THE FUTURE AS TOLD THROUGH THE GARDEN AND THE STREETS

SCENARIOS FOR THE HYPERCONNECTED NORDIC SOCIETIES OF 2015–2040.

THE NAKED APPROACH

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PROLOGUE

MEET PEKKA, OUR SCENARIO PERSON NUMBER ONE,

CITIZEN OF THE GARDEN SCENARIO IN 2035.

PEKKA, a divorced but not too lonely 63-year-old man, lives in his small flat in Gothenburg, Sweden. He works, he loves his grandchildren, he has friends and education. He enjoys life, as do most of the people in the Garden. Pekka does not mind that companies are taking care of basically everything that used to be the government's job. Pekka has adapted. He is not rich, but he gets along just fine. But just like the rest of us, Pekka also worries about the future. What will his last years on this Earth will be like? Sometimes Pekka gets nostalgic. After all, he is old enough to remember the time when technology did not control every aspect of our lives. When that happens, Pekka goes outside, climbs up the hill or a skyscraper, and silently stares at the sunset. Natural beauty like that still makes Pekka happy.

> Read more about the Garden in Chapter III of this publication starting on page 24.

MEET LIISA, OUR SCENARIO PERSON NUMBER TWO,

CITIZEN OF THE STREETS SCENARIO IN 2035.

LIISA, a 43-year-old strong believer of the old-fashioned welfare state, lives in her cozy yet again to be renovated apartment in Helsinki. Liisa knows her neighbours and is pleased with her life. She works in the dog jewellery industry but is constantly looking for a better job with a higher paycheck and more hours. Liisa, just like many other people in the Streets, is a busy person. In fact, her calendar is filled with all kinds of appointments years ahead. Liisa is also a mass user of various apps that control pretty much everything she does. Liisa does not mind. The past is behind her. Yet she sometimes gets a bit nostalgic. When that happens, Liisa goes online and orders different hyper-customized solutions, such as 3D printed products, interactive layers, or retrofitting that resemble the way apps were purchased 20 years ago when Liisa was a young woman. All kinds of data, along with the basic income she gets from the state, make Liisa happy.

> Read more about the Streets in Chapter III of this publication starting on page 24.

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CHAPTER I

THE BACKGROUND: WELCOME TO THE FUTURE THAT IS NOW

OPENING WORDS

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: It will inevitably change our relationship to the physical world and our relationships with other people, affecting communities, societies, and economies.

FOUR: It enables new opportunities for a good life within the planetary boundaries.

IN THE FUTURE, the new technologies will emerge that combine physical and digital realms. This doesn't mean that the Internet will be everywhere. It means that the physical and the virtual world will collide, come together, and exchange qualities. Digital will become physical as much as physical becomes digital. Some very material things have already entered the Internet. Cars are being shared by Uber, houses by Airbnb. This gives you an indication of the type of disruptive value that the hyperconnected planet can create. Uber is now worth 50 billion dollars by some estimates, and Airbnb has been valued at more than 25 billion. And this is just the beginning.

This publication is the first in a series of Naked Approach research project publications, concentrating on future society and business in the hyperconnected world. **The goal of this publication is threefold. The first goal is to provide the Naked Approach research consortium with tools and frameworks to plan for future development from a broad, holistic point of view.** The scenarios and the learnings from them create responsibility and advocacy. **The second goal is to provide a framework for business model research focusing on new possibilities for Nordic companies and startups.** Work on this topic is to be conducted during the next six months. **The third goal is to inspire and motivate a broader group of people** to see business and societal opportunities in hyperconnectedness from the Nordic perspective. In the big picture, we are aiming at a hyperconnected society with a Nordic flavour of values: the values of beauty in efficiency, trust, equality, and silent respective coliving. We are aiming at a trillion connected sensors and actuators in our world, built and networked in a sustainable and manageable way. And we aim at high added value for our citizens, societies and companies via hyperscalable business enablers and emerging business ecosystems.

This report investigates the principles that should be followed to achieve a positive future. We consider when hyperconnectivity is helpful, when it isn't, and how it can be achieved. We also name organizations that can have a say in how the future develops.

What is scenario methodology, and why and how do we use it?

SCENARIOS ARE A TOOL for exploring future uncertainties that we constantly encounter in our economy and society. Scenarios help in building capabilities for strategic steps, in identifying actors that should be prepared for change, and in finding the right timing for action. They depict alternative futures for society and pathways through which those futures can be attained.

There are two main types of scenarios: Forecasting scenarios are constructed from the present day toward the distant future. Their purpose is to explore the types of obstacles and opportunities that we should prepare ourselves for. Backcasting scenarios are constructed from the distant future toward

the present. Their purpose is to discover alternative pathways through which a desired goal can be met. This publication discusses two backcasting scenarios.

Backcasting is a relevant option when forecasting studies indicate that long-term developments are likely to lead to undesirable outcomes. Backcasting scenarios allow new options to be considered reasonable, widening the perception of what could be feasible and realistic in the long term.

In this publication, the goal is defined through a long-term transition to resource smartness while improving the well-being of the people. An economically viable society that is within the planetary boundaries is unlikely to be attained through incremental change. Yet avoiding catastrophic climate change is a global priority that almost all governments as well as many cities agree on. Backcasting scenarios are needed if we want to turn these priorities into successful and sustainable action.

The main focus is on how hyperconnectedness both as a technological development and as a social phenomenon transforms societies. Yet we also portray a much wider horizon on the future of our societies. This is needed because individual factors in society don't evolve independently of external factors such as economics, politics, and people's behaviour.

THE USE OF SCENARIOS IN THIS PUBLICATION

THE SCENARIOS ARE BASED on interviews with consortium members and outside experts, workshop work done within the Naked Approach project, and an extensive literature review. In the interviews and workshops, we asked the experts how hyperconnectedness will affect the future and what other aspects should be taken into account. Based on the answers of the experts and previous work done by Demos Helsinki, we chose the five most important current tensions. These tensions demonstrate unsolved situations whose solutions will significantly shape future society.

Based on the tensions, we have constructed two distinct scenarios. In both scenarios, humanity manages to avoid catastrophic climate change and environmental turmoil. This is the first tension. The other tensions are used to create two different scenarios; each of the other tensions is solved in a very different way. **The combinations of the solved tensions create the backbone for the scenarios' work.**

As mentioned, the tension between society's ecological footprint and human well-being is solved in a similar way in both scenarios presented in this publication. This is due to the fact that, in general, there are typically three types of scenarios. **Some scenarios describe the collapse of society or civilization (image 1, scenario set 1).** These scenarios are helpful in finding ways to avoid collapse but not very helpful in offering visions of otherness or making great leaps forward. Then, there are **scenarios that show how things are continuing to improve in the same way that things used to improve (image 1, scenario set 2).** These scenarios are typically the least useful. The last type of scenario includes **those that demonstrate how things improve but in a different way than what used to be the case (image 1, scenario set 3).** These scenarios are the most useful and helpful type in showing the visions of otherness and some paths for how to get there.

Scenarios of the first type will not offer us anything useful for development or for the role of the digital technologies. Scenarios of the second type are Trojan horses: we would like to continue on the current trajectory, but the framework we have selected shows that this path is ultimately unsustainable and will eventually lead to scenarios of the first type. Thus, the third type of scenario sets "a better world but with different means than before," which includes a decoupling of the framework. This is the type that we investigate.

There are multiple possible scenarios in this scenario set. Actually, there are countless different scenarios. This publication shows just two significantly different scenarios to demonstrate various strategies we can choose from to expose the role and requirements of technologies and to encourage discussion about political, social, and economic decisions that we need to make. Thus, with the tension of the limited resources, only one outcome is accepted in the scenarios of this publication: a better world with less consumption. Nevertheless, the scenarios differ from each other in the tensions presented below.

In the end, the aim of this scenario publication is to showcase that an economically viable society within the planetary boundaries can be attained with the help of Nordic values and hyperconnected technology.
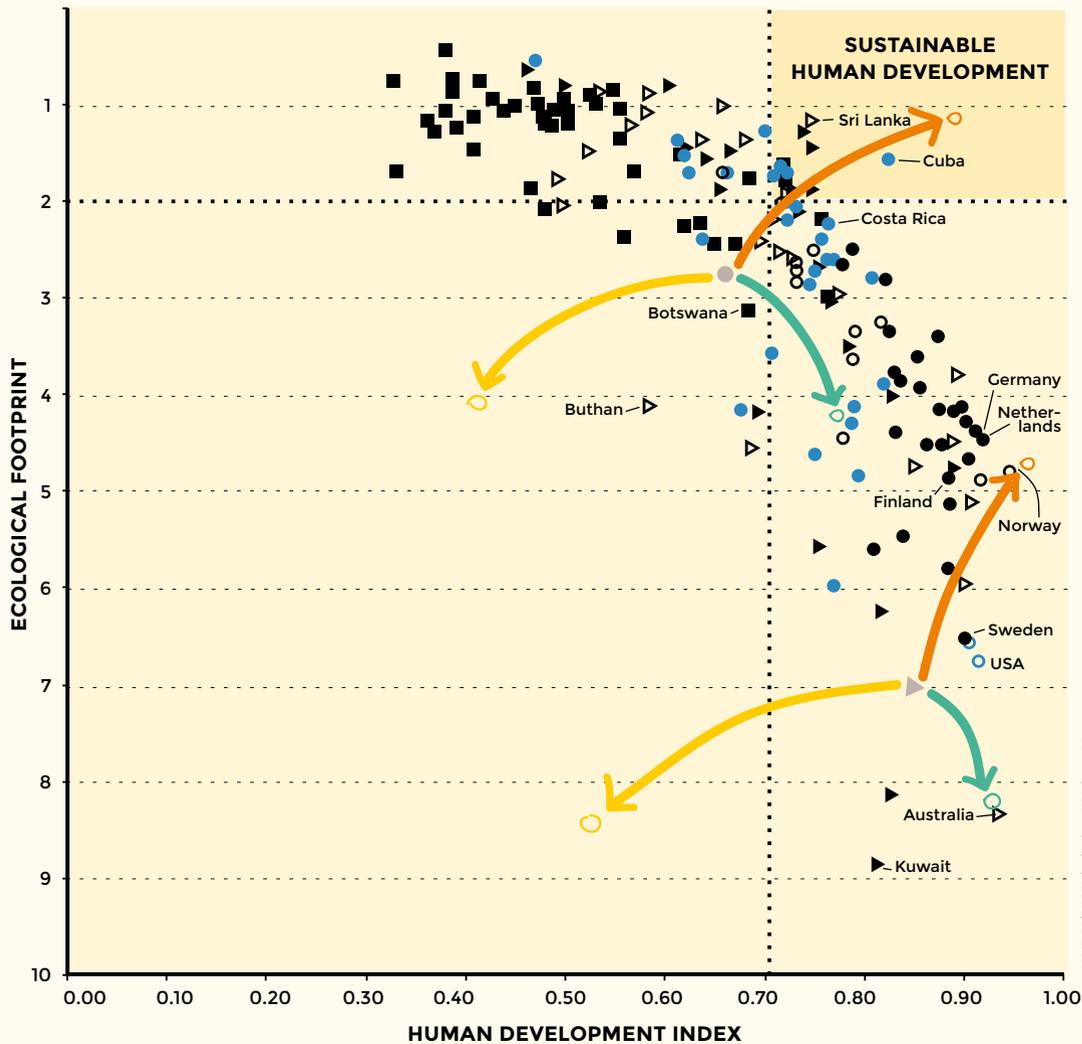
Figure 1: Scenarios investigate futures where the correlation between HDI and society's ecological footprint has been reduced. The chart illustrates how the countries with a high ecological footprint (a bad thing) are also the countries that rank high in the human development index (a good thing). On the upper left corner is a rectangle representing "sustainable human development."

UNDP (2013C); design Maritere Vargas

SUSTAINABLE HUMAN DEVELOPMENT

ECOLOGICAL FOOTPRINT

HUMAN DEVELOPMENT INDEX

Sri Lanka
Cuba
Costa Rica
Botswana
Buthan
Germany
Netherlands
Finland
Norway
Sweden
USA
Australia
Kuwait

SCENARIO SET 1: COLLAPSE
SCENARIO SET 2: CONSUME
SCENARIO SET 3: COLLECT

AFRICA
ASIA (Pacific)
ASIA (Middle East / Central)
EUROPE (EU)
EUROPE (Non-EU)
LATINAMERICA
NORTH AMERICA

HOW TO READ THIS PUBLICATION

ACCORDING TO SEVERAL INTERVIEWS conducted during the Naked Approach research project, **a typical reason for a failed technology research project is the lack of a coherent vision.** What, then, is a vision-driven research project? A common example is the moon landing, but there are closer examples as well. For example, the development of 4G and 5G networks was undertaken to address a pronounced problem.

The vision presented in this report is that, with the Nordic perspective toward the hyperconnected, planet it is possible to decouple the negative correlation between crossing the planetary boundaries and enjoying a good life.

A solid vision provides meaning and purpose for research work and technology development and guides the solutions to address real issues. It is inspiring and motivating to solve a real issue. Companies find it easier to identify business opportunities when the problem is clearly pronounced. And public opinion supports and encourages efforts to solve problems they feel are important.

The topic of this publication is "hyperconnectivity," which refers to Digital Planetarism, the Internet of Things, Connected Devices, and Programmable World. The Naked Approach, a project developing ground-breaking solutions to these developments, is given a special place in solving the identified grand challenge. The Nordic perspective toward hyperconnectivity is investigated thoroughly in the scenario contexts.

What should you expect when reading this publication?

FIRST, the scenarios of this publication are very holistic. They look not only technology development but also most important social, political, environmental, and economic developments. The systemic interactions and intercomplexities of the different developments are investigated in detail.

SECOND, although the scenarios show a path toward a better but different world, the scenarios are not utopias. They aim to demonstrate that any possible step toward a more sustainable, just, and enjoyable world also causes unintended side effects.

THIRD, the scenarios presented in this publication do not demonstrate all the alternatives – quite the opposite. They simply show two very different paths through which the wicked problem is solved and reveal further problems that stem from the solutions. They show radically new ways of creating and capturing value via hyperconnected technologies such as energy harvesting and printable electronics, but they don't show all the possible value creation models.

FOURTH, the scenarios are not the findings of the research. Instead, they should be considered research material. The findings include 1) principles of the Nordic perspective toward hyperconnectedness, which help in solving the grand challenge and thus achieving the vision; 2) the grand challenge itself, which is the base for the vision; and 3) recommendations for different gatekeepers.

THE PRESENT: THESE ARE THE CURRENT TENSIONS

LOOKING FROM 2040 BACK TO 2015, the solution to most uncertainties of this era will seem trivial. We are not granted such a luxury. Thus, this chapter explains the current tension developments that have an uncertain outcome. Demos Helsinki has formulated these five most important tensions regarding the future based on multiple workshops, expert interviews, and our previous work on megatrends.

The most important current tensions are:

TENSION 1 ON LIMITED RESOURCES:
Well-being *versus* the planetary boundaries.

TENSION 2 ON EQUITY AND CAPABILITIES:
Participation *versus* control

TENSION 3 ON NEW ECONOMIC SYSTEMS:
Converging markets *versus* fragmenting structures

TENSION 4 ON SUBSISTENCE:
Liberation from work *versus* the end of work

TENSION 5 ON VALUES:
Liberties *versus* security

WE CANNOT KNOW how these tensions will develop in the future, but we can speculate radically opposing outcomes and try to understand what kinds of futures the different combinations of outcomes create.

Tension on limited resource

Tension on equity and capabilities

Tension on new economic systems

Tension on subsistence

Tension on values
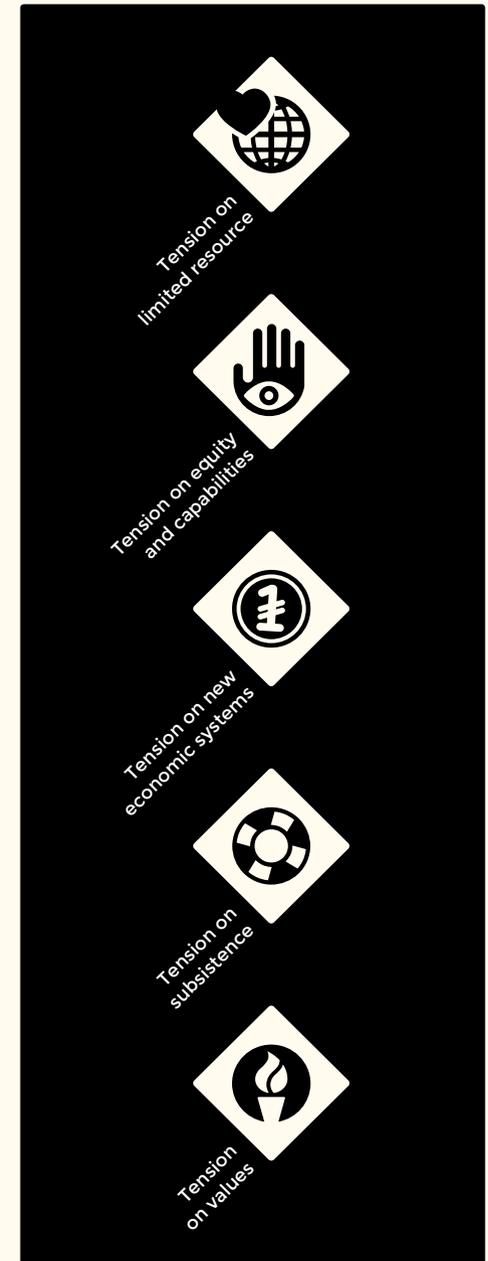
TENSION 1: LIMITED RESOURCES: WELL-BEING VERSUS THE PLANETARY BOUNDARIES

THE VISION in this publication is that, with some key technologies and social change, we can create a world where a good life does not mean unsustainable levels of natural resource use. **The argument is that, by emphasizing Nordic values of trust, respectfulness, and collaboration and by making conscious choices when regulating, developing, and using hyperconnected technologies, it is possible to end up with a more sustainable and enjoyable planet.**

Ever since the Limits to Growth report was published by the Club of Rome in 1972, the inevitable limits of the planet have been well known. Climate change has made this topic ever more urgent. According to the IPCC (a global scientific panel on climate change), we must turn global climate emissions to a declining trajectory within the next decade to avoid the threat of catastrophic climate change. Within the next 40 years, emissions levels in developed countries will have to be 90% lower than in the 1990s. Major changes are needed to maintain the well-being of the people while living within the sustainable boundaries of the planet.

What makes this challenge even trickier is global population growth. Global human population growth is around 75 million annually, or 1.1% per year. The global population has grown from 1 billion in 1800 to 7.3 billion in 2015. **The number of people will continue growing to reach 8.4 billion by the mid-2030s, perhaps topping 11 billion around 2100.** The defining correlation of our time is the correlation between the unsustainable use of resources and human well-being. Because the resources of our planet are limited, we must seek ways to end this dependence.

Finland leads the charts in human well-being year after year. But with our current way of life, this level of well-being is unsustainable. **The average Finn uses approximately three and a half times more resources than what is sustainable in the long run.** In contrast, the countries that do succeed in environmental well-being charts are typically not great places to live or prosper.

Technology can help to decrease the aforementioned correlation. In the Naked Approach project, the research consortium is investigating sensors that are energy independent via energy harvesting, e.g., by collecting their own energy from solar panels or even vibrations. This makes it possible to avoid previous path dependencies, to place technology in places where it has not been before, and to construct technology networks that don't increase the burden on the existing systems. Even more importantly, these technologies can radically reduce the overall resource use in building and construction, transportation and mobility, and production and manufacturing. They can even reduce the need to move around and to construct new buildings by creating new flexibility in old spaces and places.

Figure 2 Correlation Human Wellbeing – Environmental Wellbeing
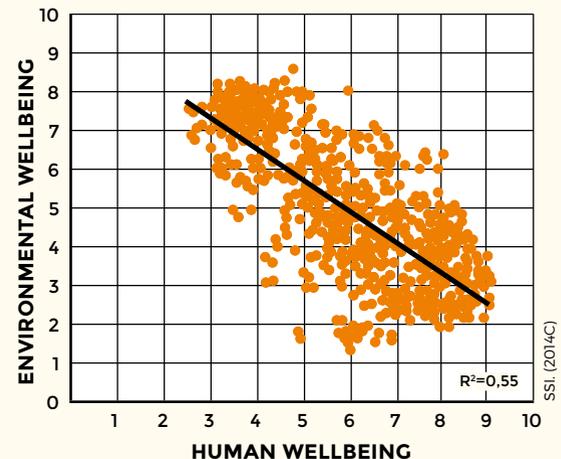
Key question on Tension 1 on limited resources

HOW CAN WE INCREASE HUMAN WELL-BEING WITHOUT CROSSING THE PLANETARY BOUNDARIES?

IN THE GARDEN SCENARIO, the increase in well-being is within the planetary limits because of smart grids, ICT, and data companies operating in the energy, mobility, and food markets, abundant solar energy, super-effective logistics systems and manufacturing, and a widespread circular economy. **IN THE STREETS SCENARIO**, the ability to sustain resource-efficient growth stems from data-driven behavior change and the wide systemic interoperability of products and services. Centralized data collection is used to eliminate peak usage completely. Small and large devices, from hair sensors to cars, are everywhere, but they are self-sustainable by collecting their own energy from the environment.

TENSION 2: EQUITY AND CAPABILITIES: PARTICIPATION VERSUS CONTROL

SINCE ITS CREATION, the Internet was a promise. It was expected to provide us with a great deal of information and connect us globally. With its help, we would find new solutions for all fields of business and solve societal problems. Now we know that there will be a significant global increase in accessible information in the future, regardless of users' geographical location or personal wealth. This is due to the increasing number of people and devices that are connected to the Internet as well as the amount of content that is published online. Because people have a lot more information than they could have ever imagined and they are more closely connected to each other, they can use the information in meaningful ways and solve complex problems together.

This approach ignores the fact that there is no neutral technology. **The new world, which will be defined by complex network systems, the Internet of Things, and connected devices, is twisty.** Those who understand that the system might have more power and capabilities in the future. The tension of participation, control, and equity in the hyperconnected world is that a possibility is not a capability. Access to information and the possibility of using all types of technologies doesn't necessarily translate into the capability to do so.

Examples of this are manifold. Most of us use the Internet, but how many of us can shape it? Can you code? **All of us have the opportunity to search for information on the Internet, but how many of us can go beyond Google?** Do you know how their algorithm selects the information offered for you? And it is not only our personal abilities that dictate our abilities but also, and more importantly, the networks and groups we belong to.

For Nordic societies, a big question is whether hyperconnection technologies will help to balance differences in capabilities by, for instance, providing new means to communicate for the mute or wider access to sports for the mobility impaired. Another possibility is that new technologies will help to accumulate even more abilities for those who have the power and resources to purchase state-of-the-art solutions. Whether we'll see the top 1% gain more or emancipate the 99% of the rest of us is not only a practical question but a value choice.

This is not just about how and with what capabilities an individual handles work or leisure tasks. It is also about the ability to affect society at several levels. Is it possible to purchase tools or services that give an individual better status in communities or, for example, wider privacy? What types of tools and skills separate people by their abilities to combine their strengths and cooperate?

Who controls technology, and what is the role of technology in controlling people? Can people regulate the global technology system? Who has control and power over networks? What about sensors, connections, servers, databanks, or analytics? Is the control over some of these local instead of global? Can all people use the opportunities provided by new technologies? Does technology create equity through leveraging capabilities or inequality through different levels of access? The level of trust indicates what common deals are mostly based on and what the most important context for common regulations is. **But are we, in the near future, going to live in a world of common rules, or is there enough trust to support interaction only in local communities?**

Because of the increase in the amount of available information, it is becoming more and more difficult to be a distinct individual: in a 2014 PEW study, just 24% of adults "agree" or "strongly agree" with the following statement: "It is easy for me to be anonymous when I am online." Nevertheless, according to Villi and Matikainen (2015),

most people prefer to remain anonymous when they are online. When asked whether they feel that their own efforts to protect the privacy of their personal information online are sufficient, 61% say that they "would like to do more," while 37% say they "already do enough." **Our perception of what privacy is is changing rapidly. This perception plays a vital role in how the big data, personal data, and open data will be considered in the future. Will there be privacy in the future? If there isn't, will we have roles? How?**

Moreover, we speculate in the scenarios who who will get to decide what in 2035 society. There have been examples of power struggles between volunteer website admins and website owners (e.g., with Reddit.com). These types of conflicts and redistribution of power are possible on a larger scale in the imminent future.

The increase in the amount of collected data and insights is changing politics. Some discussions change from political deliberations to facts and experiments. We know more about our true behavior than ever before. Perhaps by 2035 there will be fewer things to decide upon. It is also possible that some data will be transferred away from the national level to cities and to supranational institutions.

Key questions on Tension 2 on equity and capabilities

HOW CAN WE CONTROL THE RISKS AND MISUSE OF NEW TECHNOLOGIES?

IN THE GARDEN SCENARIO, dangerous technologies are not offered to anyone because of heavy corporate self-regulation. **IN THE STREETS SCENARIO**, democratic governments are given wide permission for data monitoring and analytics to avoid the misuse of widespread technologies.

WHAT TYPES OF TRUST AND COMMON RULES WILL EXIST IN THE FUTURE?

IN THE GARDEN SCENARIO, people trust primarily their own neighbors and colleagues. Most other interactions are mediated through large companies, providing trust for interactions. **IN THE STREETS SCENARIO**, people trust democratic institutions. Mutual trust between people is also high, partly because of trust-enhancing peer-to-peer technologies such as the blockchain.

WILL TECHNOLOGY HELP TO BALANCE DIFFERENCES IN CAPABILITIES, OR WILL IT ACCUMULATE EVEN MORE ABILITIES FOR THOSE WITH POWER AND RESOURCES?

IN THE GARDEN SCENARIO, technology accumulates abilities for those with power, but the middle class also reaps the fruits of the new innovations, albeit at a slower pace, to maintain peace and harmony in society. **IN THE STREETS SCENARIO**, technology balances the capability differences. This is achieved via large programs to teach and provide access to novel tools, analytics, and technologies.

TENSION 3: NEW ECONOMIC SYSTEMS: CONVERGING MARKETS VERSUS FRAGMENTING STRUCTURES

ACCORDING TO MOORE'S LAW, computing power doubles every two years. This observation has been relatively accurate for 40 years. Nowadays, people can use cheap computing power in the cloud to calculate complex big data sets for a very small cost. **What will happen to the economic system if the marginal cost drops to zero or close to zero?** For almost twenty years, consumers have shared digital goods among themselves for free, reducing revenues in the music and newspaper industries. Soon, when everyone can access big data, sensors and analytics will speed up the efficiency and increase the productivity of physical things such as products, services, and energy. This will dramatically lower the marginal costs, throwing the current commercial paradigm into crisis.

Forms of ownership are rapidly changing, affecting the political and economic realities of our societies. New service models (as-a-service models) in many markets reduce the need for ownership. Look at worker-owned businesses, collaborative consumption, the sharing economy, and platform businesses such as Uber and AirBnB. According to Thomas Piketty, the rate of return of capital is always greater in the long run than the increase in wages. What follows is that inequality is not an accident but rather a feature of capitalism that can only be reversed through state interventionism. Currently, the share of, e.g., American income earned by the top 1% has returned to a level close to 20%, nearly matching the all-time high set in the year 1928. **The piling up of capital will likely lead to social turmoil or large changes in the near future.** But which system is more equal, a participatory system that relies on meritocracy, self-expression, and capabilities or a corporate system that relies on consumerism, money, and a promise of a good life?

In the future, attention and data can be more valuable assets than money. Markets could converge and soon be run by just a few technology conglomerates. Digitalization redefines the boundaries of many industries. In smart city markets, energy, construction, IT, telecom, and security industries are converging toward a single marketplace. Construction companies can put solar panels and windmills on their roofs, effectively becoming energy companies. IT data warehouses can use their excess heat to do the same.

Or, instead of converging, the markets could fragment to into isolated islands of incompatible standards. Will development be driven by closed collaboration platforms such as Facebook and Uber or open collaboration such as Linux and Wikipedia? And further, based on the work of Mario Mazzucato, it is reasonable to ask what truly drives the development of future innovations: is it market funded-innovation such as SpaceX and Hyperloop or government investments such as GPS and the Internet, developed by the U.S. military?

In the scenarios, we also speculate with possibilities of MyData and socializing the data economy. In the data economy, the modes of ownership are especially bound to data and infrastructure. Infrastructure refers to sensors and sensor platforms. Ownership of data and infrastructure can be interconnected or separate. Different actors are emphasized in different modes of ownership. We ask how the new solutions and applications develop. Are solutions built by constructing large ecosystems and optimizing the overall experiment or by enabling fast and random solutions to experiment with different approaches? **What about the role of communities in supporting people with their basic needs?** Hackers, global corporations, and local communities can all play a role in fulfilling these needs by building digital and physical systems.

Further, in the scenarios, we consider the enablers of the hyperconnected planet. Development requires significant investments and funding mechanisms. Economic enablers include, for example, infrastructure investments

and the development of big data analytics. Are these created via markets, governments, or corporations? The scenarios also take a stance on what sector will provide the most value by 2035. In the digital world, companies continue to compete with respect to which will be the most effective in producing value. The hyperconnected planet affects different sectors at different paces and increases their value production in an uneven way.

Currently, big industrial and Internet companies such as Cisco, Siemens, Apple, and Google lead the race in hyperconnected solutions. The biggest startups, such as Uber, have created a platform for mobility that is scaling in cities throughout the world. Are big corporations inevitably linked with the next phase? Or will there be alternative routes such as a diversity of small-scale platforms or national commons? The biggest Internet of Things companies probably have an advantage over new actors, but they probably haven't won the competition for the next phase, the hyperconnected phase.

Connected to the question of the biggest actors is a wider unanswered theme of how novel services and business models emerge. Startups are experts in trying out new business models, but this thinking is expanding to other areas as well. **Insurance companies, for instance, have a natural incentive to use data and promote service models that are more resilient and easier to predict than selling single products.** In 2015, platform providers such as Airbnb or Uber have been able to

capture value and increased valuation with significantly low investment costs. Likewise, operating system providers have maximized their value capture system by monopolizing digital access points for consumers and then enabling usage of this access point by technology providers such as app developers.

Key questions on Tension 3 on new economic systems

HOW AND WITH WHOSE HELP AND INVESTMENTS WILL NOVEL SERVICES AND BUSINESS MODELS EMERGE IN THE FUTURE?

IN THE GARDEN SCENARIO, it is the corporations whose large R&D investments provide new market disruptive economic development. **IN THE STREETS SCENARIO**, the largest role can be attributed to government research programs. Self-directed autonomous groups also play a role in figuring out new models for spreading innovations.

WHAT SECTORS PROVIDE THE MOST VALUE IN THE FUTURE?

IN THE GARDEN, the most lucrative sectors for growth are novel industrial processes, logistics chains, and the circular economy in various markets. **IN THE STREETS SCENARIO**, it is device manufacturing, design

and fashion, and repair and maintenance businesses.

ARE MARKETS CONVERGING OR FRAGMENTING?

IN THE GARDEN SCENARIO, markets from food to transportation and leisure to manufacturing are heavily converging into a single smart technology marketplace. **IN THE STREETS SCENARIO**, the market structures are fragmenting. Nevertheless, they are self-directed to remain compatible via intrusive standardization.

WHAT HAPPENS TO THE ECONOMIC SYSTEM WHEN MARGINAL COSTS DROP CLOSE TO ZERO?

IN THE GARDEN SCENARIO, the reduction of marginal costs leads to a monopolized economic system and an experience economy via augmented reality. **IN THE STREETS**, low marginal costs allow the constant redesign and rapid fashion cycles.

WHAT HAPPENS TO OWNERSHIP?

IN THE GARDEN SCENARIO, people own only data. This is enabled by the social treaty between companies and societies. Things are used via as-a-service structures provided by companies. **IN THE STREETS**, people own a lot of things themselves and lend them to others through the collaborative economy.

TENSION 4: SUBSISTENCE: LIBERATION FROM WORK VERSUS THE END OF WORK

THE QUESTION OF THE IMPACT of automatization and digitalization on the future of work has been debated for a long time. One of the most well-known books in the debate is Jeremy Rifkin's End of Work (1995). According to Rifkin, unemployment will increase massively in the future because of the information technology. Millions of people in the manufacturing, agricultural, and service sectors will lose their jobs because the work can be done with help of machines. Because many tasks no longer require finite skills, middle-income jobs have significantly disappeared (see the following chart):

Fifteen years ago, this development might have sounded like something out of sci-fi. But in the present day, it is a highly topical question. **Routine work is disappearing.** In Finland, Etla has predicted that, in twenty years' time, the jobs of salespersons, secretaries, and accountants will disappear. One of the great tensions of the hyperconnected world will be the future of work. Do automation and robotization mean liberation from work or the end of work? **If a robot takes over your job, what will you do in the daytime? How will you support yourself?**

The scenarios provide alternative answers to the questions "What are the means of the people to have a livelihood for themselves and for their loved ones?" and "How do people participate in a meaningful way to society?" The means of subsistence and how income is redistributed varies between countries are addressed. In Western countries, the weight of the middle class grew during the 20th century, but several drivers loom in the future to change this. This variable investigates the structures of income generation and opportunities for people to participate in developing society through work or other means.

Technological unemployment means that many of the current jobs can be more efficiently done with automated solutions. However, in many if not all cases, a human-machine combination is the most efficient. Will the biggest gains be seen in more efficient business processes, or will we see a leap in convenience in private life? **Industrialisation started out as new technologies but in the end transformed how we design factories and the types of organizational cultures that exist.** This, however, took centuries after the first application. Viewing the hyperconnected planet holistically allows us to perceive gains in all parts of society and thus provide a more systemic perspective on the improving capabilities from the start.

Figure 3 Change in Occupation Employment Shares in Low, Middle, and High-Wage Occupations in 16 EU Countries, 1993–2010
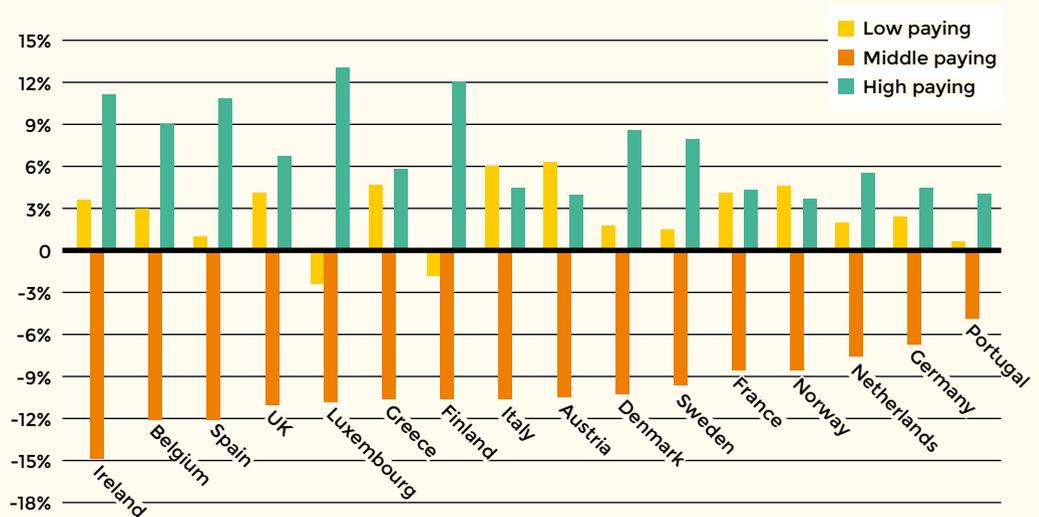
Goos, Manning, and Salomons (2014, table 2).

Key questions on Tension 4

DOES INCREASING AUTOMATION MEAN LIBERATION FROM WORK OR THE END OF WORK?

IN THE GARDEN SCENARIO, increasing automation means unemployment for many. There is a large group of have-nots that don't benefit much from the increased automation. Instead, their salaries might drop and jobs become more simple. **IN THE STREETS**, government manages to solve the difficult puzzle by providing most people with the newest technological means and capabilities to participate in the liquid job markets. It's a liberation from work, although not of the type where there is no longer any work at all.

WHAT HAPPENS TO THE MIDDLE CLASS? HOW WILL PEOPLE SUPPORT THEMSELVES IN THE FUTURE?

IN THE GARDEN, very few high-paid jobs remain. The owning elite is small, and the people they employ form a rather uniform middle class. Those who are more unfortunate support themselves via their social connections and families. **IN THE STREETS**, the government supports job dropouts and encourages them to engage in art, science, or business without the fear of failure. In this scenario, a typical career path involves constantly jumping between jobs, guided by the relatively random inspirations and opportunities.

IF MACHINES DO THE WORK, WHAT WILL PEOPLE DO? HOW CAN WE PARTICIPATE IN A MEANINGFUL WAY IN SOCIETY?

THE LIFE OF A MIDDLE-CLASS WORKER IN THE GARDEN SCENARIO is harmonious and peaceful. The days are filled with after-work augmented cultural events and experiences. The subcultures of the have-nots are very distinct from the hegemony. **IN THE STREETS**, people still do many jobs that machines could theoretically do. This is partly due to the fact that people are still more flexible than machines in providing temporal, fast-learning, unique experiences and products for consumers.

TENSION 5: VALUES: LIBERTIES VERSUS SECURITY

PEOPLE STARTED to move from rural areas to work in the factories of urban areas after industrialization. Globalization has strengthened the trend. Especially in developing countries, people are moving to cities with the hope of better employment, education, and living standards. In addition, the liberal atmosphere of big cities attracts people with different lifestyles.

In cities, people are more capable of constructing their own life, separate from traditional communities such as family. Individualization has been especially strong in Western countries. People are willing to distinguish themselves from each other. Individual identity is often shown by consumer goods such as clothes. In addition, people form new types of communities based on, for example, hobbies.

In the future, will we experience ourselves as individuals? Or will people feel more connected? When an increasing number of people are connected to the Internet and the information on the Internet keeps growing, there will be a significant global increase in possible connections and accessible information. This information will enable new capabilities and provide opportunities for people to take advantage of.

Values change slowly. **In the future, we might value harmony over self-expression or our own wellbeing over fairness.** The scenarios describe these different values that drive people. Values play a role in what aspects we would like to optimize: population growth, science, or wellbeing; security or individual liberties? Based on previous changes in values, it is possible to identify changes in what topics will most debated in sociopolitical discussion about 20 years into the future.

The scenarios also take a stance on how we perceive things that surround us, such as buildings, backpacks, and books. Do we have a relationship with them? Do they translate meanings to us as symbols of something else, not least as part of our identities? The relationship between a man and tangible items changes when those items become more and more self-aware, collecting data and reacting to their surroundings. Variable values define the rate of refreshment of things and how people bind themselves to items. For example, one's relationship to things is changed if the reality is heavily augmented.

Key questions on Tension 5

WHAT WILL WE VALUE IN THE FUTURE?

IN THE GARDEN SCENARIO, people value peacefulness, harmony, and easy life. **IN THE STREETS**, the most valuable things are the ability to express oneself and be creative and curious.

WHAT WILL OUR RELATIONSHIP TO REALITY BE?

IN THE GARDEN SCENARIO, many experiences both at work and in leisure time mix virtual and real elements. Daily life is enhanced by augmented reality tools. **IN THE STREETS**, people crave new things, novelty, and surprises. The physical reality is constantly reformulated because of changes in fashion trends.

WILL WE EXPERIENCE OURSELVES AS INDIVIDUALS OR CONSTRUCT OURSELVES THROUGH OUR ROLES IN DIFFERENT GROUPS?

IN THE GARDEN, people value their communities. They have the ability to play different roles in different groups and retain privacies between them. **IN THE STREETS**, people are individuals who take themselves in various contexts.

NINE TECHNOLOGICAL ENABLERS

THIS SECTION describes the technological enablers of the sensor revolution. They have the capacity to disrupt the current world in a fundamental way: shifting our daily routines, the way we work, what we consume and how. Technology may be developing faster than anybody could have imagined. It changes our behaviour, norms, and even values. Modern information technology becomes more and more available for all people over the world. Technology becomes part of our physical environment.

1. Increase in accessible information

WHEN AN INCREASING NUMBER of people are connected to the Internet, and the information on the Internet keeps growing, there will be a significant global increase in accessible information. This information will enables new capabilities and provide opportunities for people to take advantage of.

2. Increase in the role of APIs

WHEN MORE AND MORE INFORMATION on the Internet is machine readable only, systems will become more complex, and there are more big datasets that are incomprehensible to people, the role of APIs will increase. APIs, or application programming interfaces, are building blocks and interfaces between programs. APIs offer people opportunities to use complex systems they don't understand thoroughly.

3. Growth and abundance of computing power

ACCORDINGING TO MOORE'S LAW, computing power doubles every two years. This observation has been accurate for 40 years. Nowadays, people can use cheap computing power in the cloud to calculate complex big data sets for a very small cost.

4. Miniaturization

TECHNOLOGICAL PRODUCTS and devices are smaller and smaller. The trend can be seen in the development of mobile phones, which became very small until smartphones made

them bigger again. Devices are still getting thinner and becoming more flexible.

5. Sensors

THE DEVELOPMENT OF SENSORS that can connect the physical world to the Internet is a crucial part of the current revolution of the Internet. Sensors can be used to measure everything from movement to particles in the air and more, at an extremely low cost. Sensors can tell us the shape, size, and temperature of any given thing near them. This means that firms whose business model benefits from new information can disrupt whole industries. For example, with the right information, a moving firm could fit multiple loads in one truck and optimize routes so that everything can be done in half the time.

6. Energy self-reliance

ENERGY HARVESTING has become an efficient way to replace batteries and wires in portable low-power devices. This is the amazing part of technological development: things will no longer need an external energy source anymore. Things will harvest their energy from their environment, such as from heat, light, movement, and radio waves. This makes it possible to avoid previous path dependencies, to place technology in places where it has not been before, and to construct technology networks that don't increase the burden on existing systems.

The development of energy-harvesting devices and sensors will change radically the current economic system and has huge potential to tackle climate change and other environmental problems. Meanwhile, it is critical to the development of the sensor revolution: without energy harvesting, the sensor revolution cannot happen at all.

7. Stick-it-on devices

STICK-IT-ON DEVICES are energy harvesters, easily attached to "old-world" objects, that can change their appearance and sense and communicate with their environment. Stick-it-on devices, together with energy harvesting and the development of cheap sensors, enables the development of the Internet of Things.

With stick-it-on devices, digital technology will be immersed in the environment so that everything built or manufactured will be digital by default. This means essentially digital buildings and digital cars, bikes, trains, and so forth.

8. Printable electronics

PRINTABLE ELECTRONICS means that one can print things such as solar cells, processors, even touch screens, and so forth. Printed electronics will enable totally new concepts and product platforms. They will change the approach to complex interconnection and system integration. It will make it possible for pure computing power can be painted on the walls, printed, used, and painted again.
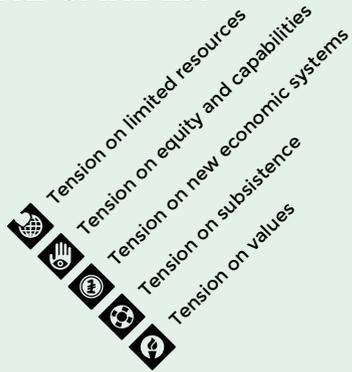
9. Digital surroundings

AS AN EMBODIMENT of digital services, the surroundings will provide information, connections, tools, and guidance for the user as well as adjustments for living conditions (automation). The surroundings will collect data that is processed and bred for various types of digital information that can then be used by other services. Digital surroundings will enable the growth of users' personal digital information property, increasing the efficiency of daily tasks via smarter services. This constantly growing personal or joint information property is one of the key components of future societies and businesses. Instead of growing wood or vegetables, we will be growing, breeding, processing, and using information.

2015   **2016**

TIMELINE OF THE GARDEN

Tension on limited resources

Tension on equity and capabilities

Tension on new economic systems

Tension on subsistence

Tension on values

✴ Technological innovation

TIMELINE OF THE STREETS

Tension on limited resources

Tension on equity and capabilities

Tension on new economic systems

Tension on subsistence

Tension on values

✴ Technological innovation

2015   **2016**

CHAPTER III

THE SCENARIOS: THIS IS HOW LIFE WILL BE IN THE GARDEN AND IN THE STREETS

THE GARDEN VS. THE STREETS

THE GARDEN AND THE STREETS SCENARIOS depict a world where income equality is on the rise and technologies are developing fast and becoming more and more abundant while many natural resources are becoming more scarce. Under these drivers, both scenarios show features that are "better but different." However, they are not utopian. The good solutions presented in both scenarios come with a cost.

THE GARDEN

THE GARDEN SCENARIO emphasizes shared value in business. Companies subvented welfare services. The society is very effective but does not disrupt the life of a normal person. People are happy and proud about their rights to data and speech. As-a-service models provide everyone with a relatively good and improving living standards without burdening the planetary boundaries. Trust between companies and society is strong. There are new ways of solving old issues in care and well-being. Education and healthcare are mostly taken care of by multinational corporations. In Finland, the Facebook classroom is a fast and effective way of learning from the best minds of the world. People aim for good, comfortable lives. For many, the best moments in life are those spent in a nicely treated home garden after a hard workday, with a good audiobook and a glass of Amazon wine.

THE STREETS

THE STREETS SCENARIO emphasizes emergent value networks that emerge to fix specific problems. Companies are small, and business isn't always booming. Often, a societal problem is solved with a challenge prize, experiments, and innovative procurement. People trust the government. They almost have to because of the very liquid job markets. There is universal access to technology, and society is maintained via efficient education and open commons-based data and technologies. People are self-organized in task-based groups that control the global supply of data and standards. These standards enable the very efficient production of customized products. They also take care of the environmental sustainability and interoperability of various tools, gadgets, and services. Further, the ever-present collaborative consumption and sharing economy offers multiple marketplaces at the same time.

Timeline of the Garden

The "startup culture" spreads to all companies.

First experiments in the nanoproduction of energy.

IoT system architecture development: the Big 5 realize that ecosystems are key in winning the platform competition. They start great competition to develop business ecosystems toward important heavy data industries.

The Flow Garden Festival becomes the top urban festival in the Nordic countries and implements an ambient social location application that shows where users' friends are at the festival.

Rise of the neo-liberal objection to regulation.

Facebook Classroom is launched.

Timeline of the Streets

People spend more and more money on privacy.

Amazon launches three different as-a-service models.

New privacy startups are established and offer services such as "hide me," "data laundry," and "privacy agents."

FUTURE SCENARIO 1: THE GARDEN, 2015–2040

IN THE NORDIC COUNTRIES, the role of state-organized public services have diminished because of insufficient funding. Meanwhile, the structures of local decision-making and collaboration have taken several steps forward. New technologies and participation tools have helped people to solve local challenges together. **Neighbourhoods, religious groups, and hobby groups are a more significant part of safety nets for people in 2035 than in 2015.** They provide peer-to-peer services in health, care, and education, form platforms for sharing economy solutions, and even offer mutual insurance systems. This development has been accelerated by expanding the gathering and use of data.

Data is owned by individuals and organizations. Comprehensive models have been created to administer the sharing of data. Still, there are severe disparities in how people are able and encouraged to use their MyData, but the state has been efficient in creating new enabling regulation to support digital innovation. Globally dominant companies provide comprehensive value systems to other companies and organizations both locally and globally. These dominant companies seek to become monopolies by creating consumer platforms and create value networks to support their positions by connecting other actors to create, e.g., services on top of their digital platforms. The **Big 5 platform providers account for about 80% of new innovations and revenue in digitally connected markets in developed countries.** Traditional industries are converging into these platforms, although the most rapid transition was witnessed in the 2020s when

hordes of existing companies went bankrupt because of the rapid diffusion of new and dominant business models. Nowadays, most industries operate through various as-a-service business models that secure smooth and easy-to-use operations.

The biggest efficiency gains have been achieved through data- and sensor-driven improvements in industrial systems. Smart systems have resulted in major leapfrogging in manufacturing, logistics, and infrastructure maintenance. Smart control of industrial symbioses has lead to an efficient circular economy. **Hyperconnectivity includes not only people or things but nature as well. Forest, mines, and rivers, among other things, are part of logistics systems.** This allows unforeseen efficiency gains by allowing the optimization of nearly everything. Platform providers have incentives to optimise the use of natural resources. The Big 5 platform providers own most of this new infrastructure, and they compete for public

tenders to get new partnerships. These partnerships are beneficial for the government, as they provide new outlets for organizing services for citizens.

Nation states are focusing on creating secure, efficient global markets and creating a good investing environment for private investors and business angels, but they don't intervene much in industrial policies. This has led to advanced and diversified forms of risk capital for companies. **Big companies aim to grow resilient ecosystems by providing long-term corporate venture funding and opportunities for experimentation in their ecosystem.** Still, they want to maintain strong control over the market. In everyday life, the need for large living spaces and travel have taken a step back because of the advancement of augmented reality solutions. Many traditional industries have increased productivity by utilizing augmentation technologies provided by the Big 5 companies.

FUTURE KEY EVENTS IN THE GARDEN

2020: The dominance of platform models changes almost all industries, from health to education.

2022: Deal in the Nordic countries: companies are allowed to dominate on their platforms if they provide absolutely all power in regard to individuals' data back to their users.

2025: Ownership is out of fashion. Almost all needs are filled with as-a-service business models and rents.

2030: Data transparency inside corporate platforms provides a superb customer experience with superfast logistics and anticipatory need-filling.

2035: Almost all business is linked to multinationals. Smaller companies have to pick a side.

Timeline of the Garden

The Finnish government from 2015-2019 proved unexpectedly successful in creating welfare while transferring political power to the local level. This led the other Nordic countries to follow suit.

IoT system architecture development: Google and other big actors enter the energy infrastructure business; Google announces a joint venture with British Petroleum.

Civil skills teaching has become an important part of the curriculum in most schools.

The unemployment rate among highly educated people is 20%.

The first iterations in human-computer-human combinations are launched.

Timeline of the Streets

Businesses sell things to people. Connected things make life easier; everyone wants to purchase a new car, table, or even walls.

The first connected devices boom. Large companies sell products such as cars that seem to become outdated in a year or two.

A basic income is introduced in three EU countries after experiments demonstrated positive outcomes.

Privacy bills become more and more expensive.

Corporations sell devices as services and use the data to support their advertising and insurance business models.

The introduction of the basic income creates a new breed of lifestyle artists.

2020

THE DRIVERS OF CHANGE IN THE GARDEN

IN THE GARDEN SCENARIO, the four core aspects of the future in the Nordic countries are the emergence of a post-voting society, severe platform wars, a new social treaty, and the development of hyper logistic systems.

Post-voting society

THE POST-VOTING SOCIETY is a driver that emerges through behavior and actions of individuals and groups. During the development of the scenario, the five biggest corporations control the data streams. They provide the data for public use to maintain their legitimacy. Cities, municipalities, and governments start actively using the data to analyze where and how to build core infrastructural components such as houses and streets. **Because people are well aware of how society uses the open company data, they can affect societal decisions through their behavior.** Behind this development is a relatively rapid decline of the representative democracy. When less than 45% of the population participated in the municipal elections in 2016, the Finnish government decided to concentrate on values in general elections and use more and more behavior-based data in everyday decision-making. Further, encouraged by social experiments supported by the government, the political parties started to move more

strongly toward politics based on data.

This development has led to a decrease in the purpose of the state. Using a climate deal as a platform, global regulators set loose global regulations to guide multinational companies. Most business is run by transnational corporations. **By 2035, people get their basic needs fulfilled more in their respective communities than by the government.** Corporations aim to keep their employees healthy. Thus, preventive care and subjective wellbeing are heavily supported by the companies. In their respective businesses, corporations focus more and more on creating shared value. This is also a result of challenges in their legitimacy in a world where not everyone is employed and able to reap the fruits of the success of the corporations.

Platform wars

AFTER SEVERE ACCUMULATION of the monopolizing and converging markets caused by the next steps in digitalization, industries turned organically to monopolies. What was in 2015 referred to as the platform economy became by 2035 a unifying force that resegmented most physical industries under the control of single corporations. The Ubers and Googles of food, housing, and clothing network aggressively with the local compa-

nies and communities that own the platform resources. **In the first years of the Garden scenario, the Big 5 corporations, Facebook, Amazon, Google, Microsoft, and Apple, broadened their markets gradually. Their aim is total control over their ecosystems.**

Another development supports the growth of the corporations: during the 2020s, the bets in the investment market were huge. Investors and funds had monstrous sums of money in their portfolios, but because of the stagnating global economies, no other sector in the risky startup market brought any significant profit. **With the help of the large investments, some startups grew through bloody competition to become corporations, but most were bought, chopped up, killed, or conquered by the existing corporations.**

The original corporations aimed to control consumers by making products that were as intertwined with the lives of individuals as possible. They built smart cars and smart homes that made people's lives easier. Soon, however, other strategies emerged. Large manufacturing companies aimed to control municipalities and cities. **And the biggest corporations of the 2000s, such as Nestle and Unilever, aimed to control whole nations, selling them total smart mobility or food systems.** The alternative strategies were not enough to overcome control over individuals, and these companies declined. Finally, by 2035, they were bought out of the market by the Big 5.

The business model of all the Big 5 corporations is a partnership model. These large companies control their ecosystem and have access to their users via local partners, which are smaller companies. Because of this model, their margins have dropped from the golden years of the 2010s, but through their immense volumes, their profits are still inconceivable. Three of these companies are proactive in solving wicked global problems, as it is clear to them that these problems are a major business disruptor. By 2035, the fourth one came on board and the fifth one was practically destroyed and devoured by the others. The platform wars between these companies are bloody. They operate in a zero sum environment where the relevant asset is the money used by consumers on their platforms. Thus, all of these companies represent their own total value system, which includes despising the other corporations and all they stand for.

New social treaty

MANY PEOPLE found it difficult to accept the dominance of the Big 5 corporations. By 2030, the companies had to choose between thousands of international protests, boycotts, and hate and constructing a "new social treaty" to give people enough rights and freedom. Naturally, the corporations knew the situation with their superior data and acted proactively to establish such rights. In many countries, these global rights granted by cor-

porations far superseded the rights provided by the national governments, including significant rights to personal data and privacy.

After the change, most people were very satisfied with their lives, supported by these corporate welfare promises. The U.N. supported the global deals that bound the corporations to give up their autonomy one by one. In return, the corporations gained a substantial increase in legitimacy and a capacity almost comparable to a global tax on their services.

In 2035, the CEOs of the Big 5 selected because of their superior skills to negotiate with national governments and supranational entities. They are considered similar to churches as social actors. Their value network, linking the global level to the local level brings value to everyone involved.

Their incentive to increase value is through optimization, made possible by their transparency. In essence, the social treaty enables a good life without placing a heavy burden on the planet but includes putting a significant part of personal autonomy under the control of these corporations. Each of us knows all the time what pieces of information we are giving up as well as what we get in return. Similar MyData mechanisms are at work not only with individuals but also with smaller companies, institutions, and organizations.

Interesting developments follow. **Algorithms become a part of the living environment.** Freedom of choice is more about having the freedom to choose a destination but not the means to get there because the

Timeline of the Garden

⚙ Alibaba and Amazon set joint standards for sensor APIs and engage in a research program.

⚙ The Hanging Garden Festival starts using energy capture screens at a festival bar that shows where the most social activity in the festival is.

🌐 All the relevant companies have a plausible strategy to tackle climate change.

⚙ Microsoft starts delivering goods to the different neighbourhoods based on algorithms. They know what people buy in different areas.

Timeline of the Streets

◈ Due to the global success of software companies operating in a team-based form, holocracy spreads across industries and some 30% of Finnish companies already operate partly in a holocratic fashion. This increases the competitiveness of medium-sized companies relative to extremely scalable startups and capital-intensive large corporations.

🌐 In a populist move, European countries decide that only climate refugees will be taken in (the Climate Refugee Act), under pressure from collapsing states in Northern Africa and the Middle East. Therefore, most social issues start being framed as climate problems and the link between desertification and social unrest becomes evident.

⚙ Big bands start using sensors that show the collective pulse of a gig. Bands can compete based on the pulse number.

⚙ Energy-harvesting windows are launched.

corporation promising the mobility service maximizes its effectiveness in delivering the service. People buy goals and pay for promises. **People's harmony, equality, and wellbeing increases. A typical life is a comfortable, happy experience.**

Hyperlogistics

BY 2035, the Big 5 corporations, controlling all flows of important material and virtual goods, are able to optimize global logistics in a completely new ways with big data and cheap sensors. This brings momentous benefits and significant efficiency.

In a testbed project in 2019, the national logistic systems were superconnected in the Nordic countries. This involved tagging all the goods pushed to the system with a information chip that contains data on the size, structure, and shape of the item. The successful pilot spawned further tests and worldwide interest. **By 2025, the first logistic companies stopped using the metric system because it was no longer needed.**

In 2030, technology originally developed in a research project under the Naked Approach was used to tag all the trees in Southern Finland. After this, the Finnish bioeconomy became extremely effective. Every decision was optimal. By the end of the decade, logistics systems were involved in everything tangible, and even nature was a part of the logistic chains.

2035: PEKKA, AN ORDINARY CITIZEN OF THE GARDEN

63-YEAR-OLD PEKKA lives in Gothenburg, Sweden. His life is satisfying, as he is capable of finding both friends and purposeful work throughout his life. Educated as an accountant, he used to work in the financial administration center at the Mölnlycke headquarters. He moved to Göteborg in 1999 after Mölnlycke and the Finnish Kolmi-Set merged. Nowadays, he has several different customers around the world, as he has important accounting skills in increasing the efficiency of industrial production processes for consumer goods. During his career, he has worked around the world in different levels of corporations as a controller and gradually diversified his core competence from financial flows to include material processes.

He has gained and provided substantial support to and from his fellow ethnic Finns in Sweden. He has divorced but still escapes the usual threads of lonely middle-aged men by engaging with a peer-to-peer group in his neighborhood. He has a small apartment that serves well all of his needs well, as augmented structures and services can expand the space beyond the concrete walls and ceiling. In his apartment, it's easy to create an atmosphere suitable for business negotiations and collaborate efficiently with his global yet fast-changing team.

Pekka's daughter is married with two children and lives in Plymouth, England. They are in touch almost daily, and Pekka has a chance to play with his grandchildren through the Shadow on the Wall application, which gives an experience of being present almost without any sense of the distance that separates them. As the grandchildren get older, Pekka can even look after them through the application when their parents go out.

Many people have liberated themselves from work. All one needs is a little capital and a car, boat, or extra room in one's house to earn income without working. Pekka does not have this, but he does fine with his salary for now. What worries Pekka is how he will manage as he ages. There are plenty of pension sources because he has been working for so many contractors. Managing them and making decisions concerning his personal financial issues and health seem to have become challenging for many old people.

Pekka also is afraid of how well integrated into his neighborhood community he will be when he gets old, how his contributions will be remembered, and whether he will get something in return if and when his income and capabilities to help others diminish. In general, however, he trusts that companies will take care of him and provide him with a comfortable level and quality of life for a moderate cost. Pekka and his peers perceive a comfortable life as a human right. It is, to them, a decent goal in life. The pleasures they seek are not so much Roman bacchanals but instead closer akin to Instagram moments: good wine at sunset, a smile after a comfortable cab ride, the protective feeling of warm wool socks in the morning breeze. The only issue is that these pleasures are offered in a very precise format. The few large companies providing the experiences emphasize price over personalization. Because of this, Pekka no longer orders wine with an augmented sunset. Although he knows that it is generated when ordered and thus unique, it still feels that he has seen it a hundred times already.

Pekka remembers the provocative advertisement from Microsoft in the 2020s: "Only old people hate technology. Don't be old, buy MS Gold." Still, he sometimes removes the Google soundrings from his ears and enjoys natural sounds without any ambient noise. This he does only when he is in relative privacy, although even the automated bug request emails from Google are embarrassing. Luckily, no one has noticed the bug reports on the office table yet. He will have to think of a good white lie before someone asks about it because, if he is not using the soundrings when asked the question, it would be difficult to pull a good lie from the cloud in time.

Timeline of the Garden

The right to MyData is recognized for all juridic persons and institutions.

People start to sell their rights to MyData to big companies.

SAP develops into a data management system for resource data collected by sensors.

Construction companies put moisture sensors in the concrete of old buildings. Sensors send once a month a data point on the moisture level of the concrete to the companies, which prevent moisture damage.

Google launches the second-generation "hide me" service, which allows people total anonymity on the Web.

IBM starts to mass commercialize augmented reality into building stock. It launches a new space concept.

Timeline of the Streets

The Finnish government creates legislation related to augmented reality, banning uncontrolled advertising.

Ikea launches "Sticka på," sensors that can connect any object to the Internet for 0.50 €.

Most sensor technologies are introduced by the biggest corporations in the world. They even give sensor nodes to people for free to support their own business models and protect them from the competition.

The first city launches a public database that contains information about buildings, electricity, heating systems, and so on. It gives builders the opportunity to propose detailed construction jobs and to undertake several similar tasks in neighboring areas at the same time.

HOW IS THE NAKED APPROACH TECHNOLOGY USED AND EXPERIENCED IN THE GARDEN?

MOST OF THE TECHNOLOGIES used in the Garden scenario are hidden from the eyes of the common man. Energy-harvesting sensor technology is still everywhere, from garbage trucks to postal packages and from forks to streetlights. The guiding design principle for these technologies is to maximize usefulness without burdening the user. **People know that they are surrounded by technology, but because it is hidden and omnipresent, it is considered natural.** They also know that they can flush the data to completely destroy all pieces of information collected from their daily lives.

The development of the technology as a hidden layer started when several large companies began using these technologies, which were at the time cheap but not ridiculously cheap, in monitoring their internal processes. Amazon, for example, began attaching location chips and microphones to packages to investigate how people actually opened their packages and where. The information revealed new insights on how people behave and led to an even greater competitive advantage.

2035: KIRA, A TYPICAL COMPANY OF THE GARDEN

KIRA IS A DANISH CONSTRUCTION COMPANY. It provides maintenance and updating services for the building and real estate sector. It operates in the Google ecosystem, as it is an IoT franchise partner with Google. This means that it owns sensors and nodes in its customers' premises. The data is owned by Kira, but customers have the licensed right to use the data. Kira's competitive advantage comes from making its customer data to interact with other data in the Google ecosystem. Especially important is the benchmarking data that reveals the most efficient ways to connect with other nodes in the value network. Kira's business model is based on its performance. It promises to keep the operational costs of the always 5% lower than the average. Their share of revenue is one-third of 5%.

In the beginning, Google provided seven-year financing that enabled the the company to experiment early but still maintain a separate R&D team to develop sensors to fit the special business areas of Kira. Google has a policy to share innovations within the ecosystem of its franchise partners. Nowadays, Kira has a small number of employees, but they benefit from innovations made by other companies in Google's ecosystem and hire previous employees for short-term contracts. Pekka sometimes works for Kira, as he often attends trainings offered by Google and contractor meetings at Kira.

THE BATTLE BETWEEN A GOOD LIFE AND THE PLANETARY BOUNDARIES

ONE OF THE MAIN APPLICATIONS FIELDS of hyperconnectivity technologies has turned out to be energy technology. Smart grids of different scales, ranging from continent-wide unified electricity systems to neighborhood/village-level energy networks, have paved the way for quick transformation to renewable energy and battery technologies. **The biggest ICT companies have entered the energy market and invested in energy infrastructure in all continents.**

Meanwhile, the price of solar energy has continued to sink because of diversified forms and scales of production technologies: photovoltaic energy is being harvested in all possible structures and used for the harvesting machines themselves, stored to a battery, or distributed to a grid. These advanced energy systems have had the biggest economic impact on developing economies, where the constant availability of electricity combined with access to the Internet have meant stronger integration into global markets, diversified sources of income, and opened access to modern forms of education and health care.

Super-effective logistics systems are in place. They are based on large streams of items, where each item knows where it is going, and drone-based last-mile delivery. Goods are delivered based on the services sold, so it is always easy to anticipate the market demand.

Industrial processes and the maintenance of infrastructure technologies have enabled significant cost reductions because of increased energy and material efficiency. Integrated data systems have pushed forward circular economy ecosystems. The construction and real estate businesses have changed remarkably and shifted toward performance-based business models.

Timeline of the Garden

Deal in the Nordic countries: companies are allowed to dominate on their platforms if they provide absolutely all the power in regard to individuals' data back to their users.

New types of partnership structures are created to solve wicked problems that emerge within society.

The first businesses disengage from the metric system to maximize the utilization of smart measurement processes.

Timeline of the Streets

Electronics companies experience mineral shocks as the demand for energy increases with the increase of renewables and the electrification of transportation and the Internet of Things.

Facebook and Google run out of steam with advertising-based models and start charging people for their health-related data. Also, sharing companies such as Airbnb and Uber start charging for good reviews. This outrages people, who migrate from the services. The whole economy reaches a stagnation that lasts six years.

Big political movements emerge around data globally. Talk about the redistribution of data and a new deal on data emerge. Experiments with open data and MyData are up. Regardless of that, large corporations consider data their asset and keep selling it back to consumers; some are willing to pay and some are not.

Europe reaches a climate change deal that is standards (eco-design) driven. In other words, the continent starts pushing innovation heavily through the standardization of most material-intense fields of production to enable closed loops in production and consumption.

FUTURE SCENARIO 2: THE STREETS, 2015–2040

IN THE STREETS SCENARIO, the Nordic countries are driven by effectiveness. Effectiveness is not just industrial but mostly occurs via integrating all data into one and providing APIs to anyone willing to use them. All data is integrated into a massive cloud, so unforeseen analysis and prediction capabilities are available. APIs are offered for anonymized information openly for anyone.

Business is evolving around adjusting appliances and constantly refitting new types of sensors and robotic features to individuals' homes and surroundings. **Our hunger for new features in our homes, vehicles, clothes, food, and so forth is never-ending. Creativity blossoms in the new cybernetic age.** Taste, tactility, and other sensual experiences are driven to the maximum as people's need for new designs drives the economy. Designs are implemented by teams and SMEs that each has a different way of retrofitting new types of appliances that enhance our experiences and help us impress ourselves. These modern-day craftsman teams travel around the world, always collaborating with the user in creating fabulous sensual experiences and seamless interaction with others.

The SME's are a part of a global holocratically governing body that has largely replaced global corporations. The Global Standards Forum decides on standards that all the teams work under. Standard work is very innovative, and different types of standards are tested locally all the time to drive maximum technology development. As there is plenty of data available, judging what the

best standard is is pretty easy. It is always about what works best.

The shift to shared standards has created a new type of global marketplace for quick applications. The human desire for self-expression and its central role in the culture has also pushed down company size, and tastes are so refined that everything in the consumer is are more or less significant. Those who cannot afford specialized teams are left to their own devices. Nevertheless, **basically anyone can learn basic tricks of the trade since all data is open and everything on the platform level is standardized.** In principle, anyone can create with the sensors and automatization, but most people buy new features from small and medium-sized enterprises (SMEs). Team-based, fluid companies provide great products for those who can not make them themselves.

The state has a rather limited yet an extremely strong position. **The welfare state has a new role, performing most of its functions via the redistribution and reorgani-zation of data. In other words, data has become the main policy instrument.** The state has a monopoly on data integration to ensure both extreme material effectiveness and the formulation. The data integration monopoly is the main way of regulating against corporate monopolies in service provision. Privacy has therefore does not have the same meaning it had some dozens of years ago. The Nordic states guide it.

People express themselves via the ongoing redesign of their environments with very particular tastes over sensoric sensations and nuances. In terms of production, two layers that are extremes work together. Extreme technological standardization, decided upon as a group, opens wide opportunities for customization. All hardware products are created in the same way that Linux distros or other open-source software is written today: by editing, reformulating, and combining existing standardized technology and product branches.

2020: Based on basic income experiments, a broad right of subsistence, no questions asked, is adopted in Finland.

2025: In business, the dominance of flexible role-based holocratic organizations leads to wide adoption of this organization model.

2030: Governments are granted a data monopoly because of problems with big data companies.

2032: The union of small companies and freelancers in holocratic organizations operating in smart grid markets establish common liquid standard procedures using github. Other sectors follow.

2035: Access to all types of technology is a universal right in the Nordic countries. This access is granted to support grassroots entrepreneurship and activism.

Timeline of the Garden

People start moving to neighborhoods where others use the same types of services and platforms.

More people are entrepreneurs and self-employed than employees.

IoT system architecture development: platform providers initiate new business models to engage new stakeholders via franchising.

The as-a-service model is incorporated into many consumer goods industries. H&M starts a dress clothes service with a monthly fee. Soon after, audio-as-a service and cooking as-a-service models emerge.

Timeline of the Streets

European countries actively work to invent new value creation approaches. European collaboration is revived after the realization that, without it, Europe will become a backyard for the larger markets. Recent wounds from the Euro crisis are still visible.

3D morphing becomes a hype topic. The point is to intelligently combine used products and items to create new products. This is more and more possible because things know what they are like and can broadcast that information to, e.g., recycling bins.

The failure of the data-based business logic becomes evident when automation reduces the purchasing power of the common man. As it happens, people have to scale down their monthly costs to fit the basic income. This leads many people to cancel their subscriptions for their cars, phones, and smart beds. An IPCC climate deal makes it possible for activist groups to demand data related to energy usage and consumption. This act is used widely to create services and hacks that allow for more energy-efficient lifestyles.

People would like to buy, but there is no money. The economy is in severe stagnation.

CORE DRIVERS IN THE STREETS

IN THE STREETS SCENARIO, the four core drivers of the future are data socialism, where governments control the data, hakuna matata economics that reduces the importance of the economic machine, involving everyone with technological universalism, and support for fast experiments through liquid standards.

Liquid standards

LIQUID STANDARDS are the machine that renders possible both data socialism and the hakuna matata economy. It was made possible by two simultaneous developments in how people work and heroic efforts in the maker movement.

First, in the maker movement, the process involved a data gathering operation that pales only compared to Wikipedia in human history. In a tad bit under ten years, the makers collected construction information and requirements for almost all the tools and things known to man at Encyclogear.com. This dataset proved invaluable for mankind, because, with it, it was possible to easily hyper-customize interconnected, working solutions for almost any need and desire.

Second and more importantly, **there was a radical shift in how people organize for work, starting already before 2020.** Major companies had to restructure their organizations around holocratic experiments because

its form proved superior to older forms of organizing. The holocratic form of organization is a sociotechnical system in which decision-making is distributed to self-organizing teams. When larger and larger organizations moved to this form of organizational hierarchy, and most did so successfully, it was ever more difficult for other companies to attract talent and motivated workers. Thus, the wave of reorganization stormed through European, East Asian, and American companies. However, there was a caveat. By 2030, when the holocratic organizations controlled most of the decision-making in all the important companies and most Europeans were really fed up with the misuse of their personal data, a revolution swept through the ranks of the holocram that took control of the data from the companies and gave it to the commons. The companies themselves were weak at the time because of a severe six-year stagnation of the economy.

The stagnation occurred because of the ever-diminishing marginal costs of production. Companies benefitted from this reduction in production costs at first and were able to sensorize the world in its entirety to an interesting degree. But then the decline in purchasing power hit them hard. **During the turmoil of the 2020s, many large companies fragmented into smaller entities, held together only by the strength of the ties in the holocratic groups.** The holocratic groups, by

2030 often operating without organizations but in close relationship with their respective national governments, evolved into bodies that were responsible for the standardization made on top of the Encyclogear data. These democratic interest groups took a serious tone on sustainable standards. The rules were shifted but just a bit. For example, any SME could build a computer of unimaginable variety, but any computer ever produced after 2032 had to be totally decomposable. European governments were responsible for monitoring the regulation.

Data socialism

WHAT IF ALL THE DATA were governed by the state? The Streets scenario is built partly around investigating this idea and its implications.

In the Streets scenario, the most important monopoly of the state has changed. It is now mostly related to data. From the perspective of governments, the shift started when there was a serious discussion about public R&D funding and the role of government in the innovation system. The realization was that the business environment was more and more difficult to anticipate, but at the same time, there was a need for long-term investments. **It was decided that the role of the government is to identify leverages, such as competences and data, and enable their lean operation.** Starting with health care, the public sector started to combine different data sources and platforms as a trusted operand, taking special care with respect to data security and privacy. This was enhanced after several privacy shocks caused by larger companies trying to maximize their profits in a declining marginal cost society. This occurred because people wanted a change in the natural monopolies of the digitalization era. The new constraints and possibilities are governed together, and for companies, the rules are clear.

Further, people's relationship to material things has changed. Things are the most important forms of self-expression. **By 2035, a sort of solarpunk movement turned mainstream. People customize all their things with 3D morphing and 3D printing, altering them to fit currently popular design.** All applications are independent. There are many apps and many different types of objects. All of them are easy and cheap to customize to meet everyone's needs. People are also able to do this themselves. A technological breakthrough, statistics-based natural language programming, makes it feasible for even a child to create apps and useful hardware items. Taking all this into account, **freedom of choice hasn't ever been so great for a typical citizen. The people decide together what data should be open to everyone and what shall remain in the government vaults for the time being.** There are many levels of data access, all of which are decided upon by the very active holocratic groups.

The standardization of data is truly liquid. This is possible also because of a radical technological development in data trackability. **In 2035, it is possible to know where every piece of data has come from.** Thus, it is even possible, although very rare, to draw back data from open use.

Data socialism makes truly ubiquitous solutions possible because everybody can create solutions. Open, government-controlled data is also the key to more effective use of resources. **The most valuable part of the government-controlled data is that all the data in the world is finally in the same place.** The hyperconnected, live dataset allows everyone to work on noticing connections and correlations that otherwise would remain unnoticed.

Open data also opened new opportunities. It enabled a flourishing small business sector in the software and hardware industries that, in effect, ended the economic stagnation of the 2020s. It also made it easier for everyone to optimize life, to make the right things instead of just doing things right.

Timeline of the Garden

In Europe, cities start to create their own standards for data. In the U.S., corporations start to create standards for data.

Facebook health groups and classrooms form competing structures and start to support decision-making.

TADT (the Trans Atlantic Data Rights Treaty) is established between the U.S. and Europe. Minimum rights and requirements are set for companies, cities, nations, and individuals to promote business and trade.

Timeline of the Streets

The global recession renders the business model of corporations useless. Small companies start to hack existing systems to use data more efficiently.

Global market stagnation caused by low purchasing power (driven by automation) puts even more people out of work. Many countries turn to a basic income to have at least minimally functional markets.

Global stagnation makes business more difficult for large companies. New business models fail. The data-enhanced sharing economy booms.

Driving a car is considered too dangerous and is therefore forbidden by law. Cars know how to drive much better than human beings.

People feel strong affection for their household assistant robots but also replace them with newer ones when they hit the corner store if they have the funds to do so.

Hakuna matata economics

DURING THE 20 YEARS prior to 2035, industry after industry collapse because of diminishing marginal costs. Especially in the building and energy sectors, which were huge industries in 2016, the change was radical. There were more and more energy-independent houses and collaborative construction projects. Traditional markets were reformulated to provide significant value added via sustainable solutions and design-driven sales, but the proportion they took from the total economic cake was much smaller.

At the same time, the SME sector grew. Open data provided more and more by the government for free created a level playing field between the big players and smaller companies. This was purposeful: **governments and most holocratic groups allied to prevent monopolization. Thus, most companies were in niche markets.** This was further supported by the trend in the European nations that people wanted highly customized solutions to their individual needs and another trend that rendered the customization of production much cheaper than it used to be. Economies of scale don't pay much of a role in production, although there are still some benefits in logistics.

Market creation works by incentivizing solutions through public competitions and impact funds. The companies that participate in these types of competitions or funding rounds generally don't even want to last for-ever: they exist to solve a problem.

The public sector is somewhat smaller but still in operation. It is made possible by aggressive preventive care and relatively high taxation of land and buildings. Other than the taxation of these resources, government has a limited role in physical things: its regulatory power is more in effect in the virtual world. **Even though there is a functional welfare state, the most important legitimacy of the government comes from trust in data instead of the redistribution of physical resources.**

The declining markets and public sector have been ousted by a predictive ad hoc economy. Sharing services, collaborative commons, and alternative markets flourish. Productivity has increased substantially because of decreasing marginal costs, but there isn't work for everyone all the time. The multi-sided customization economy provides many people some income, but the investment levels of the early 2000s have never returned. Alternative sharing and collaboration systems take care of many things that the monetary economy was responsible for only 20 years earlier, and they do so in a more effective way.

The hakuna matata economy solves wicked problems by solving problems with the emergent benefits of different communities and groups. The unintended positive consequences of the holocratic dominance and lack of investment funds are more sustain-

able, effective societies where everyone can participate.

Technological universalism

DIGITALIZATION and technological development have concretized the threat of the total disappearance of the middle class in Europe. By the mid-2010s, incomes are accumulating among a select few and societies are becoming more and more polarized. The Nordic reaction to this threat was to establish a basic income, not because it was a perfect solution but because there were simply no other ideas to try out. The major political quarrel was about what type of basic income would become the norm. A basic income was required because of production leap caused by digitalization and the automation-driven augmentation of jobs. Society was turning into a hyperconnected society with the connection of all physical assets and operations to virtual assets. In this society, it is always a human-computer combination that produces the most value. The stagnation of the 2020s was used as an excuse to increase the effectiveness of organizations, but because there is very little growth, there are always fewer jobs.

The selected basic income increased the quality of life of the poorest quadrants. The unintended outcome was that, in many markets, the previously lucrative luxury markets collapsed because most consumption dropped to the "basic" level. Class and identity are constructed via means other than showing off resources. As an outcome of these effects, the income distribution in society has become more even but is in total lower than before.

Moreover, the emerging collaborative consumption and sharing economy fulfils basic needs. **The basic income, meant for this purpose, is considered more of a way to get something nice for oneself each month.** This is largely due to the status-driven values of society: using the basic income mainly for self-expression is the norm.

Because of this, the basic income is considered a failure. It failed to support groups and communities of people, only providing support to individuals. Thus, it does not live up to its promise. At the same time, the basic income is in an emerging crisis, and holocratic organizations have begun to emerge in how people work. This reveals another cause of inequality: a technological divide. To support the struggling basic income model, the government has started to develop a model for technological welfare. The universalistic idea of enabling everyone with technological means to maximize his or her capabilities starts to gain ground, not least because the technologies themselves are very cheap and abundant. What is lacking are knowledge and the capacity to use the simplest tools. Nevertheless, the Nordic societies are very educated, so technological universalism can be built on top of the remains of the previous welfare state. The core decisions in this process are the pragmatic value choices that support the goal.

In the Streets scenario, every data-driven capability is used in society. The scenario emphasizes the Nordic model in welfare and collaborative consumption by groups.

Timeline of the Garden

◆ Small local stores and smaller supermarket chains are unable to compete with the multinational food home delivery companies. Many store register operators become unemployed.

People get real-time feedback on the consequences of their behaviour. Gentle nudges powered by the Internet of everything help them change their behaviour toward more sustainable activities. 🌐

A trade treaty is signed between Europe and North America. Forms of ownership of data are the crucial part of the treaty. ◆

Cities start to use citizens' data actively in urban planning. People become aware that they can affect urban planning through their behaviour. 👁

"Telepresence" and "presence" are synonyms for most people. ✳

Timeline of the Streets

👁 Nordic governments decide to start gathering data into a massive cloud. The Nordic Data Agency is formed and unforeseen crypting, security, and privacy measures are incorporated. The Data Agency is comparative in power to a court and actually resides with courts in the government structures as an independent part of the state. The Data Agency decides what is opened and what is closed.

Holocratic groups introduce a data standardization deal to weakened corporations. This deal leads to a situation where only the government is allowed to combine big datasets. 👁

Developing countries adopt innovation through standards to access more markets after the great stagnation and to counteract the ever-increasing pressure from growing middle-class worry over pollution and the environment. ◆

HOW IS THE NAKED APPROACH TECHNOLOGY USED AND EXPERIENCED IN THE STREETS?

THE WIDESPREAD ADOPTION of energy harvesting technology has reduced the energy burden caused by IT on the strategic energy production facilities. It's simply easier for users to attach energy-harvesting nodes that do some preprocessing of the collected data than to try to do electric wiring. Naturally, this type of widespread harvesting is not very efficient, but because the components are made from abundant materials and the manufacturing process is very efficient printing, it really does not matter.

Because, from the technical performance point of view, everyone has a right to access and use similar technological capabilities, and because there is abundant renewable energy but resources are scarce, users tend to hyper-customize their gadgets and items using recycled material. Because of the equal access to technical performance, everyone has the right to use energy-harvesting sensor technology. This means that the capabilities provided by the technological breakthroughs don't increase inequalities but actually reduce them.

2035: LIISA, AN ORDINARY CITIZEN OF THE STREETS

BY THE END OF THE DAY, a 43-year-old Liisa gets her new customized bottle implant from xSpeyside Circle. It's the seventh whiskey experience she has enjoyed this year. Liisa been part of the Circle as its live reviewer since February, and she broadcasts her feelings to 1,042 circles around Europe. Liisa's bottle implant shares her data with the government so that she will continue to get nudges to promote a healthy lifestyle.

In 2025, Liisa campaigned for the re-creation of the welfare state. The fruits of this New State movement enable Liisa to live her everyday life knowing that the state provides her with an almost instant well-being net. This allows Liisa to experiment and change her choices. By 2040, the state was taking care of all the basic needs through a strong universalist agenda. Liisa, for instance, receives a basic income to support her endeavours. The universalist agenda is funded by almost monopolistic access to and usage of data by the state. The government takes care of Liisa's life by optimizing her choices to support well-being and smart resource use. Boundaries are set and trusted through acceptance of the state's new role.

At the same time, Liisa enjoys new applications each and every day. She orders various hyper-customized solutions from small companies such as 3D printed products, interactive layers, or retrofitting that resembles how apps were purchased 20 years ago. The constant flow and circulation of material enables the hyper-design of applications, whether material or immaterial. Liisa shares designs, outcomes, and processes with her nearby circles, through which she gets constant feedback and new expressions.

Instead of accumulating any specific capabilities, Liisa tries and learns multiple capabilities depending on the circles she belongs to and her daily moods. Liisa is well aware that this is made possible by acknowledging the state's right to utilize every data source. This data-driven hyper-effectiveness is very explicit in Liisa's everyday life but has become such a default that Liisa doesn't pay any attention to it. Liisa makes her mobility choices based on what the Stop application suggests. Her movements are sometimes optimized before she has decided where she's going. Liisa's calendar is filled with all the necessary appointments years ahead, although most of the events are only assurance checks to make sure that automatic algorithms have collected enough information to provide a valid health analysis, for instance.

When a water pipe breaks near Liisa's home, Liisa and all her neighbors gather to help the construction workers. The culture of helping each other is widely accepted in cities. It provides a sense of belonging and meaning for those who are not currently employed or engaged in any large project. However, these collaborative helping sessions are sometimes demanding and time consuming for people who have a day job.

Liisa's current job is selling wooden jewelery for small dogs. There is a small subculture that is rather fanatical about these pieces of wood. This is typical: most people seek ways to express themselves via niche products. Nevertheless, the subculture is small, so demand for the products is low. Liisa is in fact looking for another job to supplement this one because her current job does not pay very well and only consumes some 15 hours a week.

She has relied partly on dynamically reduced pricing (a government subsidy) for the past three weeks after she was fired from her children's robot therapist job. It was not a big deal; this kind of thing happens to most people every few months anyway. The issue is that some people don't have the energy and capabilities to constantly find new opportunities for themselves. Even though the government invests a lot in good data about the open market opportunities and jobs that are feasible for the jobseeker and offers people new devices and training, some people are pushed out of the job market. These people perceive society with a sense of disbelief and lack of meaning. Often, they organize to lobby for political decisions or even act together in holocratic communities to stop a certain change. Tensions between the involved majority and the have-nots are on the rise.

Timeline of the Garden

Food does not rot in people's fridges, as the fridge actively monitors mold levels and makes suggestions of dishes that can be made with the ingredients at hand.

People buy fewer goods for their homes than they use through as-a-service models.

Markets grow extremely fast at the intersection of the circular economy, the bioeconomy, and the ambient Internet of everything.

Electricity markets are unified in all the continents by international treaty.

People feel a strong relationship those surrounding them. They have different ways of supporting and feeling responsibility for them. There are tools for following and comparing their own circumstances with those of their peers.

Timeline of the Streets

The IPCC imposes an optimization tax.

The government opens some datasets to everyone. Everyone is able to "view source" on smart surroundings and track the origins of MyData.

A new data deal creates business opportunities for SMEs but not so much for large companies. In particular, hardware companies thrive.

Pre-stagnation things are used to provide governments with a vast array of useful insight. This insight enables new products as well, with a special focus on hardware. Up and coming 3D morphing of connected things makes recycling smarter.

2035: PHILMAN CARRISON INC., A TYPICAL COMPANY OF THE STREETS

AFTER THE CLOSURE of the last corporation, the only one left standing from the notorious Group of Twenty, the long period of market convergence finally ended on the European continent. The era of the Makers had begun some ten years earlier, when local committees established the Reclaim the Data Act, practically socializing the largest clouds. Since then, it has been illegal to monopolize platform models for the sake of effectiveness.

Unlike the lawyers of the Group of Twenty claimed, the entrepreneurial spirit had not vanished. There was plenty of work to do in updating, renovating, calibrating, and keeping the ambient infrastructure up to date. For example, Philman Carrison Inc. is not a big company, but it is as big as companies are nowadays. Its 120 employees have one job to do, and they are proud to do it. Philman Carrison customizes and calibrates proximity sensors in dancing suits, cleaning bots, and other specialized equipment. Every morning, each of its employees gets a message describing his or her daily task and its location, including the time of the pickup vehicle. Because of automated bidding, it is rare that a Philman Carrison employee does not get a task each day. But sometimes they have to lay off an employee with a low rating. Training to increase ratings is provided by the state, which also pays for the time when the laid off employees aren't part of the bidding system.

After the task is given, each employee drives to the site and works with the sensor node. The nodes are fully owned by the users, so the workers of Philman Carrison take pride in doing a careful, effective, and dedicated job. After the sensor has been recalibrated and state officials has verified the change in the data streams, the workers drive to one of the seventy gathering houses in the city.

The gathering houses, owned by the holacratic guilds, serve two purposes: lunch and weekly standardization meetings. Most Philman Carrison workers serve on a sensor data standardization committee because of their expertise. In addition, many belong to one or two extra groups. It's the best way to meet friends face to face.

This week, the specified proximity sensor data gathering standardization group 1.44 is to decide on three suggestions made by preliminary groups. Although the meeting is routine, none of the members of the group has any illusion of how important their work is. It is up to them to create the standards and procedures that maintain the healthy business environment without the risk of putting everyone's specialized proximity data to walled gardens in this particular edge case. There no one would anonymize it for the greater use. Even though the issue is a minor one, the employees work for the whole continent.

THE BATTLE BETWEEN A GOOD LIFE
AND PLANETARY BOUNDARIES

IN THE STREETS SCENARIO, supranational regions, especially Europe, emphasize effectiveness through data and analytics. A huge effort is made to collect all data for governmental institutions, anonymize the data, analyze it, and use it to improve resource and energy use. Because of **energy constraints, the data is mostly collected by energy-harvesting sensor nodes that are typically cheap and easily attachable to any surface.** These sensor nodes are the crucial enablers of the data society.

As the typical business model of a company involves selling upgrades, renovations, or new innovations, societies do all they can outside the hardware business market to become sustainable in terms of both a good life and sustainable living. Thus, even though the consumption economics are still in place and do well in the 2030s, the material costs of consumption are remarkably lower than they used to be. There are many reasons for this:

- Effective data use by the government allows rapid, sustainable standards of usage, interoperability between different vendors, and data-driven behavior change to achieve more sustainable models of use.
- Using government data, vehicle batteries and sensor dust superconductors eliminate peak usage completely.
- Data-driven recycling allows garbage bins to broadcast useful base materials to nearby 3D printers.
- Nano-scale energy harvesting makes it possible to install a huge number of sensors without causing a further burden to the globe.

Timeline of the Garden

The top five companies can initiate regulations in their ecosystems. Social and cultural specificities start to separate and diversify.

The life cycle of all products and components can be tracked, and big companies create strict standards for resource smartness across their whole value network.

A U.S.-E.U. partnership is established to address ecosystem challenges. The top five companies gain rights to 10 test-bed regions, where they can conduct various experiments.

Corporations publish huge datasets on the "conditions of the planet," where everyone can check the resource smartness of different regions.

30 cities around Europe declare the New Urban Environment Act to acknowledge the merger of physical and virtual services and interfaces.

Timeline of the Streets

Open data and MyData approaches are seen as too vain to safeguard citizens, as corporations keep exploiting citizens' data, and poor people cannot afford to pay for their data. Therefore, a data integration law is passed in the EU. Only governments can integrate large amounts of data and all data should be accessible by governments in an anonymized form. The Nordic Data Agency takes the lead on the initiative.

All computers must be totally decomposable.

The union of small companies and freelancers in holocratic organizations operating in smart grid markets establish common liquid standard procedures using github. Other sectors follow.

COMPARING THE SCENARIOS

BOTH SCENARIOS have both favorable and questionable outcomes. Naturally, they are tools to learn about different alternatives to grasp the possibilities while avoiding negative events and changes. The following table shows how the key questions from the current tensions play out in both scenarios.

QUESTION	THE GARDEN	THE STREETS
How to increase human well-being without crossing the planetary boundaries?	• Smart grids • ICT companies in electricity markets • Solar energy • Super-effective logistics • Effective industries • Circular economy	• Interoperability and data-driven behavior change. • Eliminate peak usage completely with centralized data. • Energy harvesting in new devices.
How can we control the risks and misuse of new technologies?	Dangerous technology is not offered to people because of corporate self-regulation.	Democratic governments are given wide permissions for data monitoring and analytics. No one else has these rights.
What types of trust and common rules exist in the future?	People trust their neighbors and companies they work for.	• People trust democratic institutions. • Mutual trust is also high, partly because of trust-enhancing technologies such as the blockchain.
Will technology help to balance differences in capabilities, or will it accumulate even more abilities to those with power and resources?	• Technology accumulates abilities to those with power. • The middle class also reaps the fruits of the development, albeit slower.	Technology helps in balancing capability differences via large programs to introduce new tools and abilities to the common man.
How and with whose help and investments will novel services and business models emerge in the future?	Corporations have large R&D arms that provide new ways of disrupting the markets.	Government research programs and self-directed autonomous research groups drive innovation.
What sectors will provide the most value in the future?	• Industrial processes. • Logistics chains. • Circular economy.	• Device manufacturing. • Design and fashion. • Repairs.

Are markets converging or fragmenting?	Converging to a single smart technology marketplace.	Fragmenting. However, development is heavily directed via wide standardization efforts.
What happens to the economic system when marginal costs drop close to zero?	• Monopolized economic system. • Experience economy via augmented reality.	Constant redesign and fashion cycles.
What happens to ownership?	• Data ownership is left to people because of social treaty that enables companies to operate. • Things are owned collaboratively.	People own (a lot of) things themselves. Things are very cheap.
Does increasing automation mean liberation from work or the end of work?	• Automation means the end of work for many. • There is a large group of have-nots that don't benefit from development.	Automation means liberation from work, as technological universalism and government programs help people in maintaining their skill set and sense of purposefulness.
What happens to the middle class? How will people support themselves in the future?	• Only a few highly paid jobs remain. • The owning elite is small, employing a large middle class. • The have-nots support themselves via their social connections and family.	• Government supports job dropouts and encourages them to engage in art, science, or business without fear of failure. • A typical career path goes in and out of work life, guided by relatively random inspirations.
If machines do the work, what will people do? How can we participate in a meaningful way in society?	• The life of the middle class worker in the Garden is harmonious and peaceful, focusing on hegemonious cultural products and augmented experiences. • The have-nots form subcultures that are sometimes very distinct from the hegemony.	• People still do many jobs that machines theoretically could do because they want to. • People are more flexible than machines in creating unique products to meet unique needs.
What do we value in the future?	• Peacefulness. • Harmony. • Easy life.	• Self-expression. • Creativity. • Curiosity.
What is our relationship to reality?	• Many experiences both at work and away from it mix virtual and real elements. • Daily life is enhanced.	• We crave new things, novelty, and surprises. • Physical reality is constantly reformulated because of changes in fashion trends.
Do we experience ourselves as individuals or construct ourselves through our roles in different groups?	People value communities and are able to maintain distinct roles and privacy between them.	People are first and foremost individuals, with unique tastes and desires.

Timeline of the Garden

Data-Talvivaara is one of the Finland's biggest companies.

New job titles are commonly used: "My dream job is to be a data broker."

People change their identity often and have different privacy settings for different roles.

Nearables surround people completely.

The world's biggest sensor manufacturer, Sensei, produces a trillion self-powered sensors per year.

Building stock in Western countries stops increasing. New building stock all around the world is multipurpose, as home, work, and service provision are mixed. The construction companies of the 2000s have lost the battle to the big platform corporations that rule the housing business.

Timeline of the Streets

The first data raids at company headquarters occur, and companies are shut and their data taken because of breaches in data integration laws. Rogue data integration companies start forming.

Small businesses are doing well because of the constant need for people to fix, calibrate, repurchase, or update their connected things.

People are often laid off from the SMEs they work for when market dynamics change. They are then re-educated with a basic income and basic preventive education.

A healthy SME ecosystem exists with a "selling stuff" business model (not data, etc.).

All companies employ at most 400 people. Almost all work is done on as-needed basis.

CHAPTER IV

THE IMPLICATIONS: THIS IS WHAT THE TWO SCENARIOS ACTUALLY MEAN

THIS IS THE HYPERCONNECTED PLANET

BY COMPARING AND COMBINING the learnings from the two scenarios, it is possible to start to grasp the complex realities of the hyperconnected planet, the futures of Nordic societies, and action points to deliver the desired future.

First, we describe the initial conditions that can make hyperconnectedness the most important development of the century. Second, we present a list of seven core principles that can help different societies to guide their actions toward the desired future, a future somewhere between the worlds depicted in the Garden and in the Streets scenarios. Third, we pinpoint the future makers and request that consider several action points. These future makers are institutions that somehow have the power or abilities to affect our futures. They can choose whether we will find ourselves closer to the Streets or to the Garden during the next 25 years.

BASED ON THE SCENARIO STUDY, we are able to present some general principles on how the hyperconnected planet should evolve and why we need it.

When is hyperconnectivity a relevant topic?

- For hyperconnectivity to be the most important of the recent developments, it needs to help in solving wicked problems.
- Also, the wicked problems it helps to solve must be problems other than those caused by hyperconnectivity itself.
- If these two goals are met, hyperconnectivity is a relevant development.

How can hyperconnectivity live up to the hype?

HYPERCONNECTIVITY IS BEST REALIZED with the help of combinatory innovations. This means that there is a grave need to focus on other fields on top of the technological field, which is currently the most talked about. Thus, to develop a good hyperconnected planet, we must include a systemic dimen-

sion to understand the holistic and systemic nature of change. This means

- Focusing on the social dimension by including people and focusing on issues they feel are important,
- Focusing on the economic dimension by creating new value instead of simply reiterating old means of value creation,
- Focusing on the political dimension by using regulatory frameworks in guaranteeing fair markets and people's rights, and
- Taking into account the environmental dimension.

The future landscapes described in this publication reveal some developments and end results of the development of hyperconnectivity and its combinatory innovations. The scenarios show how these future landscapes can come about. Based on the scenarios and the learnings from them, we present seven principles for the development of a hyperconnected planet.

Timeline of the Garden

There is no business that is not somehow linked to the biggest multinational corporations. Smaller companies have chosen a big partner.

Supply chain management leads the whole industrial process: production sites, subcontractors, and logistics systems are pooled together in one information sharing system

As-a-service models form the biggest share of all companies' turnover.

The last business organization structured by industry collapses.

Timeline of the Streets

3D morphing breaks through.

DIY services are used in all types of spheres, such as a dataset to create one's own heating system.

Government-owned data is used to advocate new businesses, to nudge people to engage in healthy behavior, and, most importantly, to enable energy efficiency unseen before. The techno-rational data usage spreads to most aspects of life, to urge people to make energy-conscious choices even though they don't always even know they do it. These nudges might include leaving for work a little bit later to avoid traffic jams or cleaning clothes 15 minutes later, a decision made by the washing machine.

SEVEN PRINCIPLES FOR THE HYPERCONNECTED PLANET

1. Parity principle

FOR HYPERCONNECTEDNESS to be the most significant development or our era, it must play its part in solving the grand challenges of our times.

2. Utility principle

HYPERCONNECTEDNESS NEEDS to solve more problems than it creates.

3. Systems principle

HYPERCONNECTIVITY is best realized 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

SOCIAL DEVELOPMENTS are easiest to incorporate by including people and focusing on issues they find important. Technologies should be designed and developed by and with the people who use them.

5. Blue ocean principle

ECONOMIC DEVELOPMENTS are easiest to incorporate by focusing on new value creation instead of simply improving old means of value creation. It is important to reap benefits from the new value creation 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 creating solutions that lead us toward a more sustainable planet. The development of the hyperconnected planet should by definition save more natural resources than it consumes.

Timeline of the Garden

◆ The government doesn't have a role in fulfilling people's basic needs; communities have taken it up.

◆ Welfare comes through communities, which forces all unemployed people to be committed to certain communities.

◆ Amazon has a competitive advantage through return logistics, enabling efficient circular economy models.

◆ Anti-standardization has caused the metric system to be viewed as a relic of an unsophisticated era. Households use the metric system to a degree, but businesses trust instant meta tools.

☼ Most new surfaces harvest energy. Things of the hyperconnected society are energy autonomous.

Timeline of the Streets

◆ People often express anger or disappointment by leaving traces of data that reveal their feelings. This means, for example, jaywalking if they think there should be a zebra crossing at a particular location or even organizing large mass gatherings that draw political texts on the map via government GPS tracking.

ACTION POINTS FOR THE FUTURE-MAKERS TO CREATE THE HYPERCONNECTED PLANET

BASED ON THE SCENARIOS, some action points are given to different future-makers. The mentioned future-makers are responsible for making decisions that will eventually shape things in society. So it's not about creating the scenarios but more about making relevant decisions for long-term development. The action points are aimed either to achieve or avoid certain outcomes, to get the best out of the possibilities of hyperconnectivity, or just to address useful considerations. The future-makers are divided here into governmental gatekeepers, companies, funding agencies, the research and education sector, and a few additional categories.

Governments and municipalities

Decision-makers	• Advocate MyData • Acknowledge the possibility of multiple simultaneous forms of subsistence • Develop models for meaningful participation in society that don't require a job
Municipalities	• Understand and implement the radical benefits of innovative public procurement • Try out innovative procurement models where you pay for results, not for actions • It is possible to give loans to startups to participate in such endeavours • Emphasize education • Investigate more effective service models in sparsely populated areas • Advocate self-care • Simplify structures of social security to allow emergent benefits • Establish testbeds for physio-digital innovations, e.g., a last-mile logistics area for drones

Public sector	• Develop your own as-a-service models instead of just waiting for startups • E.g., models in smart transportation and transport as a service models
Finland 100 Years committee	Facilitate a large backcasting project to determine how R&D funding should be directed to create Mazzucato-style leverages
National and E.U.-level subventions	Enable similar public support for decentralized energy and housing projects than is provided for centralized projects
Ministry of Social Affairs and Health	Enable similar public support for decentralized energy and housing projects than is provided for centralized projects
Prime minister's office	• Found an 18F-style independent operator that seeks to radically increase public productivity via short interventions and new digital services • Copy the model of Helsinki Region Infoshare to gather nationwide open data • Found a "what works" center that aggregates findings from behavior research and maintains information about best practices

Companies

Large companies	Found a startup fund that invests in the disruption of your own market
All companies	• Establish SME clusters • Create shared API projects with very large consortiums
Companies with low value added	Consider collaboration with potentially highly valuable startups
Owners	Change the mindset and start thinking that purchasing the company's own stock is a sign that the company is not a technology company

Education sector

Researchers and startups	Investigate the potential of energy-harvesting technology in vanilla environments, e.g., in environments where there isn't currently any technology
Universities	Establish advanced study programs for social psychologists and engineers

Researchers of humanist subjects	• Investigate the possibility of privacy as a commons • Investigate language and the terms we lack to be prepared for the future • Put a special focus on quantitative methodologies in semiotics

Funding agencies

National funding agencies	• Re-evaluate the innovation policy of the last 10 years
	    • How to consider national innovation policy as a system
	    • Investigate the capabilities that have formed during the last ten years in your area
	    • Reconsider how you can use these capabilities as leverage now that development costs for hardware products are dropping.
	• Include the idea of market convergence in all programs
	    • E.g., energy + construction
	• Set up X Prize-style Tekes challenges to tackle wicked problems
	• Include a social impact rating in the funding decision process

Foundations	• Include an innovation or potential-for-scale component in funding decisions • Dedicate projects for open data and open access during the 250th anniversary of the world's first Freedom of Information Act, written by Anders Chydenius

Other

Lawyers	• Suggest groundbreaking, enabling legislation for algorithms and responsibilities • Investigate with engineers what could be the best systematic way to establish post-standardization procedures that could level the playing field
Media	• Identify role models in hyperconnected business and give airtime to interesting advocates of new social and regulatory visions • Don't forget that, initially, all regulations were put in place to enable some behaviors or actions; demand new regulations from the decision-makers

THE REFLECTIONS: THIS IS WHAT WE THINK AFTERWARDS

1. **POST-CHOICE** SOCIETY

SCENARIOS for the hyperconnected planet depict alternative routes through which the correlation between increasing human well-being and our ever-growing ecological footprint can be decoupled. Further analysis of the scenarios illustrates questions to be taken into account in current decision-making in policy and business. To conclude, we describe seven longer-term changes that seem to be taking place based on this scenario work. These huge shifts will shake the foundations of our current societies.

IN THE POST-CHOICE SOCIETY, you never choose to take a certain bus or train b rather, the quickest way from point a to point b. Nor the route that's most beautiful, the most romantic, or the one with the best fit for yourself. Also, you will never forget your keys, your wallet, or your watch (as if you would need those anyway). Many sensors measure, for instance, our lives, industrial processes, and weather conditions. However, there are many phenomena that we cannot currently measure. There's a promise that hyperconnected technologies will somehow revolutionise our solutions and provide the next big leap in productivity after industrialization and the information revolution. This increasing number of sensors and hyperconnection technologies enables more accurate and holistic measurement throughout societies. Many new areas from which we'll get data will probably emerge, but are there segments that remain in the shadows.

As the number of sensors and the amount of collected data increases, new models for data ownership and utilization are required. An example of this is MyData (organizing human-centric information by taking into account the challenges of privacy and data fragmentation by putting a person in control of her data) and the idea of having knowledge, access, and the ability to use data that relates to oneself. However, we might experience alternative paradigms such as viewing data as a common good and concentrating on access to data instead of ownership. Business as usual would lead to data ownership that accumulates with large corporations and is exchanged with consumers through service agreements and access to applications.

Further, **the word "privacy" is changing. As conditions change, we might have 20 words for the same thing in the next ten years.** Currently, privacy is best depicted through security and shocks. We as users already accept that much of our personal data is known to others, such as companies with whom we exchange it for convenience and services or states with whom we exchange it for security. We've already experienced privacy shocks, but level of privacy will be generally accepted in the coming years? To what extent are we willing to give up not just our privacy but also our decision-making?

2. POST-INEFFICIENT SOCIETY

IN THE POST-INEFFICIENT SOCIETY, no building is ever empty but in good use all the time. And a car would never run empty. New appliances and machines will harvest their own energy. One of the biggest open questions regarding the hyperconnected planet is whether emerging technologies will increase overall efficiency in society and business by allowing better logistics and information flows, start creating new value by solving problems that have before been unsolvable, or provide solutions for regions and sectors in which solutions have been unreachable. The question of efficiency (doing things right) versus effectiveness (doing the right things) is unanswered, but we do know that the sweet spot exists in the combination of these two factors.

For example, the current Finnish government has listed a productivity leap of about 5% as one of the main goals of the government. Can we get to 5% by introducing new technologies that tap resource inefficiencies? The productivity gains of the information revolution are brad, but the connectivity between the physical and the virtual offers even bigger promises. For example, McKinsey estimates that, in Europe alone, open data has 900 billion dollars of untapped business potential (2013).

3. POST-OWNERSHIP SOCIETY

IN THE POST-OWNERSHIP SOCIETY, there is no point in owning anything; ownership has become just a luxury. Instead of wanting to own things, we want to own data, data that concerns us and concerns others. Data or attention might even replace money as the medium of value.

In general, the paradigm shift from owning things to focusing on access is greatly facilitated by hyperconnected planet development. This is what happened to music consumption some ten years ago. Engagement with the physical reality allows more efficient usage of existing products and objects. An example of this is MaaS (mobility as a service), which is built on the idea that mobility should be provided as a service instead of constructing infrastructure or selling vehicles. Mobility as a service enables consumers to use different transportation models and allows for more efficiency in the overall system through the smarter use of existing resources.

4. POST-MARKET SOCIETY

THE PREVIOUSLY DESCRIBED POST-OWN-ERSHIP SOCIETY puts a heavy burden on the current market system. Markets are essentially an information system that is efficient in allocating resources. But it's a very basic information system. It only transfers one bit of information in each transaction. A person either bought a thing or not, but we don't know why. **In the post-market society, all types of crowd-buying, owning, and commons-based systems emerge.**

The Internet revolution was driven by hackers and programmers and then Google, Facebook, and other companies. But who will be the primary users of hyperconnection technologies be if the marginal costs continue to shrink? Will existing players continue to dominate, or will we see an emergence of new actors and even sub-cultures that start to use new opportunities to their benefit?

An open question is what hyperconnection applications will emerge? Will we see another Facebook or Twitter but this time with a strong digital-physical connection? Whether the applications concentrate on businesses and B2B solutions or consumer applications will affect who will emerge as key actors. While many Internet solutions have concentrated on the consumer (mobile games being a perfect example), hyperconnection applications can help to connect industries and national logistics systems in completely novel ways. These vanilla opportunities provide exciting opportunities from the engineering, policy, and design viewpoints, to name a few.

5. POST-VOTING SOCIETY

IN THE POST-VOTING SOCIETY, since we have the capability to know exactly what people do, there's less need to vote and speculate on certain things, as actions can be considered a vote. While companies and governments can more easily follow individuals, groups of individuals can use their behavior to illustrate a point and create political movements. Of course, there still will be politics, but how and where they will take place is uncertain.

Technological development connects with political processes and vice versa. Can solutions for the hyperconnected planet connect directly with political decision-making? By measuring activities and behaviour, much more can be perceived from well-being or mobility choices in cities, for instance. These developments can progress either top-down or bottom-up. The constant information flow has previously provided new outlets for political agency, and the hyperconnected planet can continue this and connect novel actors into the system.

6. POST-ENERGY SOCIETY

IN THE POST-ENERGY SOCIETY, it is possible to generate energy in macroscale, microscale, and nanoscale. In the post-energy society, every item can generate its own energy. This is a huge systematic change because of the size of the energy markets and thus a major business opportunity. But it also must happen, as we can be almost certain that energy sensors will need to be energy efficient. For the sensor revolution to happen, energy harvesting must become commonplace. And when energy harvesting happens everywhere, there might be energy abundance.

Thus, it is crucial to think about the role of hyperconnection technologies in the upcoming energy revolution. Does it relate to the breakthrough of renewables, the emergence of energy harvesting, improving grid technologies, or energy efficiency?

The core vision in this scenario publication is that technologies for the hyperconnected planet enable decoupling between increasing well-being and the consumption of natural resources. There are multiple routes through which these technologies can affect overall energy paradigms. One possibility is an emergence of energy-harvesting sensors and devices that support their usage. Another is lower marginal costs for renewable energy solutions and better efficiency of, for instance, solar energy. Or we might start to experience hyperconnected solutions that significantly increase energy efficiency as a whole through technological or behavioral progress. The basic requirement is that hyperconnection technologies as a whole are energy neutral. Because overall energy consumption should decrease globally, the next technological paradigm cannot require more energy than it helps to reduce.

7. POST-CARBON SOCIETY

IN THE POST-CARBON SOCIETY, these technologies serve both as a driver and a pressure valve for the transition into post-carbon societies that will be made possible by the hyperconnected planet. Connectivity between objects, humans, and possibly even nature promises more efficiency and the opportunity for better circulation and reuse of resources. A big question is whether hyperconnection technologies can help to make the circular economy a reality. In theory, constant monitoring should allow us to make correct and optimal resource choices in construction, for instance. This question is directly related to how we design solutions for the hyperconnected planet. The materials used, systems built, and added value expected are all connected to the question.

While everyday life in Western societies is well documented and many new applications are designed to tackle challenges in developed countries, a bigger question is what types of solutions we will see for the vast populations in developing countries. While populations in many Western countries are decreasing, Asia and Africa are growing fast and becoming more urban. **Will the solutions for the hyperconnected planet provide improvements for people around the world or accumulate new opportunities for a portion of the world's population that already has a wealth of existing opportunities.** In the decoupling of increasing human well-being and the consumption of natural resources, the trajectory of developing countries is one of the biggest uncertainties.

EPILOGUE

Post-choice, post-inefficiency, post-owner-ship, post-market, post-voting, post-energy, post-carbon

ALL SEVEN POSSIBILITIES are both good and bad, but by no means are they science fiction. In fact, the developments portrayed in the Garden and in the Streets scenarios are already happening. Algorithms can choose our friends. We can access almost all the music or books ever created in seconds. Advertising companies know more about us than our significant others. Solar panels produce energy as cheaply as coal plants. Autonomous cars and augmented experiences are in development. Sooner rather than later, these phenomena will merge into our daily lives and cease to amaze us. Remember, only some eight years ago, nobody had a smart phone. And have you thought about the fact that elevators and sliding doors are actually robots? A century ago, there was a vivid debate about permitting autonomous elevators. Now we would be amazed to see an elevator operator (that is, a real human being driving the elevator), not the other way around.

It is simply crucial to understand the potential for change, the untapped aptitude of technological innovations, the power within social change and politics, and the experiments created by the markets. It might take a long time for this potential to actualize. To speed up the change, it helps to understand the visions of otherness, provided by foresight. The scenarios presented here show that it is possible that increased capabilities via energy-harvesting sensors, big data, augmented reality and learning robots, new regulations, enhanced group collaboration, and other developments will create a more sustainable world, with better living conditions, equal rights, and abundance for all. They also show that some developments have a dark side.

Foresight is not conducted to predict the future but instead to make better decisions now. We don't have to choose between the Garden and the Streets. But our every decision impacts on our futures. The sooner we understand and agree on the desired future, the sooner we can start to make decisions that will create that future. With a long enough perspective, we can get rid of the irrevocability of the present and begin to see alternatives. Those who pick a desired alternative and act to realize it are the creators of the future. So, what are we waiting for?

APPENDIX

FUTURES TABLE

Global trust	Forms of ownership in data driven economy	System architecture development	Funding the technological development	Subsistence and meaningful life	Values	Hotspots of hyperconnected value creation	People and stuff	Political actors
There is only local trust	Individuals own their data and their infrastructure.	Abundance of ad-hoc solutions	Market driven	Subsistence via communities	Safety	Devices	Augmented reality	Traditional representative democracy
A common playground	Individuals own infrastructure, not data.	Common ecosystems enable optimized experiments	Government driven	A world without the middle class	Comfortable life and harmony	Consumer services	Traditional patina	Emphasis in local participation
Large trust regimes	Individuals own data, not infrastructure.		Corporate driven	Universalism and wealth redistribution	Self-expression	Industrial systems	Ongoing redesign	The world village
	Individuals don't own data or infrastructure.			Opportunity for all based on their capabilities				Self-organizing groups

THE GARDEN

THE STREETS

SCENARIO VARIABLES

Global trust

There is only local trust	Level of trust is low and trust exists in general only in local context. There are no global rules.	
A common playground	A common set of rules has been established. Principles and some regulation is global. Only a small number of people live outside the commonly agreed boundaries.	The Garden
Large trust regimes	Trust exists mostly within large regimes, such as the European Union or Russian economic area. This trust does reaches beyond the regimes only occasionally.	The Streets

Political actors

Traditional representative democracy	Traditional channels of participation, e.g. voting, maintains being the most important channel for participation.	
Emphasis in local participation	Local participation becomes more important. This happens due to new feedback mechanisms and new forms of participation.	The Garden
The world village	The role of the global arena in political decision-making increases. Different global collaborations enable participating to decision-making also for a common man.	
Self-organizing groups	Autonomous groups and the networks connecting different groups are the main channel of political action.	The Streets

Forms of ownership in data driven economy

Individuals own their data and their infrastructure.	
Individuals own infrastructure, not data.	The Streets
Individuals own data, not infrastructure.	The Garden
Individuals don't own data or infrastructure.	

System architecture development

Abundance of ad-hoc solutions	Solutions develop fast, when many different actors have access to common APIs and data. They produce solutions for known needs or to develop new knowledge.	The Streets
Common ecosystems enable optimized experiments	Just a few large corporation develop shared ecosystems. These ecosystems optimize the value for the customer. It is possible that these ecosystems feed a large group of companies in their value networks.	The Garden

Funding the technological development

Market driven	Markets create technological innovations by channeling investments in a very fast pace. Different kind of patient investment funds enable the cascading knowledge and talent.	
Government driven	Governments fund the technological development with for example large public investments to increase knowledge and providing supportive infrastructure.	The Streets
Corporate driven	Large corporations enable technological development by channeling their profits to develop new disruptive solutions.	The Garden

Hotspots of hyperconnected value creation

Devices	A significant proportion of the value is made by selling products.	The Streets
Consumer services	Consumer services and different kinds of service models are the most important value creation mechanisms.	
Industrial systems	The development of industrial systems produces most value.	The Garden

Subsistence and meaningful life

Subsistence via communities	People are connected to the society mainly via different communities. They base their livelihood on the connections in these communities.	The Garden
A world without the middle class	Middle class has shrunk and societal wealth is divided between a rich and small elite and a large mass of not-well-of people.	
Universalism and wealth redistribution	There is a significant redistribution of wealth or other resources due to universalistic goal to maintain similar opportunities for all.	The Streets
Opportunity for all based on their capabilities	Subsistence and meaningful life is possible without barriers for everyone based on their capabilities.	

Values

Safety	Safety is the guiding goal for the society and its members.	
Comfortable life and harmony	People are directed by their search for comfortable life and harmony.	The Garden
Self-expression	People search for ways to express themselves.	The Streets

People and stuff

Augmented reality	People connect to material world more and more often via different augmentation mechanisms. The role of things is diminished.	The Garden
Traditional patina	Traditional material objects are cherished and people form strong bonds to them.	
Ongoing redesign	Material environment is constantly updated and redesigned. The solutions are aesthetic or more ecological, and the relationship with things is personal but temporal.	The Streets

WHAT IS THE STATUS QUO OF THE HYPERCONNECTED PLANET?

IN A RECENT REPORT on *Digital Life in 2025*, the Pew Research Center's Internet Project predicted that the internet would soon become a "global, immersive, invisible, ambient networked computing environment built through the continued proliferation of smart sensors, cameras, software, databases, and massive data centers in a world-spanning information fabric known as the Internet of Things."

The are many other estimates by different research organizations and consultancies:

2015
ABI Research: The installed base of active wireless connected devices will exceed 16 billion in 2014, about 20% more than in 2013.

Juniper Research: The wearables market will exceed $1.5 billion in 2014, double its value in 2013–

2020
The number of devices will more than double from the current level, with 40.9 billion forecasted for 2020. (ABI Research)

25 billion things are connected (Gartner)

30 billion devices are connected to the internet. This creates over 200 billion interconnections. (Deloitte)

By 2020, there will be over 100 million Internet connected wireless light bulbs and lamps worldwide up from 2.4 million in 2013. (On World)

The worldwide installed base of smart meters will grow from 313 million in 2013 to nearly 1.1 billion in 2022. (Navigant Research)

Consumer Electronics M2M connections will top 7 billion in 2023, generating $700 billion in annual revenue. (Machina Research)

2025
There are over 40 smart cities in the world (IoT Research EU)

Self-driving vehicles are used in city centers (BGC)

20-30% of all the cars sold are self-driving (McKinsey)

115 million personal vehicles are sold each year. 40-100% of them are electric cars or hybrids. (McKinsey)

16% of the global energy is produced via solar power. (McKinsey)

2-3 billion people are connected to the internet (McKinsey)

80% of internet users only use the web with mobile devices (McKinsey)

60,000-180,000 lives are saved with surgery robots (McKinsey)

20-50 billion work hours are saved just with home care robots. (McKinsey)

2030
100 billion sensors are connected (Rifkin)

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