# THE NORDIC DIGITAL PROMISE

Four theses on a hyperconnected society

DEMOS HELSINKI

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THE NAKED APPROACH

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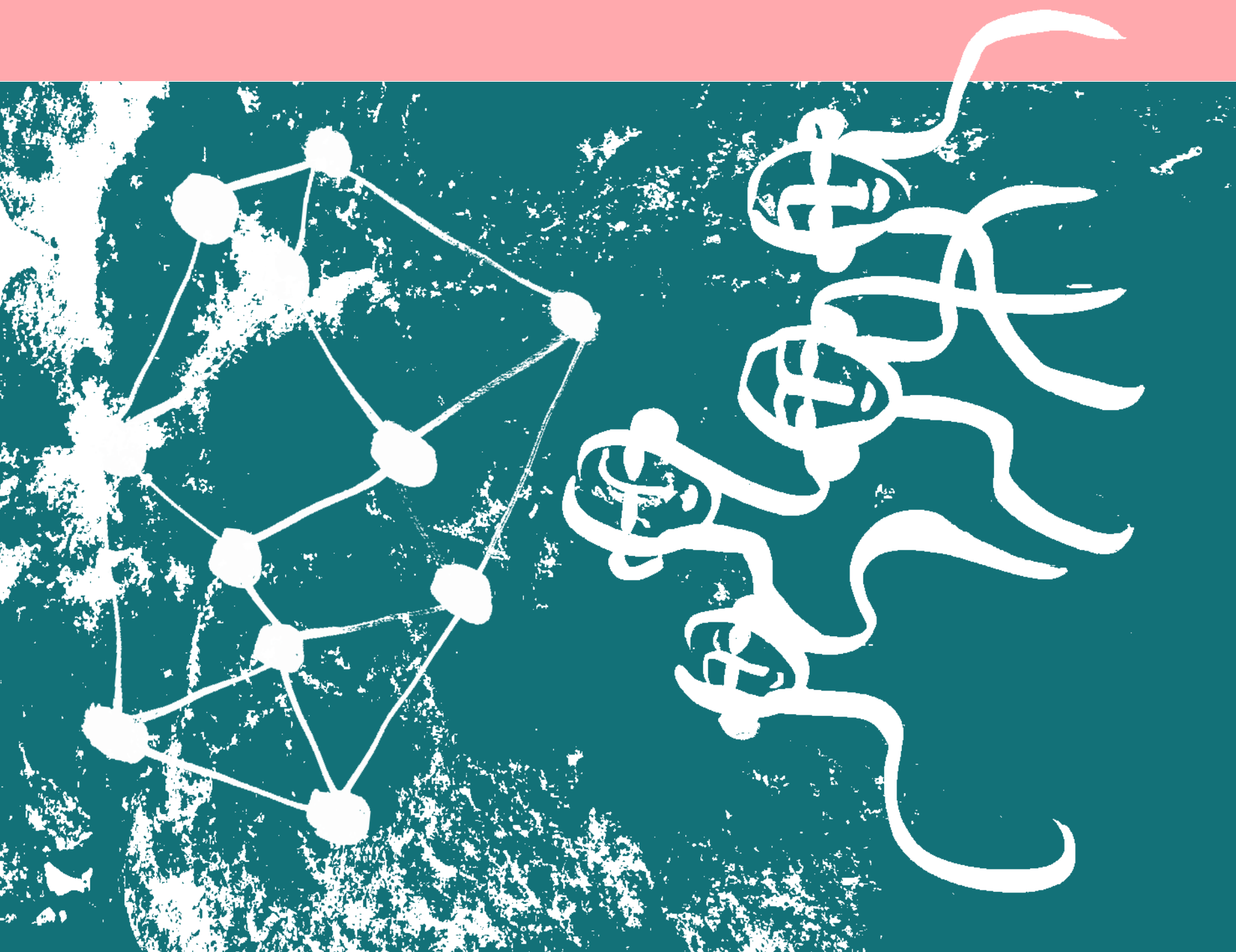
# THE PROMISE OF THE HYPERCONNECTED SOCIETY



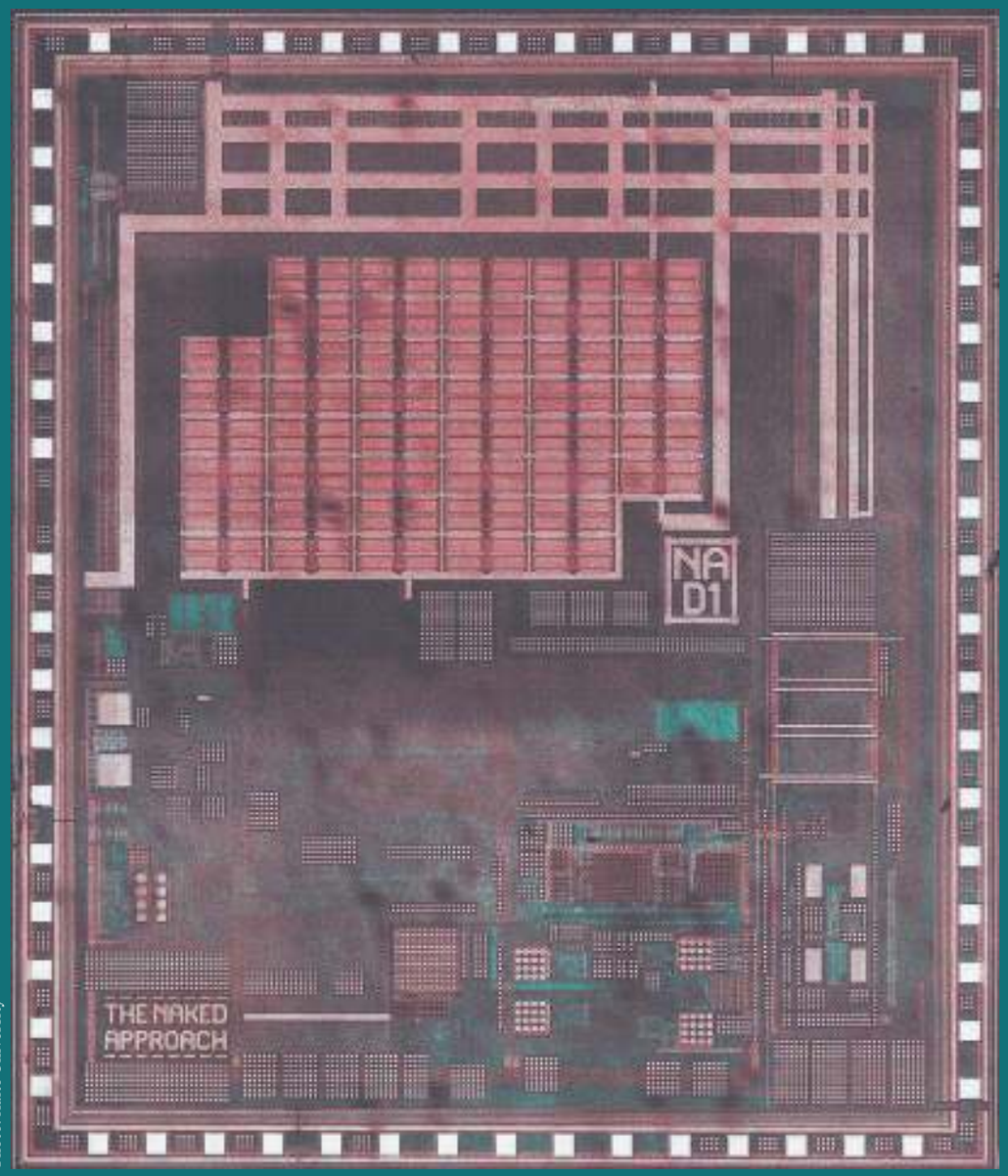



Photo: Aalto University



**INTEGRATED CIRCUITS (IC)** are microchips. These microchips can be used in sensors that are energy autonomous (i.e. don't need an external source of energy) and use very low power. The technology is tiny in size and suitable for mass production — properties that are required in the future, where trillions of sensors operate in the world around us.

In a single IC, three major technologies are combined: energy harvesting, radios and sensors. Energy harvesting is the extraction of energy from the surroundings (e.g. from light), and enables the sensor to operate without batteries. The use of ultra-low power radio circuits enables wireless collection of sensor node data from flexibly sized and easily assembled sensor networks.

The choice of sensor circuit is defined by its real-world application, such as ambient intelligence, safety, healthcare or farming. An omnipresent sensor network could for example help farmers in rural areas of the Global South to grow better crops, or elderly people to stay longer in their homes.

Due to its small size and no wires, this technology is retrofittable: these zero-energy sensors can make any surface at home, at work or in a public space smarter, by for instance turning it into an interface that reacts to human gestures. Integrated circuit technology can also be integrated with a flexible display  that uses practically no energy.

# OPENING WORDS

**IN A HYPERCONNECTED SOCIETY,** human beings, machines, and their surroundings are connected by trillions of tiny sensors. You may have heard about this fast-developing phenomenon under a different name, such as the Internet of Things, Connected Devices or Programmable World. These are all terms used to describe the development towards evermore enhanced exchange of information between us and our surroundings. Cheap, abundant sensors make the merging of digital and physical realities possible. Hyperconnected technologies develop fast, and their development is not only about computers: they shape our lives, norms, values, and behaviour. As a major global development of our time, **the expansion of hyperconnected technologies has the potential to solve perhaps the greatest burning question faced by humanity: how to increase our wellbeing and capabilities without further burdening the planet** (Demos Helsinki 2015a).

At the same time, hyperconnected technologies are shaping a world where single companies can wield enormous power over entire economies. Uber aims to become a global taxi monopoly, and Google and Facebook together control a staggering share of the flow of information. This is not just about the economy either: never before have single companies wielded so much power over our personal, social, and political lives.

On the flip side, we are witnessing a backlash against this concentration of power in the hands of a small number of tech companies. The Economist calls it the "Techlash", and speculates on how to "tame the tech titans" (Economist 18.1.2018), while the innovation foundation Nesta calls for "disrupting the disruptors" (Nesta 2018). Unless societies take an active role in guiding policy, practices, and business around hyperconnected technologies, we may end up living in a dystopian future, controlled by a handful of monopolistic platform companies.

**We need a roadmap for better life in a hyperconnected society — one in which these technologies fulfill their promise for every human being. We call this the Nordic digital promise.**

Demos Helsinki embarked on this task three years ago with a wide range of partners, imagining a future hyperconnected society through two scenarios set in 2040 (Kaskinen et al. 2015). These scenarios show us how it's possible to use hyperconnected technologies **to decouple the negative correlation between one's ecological footprint and a good life, using Nordic strengths, such as efficiency, trust, equality, and respect as a starting point.** This publication builds on the scenario work and **presents four theses on how to make sure that the future is a hyperconnected paradise rather than a dystopia.** The four theses are presented as four distinct chapters, which bring to life the Nordic promise of a hyperconnected society. In addition, the publication contains four guest blogs with cross-disciplinary insights by prominent thinkers and futurists. Scattered throughout the publication you will also find some of the technological solutions that constitute the building blocks of a hyperconnected society.

Now, at the transition towards a hyperconnected society, we hope that these four theses inspire a broad range of people to see the social opportunities that these new technologies offer — and help create an inclusive and sustainable world.

**Veikko Eranti** and **Johannes Mikkonen**

Helsinki
January 2018

# THE VISION OF NAKED APPROACH

## Naked Approach is built on Nordic practices

**DEMOS HELSINKI** has been building a hyperconnected society through a strategic research opening called Naked Approach — a project that pulls together top-tier research teams to work on groundbreaking technologies, from energy-harvesting sensors to printable electronics. The integrated circuit microchips introduced on the first page of the publication are a prime example, and were developed by Aalto University as part of the Naked Approach project. Other research teams come from VTT, Tampere University of Technology, the University of Lapland, and the University of Oulu. The Naked Approach is funded by the Finnish Funding Agency for Innovation (Tekes) and the Technology Industries of Finland Centennial Foundation.

New technologies and innovations have historically emerged in different parts of the world (Aaltonen 2016). Current technological development, however, is causing a dilemma for entrepreneurs and policymakers alike in the Nordics: how to innovate and develop new technologies, but avoid their takeover by Silicon Valley giants?

The answer is straightforward. If we want to succeed in the Nordics, we need to build our own take on hyperconnected technology. This means developing technologies and innovations based on the strengths of Nordic societes: equality, trust, and respectful coexistence, as well as Nordic excellence in user-centric design and ICT, including emerging technologies in electronics manufacturing and integration.

Naked Approach has been a vision-driven project. At the core of its vision is **the transition from gadget-centric interfaces to user-centric and gadget-free digital interfaces — in such a way that hyperconnected technologies decouple the negative correlation between one's ecological footprint and a good life.** In this vision, smart surroundings provide all the needed information, tools, and services, and we can live without carrying an array of gadgets — hence the term "naked". User-centricity implies that we have ownership and control over our own data, and that our digital privacy and domestic peace are respected (Aikio et al. 2016).



## Seven principles for the builders of a Hyperconnected planet

In our scenario publication, *Future as Told Through the Garden and the Streets*, we chose the five most important social tensions, whose solution will significantly shape future society. Based on these tensions, we constructed two distinct scenarios. In both of them, humanity manages to avoid catastrophic climate change and environmental turmoil.

**TENSION OF LIMITED RESOURCES:**
Wellbeing versus planetary boundaries

**TENSION OF EQUITY AND CAPABILITIES:**
Participation versus control

**TENSION OF NEW ECONOMIC SYSTEMS:**
Converging markets versus fragmenting structures

**TENSION OF SUBSISTENCE:**
Liberation from work versus the end of work

**TENSION OF VALUES:**
Liberties versus security

We don't know how these tensions will develop in the future, but we can speculate on radically opposing outcomes, and derive future scenarios that different combinations of outcomes could bring about. Based on the scenarios and our learnings from them, we present seven principles for the development of a hyperconnected planet:

1. **Parity principle:** For hyperconnectivity to be the most significant development of our era, it must play its part in solving the grand challenges of our times.

2. **Utility principle:** Hyperconnectivity needs to solve more problems than it creates.

3. **Systems principle:** Hyperconnectivity is best realised by developing it with a holistic and systemic perspective and by understanding the complex nature of change. This means taking into account more than just technological development, i.e., the social, economic, political, and environmental aspects.

4. **Participation principle:** Technologies should be designed and developed by and with the people who use them. Social developments are easiest to achieve by involving people and focusing on the issues they find important.

5. **Blue ocean principle:** Economic developments are easiest to achieve by focusing on new value creation, instead of simply improving old ways of creating value. It is important to reap benefits from the new value creation model built on top of increased productivity. The change should not only be an improvement, but also a source of radical new value creation.

6. **Justice principle:** Political development can be included by using and suggesting regulatory frameworks to guarantee fair markets and people's rights. For example, the risks of data ownership and privacy need to be prevented and rights need to be secured.

7. **One planet principle:** Environmental development can be included by understanding that the desired end-state of the hyperconnected planet is impossible without solutions that lead us towards increased sustainability. The development of the hyperconnected planet should, by definition, save more natural resources than it consumes.



**GUEST BLOG : Vesa Pentikäinen**
VTT

# New technologies for the digitally enchanted world

## Our life in the hyperconnected world

**AN INCREASING SHARE** of our everyday life is drifting from the real world of face-to-face physical contact to the digital domain. Our social life, everyday shopping, news and media, gaming and other entertainment are dependent on constant online connectivity to digital services.

We use our smart devices and other wearable gadgets as gateways and windows to connect us to the digital world. These tools provide limited and unnatural means for human interaction. They fix our attention to minuscule touch screen displays and freeze our muscles to micro-motoric swiping and tapping actions. We are becoming outsiders in the real word, quite often not really paying attention to what's happening around us.

More and more elements in our living environment are being connected to the internet. Integrated sensors are collecting data and reporting it back to companies, providing them with information on how we use our kitchen appliances, health monitors, electric cars, and smart hairbrushes. So far, these data streams from IoT-enabled products have made us passive data sources. Algorithms are constantly processing our collected data without giving us many options to control how the data is being used. We are treated as potential consumers of the derived services.

## Surroundings as a service interface

Is there an alternative track to these developments? We can no longer live without these digital dimensions of our life. What we need, therefore, is a more natural way of reflecting the nonphysical digital domain back to our real world and living environment. If we made the surfaces of our built environment truly interactive, we would not need to rely so much on our bearable

and wearable gadgets. The new means of ambient communication would let us feel intuitively what's happening in the digital domain, with no more need to constantly check, swipe and tap the gadgets we wear and carry. This is the idea of "Nearables": to make us the active subjects of our life and of the hyperconnected world.

New digitally enhanced surroundings will require integrated sensing and, more importantly, responding capabilities, to build a real-time two-way interface between the digital and physical worlds. Printed electronics technology offers new means to embed and hide functionalities inside everyday objects. We can create touch-sensitive table tops or interactive door panels for vehicles by integrating sensors, display elements and control electronics inside laminated or injection-molded components.

By controlling thin flexible light panels and their dynamic illumination patterns, we can for example affect the mood and signal approaching activities in a subtle and non-disturbing manner. We can also give completely new capabilities to our surroundings by attaching sticker-like energy autonomous elements or stick-it-on devices (SioDs), and incorporating a printed solar panel, an electrochromic display element, a super-capacitor for energy storage and an ultra-low power radio for communicating with the surrounding environment.

## Rules, roles and trust in a hyperconnected society

We are transitioning from the deterministic task-oriented era to a new hyperconnected world, where all our locations, actions, reactions and interactions are stored, shared and processed to create new and improved digital services. In this "omnipotential" digitally enchanted world, it is extremely important to consider the aspects of privacy, security and trust.

We might be able to rely on big companies and their ecosystems, leaving our data in their hands. It is, however, difficult to predict where our data ends up, with frequent mergers between these companies, constant changes in terms-of-use and privacy statements, and differences in national legislations.

Alternatively, we can build a distributed peer-to-peer network of trust by using blockchain or similar technologies. This approach would keep the keys of privacy in the hands of individual citizens, rather than in the hands of the established mega-corporations. It could also create a fruitful breeding ground for growing new data-related business and services.

In this multiplayer game, many new standards and transparent and open development actions are required. There will be many experiments, iteration rounds and research actions needed before the working and winning solutions are found and created. The transformation towards the hyperconnected and digitally enchanted world is not a straightforward track of actions, but a fluctuating flow of parallel developments.

The rules and roles of different players will evolve constantly. Companies, governments, individual citizens, as well as mobile agents, bots and other forms of artificial intelligence, will need to live side-by-side in the same hyperconnected reality. They all need to be adaptive and constantly looking for new positions and opportunities, while still finding a strong enough set of common standards, values, and rules that are respected by at least a reasonable proportion of actors.



**GUEST BLOG : Aleksi Neuvonen**
Demos Helsinki

# Progress in the next era

**WHY DO WE NEED** hyperconnected technologies? The easy answer is: Because we want society to advance, go forward and bring about something better. We often liken technological progress to societal progress, seeing technology as a way to get rid of material deficiencies, illnesses and other curses haunting humans and societies through time.

Technological progress is about expanding the collective opportunities of society by enabling more to emerge from less. It therefore reduces the amount of sacrifice needed from Person A in order to increase the wellbeing of Person B - such as the need for people of today to sacrifice some of their material wellbeing to make the planet more liveable for future generations.

There are, however, different ways of seeing the linkage between technological and societal progress. Technological development can bring about:

**1.** Solutions to fundamental problems of human well-being (such as hunger, poverty, illness, ignorance) that hamper people's ability to pursue things that they value or dream of.

**2.** Economic success and wealth that can be exchanged and invested in things that people value (health, higher education, free time, personal space, goods that serve as symbols of status and other forms of identity)

**3.** New skills and capabilities that (at least potentially) help people to do and achieve things that they previously could not even think of, in other words, to transcend their previous limits.

20th century industrial societies were mainly concerned about 1 and 2. They were societies of 'I need' and 'I want'. These fundamentals still provide justification to societal investment in developing new technology. And that justification is very strong: ⅙ of human beings live still in extreme poverty, and millions still suffer from illnesses that could be either prevented or cured given decent level of healthcare.

However, even if we were to attain these goals, we wouldn't be creating anything long-lasting, unless people feel that they are transcending their own previous limits. In

many cases, mere wealth or absence of dire symptoms of deprivation don't bring about sense of progress. Besides, overcoming the fundamental challenges to human wellbeing requires lots of learning by the people themselves. In most cases, it is not merely a matter of learning to perform new tasks, but about something much much greater, about transforming the way one perceives the surrounding world and oneself.

Between mid 1860s and 1960s, the Nordic countries rose from being among the poorest countries in Europe to some of the most prosperous and technologically advanced nations on the planet. Why? The easy answer is industrialisation that enabled these relatively peripheric regions to refine their natural resources into valuable goods and and export them to other countries. Yet this explanation does not tell the full story: many other nations experienced fast industrialisation during the same period, but could not turn that into something as sustaining as the Nordic countries. What made the difference in Fennoscandia was their approach to people, their skills and personal development.

The Nordic countries are known for their high level of equality. It originates from the idea that every human is capable of evolving through one's life. In other words, our contribution to society and place in it is not determined by our descent but by our drive to learn new things in life. Consequently, every citizen is considered as someone who can provide something valuable for the rest of the society. That is also the rationale behind the substantial investments that Nordic societies make in people: free education in its different forms, public healthcare, and social security that enables independence from family and other social groups.

This has resulted in a very special type of development: In the Nordic countries people have exceptional levels of personal autonomy. Hierarchies are relatively low. This means that people have less constraints to explore and discover new things.This culturally inherent curiosity also leads to a positive attitude towards technology. Technology and technological development are seen as vehicles for inclusion, something that can benefit all, without too much concern for the traditions and established social order that technology might shake up.

The Nordic case is a good example of how technological progress can bring about societal progress in all of the three ways listed above.

What can we learn from the Nordic example when exploring visions towards hyperconnected society? The following five things, at least:

**1. Think of progress more than of money.** Accumulating wealth or making human life a bit easier are not true signs of progress. When we develop transformative technologies and the social, economic and political structures that enable them, we should think of outcomes that genuinely improve the wellbeing of people - especially of those people suffering the most from different forms of deprivation.

**2. The more collaboration, the more freedom.** To put it bluntly, poverty has quite often been an impediment to greater individual freedom. The more advanced technology, the more economic growth, the more wealth, and the more freedom. However, in our current era freedom increasingly depends on our ability to combine our skills with those of others (people and machine alike) and to achieve things that no-one could achieve alone. Hyperconnected technologies can provide pivotal opportunities for new forms of collaboration and eventually freedom.

**3. Make technology accessible and open.** Digital communication has changed the expert culture of industrial society. The best experts on the globe can now be much better compared to normal people, than at any other time in history. Yet information and skills are now accessible in completely different ways than in the past - something that people increasingly take for granted. Therefore 'open by default' is becoming a minimum requirement for technologies that aim to advance societal progress.

**4. Aim high.** The transformative period calls for goals that are truly worth pursuing: visions of a society where the most wicked problems of our time have been overcome. Currently there is an urgent need for discovering ways to curb climate change while making the current model of (economic) development inclusive to all people. These type of visions serve to bring together people who would otherwise not have met or joined forces. These unlikely partnerships are the ingredient that enable humankind to transcend its previous limits. It is evident that these combinations entail technology and its developers.

**5. Think beyond current institutions.** We still live in societies structured by institutions that were largely created as reactions to the Industrial Revolution and the new socio-economic context it brought with it. These institutions are not perfect, barely fit for the time and context we are living now. We therefore have to dare to question these institutions and innovate something that could replace them, something more apt for the challenges of tomorrow. Technological progress should give rise to new forms of organization that provide people a voice, places for dialogue and pathways towards a fair society.

# FROM TECHNOLOGY-DRIVEN TO VISION-DRIVEN DEVELOPMENT

Thesis 1

**Hyperconnected technologies are changing both the way societies are organised and how they *should* be organised. To share the benefits of new technologies more equally, we can no longer focus solely on developing technology: we need to change social institutions as well. The Naked Approach project is not only about developing new sensor technologies, it is also about reorganising the hyperconnected society.**



**TECHNOLOGY :** Organic Photovoltaic

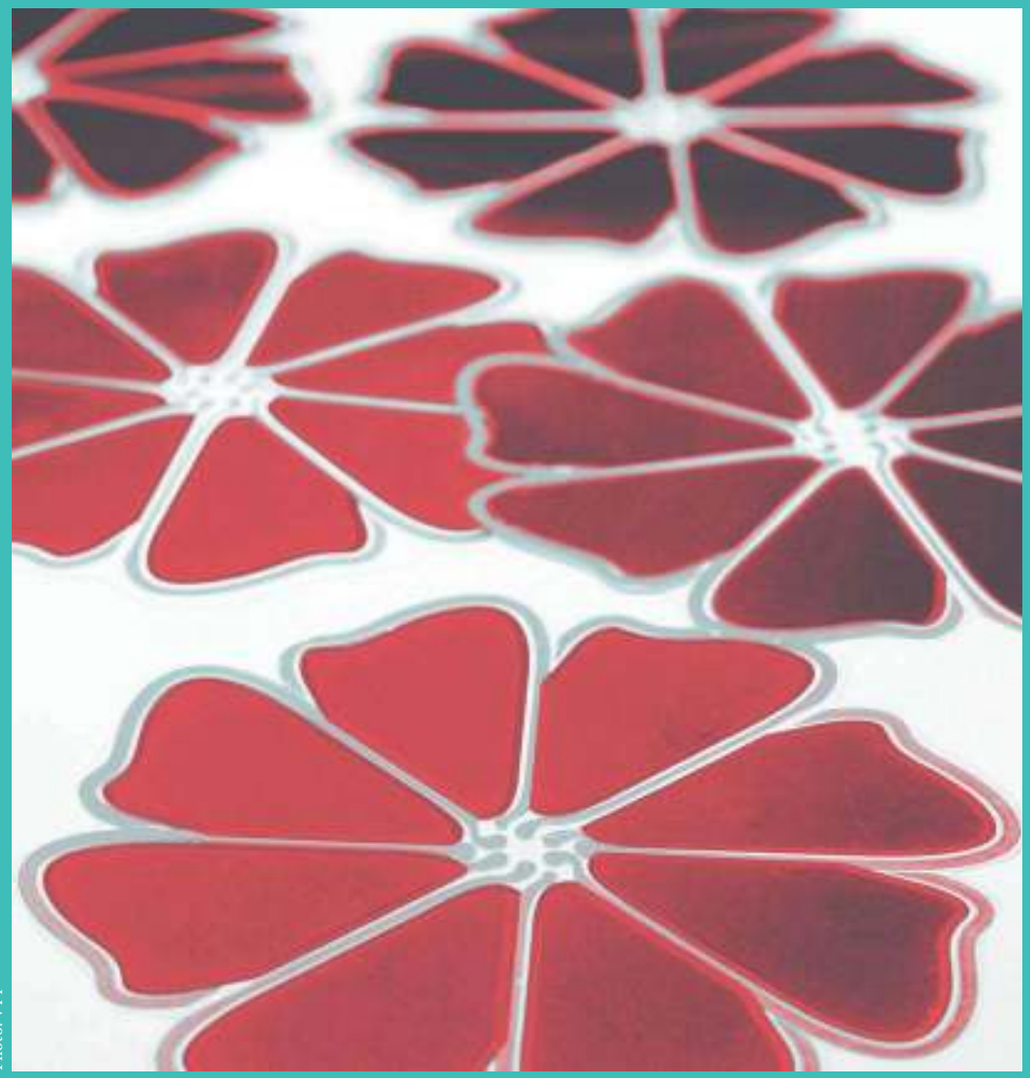


Photo: VTT

**THESE ORGANIC PHOTOVOLTAIC** (OPV) (by VTT) solar cells are suitable especially for harvesting energy in conditions of low indoor lighting. OPVs are essential for enabling energy autonomous or “carefree” smart devices, that can be seamlessly integrated into our living environment.

# TECHNOLOGY IS A SOCIAL ISSUE

*'The good news is we are sitting on a complete revolution of technology that allows us to move in a sustainable direction. That's a matter of choice though... We have to decide on a planetary scale, we're going for a sustainable, green, inclusive economy.'*

(Sachs, 2014)

**THE RISKS AND OPPORTUNITIES** related to advances in technology are so extensive that technological development can't be left for companies and engineers to preside over. Technological development is happening simultaneously in different contexts, including virtual reality, artificial intelligence, robotisation, nanomaterials, and energy technology. All these developments have potentially significant social consequences, as digital platforms displace traditional companies, computers displace humans, and devices displace traditional channels of communication.

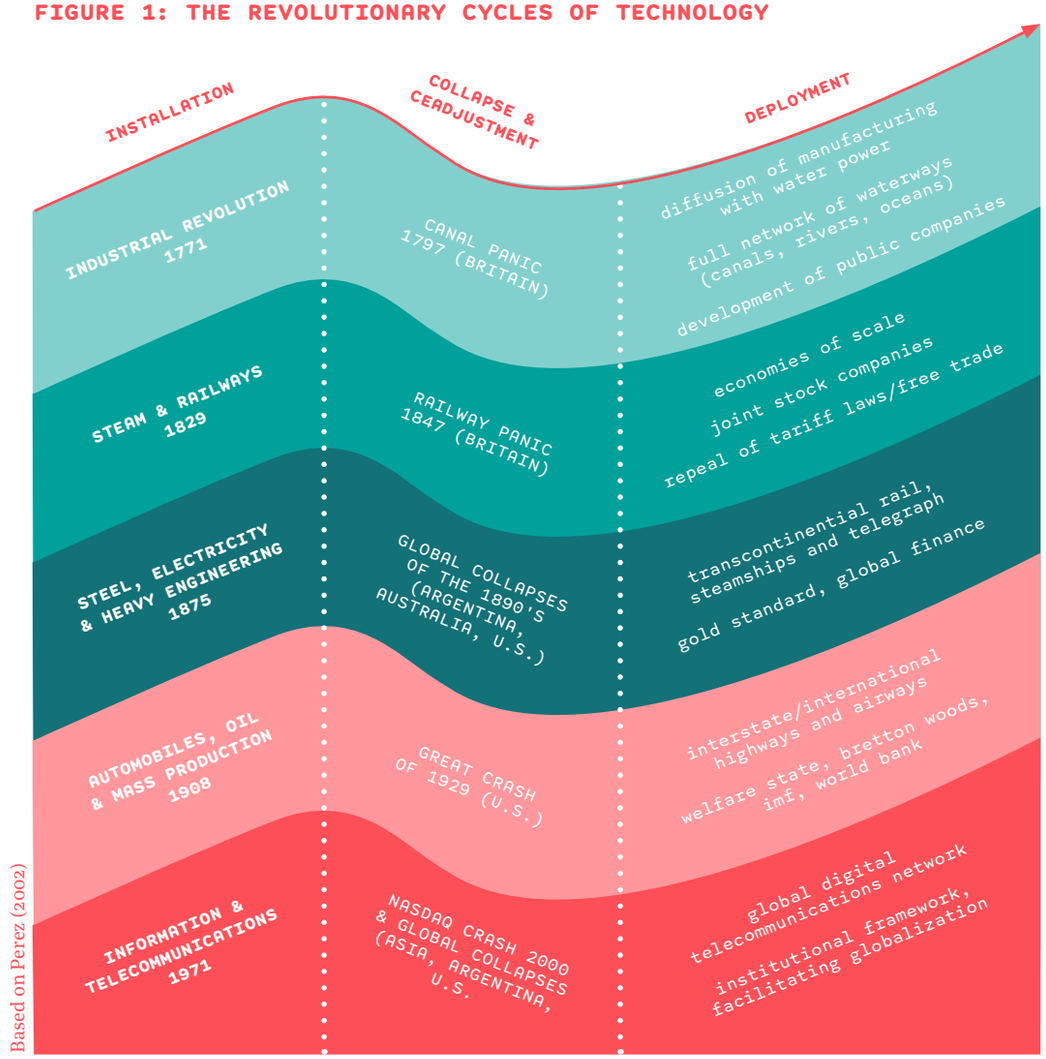
**The past offers examples of the far-reaching unintended consequences that technological innovation often has.** Mazzucato and Perez (2014), for example, describe how new technologies can lead to the development of entire new industries. The advent of universal low-cost electricity led to the widespread use of refrigerators and freezers, which spawned innovation in frozen foods, which in turn created the need for innovation in packaging methods. The creation of the packaging industry has had direct social health consequences, as our diets now largely consist of items our great grandparents wouldn't have recognised as food.

**Moreover, significant technological changes can shake up entire societies. While many of their consequences are beneficial, they can also lead to severe social tensions.** The advent of the steam engine during the Industrial Revolution brought with it more efficient travelling and factories, but also pollution and later climate change. Rapid urbanisation led to the appearance of both slums and creative cities, and while new jobs were created for millions of people, we were also left with new social problems, like unemployment and urban poverty.

These tensions prevent sharing the benefits of new technologies until new social institutions have been shaped and old ones reformed (Perez 2002). This is evident in how the unprecedented social problems, generated by the Industrial Revolution, spurred political demands for the establishment of social security systems. Social insurance became a core responsibility of the state in many Western countries, which also started to take an interest in providing other social programmes such as public education and healthcare (Kuhnle & Sander 2010).

We can reflect this back to the technological developments of today. As we are in the midst of a transition to a post-industrial society, **we need to shape current social institutions and create new ones, to prepare for the changes ahead** and ensure that people can live a good life within planetary boundaries and respond to the **tensions** outlined on page 15. The rest of this chapter answers the questions: How to steer technological development in such a way that it solves the world's wicked problems? And what is the role of public innovation policies and public funding in all this?

**FIGURE 1: THE REVOLUTIONARY CYCLES OF TECHNOLOGY**



# HOW TO STEER TECHNOLOGICAL DEVELOPMENT?

**TECHNOLOGICAL DEVELOPMENT** is often associated with the private sector, as innovations often enter our lives in the form of products and services by private companies. But the public sector has an important role to play in technological development and innovation, for **three reasons:**

**1. Technology does not evolve independently of the social context.** Political decisions and (the presence or absence of) social investment influence the direction of technological development. This means that technological development is inevitably the result of socio-political choices. For example in the industrial era, the development and usage of technologies reflected the availability of cheap energy, standardised consumption patterns, and the creation of social security systems (Mazzucato & Perez 2014).

**2. Governmental innovation and R&D funding have played a crucial role in most major breakthrough innovations.** Those areas of the world that have experienced innovation-led growth (such as Silicon Valley in the past or China today), are characterised by vision-oriented public investments in a wide range of sectors (Mazzucato & Perez 2014). For example all the technologies behind the iPhone were directly funded by government-led investments. The success of Nokia mobile phones was also influenced by public investment, especially R&D funding by the Finnish Funding Agency for Innovation (Tekes), (Ali-Yrkkö & Hermans 2002, Mazzucato & Perez 2014).

In addition to public investment, governments have many tools they can use to guide the direction of innovation, such as tax incentives, public procurement, standards, regulation, creation of entrepreneurial networks, clusters, patents, IP markets, and so forth.

**3. Technological progress often produces things that are nice to have, but do not necessarily solve socially significant problems.** Moreover, the combination of low-cost cloud computing, a renaissance in machine learning, and rapid advances in genomics have opened up new classes of problems for computers to try to solve. The public sector should aim to ensure that hyperconnected technologies play their part in solving the grand challenges of our time, and that it solves more problems than it creates (see the Parity and Utility principles in page 13).



**In light of these three reasons, it's necessary to consider how public innovation agencies can make sure that new technologies and innovations are meaningful and beneficial.** This chapter argues that this is best done through implementing the concept of vision-driven development in innovation and industrial policy. Vision-driven development is a concept borrowed from product development, where new technologies and innovations are geared to solve social challenges. The focus of this chapter is innovation policy and direct funding by public institutions, but the model of vision-driven development can be used in other contexts as well.

The important question is how to use public funding as an instrument in the implementation of vision-driven development. Within this context, we should not be asking how innovation policy can make it easier for businesses to invest, but rather how to stimulate their courage and desire to do so. In the next two sections we define two approaches to vision-driven development: the bottom-up approach and the top-down approach.

## Bottom-up: recognising and fostering emergent visions

**Innovating is not easy, and innovation attempts often fail.** According to interviews conducted for Naked Approach, a typical reason for the failure of a technology research project is the lack of a coherent vision shared by the research group.

In the bottom-up approach, such a vision is developed by the research group itself, along with the relevant stakeholders. The basic idea of this approach is that funding institutions do not define the goals of the projects they fund, but require the projects themselves to define their purpose and development goals within certain criteria. These criteria could be related to, for example, how deep the interactions between different actors are, the predicted impacts of the project, or how risks are shared. In this way, the bottom-up approach helps innovation agencies and funds to recognise development projects capable of solving social challenges.

The social and technological vision of the Naked Approach was created using the bottom-up approach: the vision of the project was not defined by its funding institutions, but instead was created together with a wide range of stakeholders.

A clear bottom-up-vision has provided a sense of purpose to the research and development work. It has also guided the development of solutions to address meaningful social problems.

*"It is not the public sector's role to define which technologies should be supported and what needs to be achieved. But it's important to define certain criteria for funding and recognise the projects that have potential to succeed."*

**Laura Juvonen**
Executive Director of
the Technology Industries of Finland

## Top-down: vision-oriented innovation

Vision-oriented innovation policies can also be implemented using a top-down model, where innovation agencies and funds define the goals and vision for the project. Historically, this has produced good results for large-scale public innovation projects, such as sending a man to the moon, or finding remedies for cancer. **Innovation policy must be understood not only as market-fixing, but as actively shaping and creating markets.**

**The top-down perspective does not imply that public actors pick winners, but rather that they set clear objectives for the projects that are funded.** In order to make it work, three things should be kept in mind:

**1. Spreading innovations requires vertical and horizontal networks.**
Vertical networks refer to cooperation between partners that belong to the same chain. Meanwhile, horizontal networks refer to cooperation among firms that are primarily competitors (Gellynck et al. 2010). The innovation process is not straightforward, but complicated and uncertain. Funding R&D does not produce an impact without enough vertical and horizontal networks to spread the message.

**2. Vision-oriented innovation policy should focus on generating networks and ecosystems.**
Innovation can be promoted through indirect interventions — throwing public money at projects does not necessarily create successful ecosystems.

**3. Key actors** in creating networks are investors, large companies, public authorities, and universities, in addition to entrepreneurs (Aaltonen 2016).

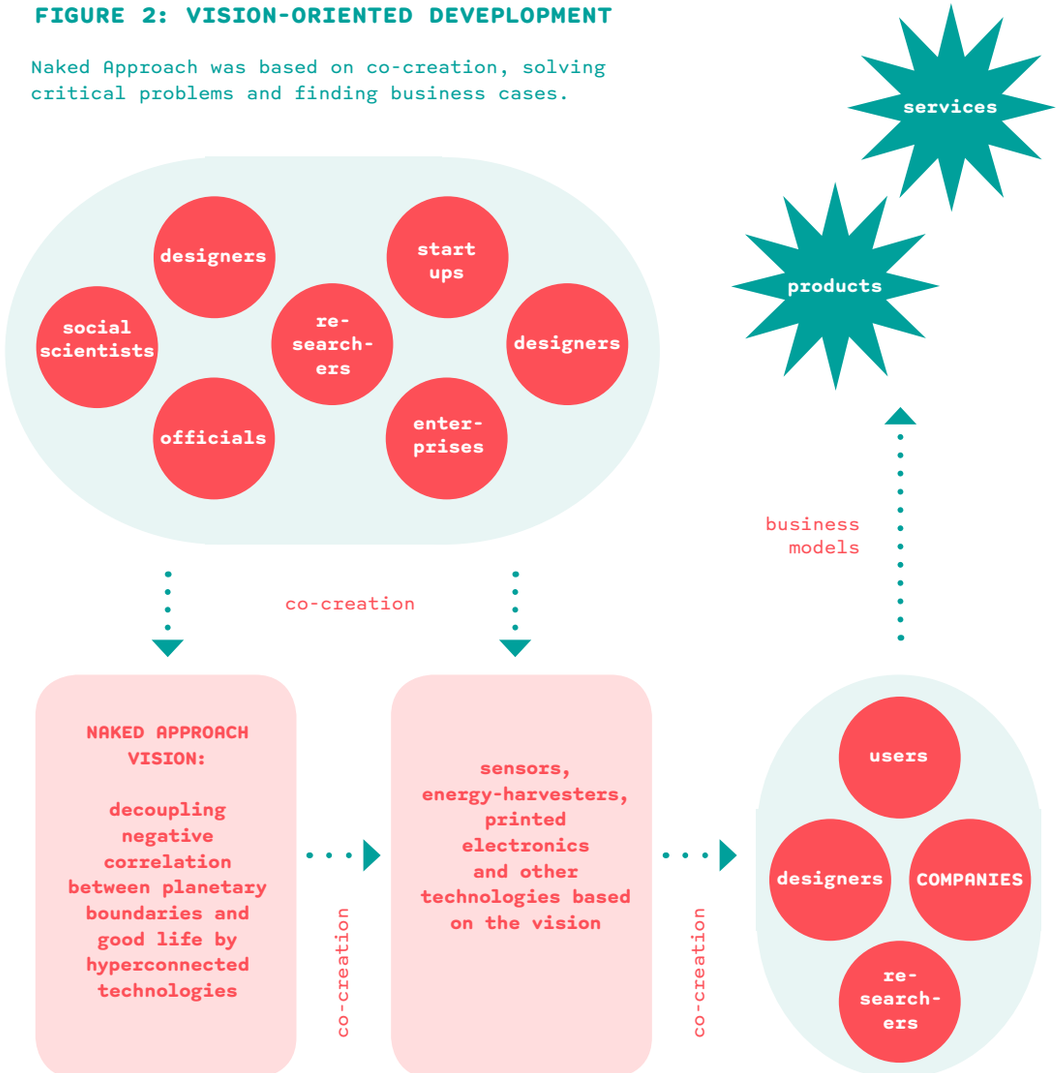


# THREE SUCCESS FACTORS OF VISION-ORIENTED INNOVATION PROJECTS

**BASED ON OUR LEARNINGS** from Naked Approach, we have identified three factors that should be taken into account when funding research and development projects.

**FIGURE 2: VISION-ORIENTED DEVEPLOPMENT**

Naked Approach was based on co-creation, solving critical problems and finding business cases.



## 1. Co-create

An impactful and successful project has a co-created vision.

**"We define co-creation as any act of collective creativity that is experienced jointly by two or more people. It is a special case of collaboration where the intent is to create something that is not known in advance."** Sanders & Simons (2009)

**"Co-creation = inviting constituencies to collectively solve problems and exploit opportunities."** Gouillart & Billing (2013)

**"A management initiative, or form of economic strategy, that brings different parties together (for instance, a company and a group of customers), in order to jointly produce a mutually valued outcome"** Prahalad & Ramaswamy (2004)

Co-creation is an approach of inviting relevant stakeholders to collectively address issues, solve problems, and exploit opportunities by combining their insights, skills and resources. Co-creation is not just a question of formal consultation in which professionals give users a chance to voice their views, but products and services are jointly designed together with stakeholders (users, professionals and so on) through a creative and interactive process which challenges the views of all parties and seeks to combine participants' views in new ways.

**In order to be impactful, the vision needs to be accepted and shared not only within the project, but also by the stakeholders of the research and development activities.** Co-creation helps to identify the truly valuable solutions. It also helps people to commit to the vision, and thus enables more relevant and more compelling solutions. The stakeholders and partners of the project feel more connected and take a positive stance towards the vision. They become co-owners instead of clients or users. (Enviu 2018.)

The vision of Naked Approach, described above on page 14–16, was co-created together with technology developers, enterprises, startups, government officials and researchers. It was developed in just under twenty workshops, with different themes from privacy to user experience, using different methods of co-creation, from backcasting to business model drawing.

By co-creating the vision we were able to:

1. Envision the relevant future.
2. Help people to commit to it.
3. Find critical problems.
4. Identify the decisions needed to avoid undesirable future scenarios.
5. Find out how to harness the potential of technological and social innovations, to make desirable futures happen.



## 2. Identify critical social problems

**The co-created vision of an impactful and successful research project is built around an easily identifiable purpose.** The purpose of a vision-driven project is not solely to make profit, but to solve social problems, to improve the wellbeing of people and the planet. It is inspiring and motivating to solve issues that matter: companies find it easier to identify business opportunities when the problem is clearly pronounced, and public opinion encourages efforts to solve problems that the public considers important.

Identifying a social problem that needs to be solved is therefore an important phase of vision-driven innovation projects, and co-creation is an effective method to identify such a problem. A useful approach can be borrowed from the start-up world, where the concept 'customer's pain' is used when developing products and services that people want to spend money on. This pain is different from 'consumer needs' — it guides business developers to find things people find disturbing, frustrating, urgent or uncomfortable. Similar thinking, on a social scale, can be applied in vision-driven innovation activities.

Finding these problems brings us, the people, into the centre of technology development. The problems that Naked Approach works to solve are summarised as the four tensions on page 15.

## 3. Implement the vision: build business cases or experiments

A co-created vision that identifies critical problems will not solve those problems, unless the project has potential to change investment behaviour. This can be achieved by making sure that development projects lead to real products or services that are also relevant from a business point of view.

**This is why an important part of the Naked Approach project was to work with companies to identify new business cases, to begin progress towards the vision in the short term.** The Kuha model by Nokia, outlined in the box below, is an example of a technological product and business plan developed by the research consortium together with other stakeholders.

**Public administrations can take steps to implement vision-driven innovations through experimentation. This means trying things out on a small scale before applying them more widely. Experiments allow for testing, failing, and learning before solutions are scaled up. Experimentation is a long-standing practice in the development of digital services, and could play an increasingly important role in politics too, through experiments or creation of experimentation opportunities by public agencies.**

NOKIA'S KUHA is a community hosted, affordable model for providing mobile broadband access to blackspots — areas without Internet connectivity. Kuha can use any available Internet connection, including satellites, to connect the base station to the operator network, thus creating local 4G access for otherwise isolated areas.



**GUEST BLOG : Miapetra Kumpula-Natri**
Member of European Parliament

# What role for the public sector in the innovation policy of the future?

**IT'S HARD TO IMAGINE** that the term "public sector" could carry a more negative connotation than it does in today's political narrative on innovation or disruptive innovation. The public sector, or the state, is considered overly bureaucratic, (too) big, slow, cumbersome, and overall a hindrance to agile and free-flowing innovation. But any serious endeavour in innovation, industry, science or economic policymaking has to look beyond such caricatures. The public sector is, and has been, a key instrument in developing and bringing about new technologies, new markets, and new incentives for scholars, entrepreneurs, and innovators.

This alternative perspective on the public sector's role is perhaps best captured in Mariana Mazzucato's 2013 book The Entrepreneurial State. Mazzucato argues that it was in fact the state that enabled such breakthroughs as Apple's iPhone or Google's search algorithms — by investing in obscure technologies out of the scope of private investors, and by providing a backbone infrastructure for riskier product development.

This, of course, does not suggest that the state is always right. There are scores of examples where a deep-pocketed state has, by picking winners, poured taxpayer money into projects well beyond their expiration date. What we can learn from Mazzucato is that good innovation policy does not try to distinguish between idealised versions of the private and the public sector, but rather considers the two interlinked. To put it simply: if a sector on economy is solely run by private businesses, how can we solve challenges in that sector without bringing the businesses along for transition? Just think about the energy sector for example.

How could this discussion shape the way innovation policy is designed in Europe in the 2020s? I believe that there needs to be a stronger link between the needs of society and R&D output. This is needed for three reasons.

First of all, the problems we are facing have grown so great that we need everyone's efforts to solve them. Combating the effects of climate change and completely changing our relationship with the planet's natural resources and the way our societies function in the post-industrial age — to name just a few — are big challenges that will not

be solved without clear indication of the direction we want to go towards.

Secondly, the continued scrutiny by citizens of the use of any public funds demands that they be used properly. This is not usually questioned when it comes to national level innovation policy, but policy at the EU level needs to show that public money produces results. This is why there needs to be greater accountability for public R&D money.

This need has already been recognised to some extent. The European Union's Horizon 2020 programme, already the largest public R&D programme in the world, has, as one of its three core pillars, seven social challenges into which funding is channelled. These range from health, demographic change and wellbeing to smart, green and integrated transport, and protecting the freedom and security of Europe and its citizens. Including these social challenges in the programme has been an attempt to steer innovation towards goals that matter to citizens.

The problem, however, is that with such a wide and varied approach, the challenges end up being catchalls, and in the worst case just another chapter of empty phrases in the introductory section of a funding application. Social goals and challenges can be hard to pin down and formulate properly. And it is hard to express the ambitiousness of the stated goals, whilst making sure that there remains room for actual innovation outside the box drawn by policymakers.

The EU is now preparing its next Framework Programme (FP9) for R&D and innovation. Funding might rise from the current EUR 80 billion to a whopping EUR 100 billion for the period 2020-2027 (although with Brexit and the multiannual framework unresolved, it's too early to report exact figures). It's time we get the link between policy objectives and funding inputs right. The time for discussion is now.

I believe this is something that the Naked Approach project can help us with. By stating a clear goal (a transition from gadget-centric to a user-centric world), by moving from sector-specific programs to goal-oriented solutions, and by encouraging a wide range of partners to produce concrete answers, the project shows us that a vision-led approach to innovation policy could be the model to bring R&D in line with policy needs.

Oh, and the third reason to have a stronger link between policy objectives and R&D? A new way of doing innovation policy might be what we need to really push technological and social development to the next level. If we rely only on the short time horizons of venture capital or the next product cycle, we will never solve the big questions our societies are facing.

The public sector's role doesn't stop at financing innovation or setting the criteria for funding — the public sector is also responsible for education systems, industrial policies and the like, not to forget public services. Social innovation is needed as well — and we are in a hurry, as technology will transform work, taxation, and social benefits.

Shaping the future through innovation requires ambitious lawmaking. With every public funding decision, I would like to see consideration of recent scientific research on what is already possible. Why take small steps towards a better world, if revolutionary solutions are already there in the labs?

If we stop treating public resources as a technology-neural, idea-neutral, and non-committal platform, and start using them as tools to change the world, we might just accomplish that — change the world.



**TECHNOLOGY :** Supercapasitor

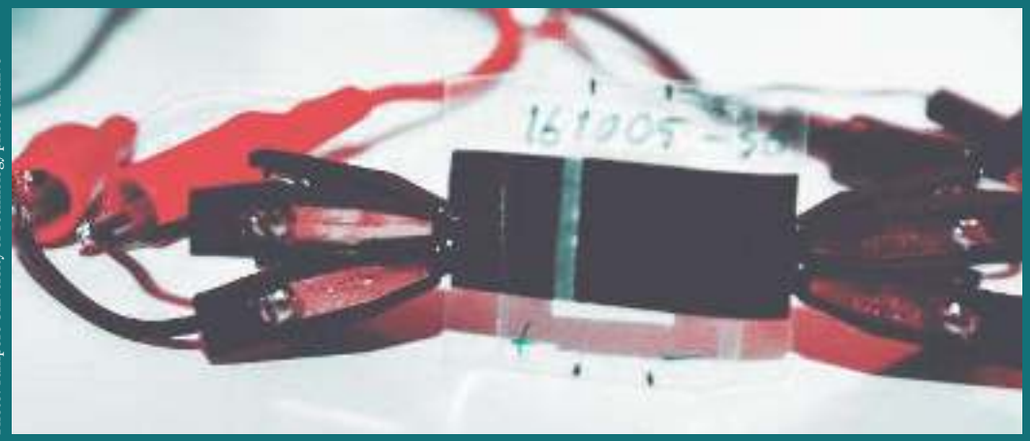


Photo: Tampere University of Technology photo archive

A printed, flexible, environmentally friendly supercapacitor – the future alternative to energy storage

**THE HYPERCONNECTED WORLD** is possible through the application of millions (and potentially trillions) of sensors to our living environment. This can only be done if these sensors don't increase our energy consumption. This is why Tampere University of Technology has worked on energy autonomy as part of the Naked Approach project.

As an alternative to trillions of batteries (and a resulting environmental catastrophe), more sustainable and environmentally friendly supercapacitors, charged by printed polymer solar cells, can be used. These easily disposable supercapacitors are produced using graphite electrodes and salt water electrolyte, which means that their recyclability depends on the substance they are made of (such as plastic).

# FROM GOVERNING PEOPLE TO GOVERNING PLATFORMS

Thesis 2

**Sensor technologies turn the whole world into data. We access this data through digital platforms. Platforms are sets of rules that enable two or more groups to interact efficiently, by specifying user behaviour, data collection, and the feedback loops between them. Platforms naturally aim towards monopolistic positions, and because platforms make our life easier, we readily and willingly let them govern our lives. At the same time, governments around the world are focusing on deregulation. We need to create new forms of governance — focused on governing people *through* platforms — to make sure that the rise of platforms leads us towards a more sustainable world.**



### What is a platform?

**In the digital economy, Facebook is a platform, Uber is a platform, Airbnb is a platform. They do not operate like traditional companies selling products. Instead, platforms like these bring together users and resources, and create business not just for themselves, but for a broader class of actors. These organisations create value primarily by enabling direct interactions between several distinct types of "affiliated customers". In this publication, we therefore define a platform as an information technology system, upon which different actors (i.e. users, service providers, and other stakeholders across organisational boundaries) can carry out value-adding activities with each other (Aaltonen 2016).**

# THE WORLD BECOMES DATA

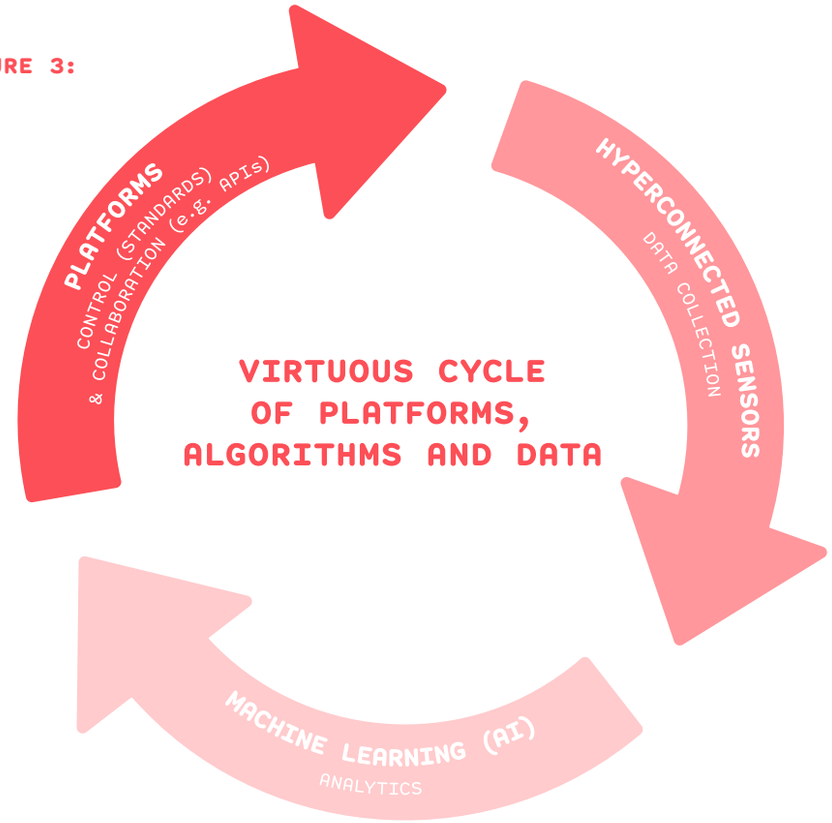
**ONE OF THE MOST** important outgrowths of hyperconnectivity is the rise of the platform business model. Platform companies rely on extensive data collection capabilities, which are rapidly increasing due to two simultaneous developments: advances in sensor technology and changes in the regulatory environment. Sensor technologies are increasingly cheap and available, as the technology descriptions scattered throughout this publication demonstrate. And as described by Aleksi Neuvonen in his guest blog, changes in the regulatory environment support new business, governmental action, and social movements that increase data collection.

The abundance of self-powering independent sensors ultimately means that the world around us becomes data. Sensors are the means to collect data for platforms to use. They are therefore a crucial part of the business model of the platform economy, the virtuous Platform-algorithm-data (PAD) cycle, depicted below in Figure 3. In this cycle, ever-increasing machine learning capabilities (see Thesis 4) play a major role. The greater availability of data improves algorithms, which in turn help

to create better and better platforms. Also the quality of the data collected by sensors improves, as algorithms refine their information needs.

In this way, platforms are the natural corporate structures for the era of superabundant data. For instance Accenture has claimed that digital platforms could make up 25% of the world's economy by 2020 (Knickrehm 2016). To understand the hyperconnected world, we must therefore understand platforms. And not only understand: we must learn to govern an economy that is made up of platforms — we must save platforms from themselves. **A platform is always a collection of deals: who owns the data, how it is processed, and whether the broader society has access to it. All deals can be either fair or unfair, and making sure that these platforms provide everyone with a fair deal is of crucial importance.**

**FIGURE 3:**






**TECHNOLOGY :** SioDs

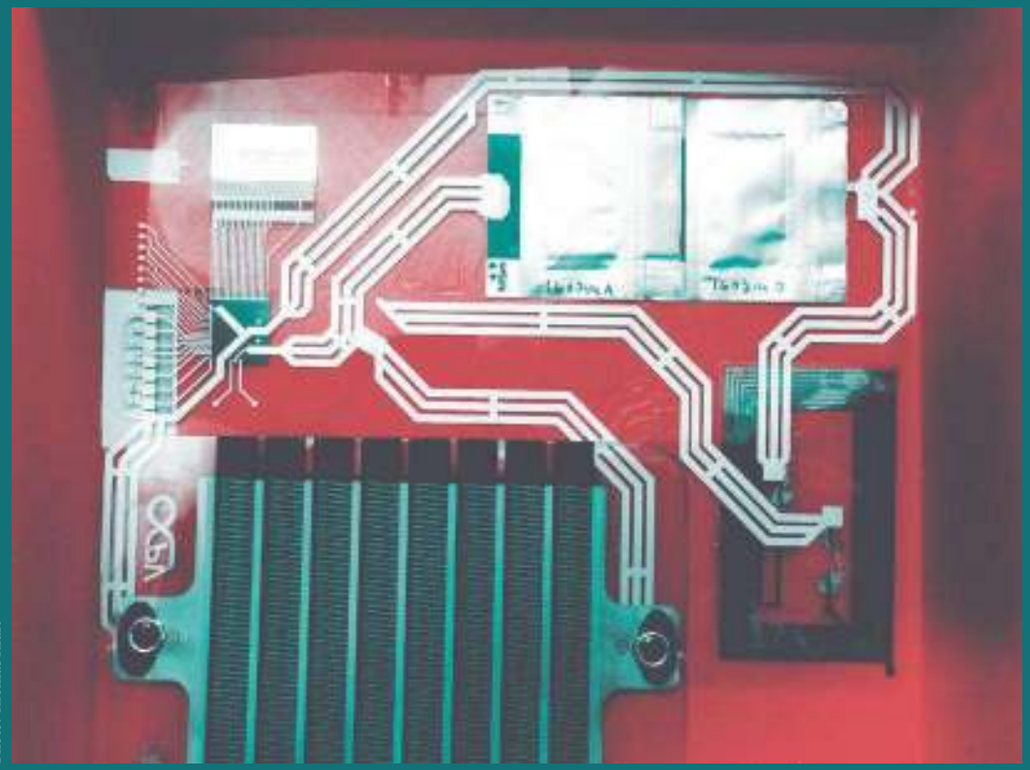


Photo: Thomas Kraft

**STICK-IT-ON-DEVICES** (SioDs) will bring computers to everyone's fingertips and to all surfaces. SioDs refer to a concept developed by a research group from Tampere University of Technology in the Naked Approach. SioDs are ultra-thin computers that can easily be attached to physical objects, and can sense their environment and communicate with it. In other words, they are one of the key technologies that enable the digitalisation of physical objects by connecting all peripheral nodes to the global network, thus creating the Internet-of-Everything (IoE). SioDs are (1) low-cost; (2) flexible; (3) energy autonomous; and (4) interactive devices that can perform functions like sensing, actuating, computing and communicating.

# PLATFORMS ARE SETS OF RULES

**PLATFORMS ARE a way to save costs, increase efficiency and maintain competitive advantage. Versions of platforms have been used for a long time by market leaders** (Evans & Schmalensee 2007; Hein et al. 2018; Korpela 2014). Microsoft Windows 95 might be the best example of competitive advantage creation through a platform product. A dominant software platform like Windows 95 allowed for a sort of ad hoc standardisation that made it possible for smaller companies to create software — a process that previously demanded immense resources. The existence of a single dominant platform also made it reasonable for developers to create software only for this one platform, which significantly reduced development costs. In this way, the platform position of Windows 95 made the development of information technology faster, while providing Microsoft with a long-lasting competitive advantage in the market.

Parallel to Windows 95, digital economy platforms also function to increase efficiency. Platforms like Airbnb, Etsy and Facebook are intermediaries that help various groups such as customers, advertisers, service providers, producers, suppliers, and even physical objects to interact, for example by helping a group to build their own services or marketplaces (Parker et al. 2016). They remove friction between people and create more efficient markets first and foremost by lowering transaction costs. As an example, Uber has lowered the transaction costs of finding someone willing to offer a low-cost ride below the opportunity cost of standing in a street corner trying to hail a cab. In this way, platforms provide a context where different groups can meet and collaborate (McAfee et al. 2017).

Thus, from one perspective, platforms are sets of rules and practices to collect data, which in turn helps to create even better rules and practices for data collection. Rules help in the production physical goods. The optimal use of information (including data, databases, metadata, algorithms, codecs, learning algorithms, apps, programs and scripts) is much more efficient when the platform is digital — even when the product or service is physical. And given that the physical spaces and gadgets themselves can also be made adaptable, the same learning and customisation-on-the-fly processes that are used on purely digital platforms will cross the barrier to the physical world.

**If platforms are conceived essentially as sets of rules, it means that they also reduce the freedom of choice of both the buyer and the seller.** The seller gets an advantage by not having to configure offerings from the start: an Uber driver doesn't have to think about whether



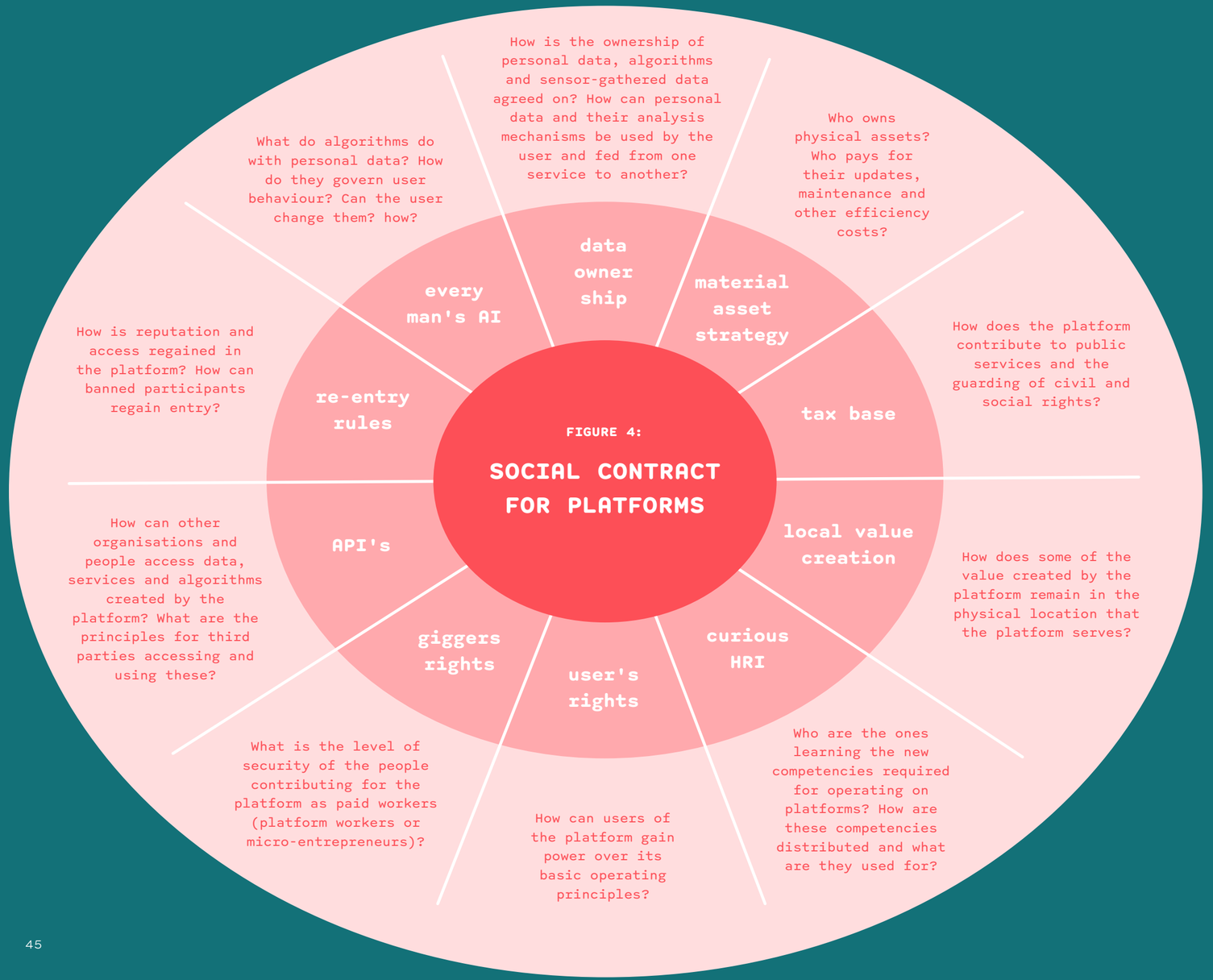


FIGURE 4: SOCIAL CONTRACT FOR PLATFORMS

←

cleaning the shoes of the customer would be a useful addition to the service. On the other hand she can only build the offering within the service standardisation of the platform. Uber, for example, claims to be an empty vessel for market forces, but among other things it 1) predicts, where the demand for drivers will be and raises surge prices in advance of actual demand; 2) creates phantom cabs to give an illusion of greater supply; and 3) shapes the interaction between driver and passenger with reputation systems and highly structured apps. In the early days, Lyft, a competing ride-sharing company, required drivers to fist-bump customers to create a convivial atmosphere.

**When everything, from clothes to food to apartments, becomes digitalised, the kinds of deals platforms are providing becomes a more and more significant social question.** It means that companies setting up platforms need to take a stand on eight social issues, which together comprise a 'social contract' for platforms. These social issues are presented in the next spread.



# FROM THE PLATFORM ECONOMY TO LIFE ON PLATFORMS

**PLATFORMS AND THE EFFECT** that they have on the world are most often described using business terminology. It's not called the 'platform economy' for nothing: the major platforms that shape our lives, such as Facebook, Amazon, and Airbnb, are commercial. This is the bottom line that structures debates about accountability and the future of platforms, where non-commercial points of view are glaringly absent. For taking an Uber or a Lyft is not only an economic act — it is also (in principle) opting to participate in a regulatory framework, with standards and specifications set by a single company.

We have now lived through the phase, where the economic impacts of platforms were their most important feature. They will continue to play out in various ways, but to make future life on platforms possible, we must turn our attention to broader questions of how platforms regulate the life that is built on top of them.

The role and mechanisms of regulation are undergoing changes all over the world. Opposing trends create a tension: people are opting in to the regulatory environments of platforms, while governments are deregulating many areas of life.

## 1. People opt to participate in regulatory frameworks by platforms

Life on platforms is enticing: Facebook and Google both count their users in the billions. Platforms, as collections of rules, make many domains of life much easier. Instead of relying on a haphazard collection of word-of-mouth tips and serendipitous wandering, a 21st century traveller can rely on Google Maps. It's no wonder that people are opting for life on platforms. This move is multiplied by network effects: platforms are more useful for a single user if her full social network is already there.

Living life on platforms leads to the strengthening of the role of **platforms as a form of governance.** Uber, Lyft and their competitors set the standards and security measures for taxi rides, while Google Maps sets

the standards for customer feedback and restaurant visibility. The standards of Airbnb effectively replace laws governing the hospitality sector.

## 2. Governments focus on deregulation

Deregulation has become a permanent fixture on government agendas in recent years, from the collective deregulation effort promoted by the Finnish government, to the US, where the Trump administration aims to cut regulation down to pre-1960 levels. Taking a longer perspective, one of the grand narratives of governance since the 1980s has been opening sectors of national economies to international competition, deregulating them in the process. The argumentation around these deregulation drives centres around the idea that increased freedom from governmental shackles gives companies and individuals more opportunities for self-actualization, which leads to a more prosperous society.

Considering these two trends together, we can see a paradoxical situation forming: **governments are turning away from regulation, at the same time as inherently monopolistic platform corporations focus on creating regulatory systems — which citizens are happily adopting.** This creates a gap in governance: people are willing to be governed, but platforms (often) set the standards with their own business in mind, ignoring social needs.

To fill this gap, we must create regulatory frameworks that are designed to work through the regulatory mechanisms used by platforms. This kind of regulation is recursive: Instead of creating governance that tries to affect citizens directly, we need to build governance that replicates its values in the governing sub-units (i.e. platforms) beneath it.

The rest of this chapter looks at platforms as instruments of governance, and explores how recursive governance can be conceptualised.



# GOVERNING LIFE ON AND THROUGH PLATFORMS

**PLATFORM GOVERNANCE** is not just a combination of employers' rights and regulation of monopolies. **Instead, it's a broader answer to the question "how to coexist in the future?".** The only companies with influence over the everyday lives of people, comparable to that of platforms, have been the British and the Dutch East India Companies. The British East India Company, for instance, managed to single-handedly reverse the balance of global trade for several hundred years: It ferried opium to China and fought the Opium Wars to seize Hong Kong (thus claiming monopoly status in narcotics), while simultaneously shipping Chinese tea to Boston's harbour, triggering the American War of Independence. And in India, it wasn't actually the British state that did the conquering, but this dangerously unregulated private company with a staff of 35 employees and a five-window wide office (Dalrymple 2015).

Platforms have similar powers. They program the behaviour of us all, and will dictate how we behave in the future. They reduce our cognitive burden by minimising friction in face-to-face contact with new people. They build trust between people (and companies) who have no other reason to trust each other.

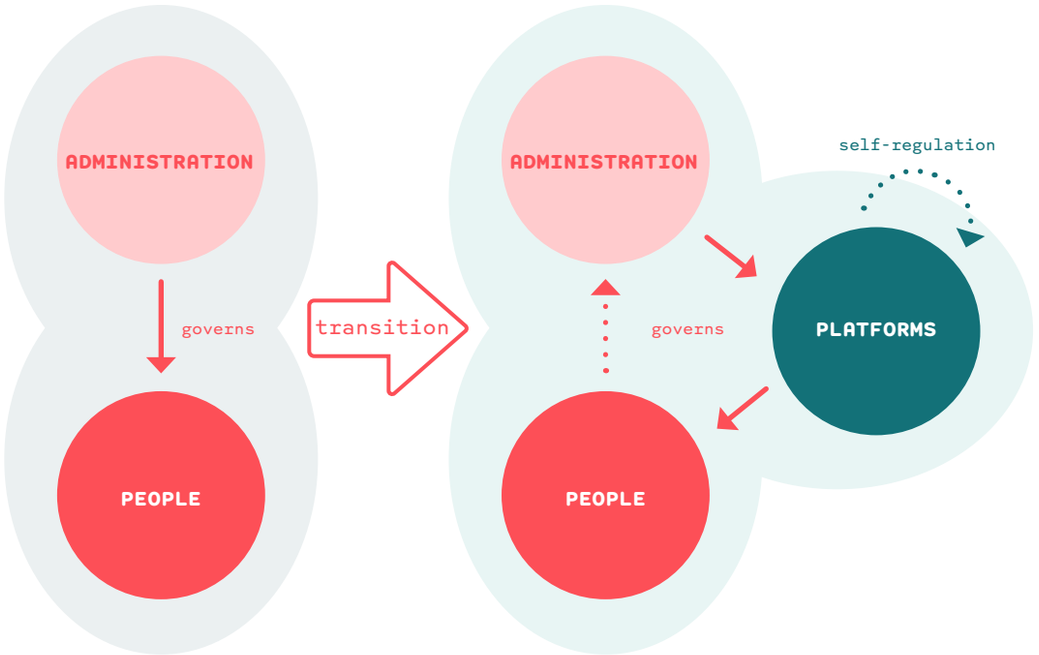
In the platform economy it's hard to vote with your money, since it's practically impossible to choose between platforms. The laws of information and network economy, such as network effects, drive platforms to seek monopoly status: the more users they have, the more profitable they become, making it increasingly difficult for users to leave (or to stay out). Thus, they grow. They grow so fast that it's difficult to anticipate their true impact, and suddenly they become too big to fail or to regulate. This is the Collingridge Dilemma: "When change is easy, the need for it cannot be foreseen; when the need for change is apparent, change has become expensive, difficult and time consuming (Collingridge 1980).

How, then, should platforms be governed?

# 1. Governing platforms

When governments govern platforms, it's about something more than just regulating businesses. Because platform companies are regulation systems, regulating platform companies is about regulating that regulation. This is called *recursive regulation.*

**FIGURE 5:**
**PARADIGM SHIFT: FROM GOVERNING ADMINISTRATION TO GOVERNING PLATFORMS THAT REGULATE USERS**




There is a growing need for developing instruments for recursive governance. Governments and supranational organisations can (and do) use taxation, negotiations over data ownership and control, publicity laws, and a variety of other standard measures for this task. Due to the global and uncontrolled nature of the internet, hard measures such as censorship and banning require technological sophistication and crossing the boundaries of what is considered acceptable by the public. Recognising and categorising softer, more collaboration-based methods is a crucial task for governments in a hyperconnected future.



# 2. Platform self-governance

Since platforms are key governance structures in the 21st century, many operators themselves have realised that they can't behave however they like. We have perhaps already seen the East India Companies and robber barons of the platform age, in the irresponsible use of our data, assets, and identities. The platform companies that wish to stay relevant are paying attention to the way their regulations treat users and non-users. It has, for example, been argued that Facebook should pay basic income to its users, who actually produce all the valuable content on the platform (Thornhill 2017). Page 45 provides a run-through of the crucial questions for platform self-governance.

Taken together, the rise of platforms forces us to question the basic terms of our economic relations. Can all-encompassing, monopolistic platforms actually be considered normal companies? How are our relationships with these platforms defined? These questions are explored in the following chapter.

# THE LIMITED LIABILITY CORPORATION IS DEAD: FROM RIGID CORPORATIONS TO NEW ECONOMIC RELATIONSHIPS

Thesis 3

**What are companies, individuals, and governments in the hyperconnected era? If, as described in the previous chapter, platforms govern us and regulate entire economies, can we afford to have them operate as normal businesses? In the hyperconnected world nano-companies are born, platforms kill the limited liability corporation, and give birth to an abundance of new economic relations. Regulating ontologies that define which kinds of actors and relationships are permitted, are a powerful way of creating new possibilities and mitigating problems created by platforms.**



**TECHNOLOGY :** Sensor Bandage

Photo: Tampere University of Technology photo archive

Printed disposable temperature sensor bandage, based on ultra-thin soft materials, such as stretchable silver and graphene nano-composites.

**TAMPERE** University of Technology has developed stretchable electronics that enable unprecedented form factors (shapes, sizes and designs) for electronics. In contrast to conventional electronics, manufactured on rigid circuit boards like silicon, or flexible electronics, manufactured on flexible circuit boards like polyamide, stretchable electronics are manufactured on ultra-thin elastomer substrates (e.g. polyurethane or polydimethylsiloxane). By combining new nano-materials and printing technologies, it is possible to produce stretchable stick-it-on devices, which are ultra-thin, comfortable, and easy to integrate into textiles or even skin (Vuorinen et al 2016, Suikkola et al 2016).

# CREATING THE OPERATING SYSTEM OF A HYPERCONNECTED SOCIETY

**THE DEFINITIONS OF** personhood, companies, and the possible relations between them are undergoing major shake-ups caused by technological and moral developments. We need to take control of this process and ask how market actors should be defined, and what kinds of organisational forms should be encouraged. In other words, we need to start rewriting the economic and social operating system of the world.

This task leads us, firstly, to reconsider the ontologies of economic action (Potts 2010) and seek answers to the profound questions: who should be classified as an individual? And what kinds of collective structures can these individuals create? Consider the following four examples:

1 In September 2017, The Confederation of Finnish Industries proposed that every Finn be issued a Business ID at birth (EK.fi 2017). Such a Business ID is used in taxation and contracts by all businesses, and signals that the existence of the company is recognised by the state. The change would in effect make every Finn a one-person company.

2 Throughout the world, Uber-drivers are waging legal battles against the company. Their objective is to be recognised as salaried employees instead of independent contractors (New York Times 2017, Uberlawsuits.com 2018, Forbes 2017). Their argument hinges on the fact that even though they can, in theory, work when and how they want, in practice Uber micro-manages their work. Uber demands that they go through specific training and incentivises them to work to a specific shift-like schedule. Because they cannot set their prices or alter the quality of the service they provide, they are more like temporary employees than actual independent contractors.

3 Over 2000 businesses in the US and around the world have registered as B-corporations (bcorporation.net 2018), agreeing to a rigorous set of demands in accountability, transparency, and social and environmental performance. They are, in effect, trying to redefine the metrics by which success in business is defined. A similar model, the Community-Interest Company, exists in the UK (Gov.uk 2018).



4 In September 2017, David Slater, a UK-born photographer, settled a legal case with PETA, concerning a selfie taken by a macaque monkey, using a set-up specifically created by Slater to produce the selfie (Peta.org 2017). The case was, at its core, about legal personhood: can a monkey own the copyright to a selfie?

Our ability to do anything in the world is dependent upon the web of possible legal entities and the relationships between them, the ontology of our socio-economic world. The governance structures that surround us in our daily lives regulate what kinds of entities can exist and what is expected of them. Corporations have to conform to specific reporting requirements and pay specific taxes, and are expected to conform to certain ethical and practical norms as well. For example, limited liability corporations have to provide financial information every year for taxation purposes, but if they are not public, they do not have to provide detailed descriptions of their finances. Their liability is also limited, as it says on the label: in the case of a financial meltdown or an economic disaster, the owners of the company are not fully responsible for its actions.

Relationships between entities, such as companies, platforms, and individuals, form the web of human action. There are many possible relationships. Some of them, such as slavery (ownership between individuals), are no longer socially accepted or legally permitted, and if they exist, they do so at the unlawful margins of society. Some are undergoing redefinition through business model innovation, such as the distinction between "employee" and "contractor" (as in the case of food delivery and taxi platforms). And some are being redefined through legal battles and evolution of the judicial system, like changes to the limited liability corporation or the copyright claims made on behalf of macaque monkeys.

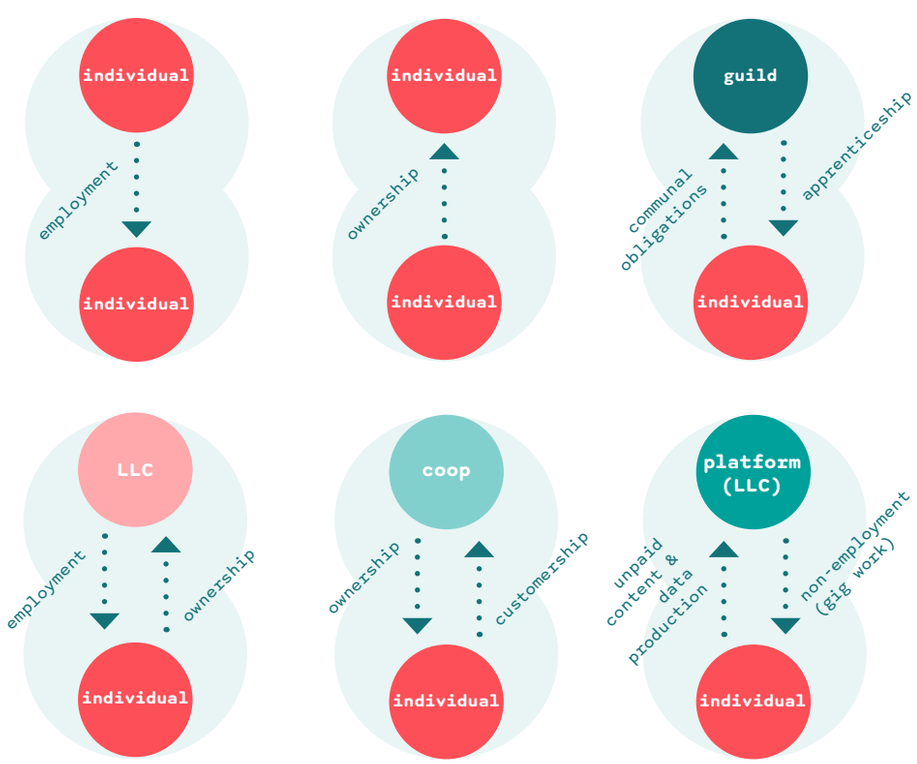
**The strongest type of governance is governing what is allowed to exist.** We define the whole economic and social landscape by setting the legal requirements an entity has to conform to, in order to be able to call itself a corporation. The same goes for relationships: the types of relationships that are allowed to exist are controlled through collective agreement and codified into the legal system. By tweaking these systems, we are reshaping **the operating system of the social world.** We can encourage or discourage particular behaviours, and create new models for making business. This type of regulatory adjustment is not only about banning things and spreading red tape, it can also be about opening up new possibilities for individuals and companies alike.

What "sharing economy" business models have done thus far, is unlock efficiency benefits by lowering transaction costs (for example by managing trust), and by creating new types of business-relations. These efficiency benefits, in the case of Uber, are dependent on the em-

ployment of workers who are not employees. These individuals work as contractors who can't set the price of their labour, advertise for their own services, or in any meaningful way affect the product they are selling. Instead, they have to follow the standards set by the platform, to avoid the risk of termination of employment. And should something go awry, these platform companies often try to dodge responsibility. This logic, while limiting the autonomy of the workers / contractors, is what creates the lowered transaction costs. You don't need to guess what's going to happen during an Uber ride — it will almost definitely follow the standards set by the company.

The fragile relationship between Uber and its drivers is not set in stone. In many countries, platform gig workers can be categorised as employees even under existing legislation. Some countries are also debating whether we should create a third category between contractor and worker, to represent middle ground in terms of responsibilities of both parties (Taylor 2017). These ideas are not without problems (what would stop all companies from categorising all workers as members of this middle category?) but are worth considering.

FIGURE 6: CURRENT AND PAST RELATIONS AND ENTITIES






# SWARMS AND MONOLITHS: THE COMING POLARISATION OF COMPANIES

**THERE ARE REASONS** why companies exist. One reason is that coordination within a company is more effective (and therefore cheaper) than coordination within the market (Coase, 1937). One could perform all the functions of a company as market transactions, but that would require tremendous amounts of trust and reputation management, as well as complicated contracts. If a steel mill had to find all its workers every day from the free market, start every morning by buying all the transportation services needed, and then find someone to operate the furnaces, a steady flow of steel would probably not be guaranteed. It always makes sense to form longer-term contracts with those providers that have proven themselves trustworthy.

If companies exist partly because they lower transaction costs in the market, the factors that influence these transaction costs also influence how companies are constructed. Thus, through smart contracts and platforms, we can begin to see the polarisation of the category of the 'company'. With the advent of the platform economy, readily available sensor technology, and all the coordination the internet makes possible, we can envision a world where, instead of an abundance of large companies, we have a few huge platform companies and a swarm of nano and micro-scale companies, made possible by temporal smart contracts.

Smart contracts (see Szabo 1996) can be created on blockchains: these self-enforcing programmatic contracts can be exponentially complicated and dynamically updating. For example, compensation for consultancy work can be tied to the up-to-the-minute market capitalisation of the company, and distributed automatically upon the delivery of agreed materials, without human oversight.

Platforms such as Google and Facebook are monoliths in their own domains. In 2018, it is hard to advertise online without paying them (directly or indirectly). When the physical and virtual worlds merge and the world becomes data, we can easily see how these kinds of monoliths could emerge in a growing number of sectors. This raises the question: are existing legal structures appropriate anymore? If a company performs the crucial task of managing transactions and lowering their costs for whole segments of the economy, can we allow them to be normal profit-seeking liability-limiting companies? **If the main social function of a particular class of companies is to create the infrastructure for all other economic and social activity, we should have stronger control**

**over those companies.**

Changes also affect how small companies can be. There have always been one-person sized companies, or self-employed people. And of course, many start-ups are founded as two-person teams with an asset pool of two Macbooks. But lowered transaction costs and lowered overall friction in the marketplace mean that companies can get even smaller. With smart contracts, there are no (theoretical) reasons why companies should include people at all.

To illustrate this: in electronic music, labels are not stable, long-lasting structures, but rather outlets for creative expression. The same DJ often releases music through multiple labels, based on the music style she produces at a given moment: one label for deep house, one for disco, and so on. The "label" is thus more like a brand than a stable company.

With smart contracts, trust management, gig-work platforms, and the like, individuals may in the future choose to do their manual gig-work through one company, their DJ gigs through another, and their corporate consulting through a third. **We might also see the advent of autonomous, AI-based companies the size of a single device.** It's not hard to conceive of a model, where a self-driving car functions as a taxi in such a way that its customers simply buy blockchain-based tokens that authorise them to use the car for the duration of the ride. **This would lead to an economy, where ownership of physical infrastructure, such as cars, is shared in small blocks.**

Both the advent of monolith platform companies, and the appearance of swarms of companies the size of a single device, call for new regulation. There are two reasons for this. Firstly, the weight of monolith platform companies can be crushing to societes if they are not regulated. Secondly, the masses of autonomous miniscule companies functionally require processes (such as taxation, financial reporting, and the like) that can be carried out completely automatically, since the whole point of these types of companies is to function without human oversight.



# THE RISE OF PLATFORMS KILLS THE LIMITED LIABILITY CORPORATION

**SLAVERY USED** to be legal. Human beings used to be assets just like everything else. In early Roman law (Patria potestas), fathers used to "own" young children, and women used to be (and in some societies still are) legally subservient to men. Companies were also much more tightly regulated: almost all kinds of companies used to require permits for trading. Moreover, only certain types of cities had permission to conduct cross-border trade. From this perspective, almost all countries in the world have thoroughly liberalised trade, and there are only a few areas of trade, such as practicing medicine, that require permits nowadays.

Our understanding of what is right and what is wrong is codified (through the legal system) into the ontology of the world. Freedom of commerce is in — freedom to own slaves is out. These changes are not (only) driven by technological development. Slavery was not (in all cases) supplanted by superior technology, but became morally repugnant, and had to be eradicated through political and military means — such as the American Civil War. **As a general rule, if a type of economic entity or relationship causes more harm than good, it can be phased out.**

Limited liability companies (LLCs) and other similar structures, such as more general joint-stock companies, were historically born out of a need to share risks (and profits) of high-risk ventures, such as seafaring. Now, with superabundant venture capital and highly developed exchanges, it almost seems like the function of this company type in high-risk sectors such as mining is to avoid risk (Mankins et al. 2017). If a mining company causes environmental damage, its shareholders are as a rule not personally responsible. Is this company type compatible with the growing governance role of platform companies? If we have an economic system where a single platform is needed to manage trust-relations in the entire sector (think Airbnb or even Hotels.com for the hotel business), treating it in the same way we treat mom-and-pop hardware stores makes no sense at all.

The limited liability corporation was a means of gathering capital and subventing loss due to inherent uncertainty. Now, the legitimacy of the limited liability corporation is severely challenged by the superabundance of capital, cumulation of cash, new natural monopolies (including closed data), and lower risk, due to better data and analytics. **There is a need for new forms of socio-legal structures for collaborative human action to satisfy collective needs.**

The limited liability company, revolutionary as it was in an earlier world, is no longer the appropriate model for organising economic activity. **The risks that should be shared, end up being privatised, and the risks that should be privatised, end up being shared.** The power and status of platform companies call for levels of accountability that do not exist in the limited liability company model.

The limited liability company is designed to produce profit. Profit-generation will always be relevant for companies to keep them alive, but it can't be the central motivator of a company like Facebook that exerts huge global influence over democracy and human relationships. By redefining the corporate structure in a way that is neither dependent on nor hostile towards making profit, we can increase accountability and better reflect the role these companies play in the future economy.

# NEW PLAYERS, NEW GAMES: EMERGING RELATIONS AND ENTITIES

**HERE,** we have collected examples of emerging entities that challenge the dichotomy between individuals and companies, and broaden the scope of what a company can be. Co-operatives have received a lot of attention in previous discussions, and are therefore not discussed here (Scholz & Schneider 2017).

## The dependent contractor

The Dependent Contractor Model, proposed in the Taylor Review, is an attempt to legally define those who are not directly employed, but are not in a truly independent work relationship either (Taylor 2017). The goal is to recognise this type of employment relationship, and to define the responsibilities of platform companies towards the people who perform the work, in a way that maintains some of the flexibility of the arrangement.



## Peer-production of services

This is a model made famous by Wikipedia and other internet services, where value is created by users in a democratic fashion. A similar thing can be done in the physical world — services, such as care, addiction rehabilitation, or assisted living, can be produced by peers (Botero et al 2012). These kinds of relationships, of course, exist in many forms, and are often not part of the formal economy. Work forms, like gig-work, transform these into more formal arrangements. Creating structures that reduce friction in these relationships, such as simpler tax-codes and easier, more flexible models of employing a person, could make it easier to bring these into the realm of the formal economy.

## B-corporations and community-interest corporations

These represent a movement to redefine what it means to be a corporation. Community-Interest Corporations (CIC) is a UK model for social enterprises that aim to use their assets and profits for the common good. The model has existed since 2005. CICs are intended to provide the flexibility and certainty of the company form, but with some special features to ensure that they are working for the benefit of the community. There are over 10,000 CIC's in the UK at the time of writing. B-corporations operate more as sets of standards than actual corporate structures. The point, however, is similar: a corporate form, which is not solely aimed at making profit, but also at creating lasting value for the community.

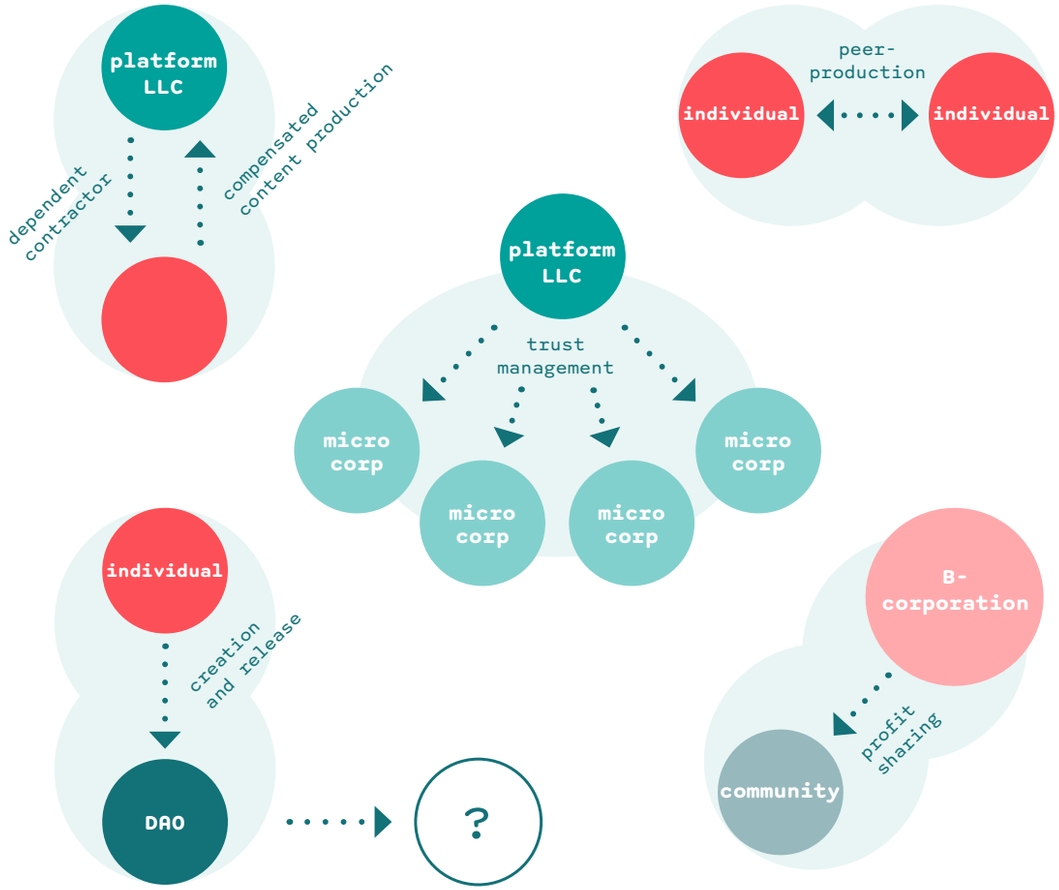
## Decentralised automated organisations (DAO)

Who said there needs to be a human in the driver's seat of a corporation? A blockchain-based organisation, utilising smart contracts, can function autonomously of human intervention, beyond initial rule-setting. Hedge funds have been leading innovation in this space, which is natural since their actions are based on algorithms anyway, but they are far from the only actors creating distributed no-laws-but-rules type of organisations (see coindesk.com 2018; aragon.one 2018; economicspace.agency 2018). These kinds of corporations, should they become more prevalent, need forms of governance and types of regulation that are markedly different than the ones required by normal human-operated

corporations. Regulations must be automatised, for example. Thus far, existing hedge fund examples are not particularly promising: the first high profile data access object, called The DAO, was hacked right after the the project kicked off (Spiegel, 2016). Needless to say, here are still a few kinks to be ironed out. But the idea is in principle in no way limited to hedge funds — one can easily imagine an automated taxi, driven by a self-driving car, operating on a similar model.

And what about the selfie-taking macaque monkey as a legal entity? The truth is we will probably never know — the case was settled outside of court. For the foreseeable future, it seems that the sensible way to challenge the central role of human agency is through AI, not selfies.

FIGURE 7: POSSIBLE FUTURE RELATIONS AND ENTITIES






# LIFE ON PLATFORMS NEEDS ACCOUNTABILITY MORE THAN EVER

IF THESE ARE the development possibilities shaping the future, what is the vision that we need?

**As platform companies gain monopolistic market positions, and assume functions that are outside the normal roles of market actors, they can no longer exist as companies.** The power they exert over their industries, their competitive sectors, and over the structure of the economy is too great. Platform companies, however, can probably not be expected to willingly give up their extremely profitable position.

Redefining what it means to be a business, redefining what is expected of businesses, and redefining what is possible for them is not only achievable, but crucial for a future where the development of technology benefits the development of humanity.

This means that the limited liability company, which limits the liability of owners, but does not confer any responsibility towards surrounding societies, must die (at least as a form that is available for platform monoliths — it, or something similar will naturally be used by some smaller companies). What replaces it must include elements of greater responsibility, greater openness, and greater possibilities for profit-sharing. The profits must be shared both between the users whose labour creates the majority of the value in the system, and between the system and the wider world.

Whether this happens through redefinition of governing legal structures, through voluntary certifications like the B-corporation, or through a revival of co-operatives or some other older forms of organisation — or by somehow turning these platforms into public utilities —, the goal must be to transition from limited liability to enhanced accountability and liability.

As for individuals, these new developments offer both enhanced subjectivity and enhanced responsibility. If one wants to work a mishmash of gigs through different platforms, it should be possible. But at the same time we must make sure that the responsibilities of platforms and those of workers are in balance. If the best way to achieve this is to create a hybrid category between a full employee and a fully independent contractor, then that must be done.

Since platform companies in any case increase the capabilities of individual actors by giving them tools to form the relationships they need, be they economic, political, or any other kind, we must, as a collective, guarantee that these new capabilities are enjoyed by everyone.

**GUEST BLOG : Ville-Pekka Sorsa**
Hanken

# The corporation as a political actor and the future of centralised property

**CORPORATIONS** are typically examined from the perspective of business, management or organisation studies. None of these perspectives offer a full answer to a fundamental question: what does it mean for a social entity to be a company? Or, what is it that makes an entity a company instead of, say, an association or a public agency? Answering these questions requires viewing the corporation as a political actor and as one of the foundational building blocks of society.

David Ciepley (2013) has studied the corporation through the lens of the history of corporate legislation and political ideology. According to him, the corporation as a political actor can be conceptualised as a private republic and a private government, enjoying the protection of the law and the status of a legal person. As a private government, a typical corporation, i.e. a limited liability joint-stock company, is characterised by three central legal rights:

**1.** the right to own property, form contracts, and sue (and be sued) as a unitary entity and a legal person;

**2.** the right to centralised management of property; and

**3.** the right to establish and enforce rules within its jurisdiction beyond national laws.

These characteristics — legal unity, centralised management of property and the right to rule-making — are constitutive to all types of companies. But different types of companies are also, at least to some extent, different kinds of governments. The majority of corporations are limited liability companies, in which owners are liable for the corporate "person" only up to the value of their initial investment. In contrast, in unlimited companies, owners are fully liable for the liabilities of the corporate person.



The gains from property and rule-setting can, but do not necessarily, go hand-in-hand. In different kinds of limited liability partnerships, for example, the right to vote may be bestowed on corporate partners, while profits are also reaped by other owners; in cooperatives, both profits and voting rights are distributed according to the extent of the owner's contribution, rather than according to predetermined ownership rights.

Considering the corporation a private republic means that it has a legally mandated right to act in the interest of its majority owners, in a hierarchical way, and without the individuals in charge being held directly accountable for the actions of the corporation. In other words — and unlike public republics that have responsibilities beyond the concerns or property of their rulers —, the corporation as a political actor is not under any obligation to act for the common good, make decisions democratically or be accountable for its activities outside the corporation.

Of course, in practice, few corporations can act exclusively for the benefit of a small elite or an autocratic decision-maker. The ownership of the corporation can be highly diverse and the interests of the owners distinct, which leads to a diversity of goals. In addition, employees may be hard to find and organised labour resistance likely if management relies on an autocratic operating model (such as management by perkele). Researchers of comparative capitalism would also point out that the institutions that influence business activity, from local operating standards to EU architecture, still vary significantly (see e.g., Johnson and Reagan 2017). But this is not the point. The point is that the laws defining corporations do not make such demands: the corporation has the right guaranteed by a monopoly on violence to act in the aforementioned ways if it so wishes, and if allowed by other institutions.

In this way, the corporation can be perceived as a unitary actor of centralised ownership, which can exercise power under legal protection and promote its own interests however it chooses under other existing laws. Debates on the future of business activity often focus only on this latter aspect, namely on how corporate power is internally exercised. This is often considered synonymous with the style of management and organisation. For instance self-managing employees and flat organisations feature often in recent discussions. But the former aspect, the future of centralised ownership, has been a much less popular topic, as has the relationship between ownership and the exercise of power. The only exception is the comprehensive debate in political philosophy on the legitimacy of corporations (for review, see Mäkinen and Kourula 2012).

The relationship between exercise of power and centralised ownership can be analysed by drawing a distinction between two dimensions of business. Business comprises of value creation on the one hand, and of value extraction on the other. The former is made up of value chains, while the latter is determined in wealth chains. Value creation defines how utility and profit are generated, whereas wealth chains define ownership over value creation and determine the distribution of profits. This distinction sheds light on another key point about the corporation as a political actor.

What are often described as corporations can in fact be chains fragmented into countless different firms. An individual value chain may contain hundreds, if not thousands of companies operating in numerous locations, thanks to processes of outsourcing, offshoring, strategic partner-

ships, and the like. This is usually described as the disaggregation of value chains (Morgan 2014). Fragmentation has also occurred in wealth chains. Multinational corporations can consist of hundreds of individual companies with complex ownership, licensing, and financial relations between them (Seabrooke and Wigan 2017). Crucially, however, wealth chains are not disaggregated in the same way as value chains are. In short, corporate income still travels through wealth chains towards the headquarters of the corporate group, usually a holding company, and through it towards the owners — even if its travel is more fragmented and decentralised than ever. In fact, wealth has been concentrating in the hands of a few owners of capital across the globe, in some places at an increasing pace (Piketty and Saez 2014).

To simplify, centralised ownership can be seen as the right of a single party to extract rent from the use of material or immaterial factors of production or of some other goods or services. For the future of the corporate form of business activity and of capitalism more generally — after all, the social order that guarantees centralised ownership is called capitalism —, **the future of centralised ownership in is at least as pivotal as the ways of organising work or income.** In principle, the corporate form of business activity could quickly decline if ownership were fully decentralised to the individual level or founded on some non-hierarchical forms of common ownership (commons). In addition to the authors of this report, many scholars have puzzled over whether a digital revolution could gradually challenge modern capitalism through these new forms of ownership (e.g., Mason 2015). The so-called platform economy and the sharing economy have been presented as challenges to the capitalist order. While the challenge may be real in principle, few platforms in practice have challenged capitalism (see Langley and Leyshon 2017).

Take Uber as an example. The corporation owns a very small amount of its factors of production — in practice, Uber only owns the mobile app and the brand. Its service providers are small entrepreneurs, who provide services on the corporation's platform in exchange for license payments. In this respect, Uber represents not a shift to a post-capitalist era, but rather a shift to a pre-capitalist era. Although Uber has given up centralised ownership and transferred the risks of ownership to its "employees", the core factors of value production are still centralised property. In these types of 'lean platforms' (see Srnicek 2016), the challenge to capitalism is not so much the tendency to decentralise ownership as how to centralise ownership without bearing the risks brought by ownership. Indeed, in this kind of a platform economy, the platform-producing corporations act not so much as capitalists as some type of feudal lords, who not only dictate what their subordinates ought to do and how, but also levy royalties from this activity without bearing the risks related to it.

Another type of stratification typically occurs in the world of commons and the sharing economy. Many open-source based forms of collaboration have already to some extent given up the modus operandi founded on corporate ownership. Often common ownership or lack of ownership are based on the precondition that the knowledge produced (e.g., software or algorithms) is not produced as anyone's property. Yet, it is a rare occasion where key factors of production, such as machinery, the energy it requires, or the production of services, are organised without some kind of individual or centralised private property.

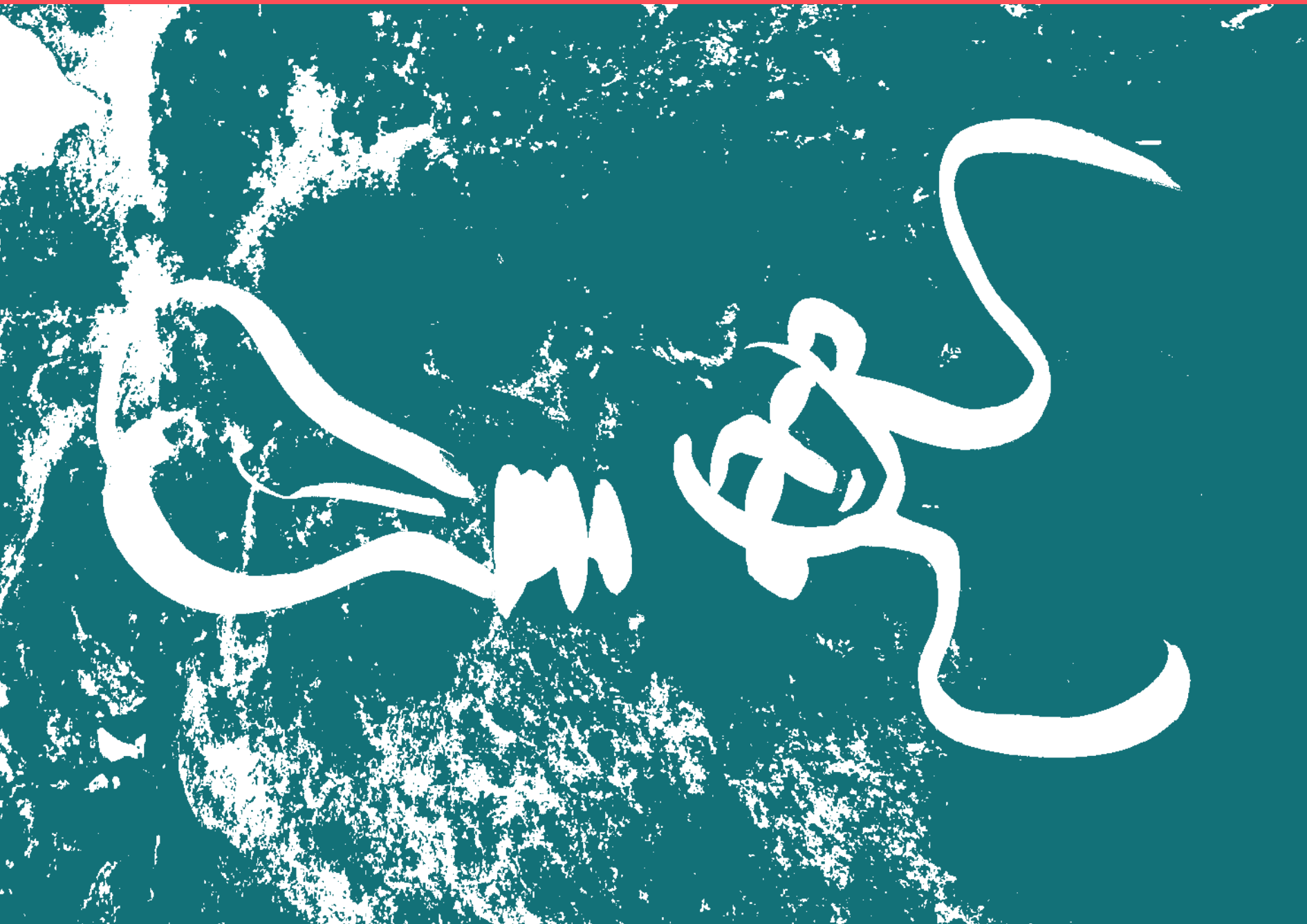


I argue that corporate ownership is not likely to transform into decentralised individual ownership or non-corporate forms of centralised ownership in the foreseeable future. It is clear that, in a purely technical sense, corporations, like any form of ownership, can be easily redefined, because the corporation doesn't exist without laws that guarantee the three fundamental rights that define it. In the simplest case, a transition to a different world of ownership may be possible through changing a single law. But politically speaking, the corporation as a political actor may turn out to be ideationally, institutionally and interest-wise considerably more stable and resilient than visionaries expect it to be.

There are several reasons for this. First of all, it is increasingly difficult to distinguish between the exercise of power of corporations and that of nation-states. Corporations have been granted considerable power in executing public policy, national policy is often formulated to promote the interests of individual corporations, and the same individuals are often involved in both institutions (Banerjee 2017). If republics are gradually transformed into private republics and public governments into private governments, it is unlikely that centralised property, which generates the capacity to govern, is withdrawn. Secondly, business activity is characterised by strong path dependencies. Many central everyday institutions, from pension funds to insurance, are based on the very profits generated by corporations. This means that the interests and incentives to give up centralised property may remain low for a great number of actors. Thirdly, especially joint-stock companies are ideologically considered such desirable actors, that a rise of strong alternatives would require a rather strong ideological shift. For example, the principle of limited liability is considered important for enabling risk-taking, and the concept of exchangeable shares is important for efficient distribution of resources in management. Unless alternative forms of ownership can be perceived to promote these types of entrepreneurial-cum-economic virtues better, they may find little support even among the greatest preachers of such virtues.

# HYPERCONNECTED BUSINESS: FROM HUNCH TO INSIGHT

Thesis 4



**Hyperconnected technologies change how companies do business and create value, by gathering more precise insights for better decision-making. In the era of hyperconnected business, we have an unprecedented amount of data available. This means that we are able to coordinate resources and produce value in new ways.**

Photo: VTT

**HEXAGON-SHAPED** "tiles" are modules with smart functionalities that can be attached to surfaces like walls, furniture and windows. The concept has been developed by VTT as part of the Naked Approach project. The electronic components are assembled on a flexible circuit board, which has a surrounding frame with magnetic connectors needed for power and data transfer between the tiles. It is easy to change the configuration by adding or detaching tiles or re-organising them into a different layout.

Each module has its own individual functions, such as harvesting energy, collecting and transmitting sensor data or functioning as a display element. Together these interconnected tiles can cover large areas, and provide more sophisticated functionalities and services to places they are attached to.

The future of business is what we call “Hyperconnected Business”, which is all about recognising the best new ways create efficiency through better use of technology and data. The joint effects of digitalisation, new sensor technologies, machine learning, robotics, printable electronics, and the ability to gather vast amounts of data and often use it in real-time, alter the way businesses create and capture value now and in the future.

This part of the report will introduce the new value creation models enabled by hyperconnected technologies, and show how the increased availability of data moves businesses from hunch to insight — in other words, **to base value creation on facts rather than educated guesses.**

# SIX VALUE CREATION MODELS OF A HYPER-CONNECTED SOCIETY

**Six value creation models that successful companies in the world of hyperconnected business benefit from were identified during the first phase of the Naked Approach research project. These include smarter products and services, real-time directed-resources, resource efficiency, data commercialisation, x-as-a-service models and platforms.**

**IN THE FIRST PHASE** of the Naked Approach research project, six distinct value creation models were identified to describe the technological development that allows new perspectives to business and strategy (Koponen et al. 2016). These are obviously not the only ones, but they play a key part in how successful businesses shape their operations, management, strategy, and both long and short-term development.

You may have heard of them before — many are used by companies now, and currently form the foundations of some of the largest businesses in the world. **The new insight is that these value creation models will form the basis for value creation in the hyperconnected world**, and with some of them not yet mainstream, their effects will span the next decades. With the right mix of these six models, organizations are able to capture temporary monopoly positions, if they choose the right context in which to apply them. The value creation models are introduced below.



## Smarter products and services

Products and services can be smart on three levels:

**1. Being able to sense its own operation** is a quality already embedded into many products today. A product can “develop its own consciousness” by having its own feedback loop, and be able to communicate information regarding maintenance, for example. A typical example of this is the warning light in a car’s control panel, which lights up to inform you when something is wrong.

**2. Being aware of its environment** means that the product can interact with information from its surroundings and respond accordingly. For example, a smart radiator can detect the weather outside and adjust inside temperature depending on this input.

**3. Being aware of its context** represents more sophisticated understanding. To continue with the thermostat example, in this case the thermostat would be able to adjust its temperature in anticipation of the personal preferences of individuals entering the room. For example, when a tired guest ready to go to bed is about to arrive, the room will be set a slightly cooler temperature in anticipation.

## Real-time directed resources

Real-time directed resources can be understood through three levels (which businesses to some extent already use), based on the type of information used:

**1. Using historical information** can offer an advantage when investigating hidden correlations in the company’s past data, for example. Using historical information can pinpoint the factors of previous decision-making and guide behavior to correct mistakes made in the past.

**2. Using instant information** in operations helps businesses find failures and respond to critical situations faster. Instant information can pinpoint the factors that are in need of attention right now, and help prioritise action and behavior to correct for mistakes as fast as possible.

**3. Using predictive information** is becoming more and more feasible, and offers big gains in healthcare, for example. Using predictive information can pinpoint issues and challenges before they arise, and offer insight for better decision-making by providing “information from the future”.

## Resource efficiency

Resource efficiency can be categorised into four models (Ritola et al. 2015):

**1. Sharing** simply means increasing the utilisation rate of physical resources by distributing and allocating their use more efficiently. This is a very typical and the most commonly used model to improve resource smartness.

**2. Optimisation** refers to improving energy efficiency through, for example, new data management, smart energy management and metering applications, as well as track-and-trace logistics.

**3. Refurbishment** refers to improving the efficiency of physical assets by integrating sensors into existing things, in order to create energy efficiency in the existing value chain, product development, and manufacturing.

**4. Dematerialisation** and smart substitution mean replacing resource-intensive practices with new solutions. Examples include teleconferencing, virtual reality applications, and the replacement of energy-intensive animal proteins in the food production chain, with something that takes fewer resources to produce.

## Data commercialisation

New ways of using data take place in three spheres:

**1. Giving, using or selling data internally** within the company's internal value chain, which a lot of companies are already doing.

**2. Selling or giving data to companies in the same value chain** can improve the competitiveness of the business ecosystem due to new information links.

**3. Selling or giving data externally** to selected value networks (or to anyone) offers possibilities to create value within a larger business ecosystem.



## X-a-as-service models

Some of the greatest potential in the business models of today's world lies in the change from product sales to X-as-a-service models, often referred to as the Outcome Economy or Servitization. In this model, abilities or functions (such as mobility), traditionally possible through the purchase of a product (such as a car), are offered in the form of a service. X-as-a-service business models entail that companies compete in their ability to produce results and provide services rather than their ability to sell products. These service models are aimed at differentiation and/or cost leadership, often providing both.

One aspect of the X-as-a-service business model is the transfer of risk from the customer to the provider, since the providing companies are in charge of the assets used to produce the service. This naturally requires new forms of asset management within the firm, made easier by new ways to control connected assets through smart solutions. Hyperconnected business allows the use of X-as-a-service models in many different domains.

## Platforms

The larger social role of platforms and the effects of platforms for business are discussed in Theses 2 and 3, so what is described here are the more technical business definitions in brief. Generally, platforms can be divided into three categories:

**1. Internal platforms** focus on companies' own operations, services and products. Internal platforms are assets organised in a common structure, which helps the company produce efficient and innovative operations, products, and services.

**2. External platforms** are extended to include partners and collaborators in a platform that is specific to some purpose of the host company. External platforms create an innovative business ecosystem, where innovators can develop complementary products, technologies or services.

**3. Providers or platform owners** open up platforms to any third parties, and parties can often collaborate on the platform without the need to necessarily interact with the platform owner. In general, hyperconnected business allows for more advanced and open platforms, where operational efficiencies and value creation among actors as well as research and innovation, can be generated at a faster pace than before. When media platforms are taken into consideration, the ability of companies to direct behavior and people's choices around what they buy and who they interact with is considerably greater than before.

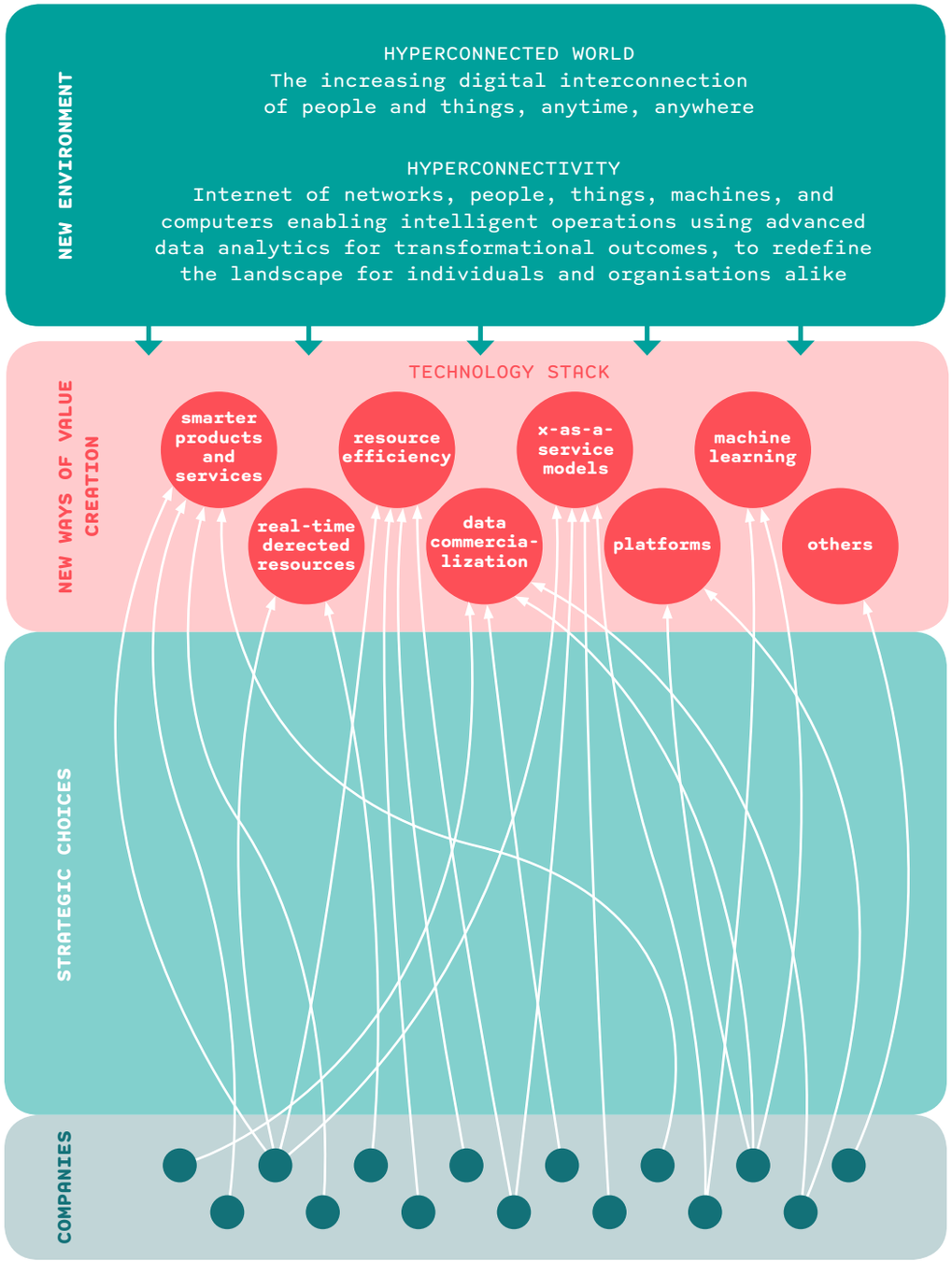



**FIGURE 8: Hyperconnected technologies affect how organizations create value and what kinds of strategic choices are available, directing companies towards more sustainable and resource smart ways of doing business.**



The above figure shows the six value creation models as strategic choices, through which individual companies make use of the new hyperconnected business environment. It is important to realize that there are vast amounts of underlying devices, sensors, applications, and other technology that are not discussed in depth here (apart from the technologies developed by the Naked Approach consortium). These underlying technological tools can be termed the "technology stack" (e.g. Porter & Heppelmann 2014). In short, it captures the technical features that the processes, products, and services require: data, analytics, real-time connectivity, cloud-services, application platforms, sensors, databases, network communication, product software, product hardware, application of external information sources, and ways to integrate all these to business systems.

Through analysis of these six value creation models, companies can gain a more in-depth understanding of how they can benefit from hyperconnected technologies. All the materials related to this part of the research are available at www.hyperconnectedbusiness.com, where it is also possible to create your own personalised report on value creation in the hyperconnected world.

# ADVANCED ANALYTICS AND MACHINE LEARNING

**ADVANCED ANALYTICS and machine learning will be used by most businesses in the very near future.**

In addition to the six value creation models outlined above, a seventh is introduced separately to highlight its importance, namely machine learning and artificial intelligence (AI). In simple terms, artificial intelligence is the ability of machines to carry out tasks that we consider "smart", and machine learning is the application of artificial intelligence (i.e. algorithms) in a way that allows machines to have access to data and learn from that data. There are a few other terms and distinctions that should also be explained:

**1. Supervised machine learning** means applying artificial intelligence to classified sets of data (completely labeled training data) with distinct qualities of input objects and desired output values. From this, supervised machine learning can produce a function that helps with problems that have similar data in them. Most often, large datasets with unified data is needed.

**2. Semi-supervised machine learning** means using much smaller learning sets, combined with clustering, to teach algorithms to be as good as algorithms trained with large datasets via supervised learning. Research has found that unlabeled data used with a small amount of labeled data can often produce considerable improvements in learning accuracy.

**3. Unsupervised machine learning** can be used to quantify and explore more complex sets of data to visualise (without any labeled training data) and represent new classifications and unexpected links with different data. Where there are no solid theories yet, unsupervised machine learning can help to find new ways to understand large datasets that are not in clear order.

The creation of **artificial general intelligence** (AGI) takes this development even further, and could, if realised, completely change the way we live, and certainly how and whether we do business at all anymore. **AGI refers to the creation of the intelligent machine that can successfully perform any intellectual task that a human being can, and is the primary objective of some of current AI research.** It is a topic that regularly crops up in headlines — and not only those about science fiction films or future studies anymore.

If one wants to speculate on the effects of this possible development, Max Tegmark's book Life 3.0 (Tegmark 2017) and its 12 scenarios are the perfect starting point. The question of whether we will achieve this point in the development of AI remains to be seen, but it is impossible to describe the development of advanced analytics and machine learning without devoting at least a side note to the possible future creation of AGI.

Even if AGI never happens, the benefits of machine learning are already applied in various contexts, and the help machines provide in solving complex issues, handling large data sets, and analysing them for better understanding, is one of the most transformative technological developments, and will affect all organisations in one way or another.



# ACTIONABLE INSIGHTS AND FEEDBACK IS WHAT YOU ARE LOOKING FOR

**Actionable insights and the ability to collect meaningful feedback create the most value for businesses looking to benefit from hyperconnected technologies.**

**THE PREVIOUS SECTIONS** describe value creation models, the business models through which value is created in the future. This section, in turn, explores where the greatest value lies as our technologies develop further.

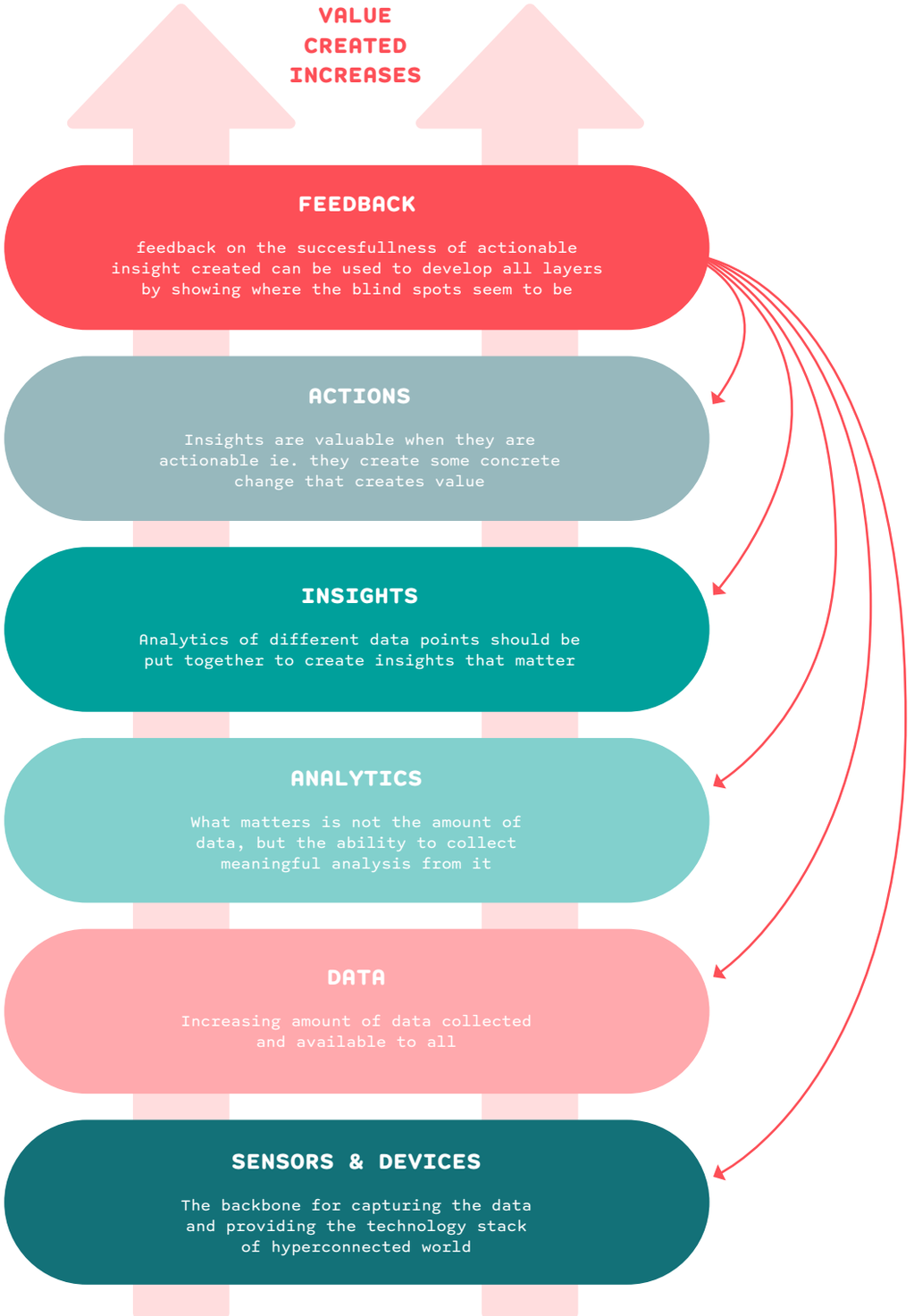
In the future, **the greatest value will be produced by the ability to transform data into actionable insights and get feedback on the success of actions.** Creating actionable insights means piecing together information that can be acted upon, i.e. information that gives enough insight for concrete and correct actions to become clear to decision makers.

How much value is created can be understood as a ladder with six steps. The value created increases the higher up you climb, as the usefulness of the created value increases with each step. The steps of value creation in the hyperconnected world are depicted in Figure 9.

Devices are not valuable in themselves, but they produce the required data. Data, in turn, is not very helpful without analysis of what it means. Analytics is also useless if it does not provide insights and if it is not connected to other data and analysis made based on them. And even insights are worthless, unless they can be acted upon and inform better decision-making. Finally, actions are worth the most when there is a feedback loop that provides information on the success of the action — and when this feedback can be used to improve all the previous steps.

In conclusion, in order for a company to reach a new level in the world of hyperconnected business, it needs to combine carefully selected datasets and decide which steps of the value creation ladder it wants to do business on. Actionable insights provide the highest form of value creation that can be acquired through hyperconnected technologies, especially in combination with continuous feedback loops. Yet constructing these actionable insights and meaningful feedback is the hardest one of the above-mentioned steps.

FIGURE 9:






# THE HYPERCONNECTED BUSINESS PLAYBOOK

**Through hyperconnected technologies, the amount of data on how and why things happen increases drastically. This shapes how we and the organisations we form use and spend resources, while at the same challenging the old business playbooks.**

**OUR RESEARCH** on hyperconnected business produced four findings that everyone interested in the future of organisations and businesses should be aware of:

### 1. Value creation needs to happen inside planetary boundaries.

From the point of view of companies, digitalisation and other driving megatrends such as resource scarcity and climate change require more resource-efficient ways of operating that allow value creation within planetary boundaries. Companies in all industries are affected by this change. New technologies offer tools to solve this challenge.

### 2. Various novel value creation models become common through hyperconnected technologies.

The New Competitive Environment is defined by the opportunities created by hyperconnectivity: the internet of networks, people, things, machines, and computers that enables intelligent operations using advanced data analytics, redefines the landscape for individuals and organisations alike. Hyperconnectivity allows for various new ways to create value that can be applied to different aspects of businesses to develop them in novel ways.

### 3. Creating actionable insights is where the value lies — hyperconnected technologies enable the move from hunch to insight.

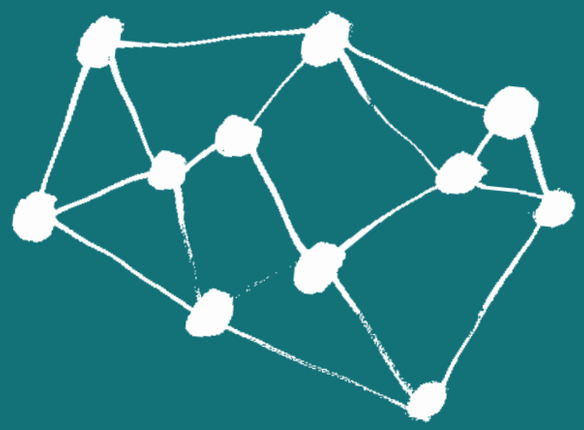
With the advent of better measurement technologies and understanding of the complex causalities between actions, decisions and their results, the success of our technologies, our actions and our organisations can be measured better and judged by their actual impact. This will result in better use of natural and human resources.

This a clear change from the educated guessing of the industrial era, replacing reliance on intuition and a limited amount of information with an abundance of information. The real challenge now is the ability to connect the right pieces of information to yield decisions based on fact and data. The ability to create these actionable insights provides the greatest amount of value for an organisation.

### 4. Hyperconnected business will challenge the old business playbooks and shape competition in a way that challenges industrial forms of organisation.

There's a great amount of  companies playing with the old business playbook of creating products and services, and hoping that that will be enough. The possibilities provided by technological development will re-shape the business landscape so much that old tricks will not be enough. All companies are affected by these radical technologies — some will be overtaken by competitors who enter their field with the knowledge of how to use them.





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# OTHER NAKED APPROACH PUBLICATIONS

### SCENARIO PUBLICATION: THE FUTURE AS TOLD THROUGH THE GARDEN AND THE SREETS

There are four things that everyone needs to understand. Not tomorrow, not next week, not next year, not next decade. Today.

**One:** The hyperconnected planet is already happening.

**Two:** Eventually, the technologies presented in this publication will become part of our environment and daily lives.

**Three:** This will inevitably change our relationship with the physical world and our relationships with other people, and affect communities, societies, and economies.

**Four:** It enables new opportunities for a good life within planetary boundaries.

This report constructs two scenarios set in 2040, to explore the most important tensions in a future hyperconnected society.

### ON THE ROAD TO DIGITAL PARADISE

This Booklet covers the Naked Approach project philosophy and focuses especially on the user and design perspectives. It illustrates the conceptual design principles and presents the practical NOT-BAD Toolbox that has been developed as part of Naked Approach.

### HOW DOES HYPERCONNECTIVITY CHANGE THE WAY YOUR COMPANY CREATES VALUE?

Hyperconnectedbusiness.com is an online, personalised report for companies. It is can be used to design new resource-efficient business models step-by-step, based on the six value creation models that hyperconnectivity enables.

### BRIEFING: SUCCESSFUL ENTREPRENEURIAL ECOSYSTEM

This publication uncovers  what is required for a successful Nordic hyperconnected business ecosystem to emerge and how Nordic companies and startups can compete with their values on the global markets. Assigned by Demos Helsinki, Aleksi Aaltonen, Assistant Professor at the Warwick Business School, browsed through over 2,000 issues from 60 top-tier management journals to find the answer.

The working paper identifies the 10 most important topics from the literature and guides the reader to the key insights.

THE NAKED APPROACH

# Full throttle towards a digital paradise

Hyperconnected society is already here. Sensors feed data into platforms, and platform monopolies dictate what news we read and which roads we drive on. Autonomous cars whizz by, as solar panels pump cheap energy for us to consume.

All technologies have both positive and negative sides to them. This publication, and the Naked Approach as a whole, is about not being afraid of the negatives. Even with the possible adverse outcomes in mind, we cannot slow down – we must push the boundaries of technology and of our societies. We must realise the promise of technological development, and make our way to the future that can be described as digital paradise. And we must co-create and regulate the living daylights out of all dystopian sprouts.

We live in societies structured by institutions that were largely created as a reaction to the Industrial Revolution. We have to dare to question these institutions, and construct their successors. Technological progress will give rise to new ways of organisation that provide people a voice, places for dialogue, and pathways towards a fair and sustainable society.

So, buckle up and let's go for a ride!