training managers to use design thinking in their organisations strategically.

However, change is not always frictionless. The challenges of implementing design thinking can be localised to three factors that differ from the traditional innovation process:

Customers and their role. In conventional organisations, customers are seen as passive consumers who do not participate in the value-creation process.

Design thinking, for its part, relies on the insights of users and uses them as a starting point for identifying new ideas. Consumers are seen as active actors in the business, before and after a product has been launched.

Abductive logic. Traditionally, development work seeks to use existing data, reduce risks and create future solutions in continuation with previous ones. Abductive logic, on the other hand, proceeds the other way around: instead of looking at the organisation's previous performance, the goal is to understand surrounding events and phenomena and what they might lead to. These outcomes then steer the process into finding the best modes of action. This approach takes uncertainty to the core of the innovation process. A new phenomenon is not just a risk, but also an opportunity. It inspires new scenarios and reflections on what might be – rather than seeking proof of what is already known.

An outside-in perspective of the organisation. Using an outside-in perspective reduces the risks of investing in something that people do not even want to adopt. Remarkably often, organisations develop their own internal truths, which also

influence organisational modes of operation and structures, even when to an outsider they do not appear to be necessary or even beneficial.

Thus, there is much more to design thinking than just a toolkit: to succeed, it requires a new organisational culture and the adoption of new values.

- **Collaboration**: Mixed teams across silos are brought together to work for a shared vision. Commercial results are measured end-to-end, which undermines the 'it's not my job' attitude.
- **Participation**: Inclusivity at all levels of the organisation. Users become experts of their own experiences and invite different operations, management and executive levels to participate in collective decision-making.
- **Empathy**: The ability to adopt the perspective of others, thereby learning and adopting new ways of operating.

These new practices cannot be implemented overnight, as they require big transformative changes. In many cases, this change calls for an internal ideational revolution and an agent of change. The internal transformation is often initiated by a disconnected 'under-the-radar' pioneer, who, little by little, engages the rest of the organisation in changing everyday working practices to become the new normal.

Debra Meyerson, professor in organisational behaviour, has coined the term 'tempered radicals', which refers to individuals who are able to push for radical new ideas and innovation in an organisation, but in a way which develops the whole organisation forward. Meyerson emphasises that this kind of

When someone within an organisation dares to question established practices, it in fact makes the whole community more creative and receptive to alternatives for their own ways of acting.

new thinking is crucial for any organisation aspiring for success. Design approaches have often done precisely this – they have proposed new ideas and viewpoints in a way that allows the rest of the organisation to consider and develop new thinking.

Psychology professor Charlan Nemeth takes this thought even further: when someone within an organisation dares to question established practices, it in fact makes the whole community more creative and receptive to alternatives for their own ways of acting. Proposing alternative viewpoints increases open discussions of what could be, and thereby also makes the entire organisation realise how they could develop in a new way. Design activists thus play an even larger role than just creating or developing new thinking: they also develop an atmosphere of trust and change, where all voices are heard. This creates an organisational culture that appreciates and encourages creativity.

Leading this change requires a set of core skills: negotiation, persuasion, interacting with all levels of the organisation, fostering the organisational atmosphere, forming alliances, creating the conditions for stakeholder participation and facilitating collaborative decision-making.

Many scholars, like Frédéric Laloux in his book *Reinventing Organizations*, have shown us that creating a new organisational culture also requires a new type of leadership. We are moving away from hierarchical leadership in order to understand different viewpoints better. These approaches have already been adopted successfully by new kinds of leaders, often also representing minorities in gender, race or cultural background. The challenge now is to help any organisation to rethink how they will work in the future and how they could be more creative.

Design thinking and design approaches can thus be used to foster a culture of radical creativity and instigate change. Maybe visionary and engaging approaches could also help us to further new egalitarian organisational cultures? Achieving change is not always easy, but more open-minded thinking and a multitude of perspectives provides us with a better chance at succeeding.

Read more:

Elsbach, K. D., & Stigliani, I. (2018). Design Thinking and Organizational Culture: A Review and Framework for Future Research. Journal of Management.

Laloux F. (2014). Reinventing Organizations: A Guide to Creating Organizations Inspired by the Next Stage in Human Consciousness. UK: Nelson Parker.

Meyerson, D. (2001). Tempered Radicals. How People Use Difference to Inspire Change at Work. Boston, MA: Harvard Business School Press.

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Conclusion

Design has the power to steer consumption patterns and influence the environment. Design thinking can help companies tackle complex and wicked problems that lie ahead and further a culture of creativity in their organisation, as well as facilitate change. Nowadays, design is, indeed, focused on designing change; a set of approaches to tackle the world around us.

The largest obstacle for change management in practice is often not resistance to change, but insufficient resources or time for experimenting with new ways, learning new skills or doing things differently. Change projects can appear too large, and everyone is busy going about their business as usual.

However, there is an increasing need for new working methods in society. Design research offers help in defining and creating new approaches to challenges brought about by changes. Yet many organisations operating outside academia do not recognise the opportunities that design can provide. Few companies and public organisations know what kinds of topics are studied at the university. And even when they are aware, it can be difficult for them to implement design research in practice.

Collaborative work is important for universities. They too, need partners. Courage and willingness to change are neces-

sary for creating visionary futures, but so is boundary-crossing collaboration. Results are generated by multidisciplinary collaboration in management, research and innovation projects, product design and in the public sector. Now, if ever, is the right time to set change in motion!

The writers

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II Cross-cutting collaboration as a prerequisite

Leading by design

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IV Join the change!

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The world around us is changing. We are constantly faced with challenges related to the environment, technology and inequality. How can design and design research help in addressing these issues? With the help of design, companies and organisations can tackle complex challenges that lie ahead, thereby also facilitating change. This book offers inspiring examples and practical tools for taking the first steps of change in our rapidly transforming operating environment.

The content also introduces opportunities that design research can offer, as well as prompting new insights for change work in the reader's own organisation. Join us in taking a step towards change!

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