Petri Tapio, Hanna-Kaisa Aalto, Maria Höyssä, Matti Minkkinen, Katriina Siivonen, Markku Wilenius & Anne Arvonen (eds)

COOLEST STUDENT PAPERS AT FINLAND FUTURES

RESEARCH CENTRE 2016–2017

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Turun yliopisto
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FINLAND FUTURES
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EDITORIAL

Dear Reader,

We have the pleasure inviting you to have look at the inspired and inspiring picks from the student essays written by students and student groups in the courses organised by Finland Futures Research Centre (FFRC). This is the second volume of our *Coolest Student Papers* series which was launched last year. The reason for publishing student papers is that as teachers of the courses we have many times thought that with some edition of a student essay they could get a real article published, but students seldom do this, even if they would be encouraged. Such a shame! We established *Coolest Student Papers* as a lower threshold forum for publishing these very good texts, some of which are of scholarly calibre. One essay published last year in this forum, authored by **Henna Heinäjärvi**, was sent to the international Student Recognition Programme of the Association of Professional Futurists (APF) and won the third prize in the undergraduate series.

This year's selection shows that brilliant new students arrive our courses. We wish to reward their hard work in their intellectual endeavour by publishing their essays. The topics range from sustainability issues to corporate foresight, from ethics to methodology, from artificial intelligence to futures consciousness. Some of the essays take a critical stance to projects that have been carried out at the FFRC, which is something we especially wish to support. Independent, constructively critical open deliberation of how futures studies should be carried out is one of the core goals of our education and a key to further development of the courses and the whole field of futures studies.

The volume is divided to sections by the course. Each section begins with an evaluation made by the teacher after which the student essay(s) follow(s). The essays of the courses studied in Finnish language are at the end of the volume. The essays are from the international Master's Degree Programme of Futures Studies, the Sustainable Development minor and Futures Studies minor offered in Finnish language. Our PhD programme essays are excluded as we expect postgraduates to aim directly at journal articles.

Dear Reader, we wish you the joy of looking at the field of futures studies from the student viewpoint. Have a nice journey.

Turku, 29 November 2017

Petri Tapio, Maria Höyssä, Hanna-Kaisa Aalto, Matti Minkkinen, Katriina Siivonen, Markku Wilenius and Anne Arvonen

FUTUS1 ETHICS OF FUTURES STUDIES

Ethics of Futures Studies (5 cr) is one of the compulsory core courses in the Master's Degree Programme in Futures Studies. The aim of the course is to identify ethical issues related to work as a futures practitioner, both within and outside academia. The course has two main focus areas: understanding the ethical responsibilities of a futurist and evaluating ethical dimensions related to possible future developments. Having a compulsory ethics course is especially important in futures studies because the field is usually considered value-rational by nature. Alternative futures cannot be studied without involving – and examining – one's own values and ethical judgments.

The course emphasises ethical discussions on relevant topics, both on general ethical considerations in futures work and on substance areas such as specific technologies. The course begins from the value basis laid out for futures studies by Ossip Flechtheim in the 1940s and continues to contemporary issues and debates. Students take part in interactive seminar discussions and complete a group work assignment in addition to writing a short essay. The primary learning outcomes are awareness about the breadth and depth of ethical issues in futures studies and resources and tools to help deal with them.

FUTUS1 essay of Anne Ventelä was evaluated by the course teachers **Katriina Siivonen** and **Matti Minkkinen**.

Anne Ventelä's essay is an excellent critical reflection about ethical issues related to futures work with young people. The central questions of personal futuring are skillfully contextualised and connected to contemporary societal issues and relevant work in the futures field. From the vantage point of young people, the essay discusses the question of maintaining agency and optimism while acknowledging risks and uncertainty of the future, in this case the turbulent future of working life. Naturally this question concerns not only young people, but all of us dealing with future developments. Importantly, the essay also suggests possible solutions.

Empowerment, Disillusionment? – Ethics of Increasing Consciousness of Futures of Work with Young People

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Introduction

This essay examines the ethical dimension of promoting personal futures consciousness. To focus the deliberation, I'll look at young people and the future possibilities regarding work. Essentially, work and education are areas where one has traditionally had the strongest possibilities, and needs, to plan ahead. However, it is reasonable to think this is changing.

The deliberation takes place at the meeting point of futures consciousness and hope - or hopelessness – and looks into the following questions:

- What are the ethical considerations of increasing futures awareness?
- What are the ethical considerations of increasing futures awareness regarding work and education with young people?
- What could be appropriate solutions to these questions?

I'll start by looking at personal futures awareness and move on to issues regarding the future of work. Then, ethical considerations regarding futures consciousness in general, regarding the methodology and finally regarding the future of work are examined. To conclude, I'll discuss possible solutions and ethically sustainable methods of increasing personal futures consciousness.

What about you – review in personal futures

In her characterization of Futures Studies, Eleonora Masini (1993, 25–26) lists participation as one of the key aspects and refers to the work of James Dator and Clem Bezold when noting, that everyone wanting to be a part of the future has to take an active role in building it. However, in the field today, there is a strong emphasis on increasing futures consciousness of organizations and communities, but tools for personal futures awareness are not as plenty.

Futures consciousness refers to the ability to see preferred, probable and possible futures and accepting the principle that there is not one, but many possible futures, which we ourselves can affect. On an individual level, the realization of this dynamic is vital. Personal futures consciousness is deeply connected to a sense of self-belief and empowerment: a feeling of control is related to goal-oriented and purposeful action and a habit of planning for the future in order to achieve the preferred (Eckersley 1999, 4; Rubin 2000, 84), whereas fear, hopelessness or pessimistic views about the future affect our life management and motivation negatively (Rubin 2000, 131).

A cornerstone of academic work in personal futures consciousness is Rober Jungk and Norbert R. Müller's Futures Workshops (1987), a scenario method bringing together ordinary people to find solutions to challenges in their environments. The aim is to allow citizens proactive participation in matters concerning them. Active participation with individuals has since been continued by for example Richard Eckersley, Thomas Lombardo, Anita Rubin and Verne Wheelwright.

In his work investigating young people's views about the future, Eckersley (1999) modified the scenario process to better suit the age of the participants and the time constraints affecting work with non-professionals. Continuing with scenario development, Wheelwright (2009) added stages of personal research and strategic planning to build a workbook allowing individuals with different backgrounds and futures to learn together.

Where Jungk and Müller emphasized the importance of imagination in personal futuring, its role has been further investigated by Lombardo (2011, 41), who stresses that as the future is "evolutionary, creative, surprising and perpetually disruptive" by nature, it needs to be approached with creativity. Similar realizations have been made by Clem Bezold in his Aspirational Futures method (2009) that introduces visions and aspirations as paths for transformative futures. Bezold's method isn't developed for personal futuring, but it includes useful thoughts to be considered.

Finally, where Jungk and Müller design a group process for increasing citizen action, for example Wheelwright and Rubin look at the futures capacity of individuals. Instead of collectively impacting our shared future, the question in their work is "how can I affect my personal future?". This essay focusses on the latter when proceeding to ask, what happens when a futurist works with an issue affecting regular people and possibly resulting to changes that can be seen as either possibilities or threats. Thus, futures consciousness is connected to both empowerment and disillusionment. As a concrete example, I'll look at the consciousness regarding the future of work. Earlier work in futures awareness, young people and/or the future of education or work has been conducted by for example Eckersley (1999), Rubin (1995, 2000), Rieckmann (2012) and Alm (2011), and a string of research projects has been conducted at the FFRC at the University of Turku, involving *Koukku* (2014), *Get a Life* (2011), *Get a Life 2.0* (2014) and *OMASI* (ongoing).

Doctor, painter, plumber – the future of work?

"What will you be when you grow up?" is a question easily first introduced to a five-year-old that will probably follow that person for years to come – nowadays longer than before, as we continue to study until an older age and get employed at a later stage (Tilastokeskus 2014; Findikaattori 2016). At the same time, it's getting harder to answer.

Only 17 % of Finnish high school students know what they want to do after graduation, and for the most of them, desired career alternatives include examples of well-know, traditional occupations (Taloudellinen Tiedotustoimisto 2016). With vocational school students, the most important wish regarding a future job is a permanent position with no risk of unemployment (Amisbarometri 2015). But what if these alternatives don't exist for them?

In a Delphi study in 2015, experts in the Millennium Project estimated that if socio-political-economic systems stay the same around the world, and if technological acceleration, integration and globalization continue, 24 per cent of the world's population will be unemployed by 2050. "Everything that can be automated will be; we need to start talking about a world without jobs quickly", concluded one

of the participants (Glenn, Florescu 2015, 247). Work is believed to be affected by technological advancements such as robotics, automatization, Artificial Intelligence, 3D/4D printing and nanotechnology. According to some evaluations, routine tasks will be replaced by new types of work that require uniquely human capabilities, such as creativity, problem solving, intuition or social skills, and many kinds of task will be divided anew between machines and humans (Pew Research Center 2014, 7–8; Pentikäinen 2014, 18). As suggested in the Millennium Project Delphi, if the political, economic and social systems and expectations are adjusted "as they should be", people will start pursuing worthwhile lives outside of the structures of work and employment (Glenn, Florescu 2015, 251). This scenario is widely accepted and discussed in mainstream media (Feldman 2016, Graeber 2016, Devlin 2016, Pelkonen 2016, Orispää 2016, Vasama 2015, YLE 2015).

This image of a future working life requires versatile skills and offers possibilities yet unknown to us. Taking a proactive stance towards these calls for a brave and futures oriented mind, not the least because of the experiential gap in our culture – what was true before is not true anymore; the way one's future could be outlined before doesn't hold at this day and age (Rubin 2000, 28). This is why work with personal futures awareness regarding education and work is much needed, but at the same time, raises ethical questions. These will be looked at in the following chapter.

Ethically speaking – what should be noted?

Futures consciousness in general

Jungk and Müller introduce Futures Workshops as a method of increasing sense of influence on the future (1987, 10), but what if it instead leads to the personal understanding that one is avoidably a part of a system that leads to a world they don't aspire? A signal of this can be seen in Eckersley's work (1999, 83–84), where he describes how as a result of scenario workshops, some participants became more aware of a gap between their hopes and expectations and a sense of powerlessness to close that gap. As Eckersley (ibid, 84) notes: "Unless young people feel empowered to do something about their concerns, the experience [scenario work] could deepen their disillusionment."

Furthermore, Eckersley (1999, 88) points out that increasing personal futures awareness includes the risk of it leading to cynicism, mistrust, anger and apathy, and instead of committing to long-term planning, the individuals taking part in the work will result to looking for satisfaction in the short term. This is an especially harmful scenario when regarding education and work, both of which for the time being demand commitment and work in the long-term.

Thus, when working on futures consciousness with individuals, it's vital that the participants are increasingly aware of solutions and their own capabilities, not (only) challenges or problems.

Methodology

Work in personal futures awareness builds on various futures methods ranging from scenarios to simulations, games, literature and exercises to build creativity in general. These, too, entail ethical remarks.

On a general note, a thought relatable to all methodology in personal futures awareness comes from Riel Miller's work with his Futures Literacy method: looking for the most possible alternatives can lead to overlooking less predictable outcomes, which can still be possible and potentially even more desirable (Miller 2007, 342) – and which, when talking about the future work, are especially desired.

Contrasted with traditional educational or career planning, futures-oriented career envisioning should build on transformational options and educate to a new way of thinking. Otherwise, the work can lead to a false perception of making sustainable and wise, futures-oriented plans and decisions.

Moving on to specific methods, Eckersley (1999,84), having done scenario work with young people, points out that the process is affected by for example superficial and stereotyped images of the future, young people's tendency to be dramatic and the group dynamics that bias discussion towards strongly held and negative views. Here, the work might not result to wanted impacts because of the dynamics of the working environment and the personal capabilities and receptiveness of the participants. Due to this, special attention needs to be payed to the process and the working dynamics in order to connect with the participants on a deeper level – not only invite them to a fun play that might later lead to questions that they are not able to answer for themselves.

Furthermore, research projects OMASI, Koukku and Get a Life have experimented with simulation, games and exercises, which also raise considerations. Tools like these require preselected choices and alternatives made by the researcher, which automatically reflect certain ideologies. In the case of future work, ideologies can for example include the thought that we all should have a job, a dream job, or a job that's challenging and not monotonous. Ready-made alternatives will impair imagining transformative futures, which, in the case of future work, are necessary.

Another point to consider is the duration of the work itself. As Jungk and Müller (1987, 15) note with Futures Workshops, people eventually become less passive and start seeing themselves as active participants. As futures awareness is a skill, it takes time to develop. A one-off workshop might be an eye-opening experience, but might not lead to changes. This again raises the concern of futures work only opening enough doors to show the threats, but not possibilities for action.

Finally, considering the mode of working one last question arises: can or should the methods include working alone? Relating to for example Wheelwright's workbook (2006) that's publicly available, is it responsible to hand out material that one can use without guidance or the support from others? What are the risks of ending up with more questions than answers, more awareness but less tools to action?

Futures consciousness and work

Work in our society can justifiably be contrasted with what Inayatullah (2004, 13) calls a myth – a structure so deep and permanent it's almost invisible and thus raises the greatest resistance to modification. In our society, we're so used to planning our lives and building our identities around it that it's hard to see desirable alternatives with less or no work at all. This is because images of the future are built on both personal hopes, experiences and values, and on shared socio-cultural knowledge. As we in many respects function between the old and new, possibilities on the personal and the shared levels are bound to clash: what we hope for ourselves might be very different from what we see in our surroundings, and so envisioning one's future is a task that will easily lead to uncertainty. (Rubin 2000, 71.) Furthermore, uncertainty about the future has been proven to greatly impact the choices regarding education and professions with young people (Erola 2004, 82).

Thus, building on the questions regarding personal futures awareness in general and the methods used, working with futures images of work with young people becomes a task that calls for special overall caution. The participants of this work are facing questions there are no real answers to, which will, at the same time, influence their lives on a profound level. Furthermore, finding answers to these

questions requires capacity to truly separate the possible from the customary – to possibly stand out against the culture of their parents, teachers and the surrounding society. Once starting this work, it needs to be made sure they leave the process with genuinely new perspectives and encouraging models of action. Otherwise starting the process can become a burden with negative, long-term impacts.

Possible solutions

In the previous chapter, I have presented ethical considerations regarding the work of a futurist working with young people and their awareness and thoughts on the future of work. Rising from this consideration, I suggest the following.

1. The starting point of the individual needs to be carefully considered: is the person equipped to use the methods, how much assistance do they need? What kind of information should be provided?
2. The work needs to provide hope, meaning and purpose in order to strengthen the participant's sense of power to action.
3. Enough time must be allocated to the work. Instead of raising awareness, the aim should be to build new skills, courage and profound understanding of culture and futures in general: what was before isn't bound to be in the future; there are more options than we're used to considering.
4. The work must aim to build creativity and capacity to understand transformation. This can be done by showing examples where old truths and models don't apply.
5. Finally, young people shouldn't be left alone with the task of building their futures. Support for transformative paths is needed from the surrounding society, parents and teachers.

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FUTUS2 FUTURES RESEARCH METHODS

FUTUS2 Futures Research Methods (8 ECTS credits) course belongs to the Master's Degree Programme curriculum, and is typically studied during the first spring of the two-year programme. After this course the student is expected to understand the field of futures research methods, make an informed choice of a futures research method, compare the similarities and differences of futures research methods and apply several methods to specific questions.

One quarter of the course grade includes activity points scored in individual and group assignments during lectures. Three quarters of the grade are received from an essay, where the student compares two futures research methods with each other based on an individually performed literature search. The student is especially guided to read and review at least 10 articles published in three important futures studies journals: Futures, Long Range Planning and Technological Forecasting & Social Change. A default length of the essay is 3000–5000 words.

FUTUS2 essays were reviewed by the course teacher, Professor **Petri Tapio**.

Isabel Bottoms compares the Causal Layered Analysis (CLA) method, which is nowadays well-known and increasingly used in qualitative futures studies, and Transfromative Scenario Planning (TSP), which is less known in academic circles, but used effectively by a consultancy firm. In her essay Isabel takes the topic to her fingertips, maps both methods into the field of transformative futures studies and compares them in an interesting and intelligent way, finally giving well-thought-of conclusions. Her text is nicely backed up with appropriate references and she continues the analysis with personal comments. A very mature essay.

Aleksej Nareiko compares visioning with normative scenarios, using also the backcasting concept for the latter. There is considerable amount of reading and thinking behind this essay. The concepts are made clear in the beginning, there is also a section, where Aleksej compares the methods thematically. In the middle, the methods are also described separately. At the end, the table form in comparison is very effective. There are actually three different ways to make the comparison in his essay. Thought provoking way of writing.

In this course, excellent essays stand out from very good ones in the way the two methods are compared. It measures the intellectual capacity of the author, especially creativity, ability to make interpretations and derivations and, the level of independent thinking.

Creating a Transformative Space: Comparing the Transformative Scenario Planning and Causal Layered Analysis Methods

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Introduction

This essay will discuss the category of futures methods that includes 'transformation' of the participants, not in the creation of transformative images of the future. In doing so it will assess the field as a whole, the Transformative Scenario Planning method of Adam Kahane, and the Causal Layered Analysis method of Sohail Inayatullah. A comparison of the two methods' similarities and differences will lead to a conclusion on their use for creating a transformative space.

The Transformative Methods Field

The Cambridge Dictionary defines 'transformation' as "to change completely the appearance or character of something or someone, especially so that that thing or person is improved."[1] For a method to be 'transformative' therefore, it must generally be able to induce a drastic change for the better. This befits the analysis and methods laid out below, once it is clarified that 'transformative' or 'transformational' is here used to describe the nature of the process that takes place in applying the futures method. There is a vein of futures studies literature that refers to transformed or transformational futures which represents the contents of the future the method produces. For example, a transformational futures scenario for a University in 2030 that sees the University system as transformed into a hub of online activity rather than present day, in-person lectures and interactions. This is fundamentally different from the process of creating a transition from state A to state B in the participants individual and collective perspective when using the method. The latter is what this essay focusses on.

In the process of situating transformative scenario planning (TSP) and Causal Layered Analysis (CLA) within the field of futures studies two things became apparent. Firstly, there are a variety of methods that fit within the 'transformative' category. After conducting a shallow literature review I grouped them into three categories that represent the different emphases under the transformative umbrella. These three groups can be seen as transformative scenario planning[2]; Narrative Transformation, which includes CLA[3]; and personal transformative methods, which includes the '4C tool', 'The Summit' and 'Rail Ties'[4]. The differences between the groups are nuanced and mostly relate to their chosen audience and slight difference in focus in the process aspect of each method. The commonalities between the groups are much greater however. Initially, mapping the field enabled me to see that

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1   Cambridge English Dictionary Online
2   Kahane (2012, 2013)
3   p. 80, Spencer and Salvatico (2015)
4   p. 8-12, Savitsky (2003)

they all seek to plumb the depths of their subject from metaphors, power structures and long-embedded socialisation, up to the surface of litany, real politik and physical challenges to be addressed. As such, they could be said to come within critical futures studies which, according to Slaughter's interpretation,

> *"...is a process of `probing beneath the surface' to consider futures problems at a range of levels right down to the framing of worldviews and worldview commitments."*.[1]

Inayatullah defines critical futures studies differently, situating it within post-structural political theory that breaks down power structures in order to historicise and politicise so-called truths and realities, dismembering the vacuum they are often referred to within.[2] Although the difference between the two definitions sounds slight, there is an active element in Inayatullah's definition. This element is more than just an observer's critique generating better informed knowledge, as Slaughter suggests, it is an active breaking down of the structures that bind the present. This could be seen as setting the scene for transformations much more effectively than merely acknowledging such power structures and their impacts exist; it is the first step to operationalising the transformation participants are envisaging. Ogilvy seems to agree with this perspective in writing that critical theory contributes a whole-world, humanity-scale "synoptic vision" (as opposed to one organisation, nation or sector) and an "activist" desire to change the status quo not just describe it.[3] I will return to the role of critical futures studies later on.

At the same time as identifying where the epistemological roots of transformative methods lie within the field, I recognised a recurring set of characteristics underlying these methods that seemed very familiar from my socio-ecological resilience reading. Thus the second significant aspect arising under transformative methods, is the apparent confluence between resilience and transformation, specifically, between the underlying principles of resilience (as identifiable characteristics of socio-ecological systems) and the process of creating transformation that emerges from the tried and tested methods within the field. In order to elaborate on this observation, the principles of resilience are explored here as a basis for further comparison of the two methods below.

The the seven principles of ecosystems resilience, as defined by the research of the Stockholm Resilience Centre, are: (1) maintain diversity and redundancy (2) manage connectivity (3) manage slow variables and feedbacks (4) foster an understanding of socio-environmental systems as complex adaptive systems (5) encourage learning and experimentation (6) broaden participation and (7) promote polycentric governance systems.[4] All seven of these principles are applied in the transformative methods in a multitude of ways. Not only are they applied, they are integrated into the fabric of the methods as the means by which they achieve transformation in participants and the means by which the results are resilient and representative of the systems they are operating within. Although the lay person can observe that resilience building requires transformation to enable evolved resilient states, it is unlikely that all transformative method creators have aligned with the seven principles of resilience purposely,

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1   p. 150, Slaughter (1999)
2   p. 128, Inayatullah (March 1990)
3   Ogilvy, Knowledge Base of Futures Studies Vol. 1
4   Biggs et al. (2012)

not least because they have only recently been scientifically outlined. There are however, empirical experiences that would have led to the creators developing the transformative methods as they did, indicating that their evolution has been true to both human and natural systems experiences on an instinctive level.

Transformative Scenario Planning

TSP emerged from the work of Adam Kahane and his colleagues over a period of years. In using adaptive scenario planning extensively during his time at Royal Dutch Shell, he began to apply the basic adaptive scenario planning framework to political groupings with deep-seated and intractable problems that could not be solved by single actors, requiring a systemic response.[1] Based on these formative experiences he developed TSP to meet the need for transformational impacts on problems such as a fractured South Africa post-apartheid[2], or a violent, drug-ridden Colombia3. Knowing this transition from adaptive to transformative in Kahane is significant in understanding how this method is different from the private sector use of scenario planning, and is able to achieve greater impact in opening up a new narrative about the future. According to Kahane,

> *"Adaptive scenario planning focuses on producing new systemic understandings, whereas transformative scenario planning assumes that new understandings alone are insufficient and so focuses on producing new cross-system relationships and new system transforming intentions".* [4]

The action of transforming, not just understanding, ties in with Inayatullah and Ogilvy's post-structuralist definition of critical theory in futures studies. The element of action brings with it extra conditions for success that adaptive scenario planning doesn't require, because it usually aims to survey the ways in which an organisation or corporation can situate itself within differing scenarios of the future. TSP aims to empower participants from across the systemic spectrum to transform themselves in four ways. Firstly to transform their understandings of their situation and their role in the situation, through the fresh eyes of a "collective synthesis of what is happening and could happen…".[5] Secondly participants transform their relationships with each other as they work together, building "trust and empathy" and their co-operation across systems.[6] Thirdly, participants transform their intent, based on their transformed understandings and relationships, their forward-looking goals and intent are adjusted accordingly. Finally, on the foundations of the previous three transformations, participants transform their actions as they engage with the potential for a transformative future that they are all key actors within.[7]

A "strong container" that can physically and mentally hold the participants throughout the 9 months or more is what holds up the entire TSP process. This means choosing a well-timed TSP project,

1   p. 16-17, Kahane (2012)
2   p. 4-13, Kahane (2012)
3   p. 79-90, Kahane (2012)
4   p. 20, Kahane (2013)
5   p. 18, Kahane (2012)
6   p. 18, Kahane (2012)
7   p. 18, Kahane (2012)

that tackles an intractable problem but also doesn't exacerbate tensions or distract participants during TSP; it also means being able to offer a safe space for difficult conversations that facilitate the personal and inter personal transformations, yet creating enough "pressure and friction" to bear fruit in the TSP process.[1]

The conditions that enable this four-part transformation are the fundamentals of the process that Kahane sets up. In overview, the process (in chronological order) consists of: constructing the infrastructure of the TSP project (convening a whole-system team, mobilising resources etc.); learning a full picture of the current reality and participants places within that (through commissioning research papers, interviewing participants, building collective understanding) - this could be considered a 'data collection and analysis method'[2]; construct narratives about what could happen in the future - the narratives acting as a 'tool for data organisation'[3]; create action points for what can be done to adapt and transform the issue - action points are one of the tools available for 'representing the results'[4]; and finally, "act to transform the system".[5]

Focussing in on the scenario building or constructing narratives part of TSP, cross referencing several of Kahane's pieces of writing on TSP shows that this is also a flexible part of the method, unlike the comparatively rigid adaptive scenario planning technique. Perhaps it receives less attention in his writing because it can utilise well-known scanning methods for scenario planning - covering data collection, analysis and organising - but it can also be of much more intuitive logic[6] if the TSP team think it best fits the group. In Kahane's words, the process of building scenarios aims to create a,

> *"set of relevant, challenging, plausible, and clear stories about what could happen - not about what will happen (a forecast) or about what should happen (a wish or a proposal) - and then act on what they have learned from this construction.".[7]*

Part of the transformational capacity of TSP comes from enabling participants to reach across the divides between them to create a level playing field at the outset of the process, and then facilitating a space on the future in which they are all "equally ignorant"[8] and by that point, have suspended their day to day priorities and perceptions in order to collectively occupy a third space which is creative and transformative. To traverse this space of equal ignorance, the adaptive scenario planning process of horizon scanning and selecting key certainties and uncertainties is used. With deductive and inductive reasoning, scenarios of what could happen in the future are explored, agreed upon, and then communicated with logical narratives, metaphors and images, as well as memorable names for each scenario

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1   p. 20, Kahane (2012)
2   Vinnari and Tapio (11th January 2017)
3   Vinnari and Tapio (11th January 2017)
4   Vinnari and Tapio (11th January 2017)
5   p. 97-98, Kahane (2012)
6   p. 700, Wilkinson, Kupers and Mangalagiu (2011)
7   p. 20, Kahane (2012)
8   p. 20, Kahane (2012)

which enter the myth of the transformation from that day forwards.[1] Mille Bojer, from Kahane's consultancy firm Reos Partners[2] which practises the TSP method extensively, said that the knowledge generation during the scenario planning stage is then researched and confirmed with sources by the TSP support team to ensure as much accuracy and consistency within the process as possible. This also gives the outputs more legitimacy in the eyes of those who did not participate.[3]

Although there is little to no academic literature on TSP, leaving the majority of commentary on the method to its creator, it is possible to gain a vivid image of how TSP works and has succeeded in the past, many aspects of which seem instinctively true to the reader. From his writing the key aspects that make up TSP emerged as - in order of importance - timing, people, recognition of scale and process.

Causal Layered Analysis

The CLA method, as created and practiced extensively by Professor Sohail Inayatullah, is a post-structuralist method to analyse the four layers of discourse that make up the reality the issue addressed inhabits. Inayatullah describes CLA as seeking to "deconstruct and reconstruct".[4] It does this by offering four layers of quantitative and qualitative analysis, which can be revisited in any order during the application of CLA. They are, the surface level of 'Litany' which includes quantitative trends, events and media, these are the most visible manifestations that do not question assumptions. The second level down looks at the 'System', the social, historical, political, economic and cultural causes which are supported by quantitative data and technical and academic analyses. The third layer down is 'Worldview' which aims to qualitatively assess on a deeper level, the legitimising discourse that enables the social causes to flourish, not just occur. The worldview level also sheds light on the foundations for the shallower levels, which becomes useful at the stage of strategising on how to affect the future. Finally, the deepest layer 'Myth', or 'Metaphor', digs out the "collective archetypes" that are society's stories generated, added to and changed over generations. They are emotional not analytical, and engage with an unspoken perspective that is culturally interwoven into societies.[5]

This four-tiered structure for critical analysis was set out by Inayatullah in 1998. Since then, the method has been applied to a multitude of different challenges and contexts, and developed and critiqued many times. Inayatullah supports this development of the method, and through the books 'CLA 2.0' and 'The CLA Reader', published in 2004, has actively communicated the different ways that CLA has been applied and modified. From the case studies of its application in the publications above, it is clear CLA could be used for all, or any combination of, data collection, data analysis, data organisation or representation of the results, if a wide definition of 'data' is applied.

Focussing on the deconstruction first, CLA's four levels represent four different ways of knowing and of understanding the world/system/issue. This manifests Inayatullah's deep drive to legitimate

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1   p. 98, Kahane (2012)
2   Bojer, M web profile
3   Mille Bojer Skype Interview (2017)
4   p. 7, Inayatullah, 2009
5   p. 8-9, Inayatullah (2009)

many different ways of knowing, and to throw the restrictive categorisations that he has experienced in his life, out of the window. According to him,

> *"...the assertion that a way of knowing is objective is simply an attempt to privilege one's ideological system over others; it privileges one model of rationality over others and then asserts that this is ultimately the real model, while others are primitive and, for reasons deduced from one's own model, should be forgotten.".*[1]

Deconstruction within CLA embraces the difficult and sometimes controversial task of working out where power lies, where vested interests, manipulations and abuses of power have taken place, and how different groups of people see the same issue or artefact. As explored above, this is an essential footing for transformative work to be able to take place. Transformation cannot begin half way up the mountain that created the current status quo in the first place.

That said, CLA can be critiqued as doing no more than setup the deconstructed foundations of a transformative process. For the transformed view of the system and transformed actions to manifest from these foundations, other methods must be used in addition to CLA. Whether this should disqualify CLA as a transformative method or not is up for debate. Bishop et al. discuss using CLA as a method to assess how farmers and policy makers could build sustainable agriculture in Australia. They conducted two parallel CLA processes: one with the farmers and one with the policy-makers. This drew out very different perspectives from the two groups, on the same issue. Bishop et al. write they believe this set up the foundation for a transformation of the relationship between the two groups, having deconstructed their perspectives on the issue. They do not offer any comment on how this reconstruction and transformation would proceed from the use of CLA however; in fact they say only "CLA enabled the possible transformation...[emphasis added]".[2]

The need for reconstruction after the deconstruction is somewhat met by the final part of the CLA method: creating "Actionable Steps"[3]. From the literature however, it does not seem to be a necessity to create actionable steps as the method can just be used as an analytical tool without actionable outcomes. If they are used, the actionable steps must be created at every layer, and are tailored to the actors able to impact that layer successfully, although Inayatullah writes they are harder to realise the deeper down the layers you go. Befitting of the layered nature of the deconstruction, the reconstructed actionable steps must also be layered horizontally in time - from the immediate to the long-term - and vertically, down the layers from litany to myth.[4] According to Inayatullah, "If the questions are transformed, then the solutions also shift."[5] Whilst that rings true generally, it does not encompass any strategy for empowering the necessary actors to carry out the transformation. Implying, if those actors are not in the room or participating in the CLA process, transformative action from applying CLA is unlikely and transformed actionable steps would become impotent.

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1 p.119, Inayatullah (1990)

2 p.169, Bishop, Dzidic and Breen (2015)

3 p.12, Inayatullah, 2009

4 p.13, Inayatullah, 2009

5 p.13, Inayatullah, 2009

Comparing Methods

Addressing first the comparative similarities between TSP and CLA I find that both methods are only as good as "who is in the room"[1]. TSP and CLA fundamentally embrace individuals knowledge and experience without requiring objectivity, in fact they acknowledge the utility of differing perspectives in bringing a much more true-to-life and actionable sense of the current situation. As such, to gain this depth of insight, both methods ideally need representatives from all parts of the system or issue being transformed, to achieve this level of insight. For example, the myth layer of CLA demonstrates how, unlike quantitative data that is publicly accessible for anyone's interpretation and use, myths native to participants community of thought, worldview and upbringing cannot be transferred or known so readily, making such individuals presence in the process even more essential.

It is clear from the case studies written on both methods (described in the CLA readers and Kahane's book on TSP), that they are nuanced and effective facilitation tools, with CLA in particular offering a framework for analysis that has been appreciated by a broad set of actors.[2] Concretely, the facilitation of CLA and TSP both require individual and collective thinking, structure and flexibility, commitment and purpose, yet also open-mindedness and a "suspension" of disbelief and strongly held opinions.[3] These common ingredients could also be seen as manifesting the principles of resilience which require polycentricity, and space for manoeuvre to facilitate diversity and systemic solutions.

Related to the facilitation technique both methods have to offer, CLA and TSP are equally scaleable. Whether the methods seek to address a person or a group, or local, national, regional and sectoral systemic issues, the methods can both be applied at any level. This characteristic speaks to their systemic qualities. Any method that is not scaleable could be excluding a diversity of knowledge and experience that prevents seeing the full picture and disabling resilience in the process by failing to understand socio-environmental systems as complex adaptive systems operating at multiple scales.

It is interesting that neither method is linear in its outlook or application. They are reflexive methods. Even though they are based on a defined process, both methods allow for cyclical dynamics, rather than linear extrapolations in chronological order. This builds in a resilience to the conclusions and the quality of the transformation by mimicking the natural world's diverse and interconnected ecological cycles whose resilience is dependent on these feedback systems and connectivity; as outlined in resilience principles 1, 2, 3, 4 and 7.

Moving to the differences between the methods, I revert to the definitions of critical theory explored at the outset. TSP is inherently post-structuralist by stating that identifying a systemic view of the issue and everyone's roles is insufficient, action based on this analysis must develop from these insights. Although CLA could also be used this way, action on the resulting analysis is not a prerequisite of using CLA effectively. This places CLA within Slaughter's definition of critical theory by default, but leaves the door open for CLA to also be used as a post-structuralist method.

Somewhat unclear in the CLA method is who or from which perspective are the four levels assessed, and from who's perspective should the knowledge come from? CLA offers no minimum prescriptions of the type of participants or their role in the issue. Hines has critiqued CLA as difficult to

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1   Franco, Meadows and Armstrong (2013)

2   Inayatullah (2009)

3   p. 92-93, Kahane (2012)

use "in areas where the corporate culture is homogenous or where hegemony is strong."[1], as it doesn't generate the depth of insight and whole-system view on the issue. Applying resilience principles here, it's clear that diversity and polycentricity is lacking, which weakens the outputs and the transformative potential. In contrast, TSP is very clear on the 'who' of the participants and the focus of the method. Kahane emphasises the size of the team must reflect the breadth of the issues in a system key to the problem being transformed, and in facilitating the TSP process, singular perspectives and 'groupthink' are rejected individually, instead, the process must constantly alternate between the two, promoting polycentricity.

Finally, TSP offers a complete transformative method that covers the method's application from start to finish. CLA offers parts of a transformative process, namely the critical deconstructed foundations, but does not necessarily offer a substantive method for the transformative process of reconstructing afterwards. Meissner and Wulf found that scenario planning had debiasing effects on strategic decision making, but,

> *"only a comprehensive execution of the scenario planning process yields the claimed debiasing potential. ... we can conclude that the major debiasing effect of the scenario planning methodology lies within the scenario generation itself...".[2]*

These results show that scanning and deconstructing drivers of change, embedded perspectives on the future and other observational efforts, are not the active transformative part of a transformative process, requiring the collective construction of alternative futures as the prism through which transformation of participants occurs.

There are many examples of CLA complementing other methods, including CLA being used in conjunction with adaptive scenario planning for developing policy recommendations on an ageing population in Australia.[3] It is CLA's complementarity with other methods that creates transformative potential beyond the foundations. Inayatullah himself acknowledges this himself in writing:

> *"Complex layered analysis is not a goal in itself. What it can do is to create the possibility for real transformation of our empirical and ideational worlds and ensure deep participation in this transformation."[4]*

Conclusion

In conclusion, neither of these processes embrace agnostic forecasting, they are both contemplative tools for more informed, sometimes even transformed, action on the future. In comparing the two methods it is striking the underlying organising principles between the two share many commonalities, which can also be represented as principles of resilience, situating both methods in the systems thinking field also. Yet, the comparison clarified that CLA is not inherently transformative as it does not facilitate the entire process through to implementing a transformed perspective. It is however valuable to the transformative methods field in deconstructing our underlying bias, histories and contexts which

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1   Lum (2002)
2   p. 810, Meissner and Wulf (2013)
3   Ageing Futures: Using causal layered analysis to develop scenarios, Inayatullah (2015)
4   p. 33, Inayatullah (2009)

enables transformative potential. TSP, although it has received little attention in futures studies, has a powerful track record of building the infrastructure for meaningful transformations in communities, societies and political situations. Perhaps TSP could incorporate CLA analysis as a facilitation tool within its scenario planning, as it is a very complimentary method.

Clarified by this essay, in my thesis I will be looking at using CLA as an analytical tool for policy-making on energy in African countries, to decolonise policy-makers perspectives on future energy options and African societies. I will also look at situating the entire renewable energy modelling platform within the method of TSP, as future energy options in developing countries require no less than deep transformation, and for actors across the system to come together effectively. Both will be considered facilitation tools in the toolkit for developing renewable energy scenarios.

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Comparison of Normative Scenario and Vision as Methods of Futures Research

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Introduction

Normative scenario and vision are methods of futures research sharing many similarities. This paper compares them by their purposes and execution. We will also look into history of these methods, their possible variations, risks and limitations, and some ethical considerations.

Definitions

Following numerous examples in literature (e.g. Phdungsilp 2011; Neuvonen & Ache 2016), we will use the term *normative scenario* as a full synonym to *backcasting*. The latter can be defined as "generating a desirable future, and then looking backwards from that future to the present in order to strategize and to plan how it could be achieved" (Vergragt & Quist 2011, 747). Many authors emphasize that desired future situations are defined during the scenario development process more often than are selected a-priori (e.g. Robinson 2003; Andreescu et al. 2013). Andreescu et al. (2013) also argue that the key in recognizing a scenario normative is the fact that it is being offered as a 'goal for action (and sometimes also a path to that goal).'

Similarly to definition of *normative scenario* above, we will imply with *vision* not only the *output* of the method such as "an image of the desired future" (Rampersad 2001, 214), but also the *process* of execution – so called *visioning*. A high number of existing definitions for vision can be explained, probably, by the high frequency with which people use their imagination and curiosity when attempting to describe future (Godet 1987). A collection of other definitions can be found, e.g. in the work by Holstius and Malaska (2004, 36-37).

As follows from the definition of *normative scenario* above, a vision containing a goal can be used as an input to the scenario method and 'the activity of visioning is normally followed by an activity called 'backcasting'' (Wilkinson & Mangalagiu 2012, 374). However, there are also many other applications for the vision method as we will show below.

Brief history

Although both methods, especially vision, tend to be described as existing since the beginning of times, the first instances of their professional use are known to be in 1970s (Lovins 1977; Robinson 1982; Bezold et al. 2009). A detailed history of backcasting can be found in literature (Quist 2007; Quist & Vergragt 2006; Neuvonen et al. 2016), as well as for the vision method (Bezold et al. 2009, 3-5). We will limit ourselves to one observation only: since 1990s both methods are increasingly used together with participatory techniques (Bezold et al. 2009, 3-5; Quist et al. 2011, 884). It is particularly noticeable for the vision method: while articles written in the 1990s (e.g. Coulson-Thomas 1992, 84) tend to

emphasize the importance of the involvement of key decision-makers combined with effective communication of the vision to the rest of an organization, the articles written in 2000s and later (e.g. Neuvonen & Ache 2016, 9) stress the need to build a shared vision: "The central purpose of the vision is to collect and consider together the views…"

Classification and sub-classification of the methods

Both methods are classified as normative (Glenn 2009, 9). Normative scenarios can be both qualitative and/or quantitative, while the vision method is dominantly qualitative.

Some researchers (e.g. Robinson 2003, 845; Bilgin 2016, 60) note that the differences between normative and exploratory scenarios are blurring because a number of hybrid methods appeared. Some argue that the differences were never sharp because no exploratory scenario can be free of moral and values (e.g. Andreescu et al. 2013, 714).

There exist a number of sub-classifications for backcasting (Quist et al. 2011, 884), of which we believe two are the most relevant for our comparison because they categorize normative scenarios by purpose.

One divides normative scenarios into preserving and transforming ones (Börjeson et al. 2006, 725). This can be compared against the vision method, which is generally aimed at bringing about transformations (Voorn et al. 2012, 352).

The other one classifies participatory backcasting into target-oriented, pathway-oriented, action-oriented and participation-oriented (Wangel 2011). Although we did not find similar sub-classification for visions, we noticed a significant diversity of purposes for which visions can be used. For example, visions in corporate foresight can be used not only as guidelines for action, but also to reduce the number of alternatives to consider, analyse strategies, facilitate communication, act as frameworks for perceptions and be a starting point for environment scanning (Hines, Bishop 2006, 156).

Like normative scenarios, visions can be classified by the field or targeted audience for which they are intended: humanistic, religious or eschatological, political, business or organizational, communal, visions in public policy and personal visions (Helm 2009, 97-98).

To conclude with, vision is more often connected with transformation and normativity, while backcasting can be aimed at preserving status quo and is not always clearly differentiated from exploratory methods.

Applications

Applications of normative scenario

In addition to the four orientations proposed by Wangel – target, pathway, action and participation – normative scenarios can be used for learning (Quist & Vergragt 2006, 1034). Objects of learning include not only immediately relevant issues such as values, images of future, flexibility and implications of decisions and policies, freedom of actions (Robinson 2003, 842) – also higher level learning, i.e. changes in definition or interpretative frame of a problem, can occur as a result of interaction of participants (Vergragt & Quist 2011, 753).

Complexity of problems and impossibility to find solutions to them by forecasting are often mentioned as conditions favouring use of backcasting (Höjer & Mattsson 2000, 629; Börjeson et al. 2006,

733; Quist et al. 2011, 884). Such conditions help explain why normative scenarios are mostly used for long-term periods: 25-50 years, allowing for major transformations (Kishita et al. 2017, 843). Problem-oriented nature of normative scenarios define their inescapable conditionality (ibid, 843).

As many normative scenarios are implemented with participatory methods, participation-based effects are also often sought, such as goals agreed by representative selection of agents (Andreescu et al. 2013, 713), shared 'frame of the future' – 'the foundational values and procedures enabling the residents of the future world to negotiate their interests' (ibid, 714), mutual understanding and co-producing new knowledge (Kishita et al. 2017, 3 referring to Kasemir et al. 2003), and higher learning, e.g. about environment and change agents (Vergragt & Quist 2011, 749, 752).

Interestingly, Vergragt and Quist note that 'expert-led backcasting is more often used to reach policy objectives, while participatory backcasting is more used to achieve stakeholders' and lay-persons' buy-in', i.e. involvement and sharing of goals (ibid, 753).

Applications of the vision method

Being a less complex method with, ideally, an easily comprehensible output – an image of preferred future, the vision method is employed for a broader range of purposes. Although some researchers argue that a vision as an output shall include a pathway (Lissack & Roos 2001, 55), such view is not common and, without this obscuring element, the vision method is naturally suitable for less predictable environments and more complex problems. In distinction to backcasting, it does not always need to be contingent, oriented towards specific context or time horizon (Voorn et al. 2012, 352). While some authors imply that vision shall be realistic and, thus, possible (e.g. El-Namaki 1992, 27), it does not agree with practice: a vision can be a direction or an unachievable goal (consider, for example, Toyota's 'aiming for zero emissions'). This additional dimension of freedom significantly broadens possibilities for use of the vision method. It also makes it more 'resilient' towards failures of implementation, since they are less likely to discourage following a vision. In case of the normative scenario method, a failure of implementation is more likely to cause disappointment in the objective because the path was conceived as a part of the desired image of future. The last argument is, of course, relative because unpredictable future can equally ruin a vision as well as a normative scenario (Lissack & Roos 2001, 58).

The task of listing categories of purposes for which vision can be used is therefore more complex. In addition to objectives similar to the orientations for backcasting proposed by Wangel, such as achieving higher performance, promoting change, creating basis for strategy, motivation of actors and contextual framing (Lipton 1996, 3-4) - communicative (Voorn et al. 2012, 352; Neuvonen & Ache 2016, 9), learning (Masini 2006, 1166; Edwards 2008, 251; Wilkinson & Mangalagiu 2012, 381), predictive (Polak 1973, 300), ethical (Stewart 1993, 91), normative (Bell et al. 2013; Morgan 2015, 110), managerial (Hines & Bishop 2006, 156), and psychological (Stevenson 2006, 110) aspects are mentioned as possible objectives for vision.

Although the normative scenario method is also used as communication medium, it would be logical to assume that the vision method is likely to be more suitable for larger audiences because it is less complex and, as will be shown below, often designed primarily for communicative purposes.

Execution

Requirements to backcasting

In addition to general requirements applicable to futures research, such as accuracy of model, its reliability for intended use, correctness of implementation etc. (Piirainen et al. 2012, 468-469), Quist et al. propose to define three categories of special requirements to participatory normative scenarios: normative, process- and knowledge-related ones (Quist et al. 2011, 885). The first one should describe requirements to vision, the second shall outline the role(s) of stakeholders in backcasting and the third shall specify what knowledge backcasting shall help acquire.

Recent research papers describe normative scenario as a participatory and iterative process (Vergragt & Jaco 2011, 751; Voorn et al. 2012, 353-354). A sufficiently distant time horizon is recommended to bring about 'veil-of-ignorance' effect in imagining a picture of preferred future (Andreescu et al. 2013, 715).

Backcasting steps

Normative scenario development usually includes two main phases: defining one or several desired states (visions) and determining paths to it/them. Additional phases may be aimed at control of quality of analysis, evaluation of suitability of proposed visions and/or paths and their implications, elaboration of stakeholder roles enabling achievement of the desired state etc. Sometimes a visioning stage is not required because a certain vision is already accepted by the client. Development of paths can include a number of steps as illustrated by the examples in the next paragraph.

Voorn et al. proposed a five-step framework for normative scenarios: (1) strategic problem orientation, (2) visioning, (3) goal setting, (4) backcasting analysis, and (5) evaluation and monitoring (2012, 353-354). Robinson's method consists of six steps: (1) defining objectives, (2) choosing goals, (3) describing present system, (4) analysis of exogenous variables, (5) scenario analysis, and (6) impact analysis (1990, 824). Other approaches to backcasting scenarios were described e.g. by Banister et al. 2000; Svenfelt et al. 2011.

Requirements to visioning

Among numerous requirements to vision, coherence is mentioned, probably, most frequently. A coherent vision is understood as the one corresponding to current reality, e.g. external trends and variables, stakeholders, corporate culture and values, products in a given organization, thus linked more to the present moment than to unknown and unpredictable future (Lissack & Roos 2001; Boaventura et al. 2008; Battistella & Toni 2011, 1033). Coherence is seen as a condition for possibility and practicality of a vision. Addressing the same concern for practicality, a paper by J. Gold warns against 'dangers of imagery' – that a vision can 'be used as a license without having to consider social factors' (1984, 379). However, this seemingly logical requirements should be taken into account together with precautions against unduly limiting vision (Lissack & Roos 2001, 54). A good example of such possible difficulties is suggested by observation of family-owned companies that followed their founders' visions for over a century (Harris & Ogbonna 1999) – a company with more rigid vision incurred additional loss with time. This paper is also notable for evidencing possible extremely long-term impact of vision, something that is hardly attainable in case of normative scenario.

Other requirements vary greatly and may include explicitness, authority, structural coupling (Voorn et al. 2012, 352); being imaginable, inspiring and innovative, consistent and transparent, qualitative and sufficiently broad (Kerkhof & Wieczorek 2005, 740); being translatable, powerful, challenging, unique, feasible, idealist (Harris & Ogbonna 1999, 334); ambitious, but not unrealistic, clear, compelling, easy to grasp, to have a long time frame (10-30 years) (Hines & Bishop 2006) etc.

As if this mosaic would not be bright enough, we will mention a number of 'inverse requirements' – fallacies typical for vision (Dorr 2016, 5-6) that need to be avoided: (1) linear projection fallacy, (2) ceteris paribus fallacy, (3) arrival fallacy. Some other typical 'pitfalls and pratfalls' were listed by I. Wilson: "Executive impatience, Failure of imagination, Failure to build consensus, Failure to solve short-term problems, 'Obsolescence through success', Lack of flexibility, Failure to implement." (Wilson 1992, 25) To overcome some of the difficulties mentioned above, such as failure of imagination etc., 'outsiders' may be useful, including women and children (Masini 2006, 1163-1164).

Visioning steps

Development of a vision is the only phase that is shared by highly diverse descriptions of the vision method. Depending on the case, the method can be applied with or without preliminary analysis of different environmental or internal aspects and can include certain post-visioning steps such as control of quality of analysis, review of implications of the vision, communication of the vision and, as argued by some authors, development of paths to the envisioned state. The latter case will make the visioning method equal to what we consider as *backcasting* here.

An attempt to create an integrative framework for visioning was made by Morden who suggested three steps: (1) development of a preferred image of future, (2) communication of the image to followers, (3) empowerment of the followers for implementation (Morden 1997). A similar, but somewhat more detailed process with more emphasis on preliminary analysis of environment is proposed by T. Stevenson (Stevenson 2006, 669-670). An example from the world of business can be found in the paper by Ian Wilson who proposed eight steps for corporate visioning, including analysis of the company's resources, management values, strategic objectives etc. and conducting 'sanity checks' (Wilson 1992, 22).

Some other execution-related aspects

In view of high variety of requirements to the methods, on the one hand, and similarity of the methods, on the other hand, it is difficult to define sharp differences in their implementation. However, some conclusions seem plausible.

First, backcasting is likely to be more costly. It follows logically from the fact that normative scenarios often include visions. The need to ensure implementation makes participation of broad public and/or experts a more probable requirement to backcasting than to the vision method and may increase costs additionally. Second, because of problem-oriented nature, backcasting is usually conducted as purposeful work on the stakeholder's side, including possible investment into social effects such as learning, networking, building shared understanding, creating involvement etc. Furthermore, normative scenarios are more likely to depend heavily on input data: if input data changes, the output of the method should also change.

Relatively higher complexity and costs limit use of normative scenarios in comparison with the vision method. Although not always mentioned explicitly, the outputs of normative scenario method are expected to be relevant to the customer and other stakeholders, to have optimum breadth, depth

and transparency. In distinction to a vision, normative scenarios are more often, if not always, required to be realistic, correspond to the selected time frames, provide logical and internally consistent pathways, including roles of actors, etc.

The vision method may be less reliant on participatory methods and involvement of experts, it can also be neutral to input data and/or be construed with limited data. Sometimes outputs can be obtained from non-stakeholders and practically without any investment – from science fiction, politicians or from freely available publications. As strong emphasis in development of a vision is usually made on communicative and appealing aspects of the output, additional investment may not be needed into societal effects such as creating emotional link with target audience.

Ambiguity of many success criteria for the vision method, their often unconventional nature make it difficult, if not impossible, to validate the outputs of visioning. In combination with seemingly lower complexity of execution, it makes a vision a thin ice for milestones it is intended to keep.

Both methods are suitable for combined use with other tools methods such as (1) participatory, (2) design, (3) analytical, and (3) management tools and methods (Quist et al. 2011, 885).

To summarize this section, normative scenario method is likely to be more costly, but also allowing for more ways to validate its outputs. The vision method tends to require less investment but involves higher risk, particularly in view of typically longer term for which visioning outputs are expected to apply.

Ethical dimension

Based on the evaluation framework for futures research suggested by Piirainen et al. (2012), on Ulrich's Critical Systems Heuristics (1994), the definitions of the methods, and literature mentioned above, some probable conclusions can be drawn. For convenience, they are listed in the Table 1 below.

Table 1. Some probable ethical characteristics of normative scenario method and vision method.

Questions	Normative Scenario	Visioning Method
What worldview is output based upon?	Based on someone's existing worldview	Often expected to create a new worldview. The new worldview is likely to be influenced by someone's existing worldview
Who determines purpose and measure of improvement?	Client	Author(s) (who convince clients, directly or indirectly)
Who should be involved in research?	Often aimed to involve all stakeholders, sometimes through representatives	Involvement of all stakeholders is desirable, but is likely to decrease the inspirational value of the resulting vision
What is the role of experts?	Experts are often key influencers	Experts are less important, often irrelevant
Who provides knowledge, expertise?	Knowledge is often provided by experts	Knowledge is often provided by the author(s)
How boundaries of relevant knowledge are defined?	Limitations and assumptions are more likely to be mentioned explicitly	Explanation of limitations and assumptions is unlikely to be provided, because it comes into conflict with form and intended use of the output
Who determines legitimacy of outputs?	Legitimate if supported by the client and other stakeholders	Legitimate if supported by the intended audience (can be broad public, not specific actors)

Conclusions

The vision and backcasting methods are flexible techniques primarily intended for research of preferable futures, sometimes with addition of possible and plausible futures. The vision method is more universal, while normative scenario method, or backcasting, is more specialized.

The vision method is better suited for less predictable situations requiring transformation, and for broad target audiences. It tends to be less costly, but also more risky. The normative scenario method can use the output of the vision method as an input. Being contextual, backcasting is likely to provide more possibilities for validation of its outputs, but is more sensitive to quality of inputs.

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FUTUS3 SYSTEMS THINKING

Systems thinking (6 cr) is an optional advanced course in Master's Degree Programme in Futures Studies. The idea of the course is to explore how systems thinking is a specific way of looking at the world and firmly rooted at the heart of futures studies.

Since the topic is from the outset very theoretical, we make in the course a great deal of effort to make it more concrete. This year this was done by looking at the university as a system instead of normal set of departments and faculties. By screening with students the present values of university – using so called Barrett value analysis – we encouraged them to express their view of how university should look like in the future, from systems perspective.

Professor **Markku Wilenius** runs the course together with a Dutch system expert **Peter Paul Gerbrands**.

The both essays chosen for this collection 1) by **Katariina Kiviluoto, Elina Nikula** and **Essi Silvonen** 2) **Isabel Bottoms** and **Otto Tähkäpää** provide a well-argued critique on current university as learning environment. Based on the framework provided in the course, both essays target at pointing out, how university education could be much more collaborative and down-to-earth by breaking down the existing tough barriers between disciplines and between teachers and students. Moreover, both essays point out, how only through more detailed understanding of the ways teamwork can be built into the learning processes, we may arrive at more fruitful learning environment. Relating to the objective of the course, both essays build very elegantly on the premises of systems thinking to crystallize the point they are making.

Systems Thinking University - An Environment for Learning and Growth
Katariina Kiviluoto, Elina Nikula & Essi Silvonen
Turku School of Economics, University of Turku

Introduction

Today's world demands interactive mode of operation. Therefore data, decision making and change will not follow each other linearly but they go on at the same time. Systems thinking is the field where things are examined simultaneously and where elements, interconnections and purpose form a pattern (TSE 2017a). In this essay we are applying systems thinking to the concept of university. The attempt is to bridge systems theory with the future of university. University as a concept will be examined from a general perspective and via examples we will demonstrate practical solutions that could be made to develop university as a system. The essay begins with a short look on systems and systems thinking from a theoretical perspective. Second, we examine the university as a system. Then we introduce a case study made in the Turku School of Economics' Systems thinking course. With the help of this case study we will introduce ideas and examples on how university as a system could develop its structures, performance and interconnections by adopting ideas from systems thinking. Finally, we discuss and wrap together the main ideas.

Theoretical background

According to Checkland (in TSE 2017a) a system can be defined as a set of connected elements forming a whole characterized by having properties of its own rather than of its component parts. In other words, a system is more than a sum of its constituent parts mainly because of the way the different components act and react to each other. Meadows (2008) defines a system similarly and adds to the concoction three main ingredients: elements (i.e. the different parts forming the system), interconnections (i.e. how the constituting elements are connected), and a function or purpose (the ultimate goal the elements serve). Thus, to properly function as a system, different elements should be interconnected and share a common purpose. On the other hand, taking away any of the constituting elements (e.g. a student or a staff member) should not pose a systemic risk as long as the interconnections and the overall systemic purpose remain the same. However, a lack of either a purpose or adequate interconnections is commonly regarded as a source of systemic problems (TSE 2017b; Meadows 2008). Furthermore, changing either the logic of the interconnections between the elements or the general purpose may change the entire system, even if the elements remain the same (Meadows 2008).

Checkland (in TSE 2017a) distinguishes between four main types of systems: natural systems (e.g. human body), designed physical systems (e.g. a city transport system), abstract physical systems (e.g. an equation) or human activity systems (e.g. a university). Meadows (2008) states that systems may be formed of subsystems. Thus, e.g. a university may have several subsystems such as different faculties or student unions which have characteristics and sub-purposes of their own, but should ideally support the whole system and serve the main purpose. However, as Meadows states, sometimes sub-purposes may be in conflict with the overarching systemic purpose which may create disharmony or increase entropy in terms of the systemic whole and pose a risk for systemic breakdown.

Ståhle (2008) distinguishes systems per their openness and dynamism. Closed systems are governed by Newtonian universal laws, and they tend to be static and machine-like. Open systems are

constantly evolving and interacting with their surrounding environment, and although continuously changing they tend to strive for a controlled change and harmonious equilibrium. Dynamic systems, on the other hand, tend to be characterized by radical uncontrollable changes, disequilibrium, continuous self-renewal and chaos. According to Ståhle (2008), categorising systems according to their level of closedness, openness and dynamism may be used to analyse how different systems work in practice. In addition, dynamic, open or closed systemic properties may be simultaneously detected in any system, i.e. a university may be mechanic in terms of e.g. grading, open in terms e.g. student admissions and dynamic in terms of e.g. constantly changing requirements of research funding.

Identifying the different characteristics of a given system helps to detect underlying systemic patterns which, according to Meadows (2008), support and produce certain kinds of behavioural processes which, to a large degree, determine the way a system functions and how successfully a system reaches its aims and fulfils its purpose. In similar vein, detecting these underlying patterns and tackling them may be the key in changing behavioural processes to better serve the general systemic purpose, or even to challenge the general purpose to better support the needs of the elements (TSE 2017a).

University as a system

Based on the core ideas represented in the previous chapter, we may determine the main characteristics of university as a system. If we follow Meadows (2008), we can see that university is made of specific systemic elements such as students, teaching staff, administrative staff, researchers and other staff. These elements are constantly interacting and interconnected in several ways leading to a multitude of different kinds of interconnected behavioural patterns. The university has also a core purpose, which is the ultimate purpose of the system and which should be supported by the behavior of individual elements. The university is constituted of several subsystems such as faculties which may have their own sub-purposes (e.g. increasing the amount of students and graduates, forwarding scientific knowledge, getting top-funding etc.). In addition, the university has simultaneously mechanic, open and dynamic characteristics all of which pose different needs in terms of the behaviour of individual elements. In addition, interconnections between the elements may be challenging to determine due to the interaction between the simultaneously open, dynamic and mechanic system, it's sometimes chaotic surrounding environment and the various behavioural patterns guiding the individual elements.

The survey and the method

In March 2017, eleven students from Turku School of Economics' Systems thinking course in University of Turku (acronym UTU is used in this essay) filled in a form with list of 95 different values. Students were instructed to select ten values for each column:

1) Students' personal values, meaning, what values are important for individual as a student of UTU,
2) Current values of UTU, meaning, what values would describe the current culture of UTU and
3) Desired values of UTU, meaning, what values would be liked to see in the future culture of UTU.

Every value in the survey described and belonged to one stage in the Richard Barrett's model of development of organisational consciousness (see figure 1.) (TSE 2017a). After the survey, the answers were placed on the Barrett's model to see the relationships of the chosen values with each other (figure 2.).

As it is possible to see from the overview of the survey's results in figure 2., students' personal values focused on levels four to seven where, according to Barrett's model, the stages in the development of organisational consciousness are in level four learning and growth, in level five internal cohesion, in level six external cohesion and collaboration and in level seven systemic (figure 1.). On the other hand, students' feelings of current cultural state of Turku University focused on level three: processes and structures. Descriptive values of this level are, for example, short term planning, short term focus, goals and results orientation, silo mentality, bureaucracy, productivity, achievement and professionalism. Thus, the desirable values are on level four (learning and growth). The desirable values lifted in the survey in this level were continuous learning, empowerment and innovation.

Stages in the Development of Organisational Consciousness

Positive Focus / Excessive Focus

Level	Category	Positive Focus	Excessive Focus
7	Systemic	Overseeing the whole system, service, Social responsibility, future generations, long-term perspective, ethics, compassion, vision	
6	External cohesion and collaboration	MAKING A DIFFERENCE partnerships, alliances, environmental awareness, community involvement, induvidual fulfillment, coaching/mentoring	
5	Internal Cohesion	GROUP CONTRIBUTIONS AND CO-CREATION Shared values, shared vision, commitment, integrity, trust, passion, creativity, openness, transparency	
4	Learning and Growth	CONTINUOUS RENEWAL AND LEARNING Accountability, adaptability, empowerment, delegation, teamwork, innovation, goals orientation, personal growth	
3	Processes and Structures	HIGH PERFORMANCE Professional development, Systems, quality, best practices, pride in performance	Bureaucracy, Complacency
2	Connections	RECOGNITION Loyalty, open communication, customer satisfaction, friendship	Manipulation, Blame
1	Basic Needs	STABILITY Shareholder value, profit, organisational growth, employee health and safety	Control, Corruption, Greed

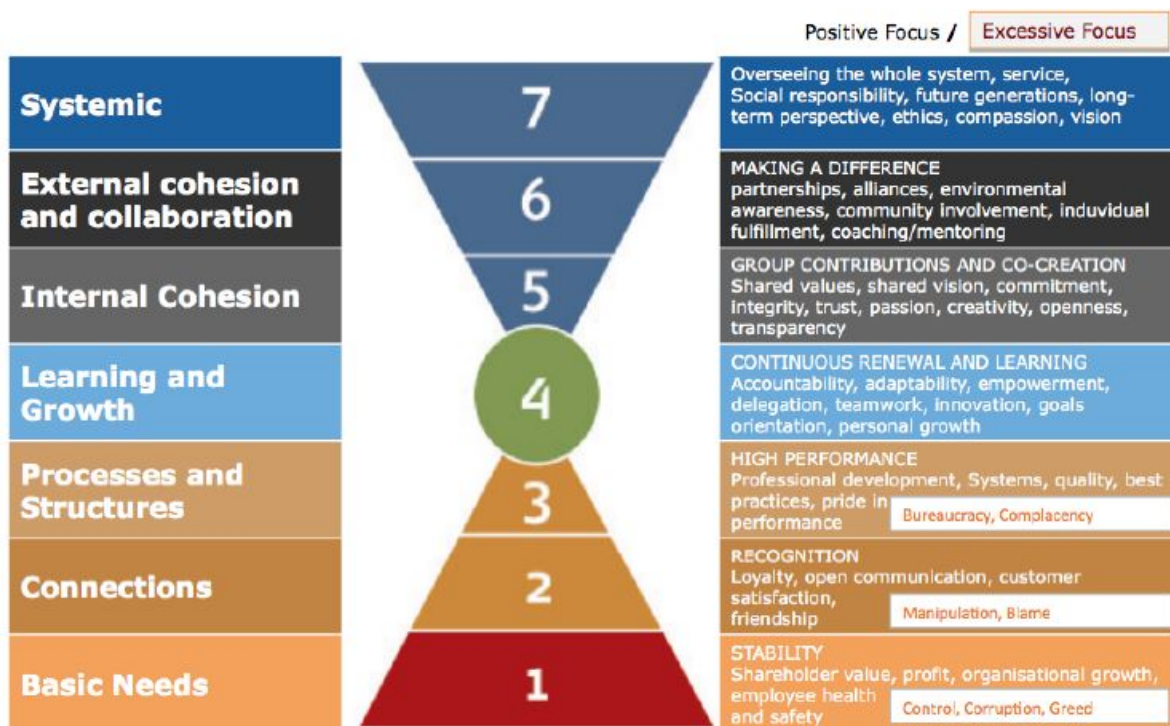*Figure 1. Richard Barrett's model of stages in the development of organizational consciousness (TSE 2017a)*

Rather interestingly, there is nothing in common in the students' personal values and the current culture of UTU. It seems that these do not meet at all. Instead, several same values were mentioned in both personal ones and desired ones (e.g. making the difference, continuous learning, long term perspective etc.).
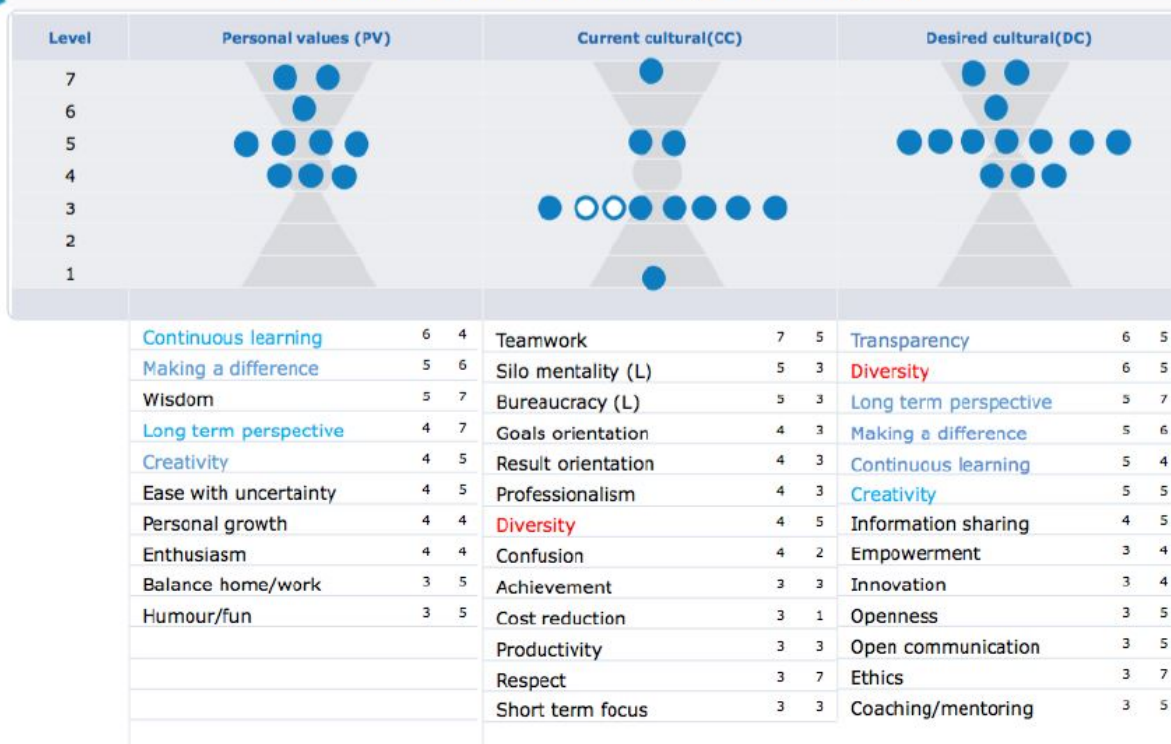
Students Systems Thinking course (11)

Level	Personal values (PV)			Current cultural(CC)			Desired cultural(DC)		
	Continuous learning	6	4	Teamwork	7	5	Transparency	6	5
	Making a difference	5	6	Silo mentality (L)	5	3	Diversity	6	5
	Wisdom	5	7	Bureaucracy (L)	5	3	Long term perspective	5	7
	Long term perspective	4	7	Goals orientation	4	3	Making a difference	5	6
	Creativity	4	5	Result orientation	4	3	Continuous learning	5	4
	Ease with uncertainty	4	5	Professionalism	4	3	Creativity	5	5
	Personal growth	4	4	Diversity	4	5	Information sharing	4	5
	Enthusiasm	4	4	Confusion	4	2	Empowerment	3	4
	Balance home/work	3	5	Achievement	3	3	Innovation	3	4
	Humour/fun	3	5	Cost reduction	3	1	Openness	3	5
				Productivity	3	3	Open communication	3	5
				Respect	3	7	Ethics	3	7
				Short term focus	3	3	Coaching/mentoring	3	5

Figure 2. Overview of survey's results about students' personal, university's current cultural and university's desired values.

Reaching towards Level Four

Universities has always been forerunners in society. This was especially the case before but it is true also nowadays. For instance, in South Africa universities take an active part in society with strong demonstrations against political corruption and students demanding equal rights to study without high costs. Thus, it can be argued that universities reflect the state of the society. In Finland apart from doing top scientific research and sharing the latest knowledge, universities can also show value leadership by promoting e.g. equality, co-operation, morality and responsibility.

Accountability and shared leadership is of utmost importance to increase empowerment which support these values. Especially, efforts are needed to respond to sustainability-related issues of which global warming and social inequalities are the most prevailing ones. Universities should take a stronger role in leading the society towards more sustainable lifestyles, not only through provision of knowledge, but also by engaging in practical projects. (Blass & Woods 2012, 117) Sustainability studies could even be made compulsory to students from all disciplines as a way of underlining the importance and criticality of these issues to civilisation and society. In order to show leadership, university should adopt an active position. Research and innovation needs to be turned into concrete actions and practical implementations. University should also actively seek cooperation and partnerships with companies, public government and NGOs. Some study modules or courses might also be organised in close cooperation with these partnerships. This could lead to the formation of an active network of shared experience

and collaboration platforms which generate innovations by combining theory with practise and by utilising the expertise of all actors involved.

Continuous learning, empowerment and innovation are the qualities most sought after in terms of the desirable future of university. In reality, these values are often also predicaments to each other. People need to be empowered in their organisational environment in order to harness their creativity and engage them in innovation both of which are needed for continuous learning. Universities are fostering continuous learning, empowerment and innovation through their research, but research activities often remain distant to students. With more transparency, these existing qualities of universities would be accessible to students and would encourage them to learn and appreciate these aspects as well.

Continuous learning

New core curriculum for basic education was implemented in Finland in August 2016. This curriculum emphasizes learning outside the classrooms, reforming existing working methods, promoting transversal competence skills, multidisciplinary learning and diversity in learning assessment. Transversal competence skills include cultural competence, interaction and self-expression, entrepreneurship, participation, involvement and building a sustainable future. (Opetushallitus 2016.) It should be noted that after ten years or even less these new learners with new sets of skills and expectations will come to study to university. Thus, university should be prepared for these new learners and also transform its ways to teach, co-operate and benefit from the competences of these new students.

Improving and developing further the personalized learning plan (HOPS) could be a good tool to plan one's studies. However, this plan should not only be the formal and bureaucratic sheet to fill in. Usage of HOPS as an evolving tool throughout the studies would enable the student to see a bigger variety of possibilities and help them in evolving their understanding. Naturally, the current HOPS does not offer much options, but the next version could be more interactive by giving suggestions based on student goals and interests, and work like a game for a student to plan one's future.

Another aspect related to continuous learning is personal growth which is crucial also for future careers. To enable personal growth the structure of the courses should be tailored to support this demand. In addition, lecturers and professors should have organisational awareness which also resonates with the idea that systems thinking is more concerned with process, rather than content (TSE 2017a). Stronger relationships and cooperation with working life as well as obligatory internships would benefit all parties. Employers would get latest knowledge and fresh ideas, the university would be more closely connected with society, and the students would get crucial practical skills and help in bridging theory with practise.

University staff most often do research, which means that continuous learning is taking place in the university´s system, at least in the level of content. Continuous learning may, however, occur and be promoted the other levels as well. Adaptability of an organisation is a sign of its ability to learn and evolve continuously. Still, there is often resistance in breaking the status quo when it comes to implementing new ideas, practises and ways of doing things (Beyerlein, Beyerlein & Kennedy 2006, 86).

Individuals are often reluctant to changing their own ways of doing their work. In universities this is sometimes shown in the practises of teachers and professors, who concentrate their continuous learning efforts in research instead of teaching. This may result in old materials, teaching without enthusiasm and concentrating on facts instead of encouraging students to get involved and interested in

the subject. University teaching would have a great potential to promote continuous learning abilities of students via teachers' enthusiasm to share the newest ideas and innovations with their students. From a student´s point of view, lectures should rather be inspiring and insightful than merely factual. Facts can and should be read from literature, however, lectures should also inspire students to seek information about the subject themselves.

Personal growth and tools enabling this are instrumental in continuous learning. By creating an environment for fostering personal growth, universities will have the chance to lead the way towards a learning society (Wikipedia 2017). For example, building and promoting a mentoring program, where undergraduate students could be mentored by graduate students and graduate students in turn by post- graduate students, researchers or already employed graduates could form an environment of ongoing development. This mentoring program could guide the students towards finding their own educational and professional development path. This type of a program would also bring more vertical communication in the system, which is often lacking.

Empowerment

In the current situation, university's activities tend to be one-way processes: professors and teachers teach, students learn, write assignments, essays and exams, which are evaluated again by professors and teachers. This one-way process often makes the student feel that the work they are doing is disconnected from the real world. So, how to reduce bureaucracy and hierarchy? Systems have to take account its whole capacity (TSE 2017a). This is especially true the field of education, which is a human centric field. Educational systems do not behave mechanically but more like an organism where various relations and interactions form the main components of a system (Twal 2017; Ståhle 2008).

Consequently, the assignments and essays the students produce should be done for "real life needs". The aims of these assignments should benefit both the system and the students' personal growth and empowerment. In addition, closer or at least less formal relationships between students and staff increase dialog, make the studying environment safer both of which may also increase innovations. According to Ståhle (2008, 12): "if there is not enough communication, the system cannot function properly". Thus, the university staff needs to be present among the students. There has to be enough time to build relationships among the staff and students. One way of increasing the interaction could be informal "coffeeshop-type" meetings (e.g. monthly) where staff and students can meet, talk and share ideas.

It is understandable that there are budget related issues in allocating staff resources towards students. However, what if the allocation of time would happen through joint projects with staff, especially in the graduate level. Allocating more time and creating joint student-staff projects, would probably increase motivation, sense of empowerment and accountability. This would also enhance the quality of assignments and other outcomes of the studies and over time even create innovations. By engaging the students to joint projects in e.g. university administration and development, the students would feel more belongingness to the university system and their role would become more significant. This would have the potential to create lasting personal contacts and open the collaboration between various actors of the system.

It would be important make the university system more transparent to all actors, including students. Generally students do not have a clear picture of the system they are part of. However, information is an essential part of empowerment, and it is needed to form a holistic view of the roles of

different actors. It is also essential in suggesting and enforcing change. (Beyerlein et al. 2006, 123). In addition, to current channels of communication, it would be beneficial to create vertical and horizontal communication channels (Beyerlein et al. 2006, 105). In university surroundings this would mean more communication and cooperation between faculties and more multidisciplinary research projects. Multidisciplinary projects would also prepare students for working life, where people often work with interdisciplinary groups. At university level, an increase in horizontal communication would bring greater transparency and increase systemic knowledge of all the participants. An increase in two-way vertical communication would enhance communication between the administration and students. Administration would provide more concrete information about factors affecting the functions of the system (laws, budgets, operations and structures) and students would get a direct channel to get their voices heard in decisions concerning them. With regards to the realities of the system it might be beneficial to give the students an opportunity to participate in university development projects and build e.g. alternative budgets for various university operations. This would give them an insight of how the system works and offer them a way to take part in the decision making processes.

A practical approach that Finland Futures Research Centre could take would be to arrange a futures workshop which would involve the students and staff to design the future of their university. University is, as well as system, a community and in that sense an appreciative inquiry in the form of futures research might bring beneficial insight to support future development of university. In addition, this would create the much needed arena for communication and collaboration for students and staff. The method of choice could be, for example, the 4D approach which consists of phases "Discover", "Dream", "Design" and "Destiny". By first discovering the issue at hand, then dreaming of what could be, then continuing with designing the potential action and at the end creating and implementing change new insights might surface which could then be used for further development. (Hindsworth & Lang 2009, xiii) Participation in the process of developing the community would enhance commitment and engagement through empowerment.

Innovation

The demands of future working life seem to entail collaboration and teamwork. Even though it might be relatively easy to collaborate, it is not always as easy to have an impact. In addition, teamwork does not always come spontaneously. Successful teamwork needs a shared vision and a purpose that all participants can value. Therefore, teamwork is also one of the skills which should be taught and coached. Teams are often intercultural and a shared understanding how to build a team, how to work in one and how to prevent and solve potential conflicts will increase the appreciation towards others' views and ways to work. For example, trust is highly valued in Finnish culture. Not only do the Finns trust their colleagues to do their part of the job, they also trust the government and the authorities (police, doctors) to do the work which has been assigned to them. Trust could in cross-cultural teams mean:

- Reliability - keep promises
- Openness - of information
- Supportiveness – team members care about one another
- Transparency – of aims and goals
- Inclusiveness – all members are involved equally

As mentioned before, multidisciplinary cooperation should be increased also in universities. This demands true cooperation between faculties both for staff and students. New innovations could be possible through teamwork and practical projects.

The Finnish "The builders of the century challenge" competition, which seeks solutions to help build a better future for young people, is a good example of teamworkorientated projects which seeks new innovations. Through multidisciplinary cooperation projects the amount of one-sided science stories could be reduced, and people could be shown the world in all its complexities and from multiple perspectives.

A potential tool for inspiring innovation that universities could benefit from are Creative Foresight Spaces and Futures Windows. Basically, this would mean providing hybrid spaces for innovation that would present and offer inspirational stimulus towards innovative thinking. (Heinonen & Hiltunen 2012, 248-250) These types of spaces would be open for all, evolving and contributing to a shared experience for the community.

The external environment and support systems are essential factors in fostering innovation. Innovation occurs partly as a response to external pressures but usually these pressures inhibit creativity in the long run. (Beyerlein et al. 2006, 91). The phenomena of having too much on the plate is common in the business world as well as in universities. It seems that constant rush is a constraint in many of the university functions as well. This combined with uncertainties about future funding may cause pressures that decrease the level of creativity and innovation. The situation is visible for students in the amount of simultaneous assignments and readings but it can also be a prevailing fact in the work of staff and researchers. This is becoming a question of performance versus quality. Would it be possible to do a somewhat less but create better quality? Rush and excess work often results in a feeling of inadequacy which may lead to guilt and stress. If this development could be disrupted by providing more time and less pressure, the level of innovation might increase.

Although usually thought as an innovation fostering environment, the university alone cannot create innovations. University is just one system in the jungle of other systems all affecting to the emergence of an innovation culture. One other system with a significant effect is the city where the university is located. The surrounding city largely determines whether the students and staff feel comfortable, have enough parks and recreation, affordable housing, accessible health care and services for families and manageable commuting. The city also determines whether there is enough economic action to provide employment for students while they are studying and after they graduate. The city can also boost innovations by offering support systems for start-up entrepreneurs and other businesses. These systems combined both foster the emergence of innovation and give innovations surroundings to grow, mature and change.

Summary and Conclusion

We have considered the university from the perspective of a student and recognize that a wider variety of practical ideas would rise from a more diverse background of authors. Our point of view has been formed by the TSE and more specifically from the perspective of Futures Studies and we recognize our limitations in referring to the whole university. We have suggested various concrete actions that could be taken to change the university to the direction we see it should be heading. It is interesting to consider what the trigger point, i.e. a characteristic of a complex system enabling the whole system to change, could be in the context of our analysis. Since the university is a social system, some aspects

could be drawn from social sustainability. One prevailing factor in both our suggestions and the survey is participation or at least the possibility to engage in participation. Although there are ways for students to participate in the current university, these possibilities often remain in the superficial level and fail to influence the system. Participation requires openness and transparency, both of which seem somewhat absent in the current departmentalized structure of university. Perhaps tearing down the mental walls between the various departments would be a trigger point. We are tempted to suggest that tearing down not only the physical walls but also bringing people in more random and unintended communication with each other would enhance collision and connection of ideas. As this is understandably impossible as a short term solution, we would like to see that over time current quarters were to be replaced by hybrid and multifunctional spaces. This might enable openness and transparency to have more space in the system. Brief note regarding the stages of development of organisational consciousness. In this essay we have mainly considered transition from stage 3 (Processes and structures) to stage 4 (Learning and Growth). However, according to the survey, students feel that in some values like diversity, teamwork and respect, university has already reached higher stages of development. Therefore, it is important to point out that development does happen continuously in different levels and stages depending on the values of the stakeholders and especially those showing leadership in the system. Development may also take a negative turn or stagnate. In addition, reaching higher levels always demands that the previous levels have reached a status quo, i.e. that these levels work without primary concern and thus the effort may be directed to higher levels.

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From Group Work to Teamwork – A Systems Approach

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Introduction

System not just a collection of things but rather an entity characterised by the fact that it is more the just sum of its parts. In other words, systems consist of interconnected elements that are coherently organized in the manner that it achieves something (Meadows 2008, 11). In this respect, a university constitutes a system as much as a football team, factory or a city. From systems perspective, a university itself, however, is part of a larger system context (cf. Gerbrands) – the society (about system boundaries cf. Dufva 2015, 20). The global megatrends such as globalisation, rapid technological development, ageing population as well as the sustainability crisis along with slowing economic growth rates are expected to initiate a systemic change in Western industrialized societies in the near future (e.g. Sitra 2016). Furthermore, the megatrends are expected to revolutionize the way we perceive issues such as work, labour, livelihood and well-being (Dufva et al. 2017). Evidently, this systemic change is anticipated to have a huge impact on universities' future as well.

Subsequently, universities in Finland are already under systemic change and in enormous pressure to adapt, renew and transform themselves to better correspond to the rapidly changing operational environmental and anticipated future challenges. Consequently, the universities have been forced to consolidate their budgets, raise private funding, impose tuition fees for foreign students and to the change the contents of degree programmes among many examples. The pressures have had its impact on the teaching methods as well: for example, Turku School of Economics (TSE) states in the intranet page that the teaching is designed so that it "responds to the needs of business life (TSEa)." Hence, our interpretation and one the starting points for this paper is the assumption that emphasizing group work as a teaching method should be understood as a means for TSE to adapt to the changing expectations of the working life in general and business life in particular.

Despite the TSE strategy emphasizing on high-quality learning experience, students' participation in designing the courses and programmes as well as close contact, dialogue and interaction between the students and teachers (TSEb, 12–22), this might not entirely reflect the student experience. This supposition is support by the results in a brief value survey conducted by Peter Paul Gerbrands during the Systems Thinking course. An excessive focus on "teamwork" emerged in the results which, however, was revealed to denote, for the students, a synonym for group work – a common teaching method TSE. Hence, in this paper focuses on TSE group work analysing the issue from systems perspective.

The paper proceeds so that in chapter two we first have a concise overview on the origins of systems thinking followed by a broader discussion on the characteristics and definitions of systems thinking before briefly examining systems thinking from Futures Studies perspective. In chapter three, we proceed first by identifying the key components constituting a Finnish University system and then moving to framing our challenge in analysing the TSE group work from systems perspective and finally providing our view of student experience in group work. In the fourth chapter we provide our suggestion for leverage points to intervene to renew and fulfil the purpose of group work as self-organizing systems.

Finally, we conclude our paper by summarizing our main findings and suggestions for TSE to support group work developing into actual teamwork.

What is Systems Thinking?

Origins of Systems Thinking

In general, systems thinking can be defined as an approach used to comprehend complex real-world phenomena embracing holism and emphasizing interconnections and interdependency within a system (Dufva 2015, 20). Hence, a system is defined by the properties, not its component parts. In this sense the emergence of systems thinking has marked a considerable shift Western scientific thinking in the 21st century from "seeing the parts" to "seeing the whole" (Floyd 2008, 138).

Systems thinking emerged in the 1920s in several disciplines, mainly in engineering and biology exploring the properties existing only when the parts have combined into a whole. Since 1920s, systems thinking has gradually evolved into a theoretical approach widely used in many different disciplines. The 1940s marked the segregation between open and closed systems, as well as the recognition of the importance of feedback loops. However, it was not until the following decade when systems thinking developed into full-fledged academic subject. (Systems thinking reader).

The development of the field of systems thinking accelerated following the Second World War as Britain and United States invested in interdisciplinary teams of scientists such the RAND and SRI International (cf. Bell 1997, 29–31) to discover and apply new inventions in science and math to defence (Leonard – Beer, 2). In the 1950s, systems engineering and systems analysis emerged with the similar intention of designing or changing the systems in order for the systems to operate as effectively as possible and to achieve its goals. Furthermore, in the 1950s–1960s, one of the most influential proponents of systems thinking, Ludwig von Bertalanffy introduced his general systems theory (Dufva 2015, 21). The results of applying these ideas, known as the 'hard systems approach', into social systems during the following decade were, however, disappointing. Consequently, the 1970s witnessed the realization that in human systems, the objectives are various and often in contradiction. Hence, the concept of 'chaos' was introduced to systems thinking and modelling of systems as well as systems design grew in popularity in the 1970s–1980s. The influential Limits to growth report was published in the late 1970s forecasting the resource depletion based on system dynamics (Dufva 2015, 21).

However, it was not until the 1980s and 1990s when systems thinking was popularised to the public and experts, mainly due to the work of Peter Senge whose main contribution was the introduction of systems archetypes which represent recurring patterns of influence found in various systems (Systems thinking reader). Over the recent years, systemic view to the world has increased its popularity as a response to increasing uncertainty and complexity resulting from deepening interconnections and the pace of communications. Consequently, the wide range of approaches, tools and methods has proliferated considerably (Leonard – Beer, 3).

Characteristics of Systems Thinking

In the present day, the concept of 'systems thinking' is widely used in academia, management practitioners and consultants, but there is little or no consensus on the actual meaning or definition of 'systems thinking' and whether it constitutes a specific set of theories.

According to Ståhle, 'systems thinking' or 'systems theory' is an overgeneralization and inaccurate label that hides the complexity of the scientific theory behind analysis of systems. She writes that every reference to systems thinking or theory must be "explicitly anchored to a certain systems paradigm or at least a systems tradition" (Ståhle 2008, 6). The author expresses this opinion because there are three core paradigms to systems thinking, each of which presents complementary and contradictory aspects in relation to each other, and can be chronologically placed in the history of the systems thinking epistemology. They are: closed systems, open systems and dynamic systems (Ståhle 2008, 5–6). Dynamic systems represent the most recent thinking in systems theory, emphasising self-organisation, self-renewal and innovation. Understanding the presence of multiple paradigms of systems thinking is therefore key to better understanding the systems under the microscope, there is a dynamism and tailoring of analysis needed.

Despite disagreement over defining systems thinking, the term has come to represent an interdisciplinary view of the world which conceives real-world phenomena as systems emphasizing interrelationships and interconnections (Kefalas 2011, 345). Furthermore, whatever the preferred theory of systems, there are some generally agreed characteristics common to all systems: elements, interconnections and function or purpose.

Elements do not have to be physical things, intangibles are elements as well. Some interconnections are physical flows, but many interconnections are flows of information. The purpose or function of a system is often difficult to detect as it is unspoken. Deducing a system's purpose is often easiest by watching and detecting its behaviour (Meadows 2008, 13–14). The systems, however, do not necessarily consist only one purpose but there are often numerous sub-purposes as well. One way of comprehending the relative importance of purposes and sub-purposes is by imagining them changed one by one. Distinctive to systems is "integrity" or "wholeness" and mechanisms that maintain those characteristics despite the ability of systems to change, adapt and respond to disruptions. Hence, systems are resilient as well as evolutionary and in some cases, self-organizing and self-repairing. (Checkland 2011; Meadows 2008, 11–12).

In order to avoid further academic quarrels, in this paper systems are considered "an interconnected set of elements that is coherently organized in a way that achieves something" according to Donatella Meadows' definition. This report will also apply Ståhle's prerequisite that 'systems thinking' is paradigmatically defined according to the system in question.

Systems Thinking in Futures Studies

In Futures Studies, systems thinking has been closely connected to the emerging complexity and subsequent need for more holistic approaches that address complexity (Mannermaa 1988, 288–289). Futures Studies has accepted that a systemic understanding of the world is necessary for its foundations and 'systems thinking' (in the representative rather than scientific sense), has firmly taken root in the epistemology of the field. It is clear that systemic understandings of drivers of change enable better quality foresight that is more representative of the complex reality foresight must assess. Or, in another example, understanding human system dynamics in history can lead to pattern identification such as the Kondratieff Waves, and Professor Wilenius' theory of the Sixth Wave (Wilenius, 2017).

Subsequently, systems thinking has had a major influence in theoretical approaches as well as the practices of futures studies. In general, it can be concluded, however, that in futures studies and foresight, systems thinking has been perceived first and foremost as a theoretical framework rather than

seeing foresight itself as system instead of a process (Dufva 2015, 22). Furthermore, as noted by Floyd (2008, 140–141), it is crucial to distinct systems thinking from systems theory. According to Floyd, systems thinking is ultimately an epistemology – a view to how the world is perceived. Systems theory, on the other hand, is more of an abstract, theoretical framework describing the world emerging from perceiving the reality consisting of systemic relations. In this regard, systems theory as an epistemology provides the foundations to theories about systems. Furthermore, the intellectual endeavour to understand and develop responses to complex, systemic problems constitutes for systems intervention methodologies.

With regards to Futures Studies, the ability of systems thinking in explaining the reality should not be exaggerated. Even though it is luring to presume that thinking of systems or systems approach to social phenomena would be the key to control systems or the make the systems work, this is not the case. As noted by Meadows (2008, 167–168), "self-organizing, nonlinear, feedback systems are inherently unpredictable" and furthermore "goal of foreseeing the future exactly and preparing for it perfectly is unrealizable."

Setting the Boundaries

Identifying the Systemic Qualities of a Finnish University

There is general consensus that there is not one type of system, instead there are multiple types and dynamics of systems. They can primarily be categorised into four: natural systems, designed physical systems, designed abstract systems and human activity systems (Systems thinking reader). All four can then be open or closed in their interaction with the environment; over which they can have some influence (though not power) or no influence at all.
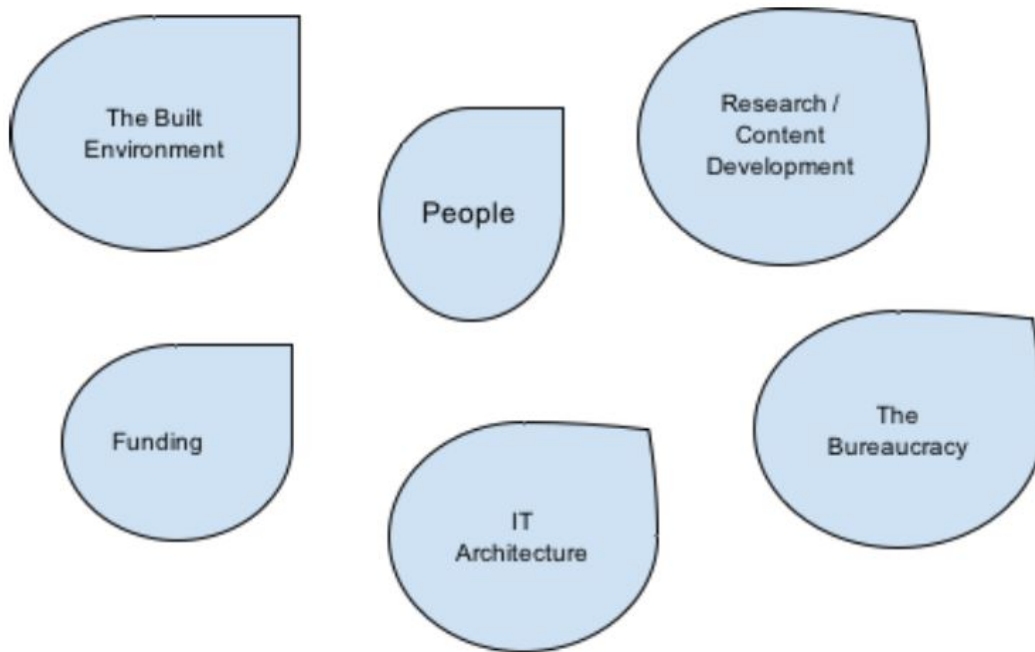
In thinking about an average Finnish University as a system, we can identify multiple types of system co-existing, interacting and impacting each other at once. A University will have its natural surroundings and environment that contain the University's relationship to natural systems, influencing for example, freshwater run off into the river due to concrete car parking area.

A University contains designed physical systems, namely a campus for accommodating and teaching students, and hosting research and learning within buildings built for such purposes. Universities manifest designed abstract systems, for example its organisational structure. The system by which students, administrative staff, teachers, researchers, business, government and the scientific community experience the University's facilitation of relationships through hierarchy, bureaucracy, information technology architecture and status could be called a designed abstract system.

Finally, Universities are also large manifestations of human activity systems. It is argued that such systems cannot be objectively interpreted in the same way as the other three, but they can be analysed. In this context we suggest that the human activity system of the University are all the human relationships, networks, dynamics and information flows that cannot be objectively known, but fill in the gaps and bring to life the other three types of system, creating a University as a dynamic learning community of interactions facilitated by the foundations of a campus, organizational structure and the surrounding environment of Turku at UTU for example.

After identifying the four types of system operating simultaneously within an average Finnish University, we can see common components and dynamics across each type of system.

The common components can be summarised as:

Subsequently, the common dynamics affecting the four systems in the Finnish University system include:
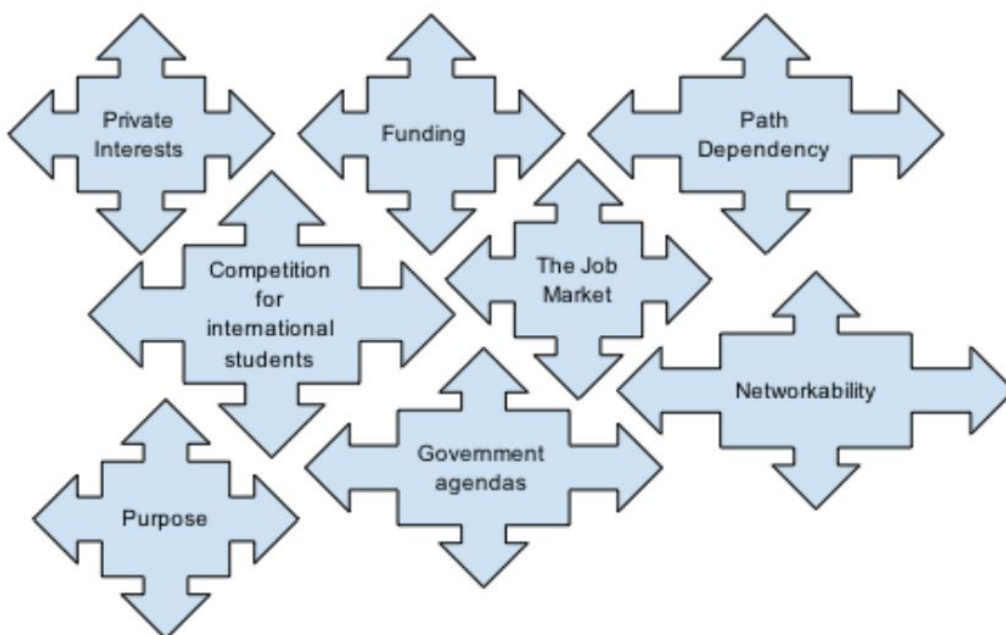
The Systems Thinking Task: Defining the challenge

In thinking about the Finnish University as a system, the process was started by Peter Paul Gerbrands and Professor Wilenius in the FUTUS 3 Systems Thinking classes. Using a values surveying tool, the eleven systems thinking class participants were asked to choose from amongst 100 different values

listed in front of them, assessing their personal, current and desired values as manifested at the University of Turku (UTU). The survey results were then aggregated and placed on a table to enable a graphic picture of the results according to their levels of 'organisational consciousness' on a scale from one to seven, as defined by Richard Barrett (Turku School of Economics, 30th March 2017, slide 2). The results are summarised in the graphic screenshot below:

Students Systems Thinking course (11)

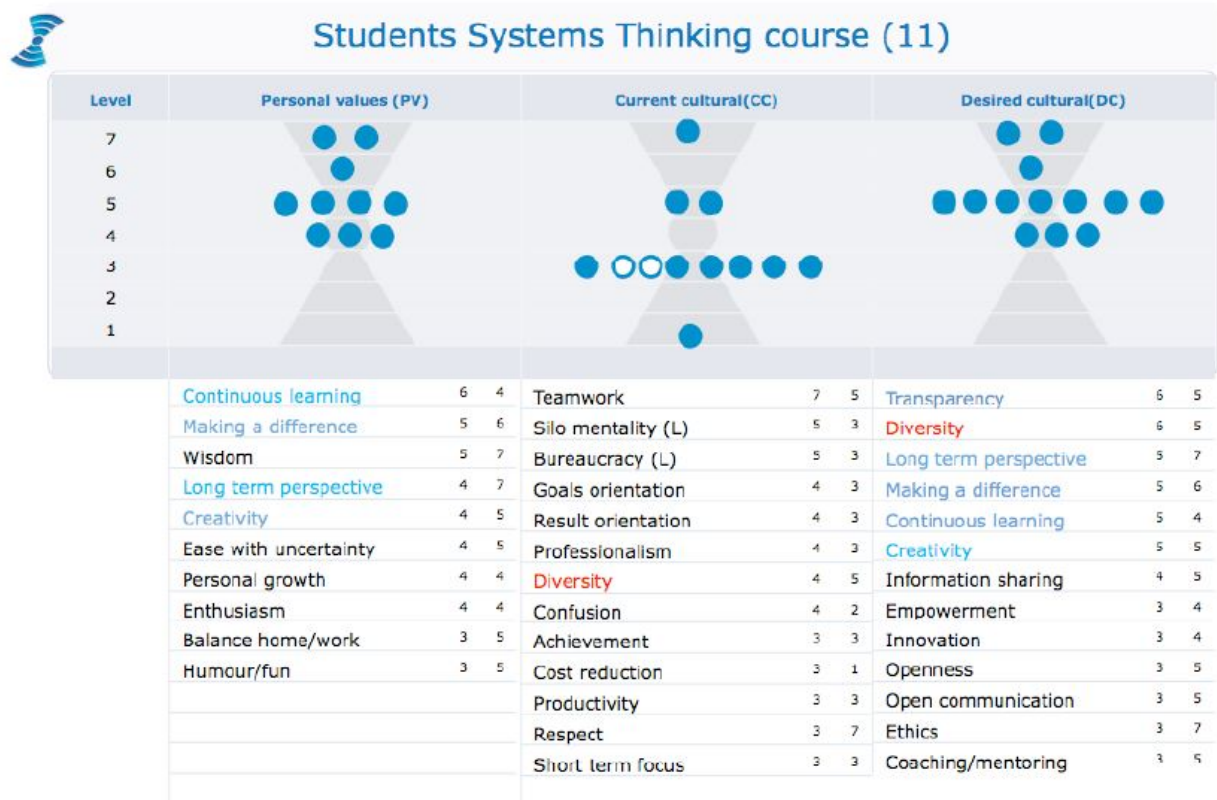| Level	Personal values (PV)			Current cultural (CC)			Desired cultural (DC)		
	Continuous learning	6	4	Teamwork	7	5	Transparency	6	5
	Making a difference	5	6	Silo mentality (L)	5	3	Diversity	6	5
	Wisdom	5	7	Bureaucracy (L)	5	3	Long term perspective	5	7
	Long term perspective	4	7	Goals orientation	4	3	Making a difference	5	6
	Creativity	4	5	Result orientation	4	3	Continuous learning	5	4
	Ease with uncertainty	4	5	Professionalism	4	3	Creativity	5	5
	Personal growth	4	4	Diversity	4	5	Information sharing	4	5
	Enthusiasm	4	4	Confusion	4	2	Empowerment	3	4
	Balance home/work	3	5	Achievement	3	3	Innovation	3	4
	Humour/fun	3	5	Cost reduction	3	1	Openness	3	5
				Productivity	3	3	Open communication	3	5
				Respect	3	7	Ethics	3	7
				Short term focus	3	3	Coaching/mentoring	3	5

Figure 1. Results of values survey on FUTUS 3 2017 Students, 30th March Source: Turku School of Economics, Slide 3.

Whilst it must be stated that the sample size was very small, and from only one subject group (although containing multiple majors), the convergence on certain values within this small group has created the focus on "teamwork" as an intervention to focus on within this report, as it was generally felt to have "excessive focus" in Barrett's terminology. The intervention and analysis is presented in sections four and five below.

This small exercise does not shed light on the UTU system as a whole, if that is possible, it shows one perspective of one component with the wider UTU system – that of students. Even though the phrase "teamwork" was used in the values survey, there was general consensus in the class discussion that people chose it as symbolising what is called 'group work' within the UTU system.

Assessing the TSE strategy, there is no clear vision for group work's role in the TSE system. Therefore, if we extract the role of group work from Barrett's levels of organisational consciousness, teamwork is represented as level 4 'Transformation'.

Manifesting "Continuous renewal and learning" through "accountability, adaptability, empowerment, teamwork, goals orientation and personal growth" (Turku School of Economics, 30th March

2017, slide 2). This implies that group work has transformational potential with the organisational system of TSE, which in turn could positively impact all the University's systems. To achieve this, group work is offered as a 'self-organising system' of work for students to earn some of their credits. To better understand whether the group work element of the TSE system fulfils its transformative purposes, group work as an open, dynamic and self-organising system is analysed below.

These authors would also classify group work as the 'adaptive capacity' of the UTU system as it can be defined and redefined with each iteration (i.e each time group work is set), making it a non-static part of the four systems that make up UTU. As such, this adaptive capacity must be nurtured to offer the best conditions for it to flourish.

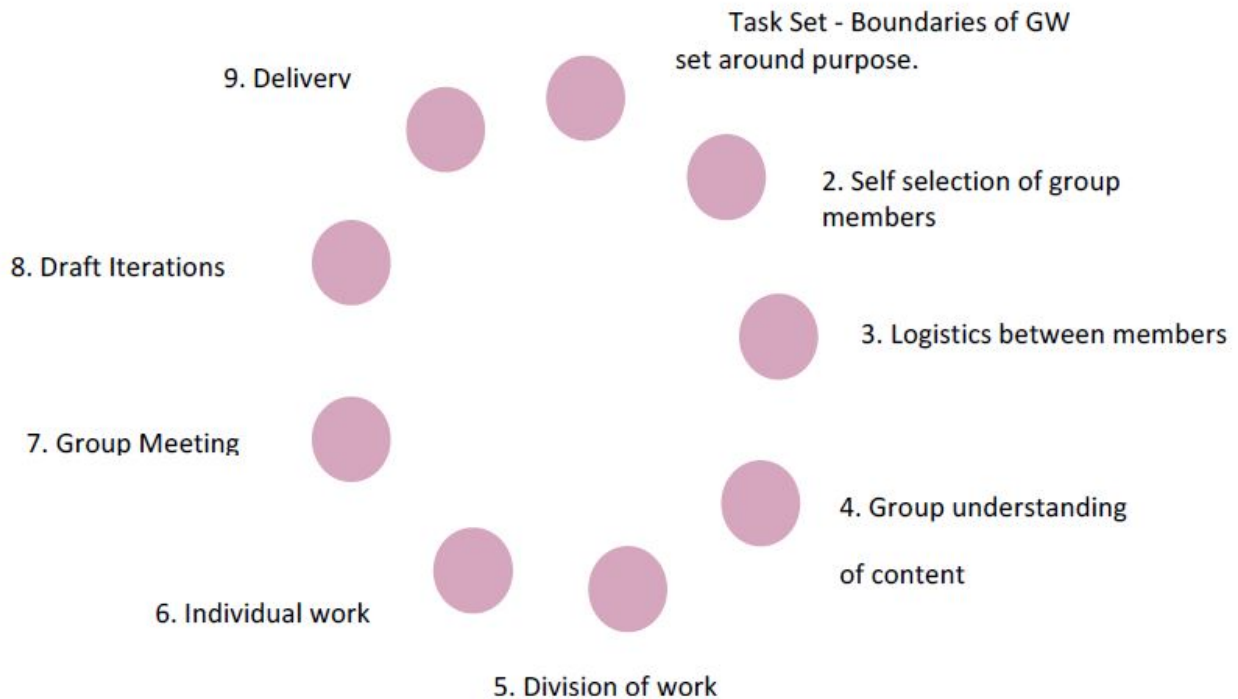*The Student's Experience of Group Work at Turku School of Economics*

Taking an egocentric and anthropomorphic viewpoint from which to map the student experience of group work, this report now focusses on the Turku School of Economics' use of group work, rather than the UTU system as a whole. This is in order to maintain the validity of the conclusions from the authors student experiences, which have been restricted to within the TSE system.

As an ethnographers and participant-observers (cf. del Cerro Santamaría 2015, 57) of TSE teaching, we argue that typical student experience in group work is characterized by the following factors:

- the students are unaware about the purpose, expectations and evaluation of group work (i.e. content vs. process/skills)

- the group work consists of several implicit and unvoiced sub-purposes likely to be contradiction to each other (i.e. learning, slacking, grades, credits...)

- the students have very different acquirements for working in groups due to their background, training and upbringing (i.e. peer-to-peer vs. hierarchies)

- students are uncertain about the advantages of working groups (v. individual work)

- the external boundaries (time-scale, physical facilities, external work load...) do not support face-to-face interaction, the development of learning strategies or iteration in group work

- the students in general lack the necessary tools and skills to deal with problems they encounter while doing group works as well as the means to systematically learn from past experiences.

Comparing the transformational organizational purpose of level four teamwork as defined by Barrett, with a student perspective, there are some differences in how the purpose of group work at UTU is perceived. In having been within the group work system at UTU both as actors and observing, the authors also found employment skills, getting to know other students better and developing relationships, saving staff time, building teamwork capacity, leadership development and developing independent knowledge and critical thinking as some of the intended purposes.

From our group work experiences over the period of eight months, the authors have characterized the current group work system like this:

Task Set - Boundaries of GW
set around purpose.

9. Delivery

8. Draft Iterations

7. Group Meeting

6. Individual work

5. Division of work

2. Self selection of group members

3. Logistics between members

4. Group understanding of content

In summary, it is a system made up of elements that do not support the transformational purpose of the group work system.

As the system malfunctions its way to repeated and staid outcomes, it moves away from its naturally dynamic state the more that it is repeated. Group work becomes a formalistic exercise in which elements are replicable and separable into individual tasks not inter-reliant, interrupting the information flow dynamics necessary for a functioning self-organising system and removing the complexity andcontinuous learning possibility of group work.

A lack of transparency in the process initiated by the course teachers leads to a poverty of information flows, feedback systems and evaluative criteria. Finally, the lack of interaction between group work systems for different courses misses out on informative interactions and added complexity, rendering each group work system as closed to its environment.

The final section below defines what an intervention for group work that reestablishes this adaptive and innovative capacity for TSE could look like.

Developing a Systemic "Teamwork" Intervention

"To achieve the capacity for self-renewal, it is necessary to amalgamate and integrate different kinds of expertise, interests, people and organizations. The management of these complexities presents a huge challenge for every organization, and cannot be adequately met without an internal capacity for self-organization." (Ståhle 2008, 2)

According to Prigogine, for a self-organising system to fulfil its purpose it must have the following five core aspects:

1. be far from equilibrium, at the edge of chaos;

2. create entropy, as excess energy produced by the system is needed to cause instability and push the system away from equilibrium;

3. iteration, through a continuous, highly sensitive feedback process which distributes information to the whole system, facilitating self-renewal, fractals, spontaneous reaction and adaptation to change.

4. bifurcation, where the system has a genuine choice without a predictable outcome, new solutions and innovations are generated;

5. time, in relation to subjective time where the system creates its own history from its own choices (Ståhle 2008, p.7).

In human activity systems, in particular self-organising systems, it is a relationship of interaction, nothing is manageable in the traditional management sense. And yet, that is the established format of group work that self-organising has led to at TSE. Through difficult and negative experiences where students have not felt able to reach the quality of output or experience in their group work that created a positive feedback cycles, they have come to a way of group work that stabilises the interactions and knowledge feedback processes as much as possible, individualized the work so that each contribution can then be grouped together to form a piece of group work that doesn't necessarily represent developed systemic relationships or new knowledge. It is the authors views that without an introductory course or session on how to harness group work effectively, as a system of people and as an individual that is one entity within the system, the enabling setting for facilitating innovative, empowering and transformational group work have not been created by TSE.

Moreover, not only are the individual group work systems per subject malfunctioning, the network of group work systems across TSE are not connecting up into an effective group work ecosystem which students can experience. Intra systemic systems must be both non-linear and based on feedback for iteration to function properly. This requires that each course that is conducting group work with students during a set period, must connect up with other courses on that programme during that period, to ensure that they are complementary not competitive. In her book, Donatella Meadows (2008, 145–165) identifies twelve leverage points, a places in within a system where small change could lead to a considerable large shift in behaviour. Subsequently, based on Meadows framework, this report identifies the following leverage points and interventions for building better teamwork and adaptability of the UTU system through group work:

❖ <u>Paradigms</u>: by imbuing a sense of the paradigm in which group work takes place and is set within TSE, Futures Studies and each course, students initiate their group work with a sense of the context in

which group work arises, the mind-set with which the TSE system approaches group work, and its goals, structure, rules and parameters.

- Intervention (1): To create a TSE group work manifesto, that orientates group work within the TSE system, TSE's commitment to supporting transformational innovation spaces, the benefits of group work and purpose for students, with a customised subject-specific section from the field of studies students are in.
- Intervention (2): Creating more designed physical systems specifically for group work meetings, encouraging face to face group collaboration over individual work. For example, there is often a lack of space to work away from the library space in TSE, with groups often resorting to the canteen.

❖ <u>Goals</u>: the purpose or function of the system must be clearly set out. As such clear communication of the goals of group work for the purpose of that course should be communicated each time a group work is set.

- Intervention (3): A good working example was set in the Futures Studies Case Evaluation course where the first task of groups was to co-create a one-page document agreeing on their members, mode of work, subject of the work, timeline and how to address conflict. This clearly required group members to understand the paradigm and goals, and to translate them into a commitment to themselves and the group that they had accountability for during the course of the group work.
- Intervention (4): The goals of the group work for that course must be outlined from the beginning of the course on the Moodle course page as well as in the class.

❖ <u>Self-organising</u>: the power to add, change or evolve the system's structure by students is inherent in the group work format of work. However, effective selforganising that fulfils its transformative innovation potential is not an inherent capacity or body of knowledge that every student has. This is particularly true for example, if an international student comes e.g. from an authoritarian context, selforganising can be a deeply uncomfortable and unknown experience that alienates them from the work of the majority who are familiar. As such, self-organising is a mind-set, it's an organising capacity that is learnt, and there are tools that make self-organising easier, more effective and more impactful.

- Intervention (5): a written handbook in Finnish and English, offering background, basic foundations for organising in groups, basic tenets of how to discuss, brainstorm, input and facilitate without negatively impacting or being excluded by the group's dynamics.
- Intervention (6): an intensive, obligatory, short course in facilitation skills that teach each student how to be a constructively contributing individual in group settings, how to facilitate groups as a whole for cohesion and effective innovation, applying systemic thinking, and how to self-organise as a group for the purposes of academic group work.

❖ <u>Rules</u>: in the systems context 'rules' describes the incentives, punishments and constraints of the system. For group work within the TSE system, the incentives and boundaries or constraints of the system are set up by the paradigms and goals interventions described above. Currently however, clarity on the incentives, punishments and constraints are missing.

- Intervention (7): A clearly defined process for dealing with problematic group behaviour should be set out from the outset, in the TSE manifesto for group work, by the course tutor and on any relevant web page within TSE's designed abstract system.

❖ <u>**Information flows and reinforcing feedback loops:**</u> to prevent system malfunction, but also to create the conditions for maximum innovation and transformation potential, information flows must be open to whole system with continuity and in perpetuity. This flow enables iteration, development and adaptation which cannot take place on very little information.
- Intervention (8): A consistent and comparable framework for marking group work across departments, and if possible across the entire TSE system.
- Intervention (9): A staff commitment to providing substantive feedback on every submitted group work to enable students to learn from their work and how to improve it in further systemic iterations.

❖ <u>**Buffers:**</u> buffers can increase the stability of systems, until the buffer gets too big and the system becomes inflexible.
- Intervention (10): In the context of group work within the TSE system, a minimum buffer would be the guidance and structure that group work is set out within, and an introduction to the foundations of research methodologies that reassures students research is an iterative process.
- Intervention (11): a next level buffer could be in the form of teacher support for those struggling with the dynamics within their group, offering tailored support for each students struggle within the group work system.
- Intervention (12): to prevent over-structuring and rule setting for group work, which would create a large buffer that stifles self-organising and innovation in the system, space to explore topics, solutions and different modes of work can be encouraged by tutors setting group work.

Conclusions

Systems thinking emerged in the1920s, established its status in the academia following the Second World War, gained popular recognition and acceptance in the 1990s and proliferated in the 2000s. In Futures Studies the growing popularity of systems approach is connected to the need to understand increasingly complex social systems.

On a theoretical level, it is crucial to make the distinction between systems thinking and systems theory. Systems thinking is first and foremost an epistemology on which theories concerning the systems can be constructed. Systems intervention methodologies, on the other hand, are responses used to understand and cope with complex systemic problems.

In this paper, systems thinking has been used to analyse University of Turku (UTU) as an element in Finnish university system and especially, to scrutinize "teamwork" from systems perspective. The concentration on "teamwork" was due to the results of a value survey conducted in the class, which put "excessive focus" on the issue as defined by Barret's framework of 'organisational consciousness'. However, it was revealed by the brief discussion in the class that by "teamwork" the students actually meant group work – a common teaching method at Turku School of Economics (TSE).

Hence, we analysed group work as an open, dynamic and self-organising system. According to Barret's definition, teamwork represents "transformation" manifesting continuous renewal and learning. Conversely, based on our experience as participant-observers in numerous group works at TSE, we argue that currently group works comprising a rather closed learning cycle – a formalistic exercise deconstructed into several individual elements not necessarily constituting a whole that is more than the sum of its parts. Related to this, we managed to identify several malfunctions related to the purpose, information flows, feedback systems as well as evaluation criteria of group work when it is considered a self-organising system After recognizing the systemic malfunctions, this report systemically and systematically identified twelve interventions that very concretely lay out how TSE could move forward with group work, reinvigorating its systemic purpose to better fulfil its transformative role in the system and for students. The interventions were constructed based on the framework by Meadowns (2008) and included tangible (structures) and intangible (mental models) elements supporting face-to-face collaboration and facilitating continuous learning. Concretely, the purpose and evaluation of group work should be elucidated as well as proving students with concrete tools and support to operate in self-organizing groups as an examples.

In conclusion, we argue that these twelve interventions could contribute in restoring and fulfilling the purpose of group works as self-organizing systems (Ståhle 2008). Furthermore, it should be noted that the identified interventions would require only a relatively small input but, in turn, could have a considerable impact. Interventions could trigger a systemic change allowing group work to evolve into genuine teamwork.

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FUTUS4 STRATEGIC FORESIGHT

Strategic Foresight (6 cr) is an optional advanced course in Master's Degree Programme in Futures Studies. The mission of the course is to make students to understand the role of foresight in the corporate world. In addition to giving theoretical background of corporate foresight, the standard way of running the course is to take students inside an interesting company for a visit. They learn to see, how companies form their future strategies in a real way.

On the basis of what they learn and discuss, the students make a group work where they challenge the existing way how company sees their future. The three reports by students originate from their visit to Nokia headquarters in March 2017.

Papers were reviewed by the responsible teacher, Professor **Markku Wilenius**.

All of three essays chosen for this compilation are build on the intensive interaction with a number senior executives at Nokia headquarters concerning the future strategies of Nokia and a visit to Nokia laboratory.

The first essay by **Aleksej Nareiko** displays a very concise and far-reaching presentation of the opportunities provided for Nokia through increasing use of artificial intelligence in the health care sector in the advent of 5G-technologies.

Harri Pohtola, Essi Silvonen and **Isabel Bottoms** create a hugely interesting scenario for Nokia with so called Cradle-to-Cradle concept, showing how Nokia could transform themselves to align with more resource efficient business model, using for instance blockchain, thereby bringing company to look like more a truly futures orientated organization.

Sara Talebian shows convincingly in her essay, how to apply new technology to smart city –thinking, thereby creating a whole new understanding how cities may develop in the future.

All these three essays are luminous examples of how strategic foresight on new technologies and their repercussions can enable more inclusive and wise business models.

Artificial Intelligence in Future Healthcare. Reflections on Nokia's Strategy

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Introduction

The aim of this paper is to review Nokia strategy in the domain of AI-enabled healthcare and suggest improvements based on the existing and expected strengths of the company, relevant megatrends and the findings of the environmental scanning. The horizon to be examined is about five to ten years from now, i.e. by 2022-2027.

The task for this analysis was suggested by Nokia specialists during the meeting with the students of the Turku School of Economics (TSE) on March 15, 2017. The representatives of Nokia were interested in 'opportunities and risks' for their company. The purpose of this paper is not, therefore, to replace the comprehensive analysis carried out by Nokia specialists in order to define the key directions for development. Instead, the objective of this work is to complement the effort of the Nokia experts and to highlight some less obvious, but possibly high-impact, transformative paths of AI-enabled healthcare.

Methodology

Although every corporate strategy is forward-oriented in practice because it is designed for implementation in future, not every strategy is built on the knowledge about future. Strategic foresight as a discipline presupposes that a viable strategy shall be developed with account for such knowledge. The knowledge about future can be obtained through use of futures research methods. They bring more rational foundations for strategic choices through systematic, holistic and multidisciplinary exploration of future alternatives. Futures research methods help reach better understanding of possible, probable and desirable futures and use it in strategic planning.

I chose to use environmental scanning (ES) as the main futures research method for this assignment. As follows from the description given by Gordon and Glenn (2009), ES is a generic term for collection of relevant data combined with analysis and synthesis of acquired information. ES suits well the assignment and the limitations of the intense university course. On the one hand, it is one of the methods aimed primarily at identifying new or overlooked future signals. By constantly monitoring mid- and long-term horizons, future-oriented organizations use ES to adjust their strategy and vision. On the other hand, ES does not always require in-depth knowledge of the domain for which information may be collected and, therefore, futurology and business students participating in the course, i.e. people who may not have relevant technological background, can use it to create valuable insights for Nokia strategy.

In this case, I applied ES to gather information about: a) probable future needs of potential beneficiaries from healthcare, b) new technologies helping to satisfy such needs. In other words, data collected via environmental scanning was used for qualitative analysis of both future demand and supply and possible ways to match them with existing or emerging technology.

Information from the scanned sources allowed constructing an image of the future AI-enabled healthcare and creating a list of main risks and challenges on the path to it.

To get general acquaintance with current developments in AI and expectations from it, I used trade reports, media articles, publications by World Economic Forum, video interviews with CEOs and key specialists of top-tier technology companies, such as Nokia, Google, Yahoo, Facebook, IBM and some others.

To obtain information about emerging AI technologies that are relevant for healthcare, I looked through over 320 scientific articles published between 01 January, 2016, and 28 March, 2017. Their abstracts were retrieved from the world's most comprehensive database of scientific publications – Scopus (2017).

About Nokia

Nokia is a global leader in networks technologies aiming to shape the 5G future. It employs over 100 000 people in more than 100 countries. In 2016 the company invested over 20% of its revenue into research and development (Nokia 1 2017; Nokia 2 2017). After the rise and decline of the famous Nokia phones, the company focused initially on the other part of its business – network technologies.

During the meeting with Nokia specialists organized as a part of the university course, the company representatives told students that Nokia also looked beyond its traditional networks domain. Nokia wants to utilize related opportunities: in particular, it expands its software business and is attracted by the perspectives of virtual reality and artificial intelligence. Students were demonstrated a number of consumer electronic devices for healthcare, including smart thermometer and scale that can be found on Withings website (Withings 2017). Two other examples of use cases were given: a) remote patient care, b) Big Data for better diagnostic decisions.

Nokia website explains that two segments with the most significant growth are the ones the company's *Digital Healthcare* part focuses on: '1) connected devices that go beyond trackers and smart watches to include scales and blood pressure monitors; and 2) remote patient monitoring' (Nokia 3 2017).

When explaining 5G to the audience, Nokia specialists emphasized dramatic differences that are expected from the new generation networks, namely high latency, multiple increase in number of connected devices, stronger focus on connectivity of machines and things than on enabling human communication, higher speed.

Findings

Demand side of the future AI-enabled healthcare market

Many experts believe that healthcare represents an attractive fast-growing market, also for AI-based products (Grosz et al. 2016, 25; Mordor Intelligence 2017). In 2016 Nokia estimated digital health market to reach EUR 220 billion by 2020. In their opinion, also some other technology markets represent a share of healthcare spending, as corresponding products provide or can provide health-related services in future – for example, portable communication devices such as smartphones or tablets; special software; connected cars (Nokia 4 2017).

Based on the relationship to healthcare services, we can categorize the stakeholders of the future healthcare market into three large groups: healthcare clients, or individuals; healthcare providers; and third persons, including government. Individuals are end consumers of healthcare services. Healthcare

providers are actors delivering healthcare services to individuals and bearing the immediate responsibility for them. Examples include hospitals, individual practitioners, emergency medical service etc. Third persons, including government, comprise all other organizations, institutions or entities that may have an interest in healthcare. They may or may not have possibilities to influence the healthcare market. Examples of third persons include insurance companies, suppliers of products for healthcare providers, government regulating healthcare industry, border control service, advertisers etc.

Individuals

As end consumers of healthcare services, individuals may need proactive, active or reactive assistance.

Proactive help aims to prevent deterioration of health. It can be further classified into long-term and short-term assistance. The former is based on monitoring of lifestyle, habits, nutrition and other long-term patterns in behaviour of an individual, on accounting for broad context, living and working environment. Long-term assistance is often connected with wellness. The latter – short-term assistance – is focused on prevention of quick negative changes in a patient's health. Analysis of the individual's current or immediately preceding behaviour, analysis of short term risks e.g. traffic or weather, diagnostics, disease detection, risk-based self-care recommendations for short term etc. serve to satisfy this type of needs.

Active help is needed when an individual experiences immediate difficulties with health. Emergency self-care recommendations, autonomous aid, autonomous contact with and assistance to healthcare professionals can be examples of demanded products.

The purpose of reactive assistance is to help a patient recover or facilitate his/her life in the conditions of deteriorated health. Examples of products corresponding to this need are intelligent help to a patient provided by chatbots or virtual assistants, physical assistance, treatment or creation of custom healthcare products provided by robots or made possible with smart devices.

One of the current trends – growing mobility of people – makes it probable that powerful multilingual language processing capacity will be increasingly sought in healthcare applications.

Healthcare providers

The main interests of healthcare providers arise from the need to provide quality services, on the one hand, and to manage costs and allocate resources efficiently, on the other hand. In addition, they often need to prove their value and quality of their service – to customers, authorities, controlling institutions, sponsors etc. – which usually requires data.

AI can play an important role in all of the above mentioned cases. Both quality and efficiency of service can be improved with solutions based on Big Data, machine learning, image analysis and other AI technologies. Some applications include medical imaging; patient monitoring; risk analytics; diagnostics and supplement advice; recommendations and/or physical manipulations in emergency or surgery room; creating individualized products (tissues, medicines, prostheses); assisted or human-free service delivery etc.

Service and asset management can be improved as more comprehensive and consistent metrics and records become available. When service levels get measurable, transparent and comparable, it will allow quantification of the value provided to customers, not mentioning the benefits of streamlined

resource allocation and better planning. Savings are also likely to come from automated record-keeping, especially if integration of structured and unstructured data becomes possible. Further opportunities can be in the flexible shared use of data, including provision of data to third persons.

Third persons, including governments

Although this category is most varied and includes actors from regulators to advertisers, the fact that they exchange data with the other two categories makes them a side to consider when developing AI for healthcare. It is difficult to draw limits and define what data will be exchanged, because of many applications data can have. The expected capacity of future AI to perform meaningful integration of heterogeneous data and understand the context will make the data obtained in healthcare valuable for the broad range of other institutions and vice-versa.

The needs of some third persons are likely to be connected with maintaining or improving public health and managing corresponding risks – for example, this is the case for government, municipalities, border control agencies, companies working in medical research and development, academia etc. Some other needs may be connected with service or asset management, e.g. allocation of budget money to healthcare providers, prevention or preparation for outbreaks of infectious diseases, control and monitoring of healthcare providers, long-term planning of population health etc. Finally, there may be information needs that have no obvious relationship to healthcare, for example, data obtained in healthcare can be used for development of cars, furniture, or robotic home assistants; for advertising; for urban or infrastructure planning etc.

Supply side: some possible transformations of healthcare

Indirect measurements

The review of recent scientific articles suggests that Big Data is likely to develop healthcare in non-linear ways. Large amounts of data make it possible to detect new correlations and verify them. In other words, Big Data opens broad opportunities for lateral thinking and unconventional approaches. One of them is a possibility to diagnose diseases or predict physical and mental states from temporally observable physical and behavioural data. Instead of traditional medical analyses often requiring chemical agents, sophisticated equipment and trained personnel, decisions can be made on the basis of nearly free inputs, such as images, video, sound or text. Examples of inputs include face expressions; speech; sound of coughing; data from sensors installed at home with a purpose to monitor the patient's lifestyle; so called hyper-images; images of urinoculture; sounds in the bathroom indicating if a person falls down; gait patterns allowing to localize joint pain; video of 10 m walking allowing to assess falling risk; data mined from social networks; data obtained through game simulation for diagnosing kinesiology of elderly patients etc.

Such possibilities are obviously cheaper than diagnostics requiring chemical reagents or specialist consultation. They can also be much faster. They are well-suited for automated short-term risk evaluation and identification of mental states e.g. depression. They also provide additional opportunities when a patient is limited in some capacity.

Non-traditional measurements are also likely to provide cost savings to health providers and indirectly to third persons. For example, in addition to the examples mentioned above, diagnostics technologies can serve for prediction of success of treatment, including survival of the patient. This, in turn, provides a basis for optimized resource allocation in the level of the healthcare provider and, possibly, in higher levels (regional, national).

Drug-free assistance

Technology facilitates or enables use of unconventional preventive care or treatment. Examples can be games for self-care of elderly patients; individualized music or sound therapy; detecting individuals with similar diseases from social networks in order to create communities and provide ill people with empathy and sympathy they need, etc.

Use cases for social media

In addition to data mining from social media for diagnostic purposes mentioned in paragraph 2.2.1. and empathy from similar patients mentioned in paragraph 2.2.2., there are reported cases of use of social media for personal health records storage and for data exchange by people in poor countries. However insignificant it may seem, it may be a viable idea to consider social media as a possible part of the healthcare system. If some people found such ways of using social media useful or convenient, other people may find them useful or convenient as well.

Future image of AI-enabled healthcare

The future image draws on the megatrends identified by Nokia experts (Nokia 5 2017, 19), the global megatrends, the information received during the meeting of the TSE students with Nokia representatives and the observations made during environmental scanning. This image describes a system of solutions needed, in the author's opinion, to satisfy the needs of the stakeholders, taking into account the expected adoption of 5G.

Data collection is carried out both in private and public spaces. Data that is collected in public places (e.g. public areas, public transport) does not always remain anonymous, but can be used to identify a person and use the data in connection with that person (see *Data use* below). Places where an individual spends a long time (house, office) are likely to be used for pattern identification. They will not only make it convenient to check one's current physical condition, but will also collect data related to his/her lifestyle, food and sleep habits, and other data that influence individual health in the long term. A particular case of data collection is hospitals – in addition to capacities that can be found in homes, hospitals will collect data required for professional use – i.e. health operations and service/asset management. Wearable and implantable devices will be used to collect individual data when a person is outdoor, out of his/her usual places (house, office).

Data integration aims to solve the ambitious problem of combining heterogeneous data from different owners, sources, platforms, in different formats and with different access possibilities. It seems safe to assume that real-time integration of the collected data will not be commercially available to a broad circle of users in the nearest years. The best expectation may be that, because of administrative and technical obstacles, the data gets integrated in multiple phases and, like national statistics, gets

more exact and more detailed after several time lags. However, Big Data is likely to self-diminish soon – after massive and comprehensive amounts of data are collected and analysed for some instances, it may become clear that just several types of data that can be conveniently collected and processed at low cost are sufficient for most of use cases in healthcare (e.g. face expressions may turn sufficient to make 99% exact predictions about short-time health condition). This will limit the need for comprehensive data integration in the level of individuals. However, healthcare providers will need powerful data integration capacities for their operations. Intelligence, security, military and scientific organizations will be interested in even more powerful capacities.

Data analysis will also follow the demand and, therefore, concentration of analytical capacity is likely to be similar to data integration: national or international centres of data integration and analysis will exchange some data with less comprehensive, but more specialized centres dedicated to healthcare. Lower costs of data transfer will make it increasingly more attractive to concentrate integration and analysis in a few universal, powerful centres instead of many specialized or competing ones. Varied needs and data access rights of end users will require highly flexible capacity to configure and customise analysis outputs.

Data use is likely to bring the key changes to the market of AI-enabled healthcare.

First, predictive applications are likely to become the next big thing in the consumer market, especially those that predict the probability of critical conditions and can call for emergency aid and assist during it autonomously.

Second, more user-friendly interfaces based on natural language processing in medical chatbots and virtual assistants from reputable suppliers will predictably win the competition over today's software applications for which one needs to formulate exact search queries. The new applications are likely to include diagnostic functionalities, help in communication with human healthcare professionals, in ordering medications and individualized healthcare products, as well as in exchanging data with non-healthcare applications or third parties (social media, insurance companies etc.). As fundamental conditions for demand are present – perceivably high value of individually tailored medical consultation in combination with lower price and better availability compared to human assistance – such products are likely to enjoy massive popularity in future.

Third, data integration will gradually open unprecedented opportunities for individual and public health management, improved quality and efficiency of healthcare services, service/asset management in healthcare and for other purposes. The data shall be made available on-demand to the legitimate 'ubiquitous user', e.g. hospitals, research institutions, academia, foreign doctors, border control services, local authorities etc. In addition to improved levels of healthcare services for individuals, a new layer – collective healthcare – will become an important use case. Status of health in a certain corporation, institution, area, region or country will be monitored and managed both reactively and proactively.

This future image agrees with today's widespread expectations that homes will become the main places for delivery of healthcare services – AI-enabled self-care, remote assistance or virtual assistance will offer more and more of such possibilities. Hospitals will focus less on routine diagnostics and consulting, but more on the activities requiring either qualified personnel or expensive resources – e.g. medical operations and sophisticated diagnostics. AI will help healthcare professionals both in making decisions and in executing operations.

Main challenges for AI-enabled healthcare

The key challenges can be divided into two categories: technical and social. In addition, a common business problem of monetization of data-based digital services remains high on the agenda because increasingly more data will be collected and used cooperatively, in the collective layer.

Technical challenges are represented by the problems of (i) data integration, (ii) data quality, (iii) data access and exchange, and (vi) security issues. As mentioned above, integration of diverse data sets such as free text or speech, video and images is not an easy task to solve. Data quality is difficult to ensure because of the problems of sufficiency, representativeness and redundancy. Data access and exchange for a broad range of users is problematic because of radically new expectations from them: 'ubiquitous user', interoperability, possibility of cross-border and cross-linguistic use of data are just some of the main challenges in this domain. Finally, security issues, both in individual and collective levels, are critically important in light of the growing number of cyber wars. Possible threats include identity theft, improper functioning of one or several parts of the system, and total failure. One more interesting issue is how to build redundant capacity for the situations of failure. Shall there be a reserve system that is an exact copy of the main one and, therefore, vulnerable to the same risks? To what degree shall human doctors be trained to work without AI and how shall they maintain that capacity through their professional lives where AI replaces them gradually?

Social aspects lie in the interconnected problems of regulation, fairness and trust. For example, regulation often depends on the acceptance of new technology by medical professionals. They may resist new technology for many reasons, including lack of trust and the fear of losing their jobs, and their influence on public opinion may be critical for adoption of AI in the healthcare market. The difficulties are often connected with ethical issues, e.g. responsibility for possible damage from AI-enabled services. In distinction to many other social dimensions, where people accept inequality more easily, e.g. income, property or social status, healthcare is one of the fields where people believe they shall be ultimately 'equal', i.e. enjoy equal access to quality healthcare. Taking into account population sizes, growing income gaps, existing communication network capacities, geographies and distances, plausible different interpretations of what type of healthcare access is fair and easy enough, the challenge of fairness of AI-enabled healthcare may be one of the most difficult to address. Put it simply, if a city X enjoys a 5G network and corresponding digital healthcare opportunities, but neighbouring villages do not, it can provoke social tensions or changes such as urbanization more than 4G could in the past.

Recommendations to Nokia

To begin penetrating the regulated healthcare market with individual digital services seems to be a viable strategy. Individual services serve as a channel to promote other products and help create awareness of and demand for more complex services that can be offered by healthcare providers or network operators only. Thus, by creating and winning a less regulated consumer market Nokia can also trigger positive developments in more regulated business-to-business markets.

Software applications that will be based on indirect measurements, i.e. analysis of temporarily observable information, and will fulfil a predictive function are likely to become a springboard for consumer-oriented healthcare products. This opportunity is interesting because highly valuable benefits to users can be provided at low cost, with relatively cheap analysis of images, sounds or video. This

opportunity is equally open for all market players and the first mover is likely to gain significant advantages over others. Therefore, time is of importance.

As medical chatbots and virtual assistants are likely to become another massive segment, Nokia may consider partnering with reputable health institutions so as to benefit from their reputation for these new products. This will help overcome the problem of weak trust. As mentioned above, success in this segment also depends on the advances in natural language processing and, in view of growing mobility of people, may require multilingual capacity as standard.

Finally, it may be useful to begin planning for the collective 'layer' of health management. Powerful data integration, meaningful data analysis and flexible configuration of access to results for legitimate 'ubiquitous users' seem impossible to achieve in the absence of appropriate regulation. Therefore, defining rules for data exchange and access shall be in focus for Nokia in the near future, after which the technical solutions may follow quickly. It is not unlikely that the regulatory changes will not need to be awaited for long because data exchange brings many possibilities for savings – both in the healthcare industry and in other domains under public administration. As the collective layer will be used by many beneficiaries, not only by healthcare, it is likely that Nokia will need to cooperate with non-healthcare institutional users such as security, intelligence and other governmental agencies, in designing networks and developing solutions for data exchange.

As a weak signal, use of social media for delivery of healthcare services can be analysed further. Would it be reasonable to consider social media a possible part of healthcare infrastructure? Can Nokia benefit from integration of healthcare products with social media? Can examples of social media use for healthcare services inspire development of new functionality in social media? Can healthcare cause lead to additional promotion and strengthening of social media – and if so, will it be reasonable for Nokia to offer some AI-enabled healthcare services to social media as co-creators?

Conclusions

AI-enabled healthcare is an attractive fast-growing market. In combination with expectedly important role of Nokia in creating 5G networks and its experience of working with governments, Nokia Technologies is well-positioned to get time advantage over the competition and to remove barriers for growth by cooperating with regulators.

In view of possible non-linear development of AI-based technologies for healthcare, Nokia should monitor closely the progress in the field. In particular, further analysis is recommended for a weak signal of social media use in healthcare.

The environmental scanning helped notice an unobvious, but promising opportunity: predictive healthcare services based on temporarily observable information. Market success in another segment that ES confirmed as potentially massive – virtual healthcare assistants – can be achieved if Nokia acquires powerful capacity of natural language processing and chooses to partner with a brand known for its competence in health sciences.

The key risks to AI-enabled healthcare include technological difficulties and social aspects, among which ethical considerations stand out – in particular, the expectations of fair access to healthcare services is likely to complicate or slow down their monetisation.

As for longer perspective, Nokia is recommended to take into account the growing aspirations for Big Data sharing, nation-wide and international integration of heterogeneous data and the need to supply legitimate users across institutions and borders with individualized sets of information. Growing mobility of people is likely to strengthen the need for multilingual and omnipresent healthcare.

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Cradle to Cradle Nokia

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Executive Summary

This report identifies the opportunity for Nokia to evolve into a company that creates value whilst building in values at the heart of its operations and design. The opportunity was identified by scanning future trends and weak signals, and then combining them with Nokia's strategy to create opportunities for strategic foresight in the company's current areas of interest.

The Mental Model

Key to Nokia's strategic foresight deep into the 21st Century, is the adoption of a sustainable and resilient mental model. Resilience to the violent disruptions of the the world and resilience of the Nokia ecosystem ensured by the company's material, human and service sustainability in a finite world.

This '7th Era' mental model for Nokia would be driven by two key concepts: Cradle to Cradle design and the secure connectivity of blockchain.

Cradle to Cradle Design	Secure Connectivity: Blockchain
Cradle to Cradle Design is a framework for designing any aspect of any system, modelling solutions on nature's processes. The ultimate way to secure Nokia's sustainable future and its legacy in the world at all levels.	Using blockchain technology to create fast and incorruptible transactions, and a distributed but highly connected network of Nokia product and service users. Blockchain creates authentic transparency and accountability.

New products

New products born out of these two key concepts could be both services and physical products. A health monitoring service that would consist of physical sensors embedded in a physical product (watch, ring or wristband) or at some time in the future, maybe even just a thin film that could be planted to one's existing watch and offers multiple measurables. The core of the services would be located in a virtual environment with all the confidential information and for example, contracts and payments, made through the blockchain.

The Opportunity

Applying these concepts throughout Nokia's ecosystem creates new horizons for Nokia's engagement with the world; a world in which tastes and expectations are evolving away from one-off ownership,

towards lifelong services of quality and adaptability. The opportunity is for Nokia to build in value, with values, at all levels of its business to ensure the loyalty and support of generations around the world.

Introduction

The faster one moves on a dark winding road, the more far-reaching headlights one must have. It is essential in today's fast moving social and technological environment to strive to have "longer headlights". In this foresight exercise the writers attempt to provide Nokia with new strategic business opportunities by using strategic foresight practises. The core of strategic corporate foresight is to anticipate *change*[1]. One needs to look beyond a specific industry and see what is happening in the broader landscape. Foresight can be defined as,

> *"Systematic, participatory, future-intelligence-gathering and medium-to-long-term vision-building process[es] aimed at present-day decisions and mobilising joint actions. Foresight arises from a convergence of trends underlying recent developments in the fields of policy analysis, strategic planning and futures studies. It brings together key agents of change and various sources in order to develop strategic visions and anticipatory intelligence."* [2]

Strategic foresight in corporate environments focuses on visionary leadership and long-term strategic development of corporate activities, promoting new market and value creation, building capacity to differentiate in the market[3].

In this foresight exercise Nokia Company is the subject organisation. The aim of this exercise is to find new future business opportunities by using foresight.

The Strategic Foresight Process

This exercise was conducted in four steps. Firstly, a careful study of Nokia's past endeavours and current business strategies was carried out. Secondly, horizon scanning for the drivers of change that could be linked to Nokia's core businesses. Thirdly, brainstorming for innovation opportunities these drivers might offer Nokia. Lastly, creation of concrete areas of business opportunity and examples for new specific products.

Nokia's strategy

Nokia is currently focusing on four strategic key priority areas[4]:
- Lead in high-performance, end-to-end networks with communication service providers: Use our unparalleled, end-to-end portfolio to sustain our market and profitability leadership.

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1   Heinonen, S. (2016)
2   EU FOREN guide, (2006)
3   Wilenius, M, (2017)
4   Nokia, (2016)

- Expand network sales to select vertical markets needing high-performing, secure networks: Broaden our footprint in five select verticals: energy, transportation, public sector, technological extra-large enterprises and web scale.

- Build a strong, standalone software business: Move beyond our current product-attached software model and create a software business with the margin profile of large software companies, focused on areas including enterprise software and IoT platforms.

- Create new business and licensing opportunities in the consumer ecosystem: Expand successful patent licensing efforts into areas like automotive, consumer electronics and IoT. Create new revenue streams from technology and brand licensing, and establish new businesses in digital media and digital health.

To be successful in these four key strategic areas, Nokia is currently developing an agile ecosystem network for the use of 9 specific target areas, which are described as verticals in Figure 1 below.
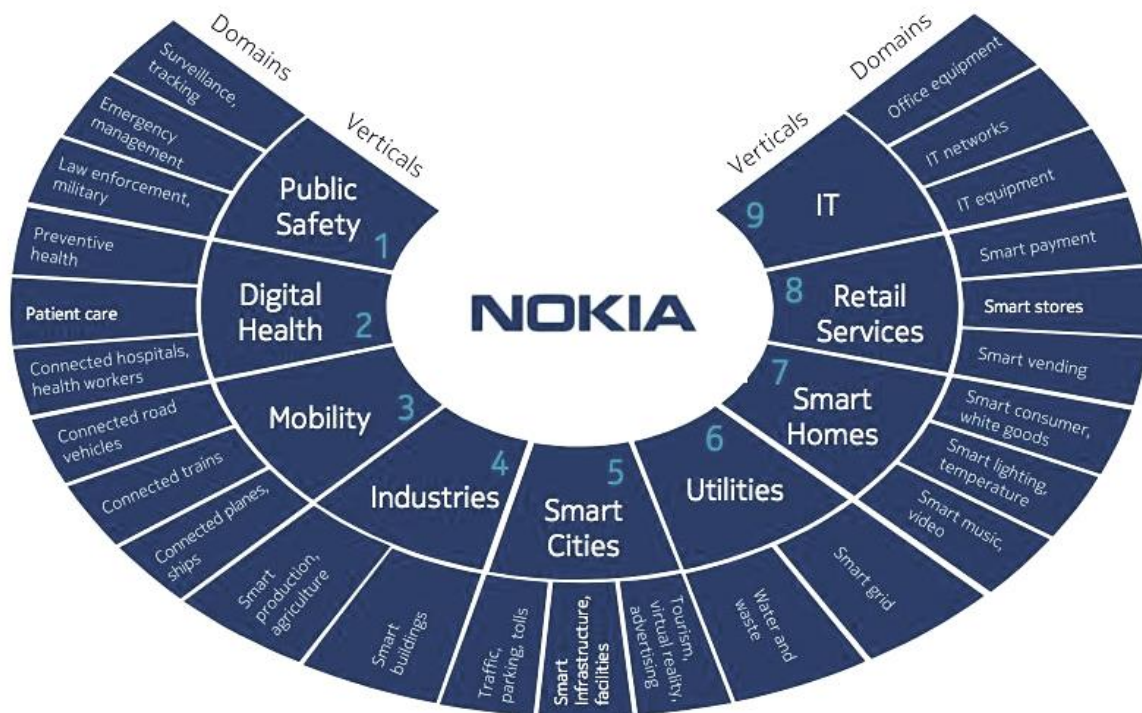
Figure 1. The Internet of Things Ecosystem (Nokia, 2016)

Scanning the horizon

When scanning the broader landscape, a PESTEC table was used to help identify drivers of change believed to be related to Nokia´s core businesses. The PESTEC table is a very useful tool that reminds researchers to scan the horizon on all the important layers: Political, Economic, Social, Technological, Environmental and Cultural. Once drivers for all categories were found, an evaluation was made to select the ones that were closest linked with Nokia's strategy (Appendix 1).

Eight drivers of change most closely linked to Nokia's strategy were:

1. Rise in financial transactions by blockchain (Economic)
2. Continued growth (geographically) of mobile payment systems in developing countries (Economic)
3. Developed countries will move towards user-based services not ownership-based (Social)
4. Moore's Law: Technology grows exponentially (Technological)
5. Consumers are using free online communication apps instead of SMS and phone calls, and instead of social media like Facebook. Privacy preferred over sharing personal details. (Technological)
6. Increase in health measuring devices that can seamlessly be added to normal accessories/clothing etc. (Technological)
7. Block chain is used to secure the IOT (Technological)
8. Resource scarcity (Environmental)

Innovation opportunities (brainstorming)

Once these eight drivers were selected, brainstorming sessions were held for finding business opportunities within these drivers. The strongest opportunity areas were found to be in drivers that emphasised a move from ownership based consumption to more service based consumption. Resource scarcity on the environmental level supported this analysis. In the future we will probably see a shift towards "cradle to cradle" design, from today's dominant "cradle to grave" product design. The cradle to cradle concept is explained in chapter 4.1. The second opportunity finding was the emergence of block chains. Block chains are discussed in chapter 4.2. Both of these opportunities might show a way for a comprehensive new mental model for Nokia.

A Resilient Mental Model for Nokia

Assessing Nokia's history as era's - where an era represents the main focus or strategy of Nokia at that time1 - we found seven in its history:

- 1960–1970: Electronics
- 1970–1980: Telecommunications
- 1980–1990: 1G & Computing
- 1990–2000: 2G & mobile manufacturing
- 2000–2010: Mobile manufacturing & software
- 2010–2014: Streamlining & new acquisitions
- 2014+ An agile ecosystem network

These era's show that up until 2014 Nokia has been carving out its niche and market success through focussing on specific products and services in each era. The latest era of the 'agile ecosystem

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1   p. 93-95, Hines and Bishop (2007)

network' marks an important departure from this strategy mode, instead, defining Nokia by its structure and capacity, rather than a single set of products or services. Although, the presentations given at the Nokia headquarters in Espoo focussed on key products and developments Nokia is working on, there is still an evident shift towards focussing on the overarching structure of Nokia than its individual product opportunities.

Nokia's embracing of an 'ecosystem' structure could be called 'biostrategy' in strategic foresight terms.[1] Biostrategy indicates strategy that mimics or is inspired by biological and natural processes. In order to maximise the benefits of biostrategy within Nokia, and lead the company into a resilient 7th era that can survive the violent disruptions of the 21st century, the principles of socio-ecological systems resilience offer some guidance.

The principles of resilience[2] promote diversity, no centralised source of power or knowledge (polycentric governance), feedback systems, complex adaptive systems thinking which acknowledges uncertainty and learning, and management of connectivity to prevent over or under connectivity.

> *"Well-connected systems can recover from disturbances more quickly, but overly connected systems may lead to rapid spread of disturbances."[3]*

Some of the implications of these resilience principles will be discussed in section 4.2 below. Extrapolating Nokia's existing 'ecosystem' strategy using "biostrategy" for strategic foresight, the authors have identified two key aspects of Nokia's future resilience for its 7th era and beyond. They are primarily 'Cradle to Cradle Design' and 'Secure Connectivity: Blockchain'. We describe the potential for both to create a resilient 7th era and beyond for Nokia in more detail below.

Cradle to Cradle Design

Cradle to Cradle Design is a framework for designing any aspect of any system, modelling solutions on nature's processes, viewing materials as nutrients circulating in healthy, safe metabolisms. It is an holistic method of life-cycle assessment and development which looks to nature for inspiration.

The Cradle to Cradle concept originates with Walter Stahel but was since trademarked by Michael Braungart and William McDonough.[4] They built the concept to design cyclical flows of materials that ensure efficient and waste-free systems which are both beneficial to the environment and the manufacturer who has to invest in raw materials for each new product. Cradle to Cradle design offers the best chance to extract the most value from each material in a manufacturing process, an economic system, a building complex or any other systemic structure. Their five criteria for assessing the lifecycle of products are briefly: hazard analysis of each material with elimination of the most hazardous; recovery of materials in each cycle and recycling at the end of their life; energy consumption during production; water use and discharge quality; and fair labour practices.

For many of those who have implemented Cradle to Cradle production they have not just sought to reduce their ecological footprint to zero, they have gone a step further and designed methods that

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1   p. 104, Hines and Bishop (2007)
2   Stockholm Resilience Centre (2015)
3   Stockholm Resilience Centre (2015)
4   Braungart, M and Mc Donough, W. (2009)

the same product can have a net positive effect on the environment. For example, wheelchair upholstery that biodegrades and provides fertilisation to the soil leaving it in better condition than it was in before.

Cradle to Cradle design is a realistic model of conducting business in the 21st Century, in preparation for the 22nd Century. There are two key drivers of change which support this, namely, resource scarcity and Moore's law of the exponential growth of technology. We can safely assume that on a finite planet we cannot continue to innovate and produce all these technologies that will often rely on large amounts of finite rare metals. As resources become more finite, prices will rise. A business model built only on researching and developing such technologies for the market cannot eternally ensure that these raw materials will be available or affordable. Moreover, as these scarcities come to pass, and in line with current weak signals, leasing and user-based systems of use will likely be preferred over outright, one-time ownership.

Leasing will allow consumers to purchase a lifetime service of the most efficient and up to date technologies without the large capital outlay of a new outright purchase. According to PWC,

> *"Access can come in a number of forms, but all are rooted in the ability to realize more choice while mitigating the costs associated with ownership: Renting, lending, subscribing, reselling, swapping, donating."*[1]

Whilst this trend is currently most relevant to media, transportation, hospitality and retail[2], and younger generations in developed countries; there are indications that the world's young generations growing up into sharing economies will expect services that manifest the same convenience and access in other areas, for example household items (fridges, sofas, white goods etc) and personal electronics. The success of the shift in the sharing economy now is likely to be the catalyst for an overall shift in consumers mental model who don't see the value in capital outlay and purchasing inefficient products for themselves. We therefore think it is an important shift in consumer awareness for Nokia to incorporate into its strategy to build resilience into its ecosystem.
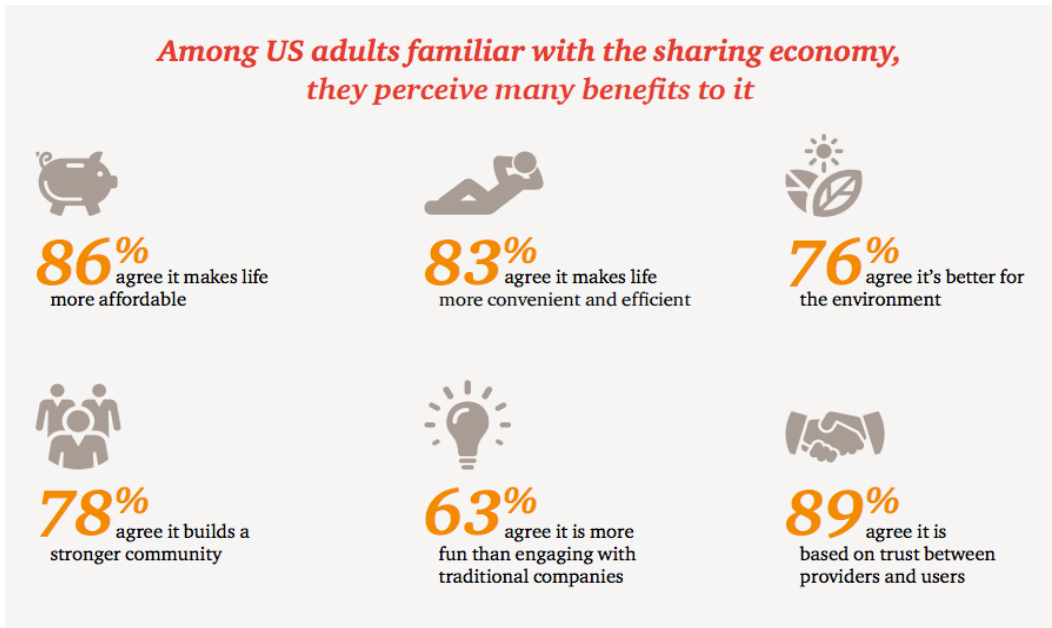
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1   p.15, PWC (2015)
2   p.8, PWC (2015)

Among US adults familiar with the sharing economy, they perceive many benefits to it

86% agree it makes life more affordable

83% agree it makes life more convenient and efficient

76% agree it's better for the environment

78% agree it builds a stronger community

63% agree it is more fun than engaging with traditional companies

89% agree it is based on trust between providers and users

Figure 2. Survey respondents answers on the benefits of the sharing economy.[1]

As such, we see embracing Cradle to Cradle design as a mental model throughout Nokia would ensure the company is getting the most out of the resource investment it puts in at the beginning of each design process. It would also relate to how Nokia does business and research as a whole, by inspiring its employees to build in replaceability, recyclability and net-positive environmental impacts within every aspect of Nokia's footprint in the world, and providing for the new generations of responsible consumers around the world. For example, through the Cradle to Cradle lens, the Nokia HQ in Espoo might have been designed and built very differently from its current format. Or all Nokia's sites could be run on 100% renewable energy, as Facebook, Google and Apple have already started doing.[2] The mental model we describe would create a net-positive legacy for Nokia both in Finland and the wider world. After all, what goes around comes around!

Secure Connectivity: Blockchain

> *"The blockchain is an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value."[3]*

Blockchain is essentially a shared "ledger" that is transparent to actors in the exchange of contracts, but is also fully encrypted and secure. There is no centralised meta "spreadsheet" of transactions that can be hacked, and therefore there can be no single point of failure or single entity in control of the information. It will speed up the globalised chain of transactions, and enable more ethical transactions as all purchases, the source and the seller will be verified using a peer to peer network that dissipates the role of middle-men and centralised sellers.

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1   p. 9, PWC (2015)

2   Wang, U. (2nd April 2014)

3   Tapscott, D - Tapscott, A. (2016)

Early drivers of change indicate that blockchain will be used increasingly to secure the Internet of Things (IOT) which is still in its early stages of implementation and security[1] to the detriment of many. Blockchains key driver and source of technical input has been around financial transactions. Governments and large international banks are already proving test cases for this purpose.[2]

As identified above, socially, there has been a shift towards sharing economies but away from sharing personal thoughts and feelings on social media[3]. Digitally connected populations are becoming more security conscious. Combined, the implications are that products and services that do not meet consumers increasing security concerns, will not succeed on the open market.
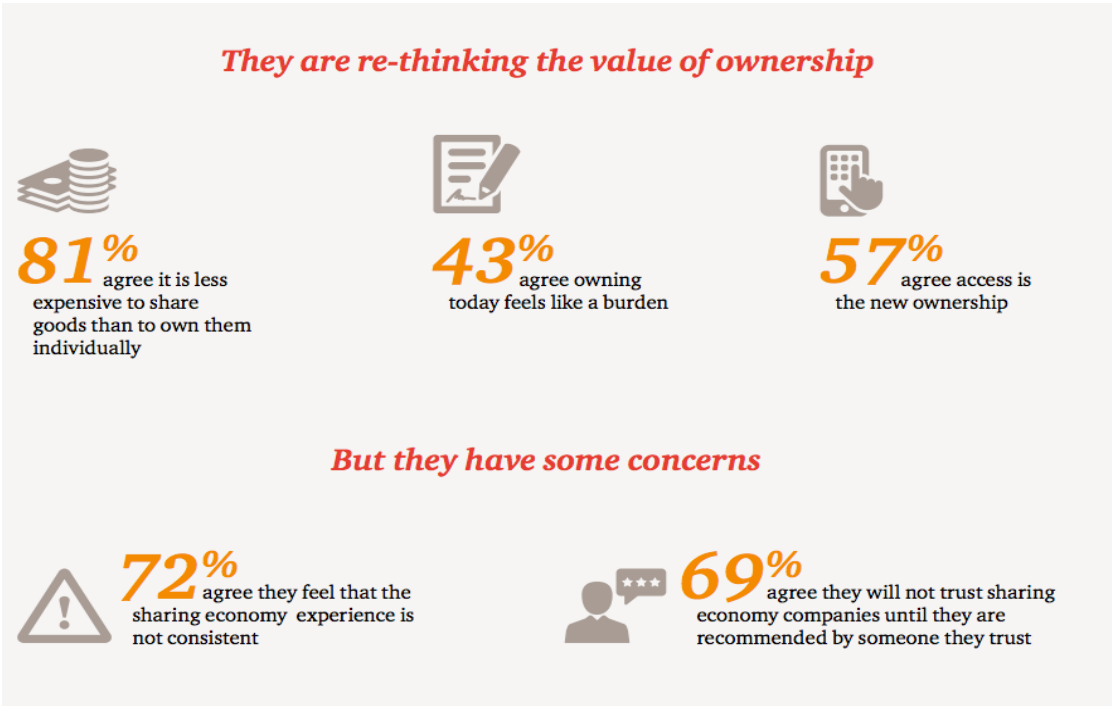
Figure 3. U.S Survey respondents on the shared economy and their concerns.[4]

If you twin this analysis with the recognition that blockchain will enable many more market participants and put the middle-men out of a job through the distributed ledger system that enables anyone to have a presence and make use of the tool, then blockchain represents the ultimate connectivity tool for Nokia to realise its ambitions. Blockchain also fits into several of the current "domains" and "verticals" Nokia seeks to address, namely: smart payment (8. Retail Services), smart grid (6. Utilities) and law enforcement (1. Public Safety).

Understandably confidence in the technology is still low, and many IT analysts think blockchain is unwieldy. However, we think the mental shift of the consumer towards security, participation in the

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1   Irrera, A. (January 27th 2017)

2   Deloitte (2016)

3   Hoffman, A. (19th April 2016)

4   p. 9 , PWC (2015)

market and mistrust of the third party brokers that are the current informal 'trust network' that block-chain represents, will be a key driver of change in the take up of blockchain globally. Adopting block-chain on a large scale is also in keeping with Nokia's existing published strategy to:

"Expand network sales to select vertical markets needing high-performing, secure networks: Broaden our footprint in five select verticals: energy, transportation, public sector, technological extra-large enterprises and web scale."

"Lead in high-performance, end-to-end networks with communication service providers: Use our unparalleled, end-to-end portfolio to sustain our market and profitability leadership."

Opportunities for Application

As we see it, the opportunity for Nokia lies in building a mega trend of responsible consumption through a Cradle to Cradle, leasing model of production for all Nokia's products, in tandem with using block-chain as the secure and dispersed basis for lifestyle "contracts" for services and responsible production. This new direction could be exemplified in Nokia's development of digital health products.

Through the blockchain underlying the lifestyle contracts, the contract, payments, product repairs, replacements and updates are all transparently but securely connecting Nokia directly to their consumer and underwriting contracts faster than any other service to date. Through the blockchain and internet of things, each device can be monitored for their efficiency and performance, whilst securing the data of the user on the encrypted blockchain. The blockchain also enables the consumer to see the full supply chain of their products, ensuring they are sustainably and ethically produced. After the device leaves the user for "recycling", the recycling of the device can be monitored through the blockchain by the consumer to ensure cradle to cradle processes in real time.

For example, for an Asian market responsive to lifestyle trends and with large numbers young people, selling a lifestyle contract that enables them to monitor their health levels, the air pollution load, stress levels, lung capacity and other factors affecting health would be invaluable. The devices and software that enable such a lifestyle contract would be leased through long-term contracts, automatically renewed through monthly subscription payments, with consumers only owning the devices and access to the software for the time they buy into the contract.

The Nokia ecosystem in practise

We make a division between physical products, e.g wearables, mobile devices and virtual reality cameras; and service products, which would include the softwares and the services inherited in the physical products.

Physical products are material intensive and they are needed in order to deliver the service products, but without software and features they are basically of no value to customers. Historically, a major emphasis is laid on the manufacturing and sales of physical products, which has also created most of the revenue. Manufacturing the physical products will still be needed in the future in order to deliver the content services.

Service products such as software and content services are gaining importance in creating revenue. Consumers and institutions are prepared to pay for services that will entertain, make them feel more secure, provide them with information, and many other things.

We suggest that Nokia's future business will be secured through the revenue from intangible services delivered through the physical products. For physical products Nokia would arrange an efficient maintenance, reuse and recycling operation, which would ensure that the flow of materials for new products would be sufficient even in raw material scarcity. With the same operation, Nokia could brand itself as the leading responsible producer of such services, which would also benefit its reputation and thus marketing.
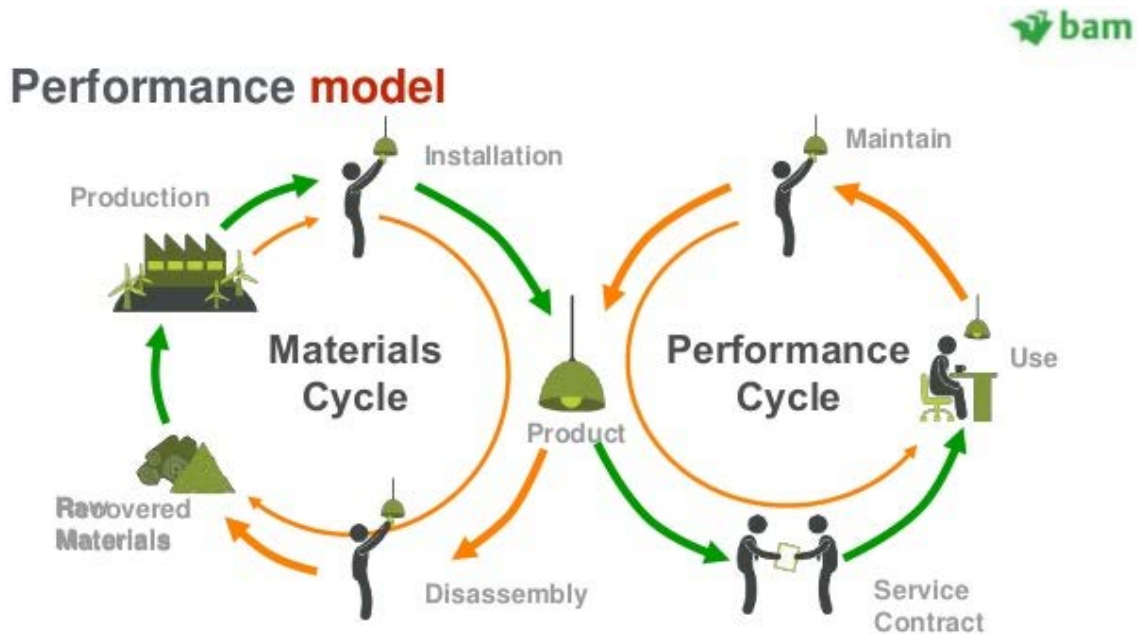
Figure 4. A repair, recycle, reuse model generated by BAM construction.[1]

Figure 4 is a simplified model of how Nokia could design its Cradle to Cradle approach towards material repair, recycling and reuse.

How could this be done in practise?

It would need to start from new product development for physical products, with a design that would ensure all the new products are easily and cost efficiently repairable and all the materials used are such, Nokia can further use in its future products. Also it should be taken into account that the structure of the devices is such, they can be easily disassembled when the time for that comes.

We recognize the financing dilemmas around leasing products, so in addition to it, we developed a solution which might bring more of the directly purchased products to recycling and also increase customer loyalty to Nokia.

Building a network of repairs and recycling would most logically be built around the existing network of Nokia brand stores and co-operators that sell Nokia products and most importantly, online. The main repair system would work through the internet with all the possible repairs and updates online, preferably even without customer involvement. Also the main system of recycling would ideally operate online, so that a customer would receive a bonus of x euros depending on the value of the

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1   BAM Construct Ltd UK (2015)

recyclable product, that they could use in their next product purchase. Customers would register the recyclable product online, get a free shipping code and as the product enters the recycling process, the customer would get the bonus code delivered. The same logic might operate in Nokia Brand stores, where customer would get the bonus directly and he could use it right away in purchase of a new product. All transactions would be facilitated securely and with a speed of exchange primarily without service personnel involvement, which would create efficiency that can not be achieved without advanced blockchain technology.

Referring to a competitor, Apple has done great work in its development of Apple Stores. They have also educated consumers in going to the brand stores for dreaming and experimenting the new products, which has added to the demand of the products by creating a community. This type of brand store - a designated experience platform - would also be an interesting opportunity for Nokia to consider. Naturally it is a resource intensive way of marketing, but could also generate positive publicity and long-term customer loyalty to Nokia's brand and its values.

Nokia (products and) services in practise

Moving to the software and content products, this is where the customer loyalty could really kick in. The idea is, that the Nokia Service model would be constructed around evolving services, that would create its customers added value in terms or health monitoring, virtual reality travel, entertainment, education, etc. The contents of services and ways to provide them would naturally evolve and be developed in order to meet and exceed customer expectations.

The core of the services would be located in a virtual environment with all the confidential information and for example, contracts and payments, made through the blockchain. For health monitoring services this would mean there was a physical sensor or set of sensors embedded in a physical product (watch, ring or wristband) or at some time in the future, maybe even just a thin film that could be planted to one's existing watch and offers multiple measurables. These sensors would be connected to the customer's profile in the service, and they would automatically monitor the preferred monitoring options and collect data in an archive stored on the cloud. The levels of alarm would be predetermined and customer could adjust them independently. Customers could choose to share this data, or some of it, with another user, maybe their doctor or medical system that would for example, calculate the needed amount of a medication.

Ideally the same system could be used for all kinds of data. For actual sickness related demands for customers already affected by illnesses and for more preventive measures for customer that are trying to avoid getting ill. One example of this could be combining the monitoring of stress levels and quality of sleep, and comparing it to healthy levels of customers long time trend. From this type of monitoring it would be seen rapidly, when some measures would need to be taken in order to reduce stress. It would also show, what type of actions work in stress reduction.

This approach to service offers standardisation and efficiency to Nokia, but from customers perspective it would be highly individualised. The same service could be applied by a young and trendy consumer living in a large Asian city to monitor the air pollution and stress levels. It could also be used by a middle-aged western with lifestyle related illnesses like Type 2 Diabetes to monitor blood sugar and blood pressure. This should be very simple for the customers to understand, buy and use, since

one of the key success factors is the simplicity, regardless of how sophisticated the technology and options behind the user interface are.[1]

Same type of service based approach could be taken with for example virtual reality. With suitable physical equipment and providing virtual reality environments for them, Nokia could offer virtual travelling to interesting locations, virtual education of any kind and entertainment services, which could also be purchased with a long term contract or by unit.

Conclusion

In conclusion, we think that Nokia's biostrategy for its future needs to evolve and deepen its roots to embrace a new mental model that will create economic value with values at every level of the business.

This '7th Era' mental model for Nokia would be driven by two key concepts: Cradle to Cradle design and the secure connectivity of blockchain. Applying these concepts throughout the Nokia ecosystem creates whole new horizons for Nokia's engagements with the world, who's tastes and expectations are evolving away from one-off ownership, towards lifelong services of quality and adaptability. As the megatrends of climate change, resource scarcity and economic volatility have been the backdrop for the younger generations lives so far, we propose that Nokia builds in value, with values, at all levels of its business to ensure the loyalty and support of these generations around the world. In short, our proposal suggests:

<div align="center">

Building in Value,
With Values

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1   Forbes (2014)

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Appendix 1

The PESTEC tables used in the horizon scanning:

	Driver of Change	Connection to Opportunity	Evidence
Political	Social media has unprecedented impact on political processes		Electoral Studies, Vol. 44 (2016)
	Big Data has unprecedented and relatively untapped impact on political processes and social advocacy		Techrepublic (2017) Motherboard (2017)
Economic	Shifts from Western consumer markets to bigger and more demanding Eastern consumer markets with different cultural values		Digitaltransformation2017.com (2017)
	Rise in financial transactions by block chain	X	www2.deloitte.com (2017)
	Continued growth (geographically) of mobile payment systems in developing countries	X	www.forbes.com (2015)

	Driver of Change	Connection to Opportunity	Evidence
Social	Social & work hyper connectivity online		www.information-age.com (2016)
	Rejection of smart homes & IOT technology in domestic sphere		www.telegraph.co.uk (2014) www.pwc.com (2017)
	Fitness boom dies with economic depressions		www.telegraph.co.uk (2003)
	Developed countries will move towards user-based services not ownership-based	X	www.shapingtomorrow.com
	The 'digital divide' grows, leaving behind the poorest, the most vulnerable, women & non urban dwellers		www.cgap.org (2017)

	Driver of Change	Connection to Opportunity	Evidence
Technological	Quantum technology is moving fast. Quantum computers are being developed a high speed		www.businessinsider.com (2015)
	Increasing need for electricity globally		www.eia.gov (2016)
	Moore's Law: Tech grows exponentially	X	www.ted.com (2006) uk.businessinsider.com (2015)
	Rise of the Chatbots		chatbotsmagazine.com (2017)
	Consumers using free online communication apps instead of phones and SMS, and instead of social media like Facebook. Privacy preferred over sharing personal details.	X	www.theguardian.com (2016)

	Driver of Change	Connection to Opportunity	Evidence
Technological	The rise of the 'zero user interface'		www.marketingweek.com (2016)
	Cyber attacks using Internet of Things		www.theguardian.com (2016) krebsonsecurity.com (2016)
	Decreasing market for health wearables; increase in health measuring devices that can seamlessly be added to normal accessories/clothing etc.	X	www.wired.com
	Setting of global and regional standards for health wearables accuracy of measurements & quality labelling		www.americanbar.org
	Fitness wearables recentre around the medical community rather than consumers, developing more seriously useful devices for health problems. e.g. diabetics		www.forbes.com (2016)

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	Driver of Change	Connection to Opportunity	Evidence
Technological	Wearable payment devices		thefinancialbrand.com (2017) www.mediapost.com (2016)
	India will compete with China to integrate AI into every part of its society		carnegieendowment.org (2016)
	Block chain is used to secure the IOT	X	mobile.reuters.com (2017)
Environmental	Resource scarcity	X	reports.weforum.org
	Climate change impacts coming ahead of predictions; rate of change increasing dramatically		www.carbonbrief.org (2016) www.theguardian.com (2017)
	Driver of Change	Connection to Opportunity	Evidence
Environmental	Intense pollution in Asian cities		www.theguardian.com
Cultural	Preference for online/virtual experiences over in-person live experiences? e.g. education		bigthink.com

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Grow Smart with Nokia

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Abstract

5G is going to revolutionize everything in the future. Hundreds of times faster data transitions make a huge IoT ecosystem possible. One of the most important applications of IoT technologies is the development of Smart cities. Nokia is the leading company in 5G development. The familiar and memorable logo of Nokia can be the flag of Smart Cities in the future.

Introduction

We are living in an era full of new emerging issues, uncertainties and huge surprises. In such a world, every business and company, small or huge, old corporations or new initiatives, even individuals and communities, they all need to have future-oriented knowledge and long-term visions to create sustainable plans and strategies for their future. In other word, every single individual or group mush have a future intelligence to survive the uncertain world and stay alive.

In this sense, many businesses and companies are conducting strategic foresight projects and embracing future-oriented vision building to determine their futures business possibilities and paths of development. Foresight is a systematic, participatory, future intelligence gathering and medium to long-term vision building process aimed at present-day decisions and mobilizing joint actions[1]. Nowadays, may corporations have a foresight department or group in their internal structures and participate in bigger foresight projects in the local and national levels.

This report aims to conduct a casual foresight process for Nokia Corporation to identify some important and crucial future business opportunities for the company in the field of telecommunications products and services and provide Nokia Corporation with some general and practical recommendations. For this purpose, first I review Nokia's past, present and future business plans and general strategies to make a sense of the mission of the company in the past eras and in the long-term future. Then, I will explain the concept of Smart City, as an important field of opportunity for the future business of Nokia Corporation, and clarify why Nokia can be a leading corporation in making Smart Cities in the future. In the next section, by scanning the environment and identifying some key parameters, I construct four possible scenarios for the future of Smart Cities. Finally, based on the most desirable alternative scenario, I provide Nokia Corporation with some general advice and practical recommendations for developing products and services for the futures smart cities.

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1   (Kuosa, 2016)

Nokia; Past and Future Business Plans

Nokia has a long history. At the beginning, Nokia was a forest product and power industry company, with activities such as electricity generation. In 1922, when Nokia entered a partnership with Finnish Cable Works and Finnish Rubber Works, it started manufacturing telephone and electrical cables, galoshes, and other rubber products for both civilian and military use. In 1967, the new Nokia Corporation was created and it started to manufacture military equipment like radio communicators. That was the first step in the next evolution of Nokia Corporation, producing televisions, computers and mobile phones.

Nokia's first fully portable mobile phone was the Mobira Cityman 900 in 1987. Nokia assisted in the development of the GSM mobile standard in the 1980s and developed the first GSM network with Siemens. In November 1992, the Nokia 1011 launched, making it the first commercially available mobile phone. In 1998, Nokia overtook Motorola to become the best-selling mobile phone brand. Between 2000 and 2014, Nokia Corporation first experienced its golden era; becoming a pioneer in mobile games, selling the most popular cell phone, Nokia 3310, and developed its business in telecommunication vastly. But after that, Nokia Corporation entered into a huge crisis by the entrance and popularity of Android mobiles and iPhone OS and encountered bankruptcy[1]. Finally, in September 2013 announced the sale of its mobile and devices division to Microsoft. After the sale of its mobile devices division, Nokia started to focus on network equipment through Nokia Networks[2].
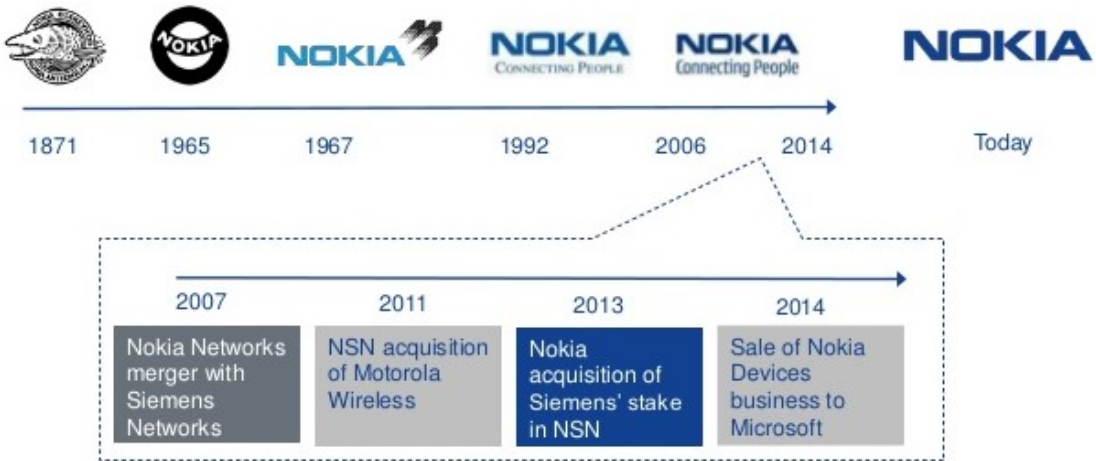
Figure 1. The history of Nokia

However, in 2014 Nokia started to regenerate serious strategic plans and policies to re-enter the consumer electronics business and mobile phone market as well. They announce that the Nokia brand was "valuable" but "is diminishing in value, and that's why it is important that we reverse that trend very quickly, imminently[3]. Nokia Corporation raised from its own ashes and started to make strategic business plans to develop new products and services. As the first successes, they introduced OZO as

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1   (Bofah, 2012)
2   (McCaskil, 2013)
3   (Warren, 2014)

a futuristic camera for VR filming[1], they sold here digital maps division to a consortium of car producers[2], and they bought the health device maker, Withings to be integrated into a new Digital Health unit of Nokia Technologies[3].

In 2016, Nokia announced its key financial and strategic targets in the present market and in long-term future. According to Nokia's president and CEO, given the appeal to others of our innovations in Networks, virtual reality, and digital health, Nokia team is confident that they can continue to build their patent and technology licensing business further in the coming years. Now, Nokia claims that from the enabling infrastructure for 5G and the Internet of Things to emerging applications in virtual reality and digital health, they are shaping the future of technology to transform the human experience[4].

Nokia announced its four key priority areas as 1. Lead in high-performance, end-to-end networks with communication service providers; 2. Expand network sales to select vertical markets needing high-performing, secure networks (energy, transportation, public sector, technological extra-large enterprises and web scale); 3. Build a strong, standalone software business (beyond the current product-attached software model, focused on areas including enterprise software and IoT platforms; 4. Create new business and licensing opportunities in the consumer ecosystem (successful patent licensing in areas like automotive, consumer electronics and IoT)[5]

As mentioned, Nokia is concentrating its strategic plans on developing fast and secure network connections and working on the 5G internet as one of the key focus areas. 5G planning aims at a higher capacity than current 4G, allowing a higher density of mobile broadband users, and supporting device-to-device, ultra-reliable, and massive machine communications[6].

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1   (Newton, 2015)

2   (Trenholm, 2015)

3   (Verbergt, 2016)

4   (Nokia, About us, 2016)

5   (Nokia, Higher returns through focused growth: Nokia sets key financial and strategic targets at Capital Markets Day 2016, 2016)
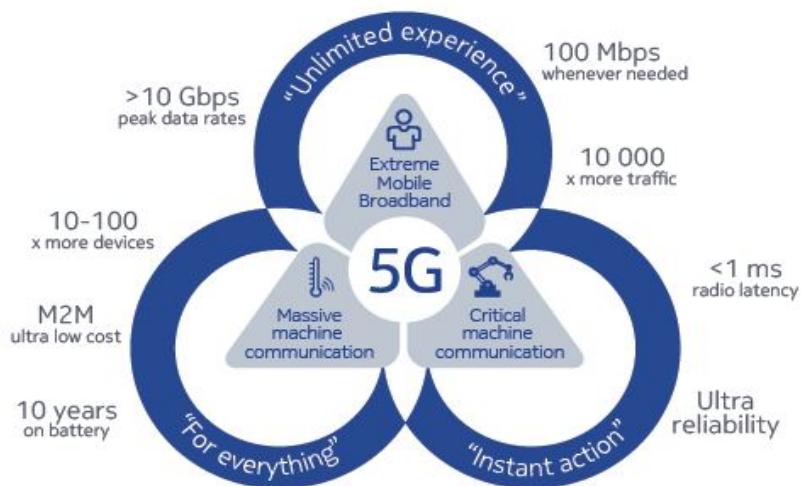
6   (Osseiran, Boccardi, & Braun, 2014)

Figure 2. 5G key features (Nokia presentation, 2017)

Nokia is attempting to expand its business in the field of 5G development in three different aspects of individuals, society, and economy. Nokia believes that 5G is going to shape a future world in which everything is connected as needed for many different functions. In such a world, products and services are designed to be de-centralized, programmable and customizable for every consumer 5G is going to increase the possibility and efficiency of Internet of Things and smart homes and smart cities as a direct result.

Figure 3. (Nokia Presentation, 2017)

Nokia has experienced several serious shift overs in its business models and strategies[1] and in every shift over, it has attempted to dramatically change its focus plans and performance to be flexible and appropriate for the global trends and emerging new things. Hence, it can be said there are serious opportunities for Nokia to be one of the leading corporations in the innovative new fields of telecommunication in the future.

5G and IoT Revolution

At its simplest, the Internet of Things (IoT) is a network of internet-connected objects able to collect and exchange data using embedded sensors[2]. IoT is the inter-networking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to collect and exchange data[3]. As it has been mentioned in many different arguments, the definition of IoT is constantly changing and expanding from the original definition, machine-to-machine communication to machine-to-human conversation.

Almost everybody agrees that IoT is going to be a huge issue in the future starting from now. It has been claimed that businesses are going to be the first sectors applying IoT to manage their products and services remotely. Governments are going to be the second adopters of IoT to control and monitor many different infrastructures and public services. Finally, citizens and consumers are the latest adopters of IoT, who start participating in the whole ecosystem by buying and using IoT devices and services and continue their role by customizing, producing and sharing them.

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1   (Aspara, Laukia, Lamberg, & Tikkanen, 2011)
2   (Meola, 2016)
3   (Brown, 2016)

The IoT Ecosystem

The IoT ecosystem enables entities to connect to, and control, their IoT devices.

In the ecosystem, an entity uses a **remote** (e.g. smartphone, tablet, etc.) to send a command, or a request for information, over a **network** to an **IoT device**. The device then performs the command and/or sends information back over the network to be analyzed and displayed on the remote. There are multiple locations in which the data generated by the IoT device can be analyzed and stored, including the cloud, a local database, on the remote, or locally, on the IoT device itself.
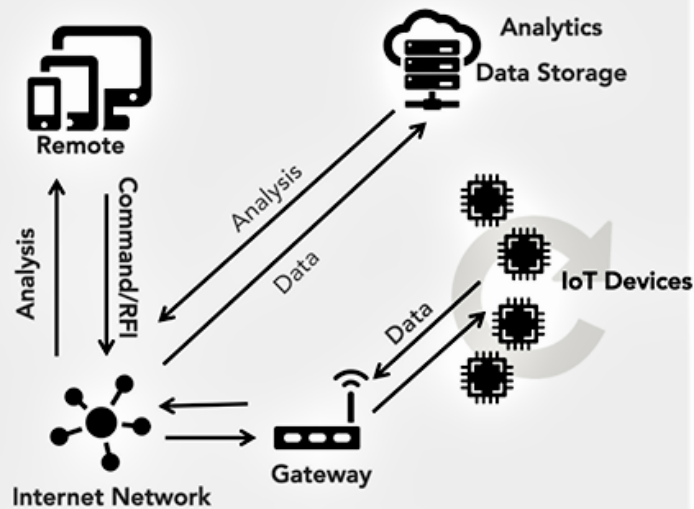
Figure 4. (Business Insider, 2016)[1]

According to Ericsson Mobility Report[2] around 29 billion connected devices are forecast by 2022, of which around 18 billion will be related to IoT. Connected IoT devices include connected cars, machines, meters, sensors, point-of-sales terminals, consumer electronics, and wearables. Between 2016 and 2022, IoT devices are expected to increase at a CAGR of 21 percent, driven by standardization of 5G internet and emergence of many new use cases (smart cities, smart homes, smart industries, smart agriculture, etc.).

5G is going to revolutionize Internet of Things (IoT). Faster data transmission could simplify connected device management, which means 5G could lead to significant growth in the IoT. Latency in cellular networks limits many IoT applications. Right now, many IoT solutions use cellular networks like 4G LTE to connect to the cloud, but the devices in these solutions produce so much data that's hard to process quickly. That creates high latency — the amount of time between when data is sent from a connected device to when it returns to the same device — which in turn limits IoT solutions' effectiveness.

5G could solve that, leading to increased efficiency and the potential more connected devices. Since 5G is able to transmit data drastically faster, companies could deploy more connected devices without fear of an overcrowded network exacerbating existing latency issues. That'll give the overall number of connected devices deployed a boost right after 5G arrives[3].

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1   (BI-Intelligence, 2016)
2   (Ericsson Mobility Report, 2017)
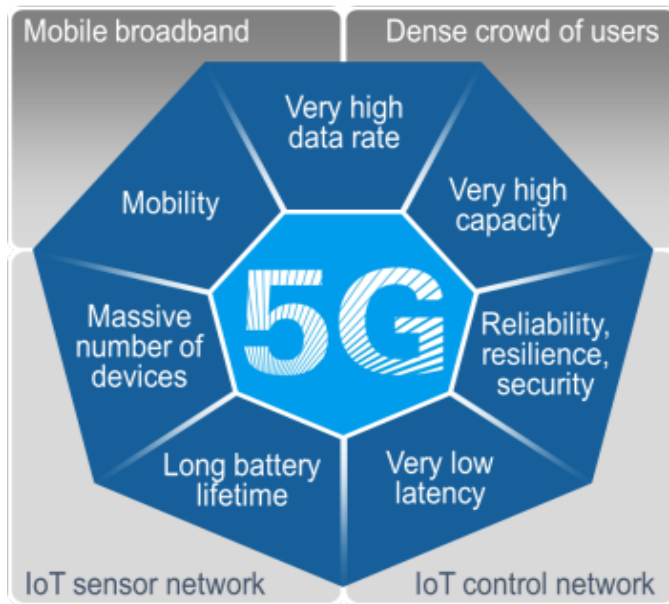3   (BI-Intelligence, 2016)

Figure 5. 5G and IoT

Field of Opportunity; Nokia and Smart City

Transforming cities and making them smart and smarter is one of the most significant applications of the Internet of Things. A smart city is an urban development vision to integrate information and communication technology (ICT) and Internet of things (IoT) technology in a secure fashion to manage a city's assets. The city's assets include, but not limited to, local departments, information systems, schools, libraries, transportation systems, hospitals, power plants, law enforcement, and other community services[1].

There are many different aspects and characteristics with which the concept of Smart City can be defined. Some definitions are highly emphasized on technological dimensions, while some others believe that the most fundamental characteristic of a Smart City is the smart citizens and smart citizen-centric services. However, in a general outlook, it can be said that a Smart City in the future consists of some key parameters and characteristics, and a smart city can be identified by measuring the level of intelligence in these key dimensions. These key parameters are shown in the figure below:

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1   (Musa, 2016)

Figure 6. Smart City characteristics (Dreamtimes, 2016)

Smart energy uses digital technology through advanced meter infrastructure (AMI), distribution grid management, and high-voltage transmission systems, as well as for demand response for the intelligent and integrated transmission and distribution of power. Smart governance and smart education include policies and digital services from the government that help and support the adoption of green and intelligent solutions through incentives, subsidies, or other promotions[1].

Smart healthcare is the use of systems and intelligent and connected medical devices. It also involves the implementation of policies that encourage health, wellness, and wellbeing for its citizens, in addition to health monitoring and diagnostics as opposed to treatment. Smart mobility enables intelligent mobility through the use of innovative and integrated technologies and solutions, such as low emission cars and multimodal transport systems. In other words, smart mobility means cars and buses without drivers, trans which are controlled remotely by the automotive systems, and so on and so forth.

Smart buildings are green, energy efficient, and intelligent, with advanced automated infrastructure that controls and manages aspects such as lighting and temperature, security, and energy consumption independently or with minimal human intervention. Smart Home is a residence that has appliances, lighting, heating, air conditioning, TVs, computers, entertainment audio & video systems, security, and camera systems that are capable of communicating with one another and can be controlled remotely by a time schedule, from any room in the home, as well as remotely from any location in the world by phone or internet[2].

In its strategic plans and objectives in the future, Nokia has significantly concentrated on the Internet of Things and its vast range of applications in all industries and businesses. In a graph, (figure8

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1   (Perevezentsev, 2016)
2   (WHAT IS A SMART HOME, 2015)

below) Nokia determines many different fields of application for IoT (developed by 5G) and the verticals and domains of each field. As it can be seen, Smart Cities is one of the fields that Nokia emphasizes on it and its related business opportunities like traffic control, parking slot management, advertising and tourism through VR.
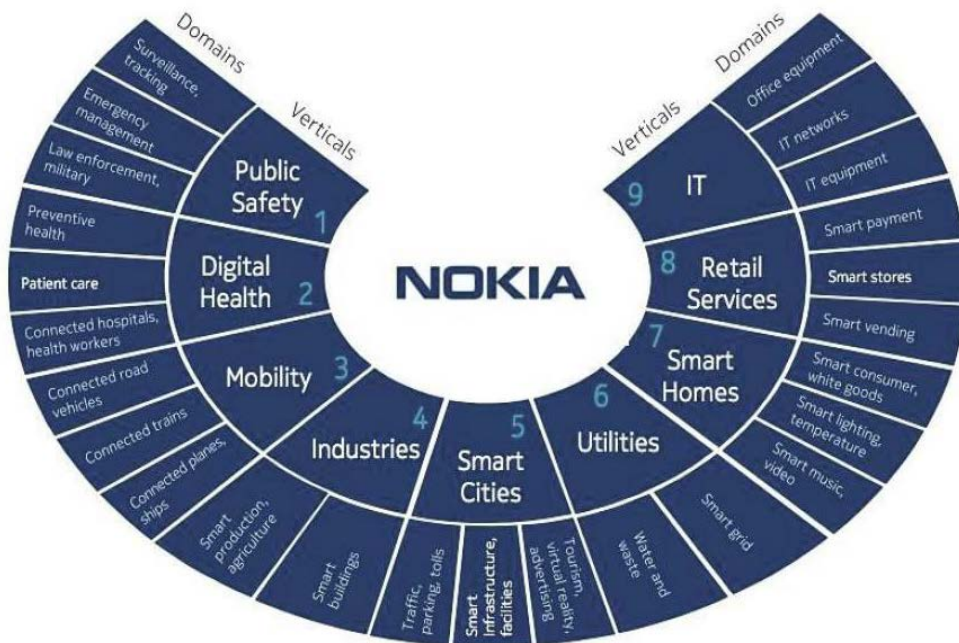

Figure 7. IoT field of applications (Nokia presentation, 2017)

As Nokia aims to be the first corporation in developing 5G, and it is scanning the horizons and planning for both short-term and long-term futures, it can be claimed that Nokia has serious business opportunities in all fields of IoT applications, particularly Smart Cities. Why? Nokia recently published a document that outlines steps that governments can take to ensure that the smart cities they develop work for everyone. The central theme in Nokia's smart cities guide is the use of data to personalize cities to the residents' liking[1]. The company's document outlines a six-point guide for the implementation of smart cities. Those points include forging public-private partnerships, removing data barriers, and developing smart cities programs that bring together the government, businesses, and academia[2].

As a provider of networking equipment, Nokia has an interest in smart cities implementation. It has already developed a platform called IMPACT (Intelligent Management Platform for All Connected Things) that it believes would be useful in the management of IoT systems in smart cities. Because the implementation of smart cities would require building city networks, Nokia can benefit from supplying its equipment for the projects.
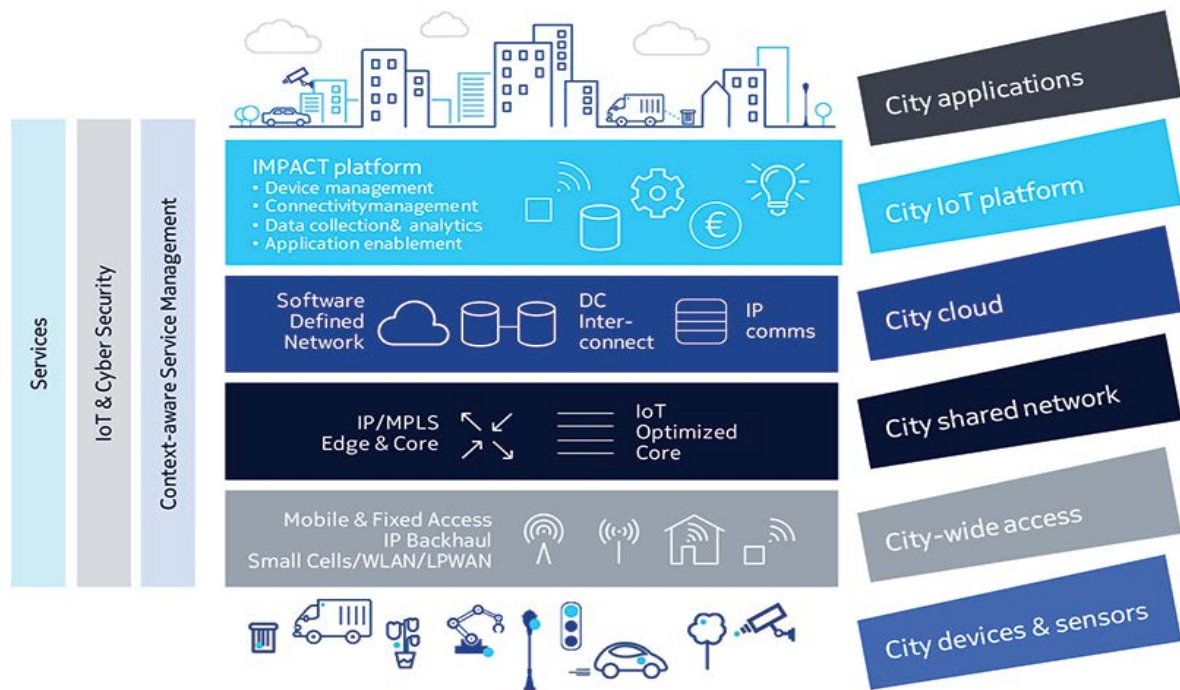
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1   (Gunter, 2017)
2   (Nokia, 2017)

Figure 8. Smart City implementations (Nokia, 2017)

The Future of Smart Cities; Parameters and Scenarios

In order to understand the role of Nokia and different business opportunities for the company, first, we need to construct some visions of the future Smart City. There are many drivers and parameters which are going to impact and shape the future of Smart Cities. Scanning the environment and different horizons concerning the future of Smart Cities, I identify some of the key parameters which I present in a PEST table below (figure 9). It has to be mentioned that the future of Smart Cities and the implementation of IoT devices, services and cloud networks consist of many technological and practical dimensions which are not located in the field of my expertise, as a non-engineer social sciences student. In this sense, the identified impact factors and the possible scenarios are more of some general visions of the future of smart cities, than detailed and specific technical and practical possibilities.

In the following table, the key parameters of the future of smart cities are identified in four political, economic, social and technological dimensions. In addition, different conditions/values for every impact factor are defined in order to be utilized in alternative scenarios. While some approaches aim to identify relevant trends, specific emerging issues and black swans for the future of the topic under the study, this report emphasizes on structural approaches in which the main structures and structural parameters are illuminated to create visions of the general structures in the future.

Domain	Parameters	Conditions
Political	P1: Laws and Legislations	Facilitating and empowering smart cities
		Limiting and restricting the emergence of smart cities
	P2: Governments role	Participating in adoption and implementation
		Disturbing businesses and people from adoption
	P3: Political power relations	Democratic/ Smart City for empowering people
		Oppressive/ Smart City for control and surveillance
Economic	P4: Technology ownership	Centralized by governments and businesses
		De-centralized/ owned by people
	P5: Economic goal	Financial and economic growth
		Sustainability and disciplined
	P6: Market status	Monopoly/ Oligopoly
		Competition/ Collaboration
	P7: Market share	Increase of market share (in IoT technologies, etc.)
		Decrease of market share
Social	P8: Public opinion	Trust in smart city/ data security, privacy, etc.
		Distrust in smart city/ surveillance, eavesdropping
	P9: Public engagement	Active/ participation
		Passive/ detachment
Technological	P10: Tech development	Technological growth
		Technological collapse
	P11: Tech status	Ethical/ humane
		Non-ethical

Figure 9. Impact Factors in PEST table

Identifying important key parameters of the future of smart cities, I believed that the most appropriate method to construct the futures possible scenarios would be conducting a Cross Consistency Assessment (CCA) matrix to determine the consistencies and inconsistencies between all different parameters' conditions, and then using Morphological modeling[1] to construct the final consistent scenarios. However, I decided to utilize the conventional and classic method of scenario building and construct four scenarios based on two main axes. First, because the most efficient and reliable software

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[1] Morphological modelling or Morphological analysis is a futures method, developed by Tom Ritchey. According to him, it is well suitable for policy studies and studies which aim to construct futures scenarios with a structural approach.

for morphological modeling (CarmaCCA) developed by the Swedish Morphological Society is not an open source available software. Thus, the possibility to get access to the software requires a time-consuming application procedure and the agreement of the Morphological Society. The second reason was the conventional story about the managers and directors of businesses and corporations who do not like to explore a large number of scenarios, which many of them are probably very similar.

Therefore, I construct four scenarios for the future of smart cities based on two axes, including technology ownership (P4) and public opinions (P8). These two axes are chosen based on a casual impact and uncertainty assessment of all the key parameters. In this sense, technology ownership and public opinions are both contains high impact (importance) for the future of smart cities, and high uncertainty.

Technology ownership is important because it is going to affect many other aspects of futures smart cities, like the market status and the role of governments and businesses. It is highly uncertain because several controversies have already started about who should own what and while govern-ments and businesses are eager to get their hands on the ownership of technologies, many believe that futures technologies must be de-centralized, owned by the people and used by the people.

Public opinion is an important parameter of the future of smart cities because citizens are going live in smart cities and they are going to be highly affected in a positive or negative way. Citizens are going to be the majority of participant, users, consumers, and developers of the futures cities and their opinions about this social structure are going to influence many other parameters like market share, ethical responsibility of technologies and legislations. In addition, public opinions about the concept of the smart city are highly uncertain, since there have been many debates and concerns about issues like data security, privacy, and surveillance. Hence, public trust or distrust in smart cities is still unclear and debatable.
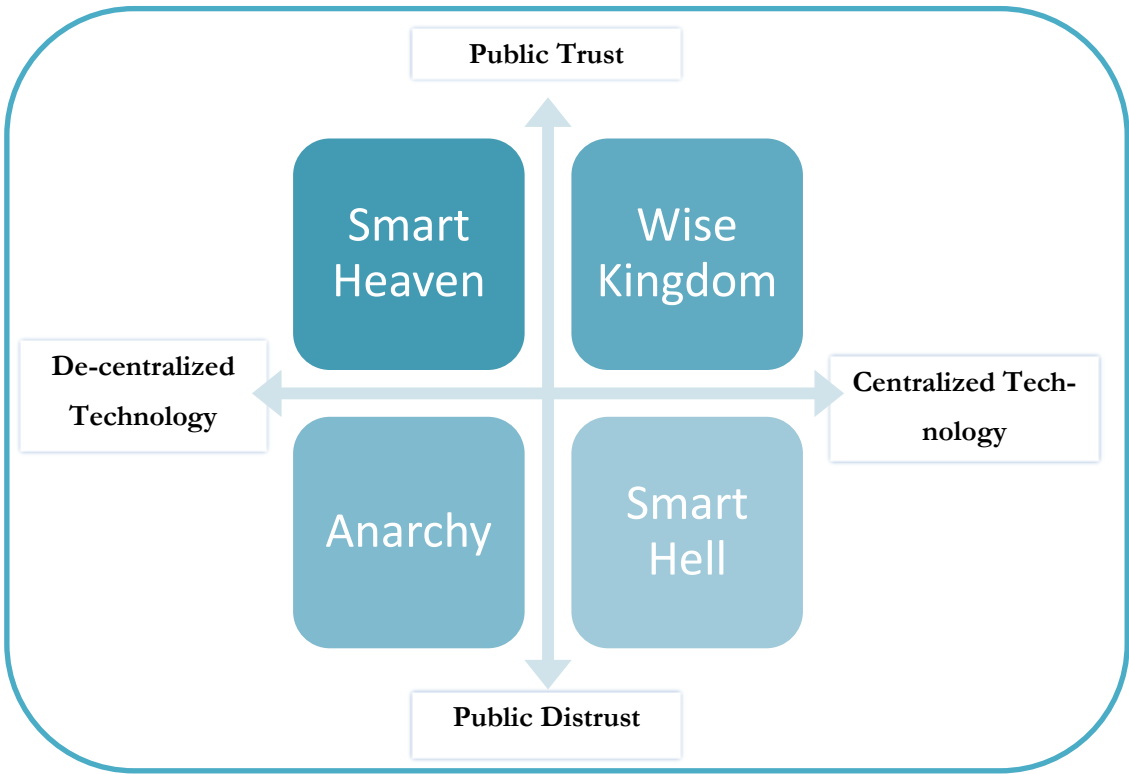

Figure 10. Four Scenarios for the future of smart city

Smart Heaven: This is the most desirable alternative scenario in which the ownership of technology is decentralized and public opinion about the whole smart city structures in theory and practice is based on trust. In this scenario, administrations and government departments, businesses and corporations, and citizens are all owners and users of smart city's technology. They work together in a participatory and collaborative manner to make their city smarter, more efficient and more sustainable. Government departments use the technologies and data acquisition processes to improve public services like waste management and remote transportation, but not for mass surveillance and breaking people's privacy for political reasons. Businesses use the technologies and IoT devices for more efficient and remote management of their industries, develop technologies and solutions in cooperation with citizens to make a smarter city and create financial benefits for their companies. They do not enter bloody competitions toward economic growth anymore, instead, they understand the benefits of sustainable growth for everyone and work collectively toward it. In this scenario, citizens feel safe and trusted and they trust administrations and companies with their data. They are not passive or reckless about their city, thus, they are not just consumers, they are developers, participants, and providers.

Smart Hell: This is the worst-case scenario for the future of smart cities. Technology ownership is centralized and monopolized by the government and maybe some big corporations. Government departments use technologies and smart city's infrastructures for surveillance and even oppressive actions and improvement of public services, smart health or transportation is not really their priority. Laws and legislations do not allow start-ups and small companies to engage in the development procedure of smart city and huge involved companies just care about their market share and economic growth. Citizens are treated like blind consumers who should not be involved in anything. Hence, citizens see their cities like an unreliable data acquisition machine which brings them no benefit and no new possibility.

Wise Kingdom: This is the scenario of centralized technology and public trust in the small number of companies and government sectors which are responsible for the management of the smart city. In this scenario, technology is monopolized by big companies and government, but they respect citizens' privacy and data security. They care about developing a beneficial and secure city for citizens and they attempt to grow smart and sustainable by providing smart public services and products for people. Citizens are not involved in the development procedure, but they trust in their administrators. They see their city as a smart and sustainable city which provide them benefits of smart heath care, smart energy consumption, and smart education.

Anarchy: In this scenario, nobody is responsible for anything! Technology is decentralized, thus, citizens, businesses and governmental sectors all can develop and use the smart city's technological possibilities in any way they want. Businesses care about economic growth and making more money out of the smart city. Government departments acquis citizens and businesses data for their own reasons like surveillance, and do not try too hard to provide smart public services. Citizens do not trust in businesses and government and try to develop their own beneficial applications and systems by using the smart technologies in their city.

Let's Grow Smart Together

As explained before, the best-case scenario is the scenario in which technology ownership is de-centralized and public opinions about the smart city are based on trust and participation. While every

company like Nokia must be properly prepared for the worst-case scenarios and middle range scenarios as well, the first priority is to know the desirable alternative futures and plan and work toward making the desirable scenario happen. In this sense, this report suggests Nokia Corporation produce customizable programmable developable decentralized technological products and services for the futures smart cities. These kinds of products and services can be owned, developed and improved by public sectors, small size enterprises and initiatives, and citizens. Hence, Nokia Corporation will be one of the leading technology corporations which protect and advocate the diversity of the futures smart cities and technological access for everybody. On the other hand, this report recommends Nokia to include citizens in the procedure of developing smart cities and appreciate their opinions and their participation. After all, the ultimate objective of creating smart cities is to provide smart services and products for the people. But how?

There are many different suggested frameworks and practical models for making a desirable future smart city. Technological frameworks, like digital city[1], information city, and Ubiquitous city[2], are focused on technological developments and discuss specific technological procedures to create smart cities. Institutional frameworks and approaches are dedicated to political aspects of smart cities and suggest the practical steps to shape smart communities[3] and smart governance. Human approaches, like creative city, knowledge city and learning city[4], concentrate on the social and cultural dimensions of smart cities and emphasize on developing humane structures to increase citizens' possibilities in a smart city. In the recently developed models and practical instructions, all different dimensions are combined. It means that apparently, we now understand that smart cities have to be smart in all these three aspects.

For example, in an executive report, which has been mentioned in Nokia's documents about the smart city, Marc Jadoul has suggested ten general and broad recommendations for creating a smart city[5]. These recommendations (figure 11) cover many different dimensions of the concept of smart city and also, provide some broad practical suggestions, like launching cross domain initiatives, implementing the infrastructures at the beginning, and creating a collaborative culture.

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1   (Yovanof & Hazapis, 2009)
2   (Anthopoulos & Fitsilis, 2009)
3   (Moser, 2001)
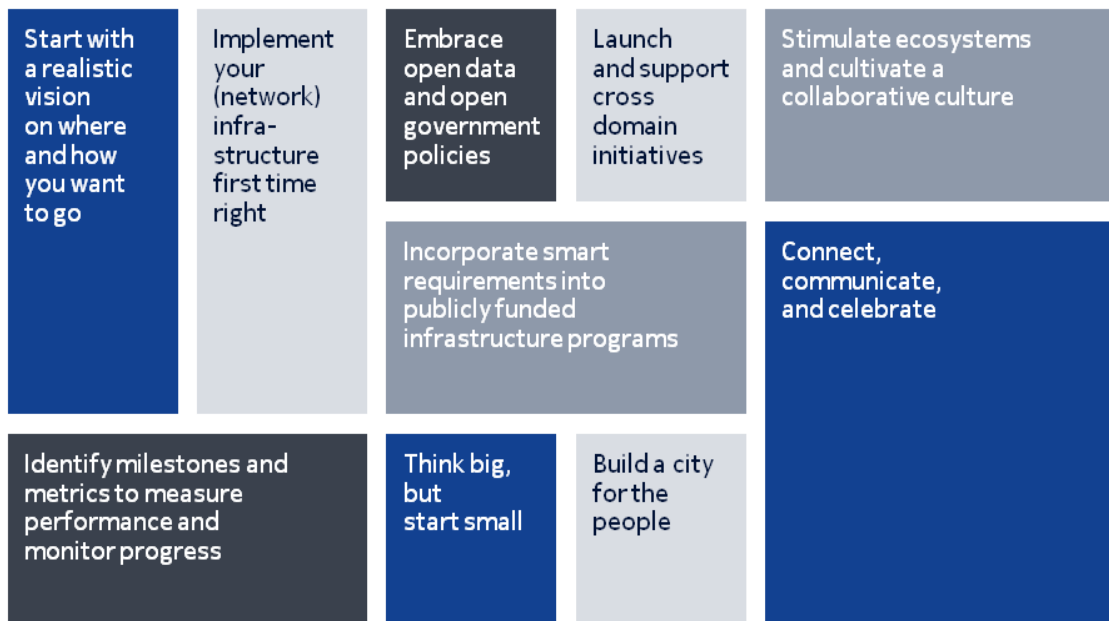4   (Dirks, Gurdgiev, & Keeling, 2010)
5   (Jadoul, 2016)

Start with a realistic vision on where and how you want to go	Implement your (network) infra-structure first time right	Embrace open data and open government policies	Launch and support cross domain initiatives	Stimulate ecosystems and cultivate a collaborative culture

Incorporate smart requirements into publicly funded infrastructure programs

Connect, communicate, and celebrate

Identify milestones and metrics to measure performance and monitor progress

Think big, but start small

Build a city for the people

Figure 11. Recommendations for creating a smart city (Jadoul, 2016)

However, this report is just going to make some practical recommendations regarding the two main axes of the constructed scenarios for the future of smart cities. While some recommendations are relevant to the concept of decentralized technology, most of them are related to the social and human aspects of futures smart cities and new possibilities for futures citizens. Because providing detailed and precise recommendations for developing technologies for futures smart cities, like IoT devices, internet clouds and ICT infrastructures needs a high rate of expertise in the field of technology, which I obviously do not have it! Hence, I will just list some initial practical suggestions related to human aspects of smart cities in the following section.

1. You say, you design: The first and most initial step in producing products and services for citizens of a smart city, is to know what do they want and how do they want it to be? There have been many survey projects, citizens' workshops and sessions in the cities which are experiencing the first phases of becoming smart (i.e. Amsterdam, Singapore, etc.), asking people what is actually being smart? And what do you want from a smart city? Although this procedure seems to be more related to public sectors and administrations, businesses like Nokia can benefit from it as well.

Nokia can conduct creative futures workshops, and citizens' panels, asking people what products and services they want to have in a smart city because people know the best. These workshops can be a part of a big research project inside the company, anticipating and planning the futures products and services characteristics for smart cities.

In addition, Nokia needs to invite people not just to say what they want, but also design it themselves. It has been claimed that many people in the recent years have learned how to develop a mobile application by using different programming and coding languages. These are active citizens with creative minds and innovative visions who just need a platform to design and create. Nokia can provide them with an open source platform for coding and developing new applications to use the big data coming from smart cities' IoT devices and sensors. This open platform can be the source of huge innovations and new surprising products in the future of Nokia Corporation. Working for people with people!

2. A huge research lab: The big data coming from IoT devices and smart city's infrastructures can provide universities and researchers a wide range of useful information for many different studies and research projects. As 5G is going to dramatically increase the rate of data transformation and data processing and analysis, nobody is going to be worried about how to process, differentiate and categorize the big data. Hence, the huge rate of data coming from IoT devices can be easily separated and categorized in order to be utilized for many different purposes. One on the most important functions of the big, quantitative and categorized data is to be used in research projects in various fields.

Nokia can develop different software, applications and supporting APIs with which researchers and research labs can get access to different ranges of data collected from all around the smart cities, from hospitals and Clinique centers to museums, galleries etc. For instance, many different data sets which are going to be collected in the futures smart hospitals through IoT devices and sensors can be hugely useful for faculties and researchers in the field of biomedical engineering and medical equipment designers and providers. These apps and APIs need to be user-friendly, easy working and understandable for the public to ensure the researchers from humanities and social sciences who are not skilled in coding and programming are able to use them. In addition, by developing simple and user-friendly apps and APIs, ordinary people and citizens can use them as well for their general knowledge and self-studies.

3. Happy citizens: People are full of stress and anxiety in the modern world. The history of the modern era has shown us that the more the societies develop and the more technologies develop, people become more stressed and threaten by emotional breakdowns and mental diseases. The futures smart cities are going to have a crucial role in helping people out of stress. In other words, a smart city is a city which its citizens are happier and emotionally healthier.

As Nokia is investing in the smart health and trying to get its hands on smart health products and services, it can combine its efforts in this field with the products and services in the smart city projects. For example, Nokia can provide citizens with applications with which they can spread positive quotes, photos, and visions on the public banners all around the city. They can express their emotional status, they can congratulate national and international celebrations and they can write creative and inspiring things about their city. There has been a successful project in a city in Germany in which people have access to some electronic banners in train stations through their smartphones, and they can write their thoughts, emotions and interesting sentences and phrases on these banners. Similar projects and many innovative ideas in this field can be provided by Nokia, helping people to be happier and make their city happier and more vivid.

4. You are not strangers: People need to trust companies and public sectors which are going to provide them with technological infrastructures and software in the futures smart cities. They need to know that these companies and sectors are transparent, clear in their financial transactions and lobbying strategies, and responsible and respondent to their business partners and consumers. Citizens want to know that they are a part of making their cities smart, not some outer strangers who are going to be informed after everything has happened.

Nokia can show its transparency in its business transactions and also its responsibility in environmental projects and sustainability path by providing citizens with access to open data. For example, the company can develop applications through which people can monitor and follow up the company's environmental efforts in the city, like electronic devices' waste management, and the operations of the company's production sites. In this sense, people can feel that Nokia does not consider them as blind consumers who are just going to be manipulated by smart advertisings, but the company shares information with them as community partners and as collaborative participants of the entire projects.

5. Let's share: Uber, Airbnb, and many similar initiatives in local, national and international levels show us that the consumerism is not the futures dominant economic culture. Instead, the economic culture of the future is going to be based on the shared market and shared economy in which people are both sellers and buyers. They are not going to be the mass consumers of the huge companies and corporations anymore, and this huge cultural shift will change the structure of all aspects of market and businesses. In this sense, companies will survive and stay alive which understand the new culture of shared economy and plan, produce and recycle their products in line with the values of shared economy and sustainability.

Nokia needs to emphasize on the share economy's principals in its strategic plans and projects for developing products and services for smart cities. The futures smart cities are going to be sustainable and green, and citizens are going to demand products with longer life span and services with which they can share values and benefits with each other. Nokia has an admirable and valuable reputation in producing goods with long life span, and that would be a significant leverage point for the company in the future. moreover, the company can provide citizens of smart cities with services and applications with which they can share their cars (like Uber), their houses and accommodations (like Airbnb), and even more, their books and other reading materials, their specific skills and expertise in a particular field like painting houses and cars, and perhaps many other things.

Conclusion

In conclusion, this report shows that the Smart City and the required products and services for making cities smart and smarter is a crucial field of opportunity for Nokia Corporation. Nokia aims to be number one in 5G development, and consequently, it will be one of the leading companies in IoT technologies. Smart City is one of the most important applications of IoT developments, and making cities smart is going to be beneficial for citizens, public sectors, environment and businesses and Nokia itself.

Moreover, I explained that the future of smart cities significantly depends on the strategies, plans and fundamental goals of telecommunications companies like Nokia. While they can create the most desirable future smart cities in which technology ownership is de-centralized and citizens trust in businesses and technologies, they can also create smart Hells in which companies are fighting for more economic growth and more money and citizens do not trust in their own cities. Hence, Nokia as one of the leading companies in developing 5G Internet, IoT devices and services and smart cities' infrastructures, has a huge responsibility in creating the proper culture and ethical principles for these sorts of technologies. The leading companies are always the ones which create the cultural and ethical aspects of technologies. I believe that the initial cultural and ethical principles for the futures smart cities' technologies must be humane and human-centric, based on participation and partnership, transparent and trustful and focused on sustainability and collaboration, instead of competition and economic growth.

In addition, as a recommendation to Nokia corporation, I suggest that the company puts its effort on developing products and services for the future smart cities which can help citizens to be happier and healthier, empower them to be a part of the process and participate in designing and developing their cities, enabling them to use open data coming from their city to be informed and to conduct research. To sum up, this report suggests Nokia to care about people, trust them and gain their trust.

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FUTUS5 FUTURES CASE EVALUATION

The FUTUS5 Futures Case Evaluation (8 cr) belongs to the curriculum of the Master's Degree Programme in Futures Studies as an obligatory course. In it students were provided material of different case studies conducted at the Finland Futures Research Centre, and they searched for additional literature in relation to them. They also met researchers, who had been working in these case studies; they listened lectures given by these researchers and they had a possibility to discuss about the case studies with them.

The main assignment of the course was to write an extensive case evaluation report on a specific case executed in groups. Four case studies were presented. All of them were evaluated by one group of students. Groups presented their evaluations in a seminar, discussed their evaluations with other groups, and at the end of the course conducted a written case evaluation report. In addition, in autumn 2016 students wrote an individual essay based partly on given articles presenting different evaluation methods in futures research and partly on literature of their own choice. In this publication we have an opportunity to read the written report of one group and the essay of one student.

The aim of the course is, that students will be able to compare various cases based on futures research methods, to critically evaluate given cases by drawing conclusions and restructuring the logics and contents, to work as a group in the evaluation process, to evaluate and summarize futures cases from the beginning to the conclusions and to be able to apply futures studies methods in various case studies. Responsible teacher: **Katriina Siivonen**.

The report written by **Isabel Bottoms, Janne Hietanummi, Severi Kausola, Elina Nikula, Harri Pohtola, Claire Schuen** and **Satu Tuittila** is an evaluation of the project Futures Consciousness presented by Doctoral Student Sanna Ahvenharju. In the project Ahvenharju has as her co-workers Doctoral Student Matti Minkkinen (FFRC) and Doctoral Student Fanny Lalot (University of Geneve). The evaluation report written by the group of students is excellent in its way to look the case from multiple points of view and to reflect it in relation to relevant literature. The report is coherent and gives a diverse and comprehensive general view of the case. Students present their own critical voice in the report, which shows to Ahvenharju and her co-workers the value of their research and gives them possibilities to further develop it.

The essay written by **Ludmila Seppälä** is excellent in her good and clear analysis based on relevant literature and presenting Seppälä's own, strong voice as well as insightful and good own observations. Seppälä presents own suggestions for development of evaluation of futures research, which is valuable. She also reflect in interesting way applicability of futures research and its value for society in relation to evaluation of futures research.

A Case Evaluation of the 'Future Consciousness 2.0' Project by Sanna Ahvenharju

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Introduction

Futures consciousness is a topic of scientific and everyday implications. Lombardo (2007, 1) defines futures consciousness as,

> *"the total integrative set of psychological abilities, processes, and experiences humans use in understanding and dealing with the future".*

Rubin (2013) adds that futures consciousness is an

> *"active and action-oriented perspective on the future, present and past and the relations between these"* with *"a specific effort to form a conception about the meanings and consequences of issues and our daily actions".*

Hence, futures consciousness is an integral part of an individual's perceptions, will and intent regarding the future. This makes futures consciousness of great importance for futurists and decision makers to understand when planning different futures and actions towards them. Despite this, the amount of scientific research on this topic is generally considered scarce (Sande 1972, 271).

'Future consciousness 2.0' is a project, led by Sanna Ahvenharju, targeted this gap in scientific research on futures consciousness. The aim of the project is to create a measurement tool to measure futures consciousness in individuals as holistically as possible, bringing psychological constructs to the field of assessing futures consciousness. This multidisciplinary approach creates new connections between the fields of psychology and futures studies. The tool is set out to be used in a larger doctoral work relating to futures consciousness of Finnish government decision makers.

The purpose of our case evaluation study is to assess the 'Futures consciousness 2.0' project. This study focuses on the methodology used in the project as well as its relevance and importance to the field of futures studies. The assessment is conducted by evaluating the presentation material of the project, and by searching and analyzing relevant scientific research articles in relation to the case.

The Case

The significance of the case and its connection to Futures Studies

The Futures Consciousness 2.0 project (later referred also as 'Case') has attempted to begin to fill the gap in the futures theories and methods that identified futures consciousness as a significant part of the futures field and an innate trait for some human and animal brains that could service the field of futures, but has so far remained vague and unmeasurable. According to Ahvenharju (2016), so far the term 'futures consciousness' has only been discussed by a few futures studies writers, Dr. Thomas

Lombardo being one of the most significant. However, Lombardo has not researched the concepts´ measurable qualities; therefore this Case offers creates new knowledge, building on Lombardo´s and others´ previous work on futures consciousness.

The issue of futures consciousness is significant because it affects the way people think and behave in different situations and should therefore not be neglected when planning for, and advocating, changes. In fact, the lack of understanding of human thinking and behavior upon change has been recognised as one of the obstacles in pursuing important goals with global ramifications, such as the mitigation of climate change. For example, the International panel on climate change (IPCC) states that there is a knowledge gap in understanding how people behave when trying to promote change towards a more ecologically friendly form of transport (Sims et al. 2014, 605). As such, this case is significant in marking the first major attempt to categorize and anchor what makes up futures consciousness and how it can be identified, thus taking futures theory one step further in its understanding of factors and drivers of change. The research of this Case not only fills a definition and measurability gap in Futures Studies, it is also the necessary parallel work stream on the human motivations behind foresight that compliments the methodologies and philosophical explorations that make up the history of the field so far.

Additionally, we found this case meaningful and interesting as it practices internal consistency by using key tools of psychological measurability from the field of psychology and applies them in futures research. By doing this, it is bringing the fields of psychology and futures studies into a more collaborative and exploratory third space that strengthens the multidisciplinary continuum of futures studies.

Finally, futures consciousness - accessible to everyone but not practiced by all - could be said to be the sustainability element of the futures field. It is this consciousness which creates the applications of the initial futures research, or creates a long term impact out of a futures workshop, through building consciousness in individuals and collectives - not just knowledge - which can then be applied in a much wider sense than the initial injection of knowledge. Essentially futures consciousness is the seed that futures practitioners can plant and enable to grow and reproduce, having a far greater reach and impact than the initial seeds planted could on their own. Further research work that builds on this Case to assess where futures consciousness comes from and how it can be fostered would also be a significant stepping stone to some of the deeper work necessary on hacking into futures consciousness to enable much wider and more tactical seed planting in the future of the field.

The application-value of this Case to society

Should this Case be successful in development of the measurement tool in a way that it can be adapted and implemented for diverse usage, there could be demand for the tool among the fields of politics, businesses, social work, education and further research of futures consciousness. In politics this tool could be used, not only for the measurement of the futures consciousness of today's decision makers, but also for the comparison of candidates in future elections. This way it could be used for example in voting advice applications for citizens to help the selection of the best candidate.

For business purposes, the application could be valuable for human resources departments in their recruiting and training processes of employees. According to a trends report (Kantrowitz 2014), 62% of human resources professionals are using personality tests to compare candidates in the hiring process. If a new position to be filled requires personal characteristics of futures consciousness, a company would now have a tool to measure this. This way it could be also possible to reveal different kinds of information about applicant's abilities and interests than the traditional personality tests. It also

opens up the possibility for monitoring, building capacity and enforcing of these aspects of futures consciousness during the career of employees.

Outside of the business world, the findings of the research could be useful for social work among immigrants and unemployed people, as well as for soon to graduate students as a measurement tool in career planning and professional orientation workshops and examinations. There could be a need for the measurement tool for example in the ongoing OMASI project by Sari Miettinen & Katariina Heikkilä (OMASI 2016) which is searching for future oriented guidance models, tools and services to be used in coaching programs in educational institutions or in other organizations, such as employment agencies. Their aim is to improve young women's life management and promote their integration to society. Measurement of the futures consciousness of these young women could support the search of different ways to improve their personal futures thinking and life planning overall.

As well as the applications outlined above, the group identified opportunities for how further research of futures consciousness could expand on the field of application. There could be possibilities to combine the measurement tool with other analysis about person's personality and demographics. This would take the process a step further than purely mapping a person's futures consciousness by starting to offer reasoning for what makes people more or less conscious. By finding different reasons behind individual futures consciousness we might be able to understand better how humans understand and deal with the future (Center for Future Consciousness 2015). This would in turn enable more futures-conscious processes and methods to be built and facilitated.

Theoretical background, methods and research material

Theoretical background

As outlined previously, futures consciousness has not been researched much, as such there is no single major theory on what futures consciousness is. For this Case, the theoretical foundation for finding out what futures consciousness is, in order to develop a measurement tool for it, is based on several publications dealing with futures consciousness, mainly academic journals. The project presentation quoted two main researchers in particular: Anita Rubin and Thomas Lombardo (Ahvenharju 2016). A vast amount of different publications were studied in order to find out what the common denominators on this issue are. After establishing them, the next step was to set up questions that reflect those common denominators most accurately. For developing the questions, the project team used professionals in the field of psychology.

There are, according to Ahvenharju, over 20,000 registered tests that offer psychological scales of measurement for different issues. These tests were also taken into consideration when developing the tool to measure futures consciousness. A testing phase of the questions was conducted applying statistical methods. The questions were tested on in one country only, the United States, in order to be able to distill a smaller number of relevant questions to take forward into the second version of the questionnaire.

In the absence of clear theoretical consensus on what futures consciousness is among scholars, 'Futures Consciousness 2.0' has been able to find out from different scientific literature what the common denominators defining futures consciousness are. This can be considered a scientific approach where new knowledge (the common denominator for futures consciousness) is based on existing knowledge. When developing tools which should have impact on strategic decision making and policy

making - as in this case - it is important that they are methodologically and professionally sound (Van der Steen and Van der Duin 2012).

The Methods and Research Material

Overall, the group assessed the methods in this Case as appropriate for the ends sought. The extensive literature review formed a firm base of what is understood as futures consciousness today, its different dimensions and also other issues closely related to the topic. They searched for common denominators and formed connections to earlier scientific literature, and developed a very precise and layered conceptual definition. According to Ahvenharju, the Case uses scientific and multidisciplinary methods. In this process they separated a large concept into smaller categories and concepts until those could be measured. This way five common themes were found: 1) Ethical Awareness, 2) Systems Being, 3) Openness to Change, 4) Agency and 5) Time perspective. (Ahvenharju, 2016). The challenge is how to consider different sociocultural contexts, and individuals' different kind of backgrounds in the questionnaires? The couple of rounds of test questionnaires enabled them to develop shorter and lighter questionnaires, by distilling the number of questions down. The way of presenting the results is not just to produce a chart giving results for the 5 themes individually, but also to present results in a combined visual chart where the reader can also quickly and easily see the "biases" of the individual answering the questions.

We identified a risk that there might be a difference between answers and actual real life behavior. Because futures consciousness is connected to behavior, it might be important to find some additional tools to be used with the survey to get results as true to life as possible, and avoid using the person being tested as the only source of 'truth' as to their futures consciousness. In the article by van der Steen and van Twist (2012, p.480) they analyse how political decision-makers look at their surroundings and their contexts to assess what is "acceptable" as a decision or a way forward. So, if this Case aims to assess the futures consciousness of decision makers through what their personal consciousness level is, that doesn't necessarily translate into futures conscious decisions because past research shows they look outside of themselves for the answers on what to do. In other words we can think of politicians and civil servants who have come into office with one set of ideals and then changed their policies and views when it actually comes to applying those ideals in decision making positions.

The 'Futures Consciousness 2.0' surveys are tested with American people only, using the Amazon MTurk Platform where respondents earn money by answering these questionnaires. As such we have some concerns over the relevance of the results to generate questions which will be used to assess Finnish decisions makers' futures consciousness. We concluded therefore that to ensure cultural relevance there may be a need to run similar test waves of the questions in Finland before Ahvenharju's aim of questioning Finnish Decision Makers can be achieved.

Although we consider the research method for conducting the surveys itself suitable for this case, we also see additional challenges associated with it. The platform was based on Amazon MTurk Platform which is a commercial service and participants can be subjected to restrictions such as differences in computer knowledge, variations in educational background and others variables. These restrictions could contribute to some loss of objectivity of the result so that they would not present the genuine reflection. Like research or surveys of any discipline, the objectivity of statistics cannot be rendered obsolete. As Ahvenharju presented, when making the surveys, they set very detailed questions into clusters and also applied psychological evaluation techniques. Random questions were embedded

in the questionnaire, which effectively blocked invalid statistics from interfering data collecting. As mentioned earlier, participants of Amazon MTurk are compensated with payment. This raises questions whether their answers are based on their true values and intentions or something else. Regardless of this small criticism, we have noticed that the questions and the process used in conducting the surveys have been intended to be as unbiased as possible and statistics have been collected objectively.

Ethical Issues

In all research ethical issues should be considered. Even if there is not a particular deontological code of the futurist, the ethical codes of professionalism, honesty, respect and duties as a scholar do exist (Poli 2011, 408). In using psychological tests and asking about people's private opinions which probably are revealing their own ideological attitudes and worldviews, issues of privacy and security arise. Where the answers of the questionnaires are stored, how they are coded, and who has an access on them are important matters. Depending on the situation in the society, there might be political or economic interests for misusing the information.

Another concern is the relevance of the questions in the questionnaires in the particular cultural context that the tool will be used within. How the words are understood (e.g. family) or what is meaningful or possible futures consciousness may significantly differ between different contexts (e.g. comparing Northern Europe to Middle-East). The cultural relativity should be considered but also questioned. We all have the ultimate possibility to use free will and effect on the future, create possible and desired alternatives (Malaska & Virtanen 2009, 67), but what is 'the most desired' future may differ in different cultural contexts.

Finally, the reliability of the answers, particularly with decisions makers, should be questioned. If the results are going to be used in decision making or governing public opinions there might be strong political or economic interests driving the results - especially if individuals results were to be made publically available. Finally, it was considered that the research tools should be made easily adaptable for policy makers to support futures oriented thinking (applying their futures consciousness) in the often conflicting and inconsistent policy making processes (Van der Steen and Van Twist 2012).

Summary and conclusion

In evaluating this Case the aim was to investigate and evaluate the project 'Futures Consciousness 2.0' by systematically looking into its theoretical, methodological settings including its research material and ethical issues. As futures studies often deals with great societal issues, like in this case, where a measurement tool would be used to measure futures consciousness of Finnish government decision making, validity and reliability of the results is of great interest to stakeholders and importance to the legitimacy of the futures studies field (Piirainen, Gonzalez, Bragge 2012).

This evaluation concludes that this project is methodologically and professionally sound when looking into all of its aspects. Futures consciousness is something that is not well defined in the field of futures studies and there has been a gap between theories and methods which this case has attempted to begin to fill in. The background work by itself, establishing the common denominators needed in order to develop the tool, can be considered an important contribution to the field. In this evaluation we also proposed that this tool might have many useful applications in the future, from pre-election applications for citizens to recruitment solutions for human resource management. For further research of futures

consciousness, there could be possibilities to take this project further in the direction of finding out the factors behind individual futures consciousness to further develop and deepen this area of enquiry.

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Steen. M.van der - Twist. M. van (2012) *Beyond use: Evaluating foresight that fits*. Futures, Vol. 44, 475–486.

Comparison of Different Evaluation Methods in Futures Research

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Introduction

Futures research, as an academic discipline, bases itself on systematic, documented and reflective underlying structure. Multi-discipline nature and the factor of immaturity set the need for methodological work in futures research. Evaluation of futures research is an important part of the discipline; it could be regarded as a self-reflection of the studies.

Futures research has its roots in social, economic and management and other disciplines, as it has originated in the form of a response to economic, political and strategic planning challenges in the society. Cohen and Lloyd compare the evolution of scientific disciplines with biological evolution: "academic disciplines evolve in response to environmental changes and interactions with others."[1] Even though future was always a subject of interest and attention, an emergence of futures studies as an academic field was called by the increase of strategic planning within the military, social and business areas. Three main stages formed futures studies, according to Ahlqvist and Rhisiart "military dimension, service and consultancy, and policy dimension." Perhaps, it could be said that advancements in the development of these areas gave it the possibility to emerge.

Cases evaluation often seen as a burden or an enforced requirement from the academia. However, on the other hand, and especially in the cases of futures research, it provides tools for development and field for learning for researchers. On picture 1 below visually presented different levels of research: object (that is futures), Futures research (as an academic discipline), and meta-research (a further step in evaluation). The meta-research level could be interpreted as a mechanism to reflect research on different phases and with different purposes. Discussion about meta-research in futures defines the area of this essay.

Several papers published on this topic and this essay aim to compare and discuss different methods of evaluation in futures research. The focus of the essay is not exclusively in comparison, but rather on looking to the area of futures cases evaluation from a broad perspective.
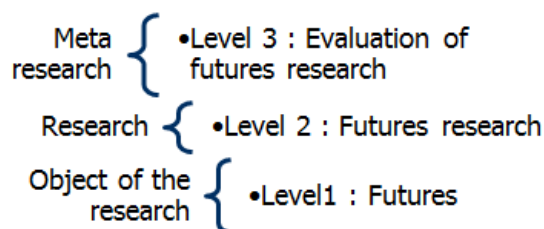
Picture 1. Visual presentation of research levels.

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1   Cohen, Lloyd, "Disciplinary Evolution and the Rise of the Transdiscipline." http://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1035&context=cba_facpubs. Accessed 31 Jan. 2017.

Short overview of main existing papers on evaluating foresight

Four articles were selected for the review of available methods of evaluation; all of these were published in special edition of Elsevier Futures Journal of 2012.

Article "Beyond use: Evaluating foresight that fits" by van der Steen and van Twist[1] focus on the usefulness of foresight in policy making. Authors consider the main point for futurists as "to develop a connective approach to their studies so that it becomes fit for use by policy makers." This is undoubtedly an important matter for futures research; it is directly connected to the justification of futures studies, the reason for its existence, and could be regarded as an attempt to build applicable knowledge in the field of evaluation of future research cases. However, there are limitations of this research. Firstly, it is focused exclusively on public policy making processes, which mean that other areas of future studies likely to exhibit other characteristics that the researchers are focused on. Secondly, as authors note themselves, the research is primarily a theoretical and conceptual paper, that was not tested empirically. Lastly, authors claim that they extrapolate knowledge related at large on observations and cases from the Netherlands to the general case. It is a disputable matter. Indeed most of the conclusions and relations refer exclusively to "the Dutch case" without any clear mechanism how this could be related to general cases of futures studies.

In article "A systemic evaluation framework for futures research" Piiranen et all[2] made a remarkable research work in establishing a framework for futures research evaluation. The focus point of their framework is in establishing reliability and credibility of the result of futures studies cases. Without compromising complexity, authors made an easy to follow a framework that guides evaluation through three main levels: utility and delivery, technical, and ethical and three stages of process activity: input, output, and impact. It forms a matrix that contains all key features of the research and allows quickly get the whole picture. Such framework could be applied to practically any futures research, irrespectively of its field, nature or methodology. In return, the usage of the framework would increase transparency of futures research cases and increase overall academic and social confidence in it. However, the approach of the framework, suggests that the research is completed, making it difficult or impossible to apply it to the ongoing research, while results are not yet discovered or formulated.

Rohrbeck et all[3] in article "Exploring value creation from corporate-foresight activities," in his energetic and practical manner evaluate corporate foresight based on the concept of added value. He sets four main criteria for it: systemic logic, tailoring to the specific context, the participation of stakeholders and possession by researchers of a clear eye for added value. These criteria emerge from studies of corporate foresight in private companies and present rather a narrow perspective to overall futures studies evaluation. However, these criteria are efficient and base themselves on empirical research data.

1   van der Steen, M, and van Twist M. (2012) "Beyond Use: Evaluating Foresight That Fits". Futures (44), 475–486.
2   Piirainen, K., Gonzalez, R., Bragge, J. (2012) A systemic evaluation framework for futures research. Futures 1(44), 464–474.
3   Rohrbeck R., (2012)"Exploring Value Creation From Corporate-Foresight Activities" Futures (44),440-452

"Learning ahead of time: how the evaluation of foresight may add to increase trust, organizational learning and future-oriented policy and strategy" by van der Steen and van der Duin[1] is an overview of several main research papers on the topic of futures cases evaluation. In their article, authors summarize main existing approaches and conclude stating that there is an explicit need to continue development of new models to evaluate futures studies and through this process to increase the credibility of the foresight, develop a connection with foresight needing bodies and support learning process among the futurists. The article itself does not contain any method of evaluation, but rather present an overview and short reflections on the topic of evaluation of cases in futures studies.

Besides these articles, the essay is taking into account discussion of a broader context of evaluation in futures research as a field and as a transdisciplinary area.

Comparison of different methods

For the comparison purposes, three main areas are selected where the methods could be compared the best. These are the origin and the foundation of the methods, characteristics, and applicability.

Origin

Futures research cases could be originating practically in any area of life, and almost always combine several fields of science and research. Considering classic PESTEC table for evaluation already would reveal how many fields need to be included. Also, formal education of scholars as futures researchers started to form significant "school of futures research" not long ago. Often researchers have various backgrounds and degrees in other fields. Thus, the question about the origin of evaluation methods could help to establish if this method would apply to the case. Comparison of all four articled by the origin could be found below in Table 1.

Table 1. Comparison of articles from origin point of view.

Article	Origin field: main focus of the article, keywords, background of authors
"Beyond use: Evaluating foresight that fits," van der Steen and van Twist	Policy management and public administration
"A systemic evaluation framework for futures research," Piiranen et all	Foresight, Technology, Economy
"Exploring value creation from corporate-foresight activities, Rohrbeck et all	Strategic Foresight, Business Management
"Learning ahead of time: how the evaluation of foresight may add to increases trust, organizational learning and future-oriented policy and strategy," van der Steen and van der Duin	Policy and management, futures research

1   van der Steen, M. van der Duin, P. (2012) Learning ahead of time: how evaluation of foresight may add to increased trust, organizational learning and future oriented policy and strategy. Futures (44), 487–493

Origin of the evaluation method, influence greatly on the perspective to futures research – to be more of practical and judging from its usefulness or be more of a long-term investment in building new knowledge. The most evident example from these four articles is Rohrbeck research, having a focus on the futures research as such, business management part of evaluation prevails.

Characteristics of the evaluation methods

All of the articles, except for systemic evaluation framework[1] and overview by van der Steen and van der Duin[2], evaluate specific cases, from a specific point of view. Be that a policy making in society or a business foresight, these are particular cases of futures studies. On the contrary with the systemic framework, presented by Piiranen, where an attempt made to present more general point of view, that could be applied to various cases evaluation.

There is one characteristic that could be traced through all the articles – special place of futures research as a field of studies. The similarity in all the methods observed from the uniqueness of the futures research cases. These are different from any other research projects, therefore, require special evaluation methods to be applied. However, this is not a complete picture, because based on the origin of the method, different approaches were used for evaluation.

One could suggest that futures research could be evaluated from a position of applying methodology from the area of studies subject, as well as transdisciplinary approaches, in addition to futures research methods. For example, if futures research project performed in the area of business administration or management, tools from these fields of study could be effectively applied to conduct the research, alongside with methods specific to futures research. For example, gathering data in an empirical or theoretical format, overall research orientation of positivism the like. In picture 3 below the research "onion"[3] shown, it presents evidently how research philosophy, approach, strategy, and techniques could be viewed as a whole within the research. This will grant more credibility and connect with researchers familiar with this area. Both Rohrbeck and Piiranen emphasize this idea as "tailoring for specific context" and "including valid expertise" respectively. Perhaps, including such methodological part into futures research would help evaluation of the cases, but surely this approach cannot be applied without paying attention to special nature of futures research. Some similarities could be observed, for example, a parallel could be drawn between positivism, realism, interpretivism, pragmatism and selection of axes in defining the envelope of uncertainty within scenario method[4] with typical scenarios as business as usual, continuous growth, transformation, and collapse.

Another possible approach could be to increase the level or transdisciplinary research methods within futures studies. There is a significant body of knowledge in this area, also about futures studies,

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1   Piirainen, K., Gonzalez, R., Bragge, J. (2012) A systemic evaluation framework for futures research. Futures 1(44), 464–474.

2   van der Steen, M. van der Duin, P. (2012) Learning ahead of time: how evaluation of foresight may add to increased trust, organizational learning and future oriented policy and strategy. Futures 1(44), 487–493

3   Saunders M., Lewis P., Thornhill A. (2011) Research methods for business students

4   Ralston B., Wilson I. (2006) The scenario-planning handbook, 123

such as transdisciplinary research framework by Polk[1] where five focus areas selected for the evaluation: inclusion, collaboration, integration, reflexivity, and usability.
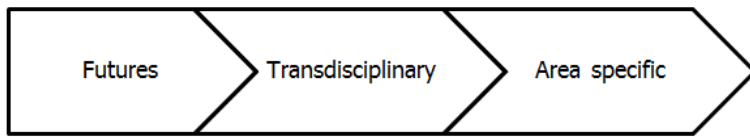
Picture 2. Methods in futures cases research.
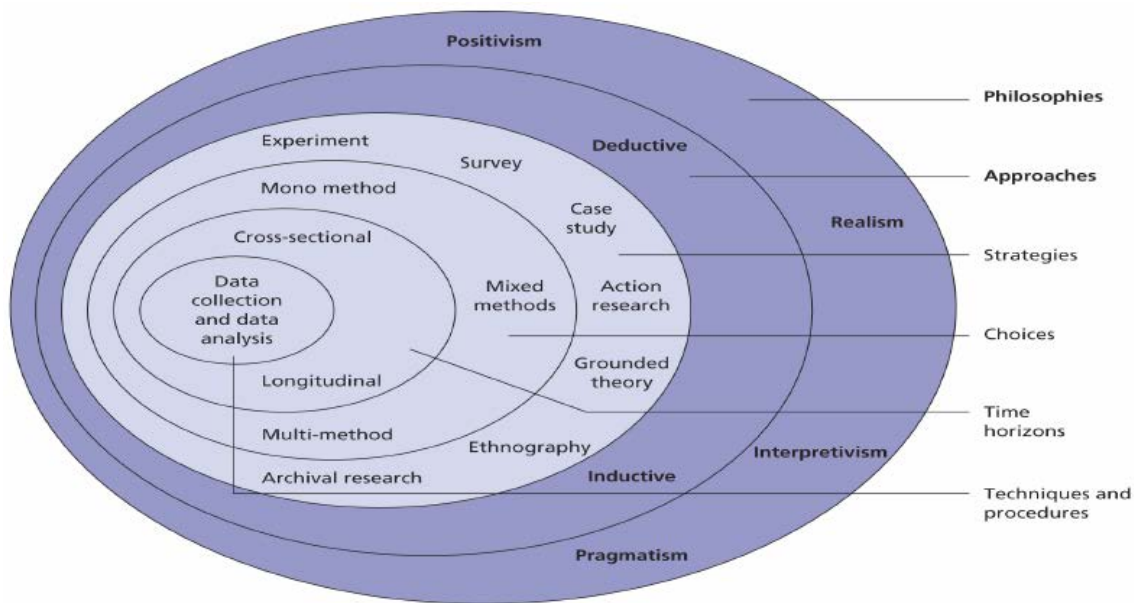
Picture 3. The research "onion." Source: Saunders, Lewis, and Thornhill (2011, 128).

Old existing evaluation method – peer review could be used in futures research applying newest techniques. An interesting trend in science caused by the development of social networks and IT technologies is a possibility to arrange peer reviewing involving larger groups of scholars, comparing with limited numbers of possible reviewers from the same school, area, or network of scientists. Such resources already exist online, as one example – www.academia.edu, a portal where researchers could publish their works and also participate in the discussions about other works. Another example is www.researchintegrityjournal.com, where the focus is on peer review and integrity evaluation of research in bio- and medical areas, where ethical questions have the most critical meaning. Similar portal for peer reviewing in futures studies would be in line with its modern spirit, but more importantly, would unite futures researchers. It would give the possibility to benefit from others work and could be as well a platform for arranging Delphi based evaluations.

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1 Polk M., "Transdisciplinary co-production: Designing and testing a transdisciplinary research framework for societal problem solving", 2015, Futures (65), 110-122.

Summarizing these points, it could be suggested that futures studies cases might be evaluated from the point of view of transdisciplinary studies or area specific studies, along with futures studies specific evaluation. Since the first two are more mature and developed areas, their evaluation methods could be applied to ensure the quality of the research work in futures studies, and increase its credibility, however nature of the futures have to be taken into account, for not oversimplifying the complexity. This idea is presented on Picture 2. Additionally emerging evaluation method could be based on peer reviewing and social networks for scholars.

Applicability

All articles have a main (or very important) focus - applicability of the futures research, validity of its results for the society or the customer. It makes an interesting path for ethical discussion about futures studies: should it be considered a pure exploration science field or applied science, for the benefit of the society? Ahlqvist and Rhisiart presented a similar discussion, they argue about "the utilitarian tradition that has steadily achieved ascendancy in futures studies."[1] This consideration also mentioned by Klay and Zimmermann, as a process of "thought collective" influencing the collective learning of the society through methodology working with objectivity and subjectivity[2].

Another related issue is setting a basis for credibility and popularization of futures studies as such. As any emerging field, futures studies need to earn trust from the society and academia, get "the critical mass" of supporters. It could be even said as "prove its right to existence." Therefore critical evaluation of research is very important and overall amount of research articles and as it was called before "Meta-research" needs to be increased.

Conclusions

Existing pool of research work in the area of futures cases evaluation forms level of meta-research in futures studies. Some more general approaches, such as systemic framework by Piiranen and others[3] or research by Alhqvist and Rhisiart[4], set the foundation for a meta-research area. Other evaluation methods take a more narrow view and deal with specific areas of futures studies.

Linking with transdisciplinary research and area specific research evaluations might be beneficial, as these are more established fields comparing with the futures studies. This way methods used for evaluation could be partly taken from existing sources. However special attention is needed for careful handling futures-specific nature of the cases. Evaluation methods, such as peer review could be applied for futures research projects evaluation using contemporary social networking possibilities.

1   Alhqvist T., Rhisiart M. (2015), "Emerging pathways for critical futures research: Changing contexts and impacts of social history", Futures (71), 91-104

2   Kläy A., Zimmermann A. (2014) "Rethinking science for sustainable development: Reflexive interaction for a paradigm transformation", Futures (65), 71-85

3   Piirainen, K., Gonzalez, R., Bragge, J. (2012) A systemic evaluation framework for futures research. Futures 1(44), 464–474

4   Alhqvist T., Rhisiart M. (2015), "Emerging pathways for critical futures research: Changing contexts and impacts of social history", Futures (71), 91-104

Applicability of futures research as an evaluation criterion seems to be almost top most concern within evaluation methods. This could be explained from utilitarian position prevailing in futures studies that were inherited from its origins. However, this opens an ethical discussion about the dominance of applicability over explorative research purposes within futures studies.

The importance of meta-research level existence in the futures studies cannot be overestimated. It shows that besides systemic research there is also space for self-reflection among researchers to ensure quality, high ethical level and reliability of the research work.

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Ralston B., Wilson I. (2006), 123 The scenario-planning handbook.

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SUSTAINABLE DEVELOPMENT STUDIES (KEKO)

KEKO9001 Implementing the Principles of Sustainable Development (10 cr)

This course aims at the development of collective expertise. To achieve "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Our Common Future, 1987), people must agree on important priorities. This is a challenge, as both the aims and the means to pursue them change depending on the spatial scale, the time perspective – and depending on whom you ask. To get experience of such dialogue, students work in multi-disciplinary teams. Each team gets one theme that they study for the whole year. In 2016–17, the themes were insect-eating, Internet of Things, Baltic herring, and mega sport events (FIFA World Cup 2022 in Quatar). Each team writes four papers: ecological, social, economic and cultural sustainability analysis of the topic. For each paper, the team needs to self-organize, agree on a more specific question or a problem, define what they mean with sustainability in this context, divide and carry out research and writing tasks, and to integrate their work into a coherent whole, all within a month. Papers are introduced by the responsible teacher **Maria Höyssä**, drawing on the evaluations by ecological sustainability co-teacher **Maria Tuomi** and economic sustainability co-teacher **Ville Lauttamäki**.

Of the 16 papers produced by the KEKO teams, the next pages feature the ecological sustainability analysis of the Insect-eating team: **Juulia Bernhardt, Antti Hynni, Milja Lappalainen, Nicoleta Kaitazis, Kaisa Pietikäinen, Maiju Pohjola** and **Elli Suonpää** (written in Finnish) and the economic sustainability analysis of the Internet of Things team: **Eeva Karppinen, Eerika Heinonen, Essi Silvonen, David Rabensteiner** and **Janne Hietanummi** (written in English).

The "Insect-eating" team produced a very polished and well-written analysis. The team took upon itself the ambitious task of doing a quantitative comparable analysis on the sustainability of the production of beef vs. insects in Finland. Due to the limited time available for doing the teamwork, such task is very challenging. It requires not only defining the research question, choosing the categories through which sustainability is analysed and finding relevant data for each category, but also working the data to a comparable form and contextualizing it to Finland. The methodological choices as well as the nature and limitations of the sources could have been opened up a bit more, however. Sometimes KEKO teams fall into the trap of trying to prove the sustainability of some solution, but here the approach is analytical throughout the work. The team does not shy away from showing that while insect production is very sustainable when measured with other parameters, it still remains somewhat energy-intensive. Their analysis and conclusions are both relevant and interesting.

The Internet of Things team narrowed their abstract theme nicely down by focusing on smart buildings in a concrete case area. Their analysis concretizes what Internet of Things means and could mean for sustainable housing. They discuss briefly the sustainability transitions approach and the potential of smart buildings to contribute to such transition, but the bigger body of their analysis focuses on looking at the case through a stakeholder framework. The work would have benefited from a more specific explanation for these choices and a tighter connection between the theories and the case analysis. However, the chosen approach enables the team to nicely illuminate the complex relation between economic, social and ecological sustainability and the different interests that influence how these sustainability dimensions play out in reality. While the team opens up the technical potential in the performance of smart solutions, they do not get carried away with it, but proceed to discuss these from the affordability and equality point of view.

Naudanlihasta hyönteisproteiiniin siirtymisen vaikutukset Suomen ruoantuotannon ekologiseen kestävyyteen

Juulia Bernhardt, Antti Hynni, Milja Lappalainen, Nicoleta Kaitazis, Kaisa Pietikäinen, Maiju Pohjola & Elli Suonpää

Turun yliopisto

Abstract

Livestock is known to be one of the biggest pollutant causing global warming. However, on a global scale it is the most consumed animal protein. As the population grows intensively to unsustainable numbers and predictions of the effects of global warming are becoming more devastating, alternative protein sources are in demand amongst the consumers. Insects are viewed as the solution to the global famine problem and its environmental impacts are vastly researched. However, local implications to specific areas are only subject to generalization.

This study was conducted as part of the Sustainable Development Studies of the University of Turku. The purpose of this report was to compare the environmental impact of livestock and insect farming, and its effects on the ecological sustainability of the Finnish food production through various indicators of sustainability such as the ecological footprint, carbon and water footprints, energy consumption, and waste management. Material was gathered from various national and international researches regarding the subject. Also news on the media were viewed to understand the potential of insect farming in the Finnish food industry. Nevertheless, national figures on insect farming were limited, especially regarding energy consumption, and thus certain aspects were subject to presumptions drawn from the results of international studies.

The study indicated that in Finland insect farming would be a more sustainable solution to food production than livestock currently is. Moreover, the study demonstrated that insect farming is better in all sustainability indicators and thus could alter the environmental impact of the Finnish food product to a more self-sufficient and sustainable direction.

Keywords: ecological sustainability, entomophagy, sustainable development

Asiasanat: ekologinen kestävyys, entomofagia, kestävä kehitys

Johdanto

Brundtlandin ympäristö- ja kehityskomissio toi vuoden 1987 raportissaan "Yhteinen tulevaisuutemme" tieteelliseen ja yhteiskunnalliseen keskusteluun uuden käsitteen kestävä kehitys. Käsitteellä komissio tarkoitti toimintaa, jolla ihmiskunta tyydyttää omat tarpeensa heikentämättä kuitenkaan tulevien sukupolvien edellytyksiä tyydyttää omat tarpeensa. Myöhemmin määrittelyä on laajennettu esimerkiksi kestävyyden neljän ulottuvuuden (ekologinen, sosiaalinen, taloudellinen ja kulttuurinen kestävyys) kautta. Kestävän kehityksen näkökulmasta ruoantuotantoa voidaan tarkastella näiden kaikkien ulottuvuuksien osalta, mutta tässä työssä keskitymme erityisesti pohtimaan ekologisesti kestävää ruokaa.

Ekologista kestävyyttä mittaamaan on luotu lukuisia indikaattoreita. Niistä tunnetuin on ekologinen jalanjälki, joka kuvaa kuinka paljon maa-alaa teoreettisesti tarvittaisiin kattamaan tuottamiemme tavaroiden ja palveluiden kaikki ympäristövaikutukset raaka-aineiden hankinnasta jätehuoltoon saakka (Global Footprint Network 2016). Suomen asukasta kohden laskettu ekologinen jalanjälki (Global Footprint Networkin mukaan 5,9 hehtaaria) on WWF:n Living Planet -raportin (McLellan ym. 2014, 38) mukaan maailman 15. suurin. Noin kaksi kolmasosaa tästä on seurausta hiilipäästöistämme ja noin viidesosa maataloustuotannon resurssikulutuksesta.

Ekologisen jalanjäljen lisäksi on kehitetty muitakin mittareita ympäristövaikutusten arviointiin. Hiilijalanjälki mittaa tuotteen, palvelun tai toiminnan tuottamisesta aiheutuvia kasvihuonepäästöjä ja näiden vaikutusta ilmaston lämpenemiseen (Ruokatieto 2016). Vesijalanjäki puolestaan mittaa tuotteiden ja palveluiden koko elinkaaren aikaista kokonaisvedenkulutusta ja vaikutuksia veden laatuun, vesistö¨jen tilaan ja muihin vedenkäyttä¨jiin (Nikula 2012). Tutkimuksessa pyrimme sekä laadullisesti että määrällisesti arvioimaan, miten perustavanlaatuisilla muutoksilla suomalaisessa ruoantuotannossa voitaisiin vaikuttaa sen ekologiseen kestävyyteen, kun otetaan huomioon resurssikulutuksen ohella myös syntyvät päästöt.

Hyönteissyönti on aiheena erittäin ajankohtainen, sillä hyönteissyönti on nähty yhtenä keskeisenä ratkaisuna maailman kasvavasta väestöstä aiheutuvaan ruokapulaan. YK:n elintarvike- ja maatalousjärjestön hyönteissyöntiä käsittelevässä raportissa todetaan, että vuoteen 2050 mennessä maailman ruoantuotanto tulisi kaksinkertaistaa, jotta koko väestö saisi riittävästi ravintoa (Huis ym. 2013, 9). Lienee selvää, että nykyisillä ruoantuotannon tavoilla tämä ei ole ekologisesti kestävää vaan on kehitettävä uusia keinoja tuottaa riittävästi ravinteikasta ruokaa.

Euroopan Unionin hyönteissyöntiä koskevaa lainsäädäntöä uudistetaan parhaillaan ja tarkoituksena on laillistaa hyönteisten käyttö ihmisravintona vuonna 2018. Suomi kontekstina on mielenkiintoinen, sillä lainsäädännöstä huolimatta Suomessa on jo olemassa hyönteissyönnin kehittämiseen keskittyvä tutkimushanke sekä yritystoimintaa, joiden tarkoituksena on tehdä lainsäädännön vapautuessa Suomesta hyönteissyönnin länsimaalainen mallimaa.

Tutkimuksen toteutus

Metodit

Naudanlihasta hyönteisproteiiniin siirtymisen vaikutuksia Suomen ekologiseen jalanjälkeen on tarkasteltu aiemmin tehtyjen tutkimusten pohjalta ilman uuden aineiston keräämistä. Hyönteisten kasvattaminen taloudellisiin tarkoituksiin on vielä suhteellisen vähäistä ja siksi tarkkaa tietoa sen kulutuksesta ja päästöistä on vielä varsin vähän saatavilla. Raportin pohjana on kuitenkin käytetty hollantilaistutkijoiden, Oonincxin ja Boerin (2012), tekemää tutkimusta hyönteisten kasvatuksen ekologisuudesta verrattuna muihin vaihtoehtoisiin proteiini- ja lihan lähteisiin. Oonincxin ja Boerin tutkimuksen pohjana on käytetty vuonna 2010 ilmestyneen Vrien ja Boerin tutkimuksen arvoja esimerkiksi naudan tuotannon resurssikulutuksista ja päästöistä.

Tässä työssä muiden proteiininlähteinä käytettyjen eliöiden (ei hyönteisten) vaatimia resursseja ja päästöjä ilmaistaan aiempien tutkimusten lukujen keskiarvoilla, sillä tulosten hajonta oli vähäistä. Varsinaista tarkkaa ja suoraa analyysia ekologisen kestävyyden mittareiden eri osa-alueiden suhteista ei myöskään ole saatavilla, joten proteiininlähteen vaihtamisen todellisen vaikutuksen suuruus ekologiseen kestävyyteen voidaan vain arvioida.

Tässä työssä perehdytään hyönteissyöntiin kestävän kehityksen, erityisesti ekologisen kestävyyden näkökulmasta. Työssä tarkastellaan sitä, *miten naudanlihasta hyönteisproteiiniin siirtyminen vaikuttaisi Suomen ravinnontuotannon ekologiseen kestävyyteen*. Tutkimuksessa luodaan täten skenaario, jossa naudanlihan käytöstä ihmisravinnoksi luovuttaisiin kokonaan Suomessa ja vastaava määrä proteiinia saataisiin hyönteisravinnosta. Vaihdoksen ekologista muutosta pyritään havainnollistamaan ekologisen jalanjäljen käsitteen avulla. Ruoan ja proteiininlähteen ekologisuutta tutkitaan vielä perusteellisemmin viiden alaosa-alueen, ekologisen jalanjäljen, energiankulutuksen, vedenkulutuksen, kasvihuonepäästöjen ja jätteiden määrän, kautta. Tutkimuksessa myös kartoitetaan Suomen olosuhteiden merkitystä ruoantuotannolle ja sen ympäristövaikutuksille sekä hyönteiskasvatuksen soveltuvuutta ja mahdollisuuksia menestyä näissä olosuhteissa.

Tutkimusasetelma ja tutkimuksen tausta

Hyönteissyönti

YK:n elintarvike ja maatalousjärjestön (FAO) julkaisussa esitetään, että hyönteissyönti eli entomofagia on suuressa osassa maailmaa tyypillinen tapa hankkia ravintoa ja hyönteiset ovat osa jopa 2 miljardin ihmisen ruokavaliota (Huis ym. 2013). Länsimaissa perinnettä ei kuitenkaan juuri ole ja hyönteissyöntiin suhtaudutaan usein hyvinkin negatiivisella tavalla. Perinteisesti syötäviä hyönteisiä on hankittu keräilemällä luonnosta. Tämä on osaltaan vaikuttanut siihen, missä päin maailmaa hyönteisiä on ollut tyypillistä syödä, sillä suurin osa syötävistä hyönteisistä elää trooppisissa olosuhteissa. Hyönteisiä myös kasvatetaan ravinnoksi sekä ihmisille että eläimille, mikä mahdollistaa hyönteissyönnin käytännössä missä tahansa erilaisista luonnonolosuhteista huolimatta. Hyönteissyönnin lisääminen maailmanlaajuisesti keräilyn kautta ei ole FAO:n mukaan kuitenkaan ekologisesti kestävää, sillä hyönteisillä on kussakin paikallisessa ekosysteemissä elintärkeä rooli ja hyönteisten määrän merkittävä lasku näkyisi koko ekosysteemin toiminnassa. Tästä syystä keskitymme tässä työssä lähinnä hyönteiskasvatuksen tarkasteluun.

Euroopassa hyönteissyöntiä säädellään tällä hetkellä laein, joiden mukaan hyönteisiä ei saa myydä tai tarjota virallisesti ihmisen ruoaksi (Uuselintarvikkeista ja elintarvikkeiden uusista osista annettu asetus 258/97, 27.1.1997, artikla 1.2). Etenkin maailman väestönkasvun vuoksi viime vuosina on herätty siihen, ettei nykyisillä keinoilla ole mahdollista tuottaa riittävästi ravintoarvoiltaan monipuolista ravintoa kasvavalle väestömäärälle ja hyönteissyönnistä on haettu tähän ongelmaan ratkaisua. Suomen kontekstissa hyönteiset ovat vielä käytännössä tuntematon raaka-aine. EU-lainsäädäntö suhtautuu vielä toistaiseksi negatiivisesti hyönteissyöntiin, mutta lakimuutosta valmistellaan parhaillaan (Uuselintarvikkeista, asetuksen 1169/2011 muuttamisesta seka¨ asetuksen 258/97 ja asetuksen 1852/2001 kumoamisesta annettu asetus 2015/2283, 25.11.2015). Suomessa hyönteissyönnin mahdollisuuksiin on lainsäädännöstä huolimatta jo herätty, ja etenkin hyönteisten kasvatusmahdollisuuksia kartoitetaan ahkerasti (ks. luku 3).

Syötävien hyönteislajien lukumäärästä ei ole olemassa tarkkaa tietoa, mutta niitä arvellaan olevan n. 1900 kappaletta eri puolilla maailmaa. Lajimääriä on kuitenkin vaikeaa arvioida varmasti, sillä maallikot saattavat kutsua samaa lajia eri nimillä (Huis ym. 2013). Taulukossa 1 on kuvattu maailmanlaajuisesti tyypillisimmät ruokahyönteiset lahkoittain. Nämä muodostavat yhteensä 76 % eli huomattavan

osan kaikista syötävistä hyönteisistä. Hyönteisiä syödään niiden eri kehitysvaiheissa lajista riippuen. Ravinnoksi voidaan hyödyntää niin ikään lajista riippuen lähes koko hyönteinen.

Taulukko 1. Maailmanlaajuisesti käytetyimmät ruokahyönteiset lahkoittain. Lähde: Huis ym. 2013.

Lahko	Kuvaus	Syötävä muoto	Osuus syötävistä hyönteisistä
Coleoptera	Kovakuoriaiset	Aikuiset ja toukat	31 %
Lepidoptera	Perhoset	Toukat	18 %
Hymenoptera	Pistiäiset (mm. muurahaiset, ampiaiset)	Toukat ja kotelot	14 %
Orthoptera	Suojasiipiset (mm. sirkat, heinäsirkat)	Aikuiset	13 %

Helsingin yliopiston metsätieteiden laitoksen hyönteistutkija Lena Huldén kertoo Helsingin Sanomien haastattelussa, että Suomessa elää noin 22 000 hyönteistä, mutta kukaan ei ole toistaiseksi kartoittanut, mitä kaikista hyönteisistä kelpaavat ravinnoksi ja mitkä puolestaan eivät. Huldénin mukaan Suomesta löytyy paljonkin syötäviä hyönteisiä, mutta ne on ennen syömistä osattava tunnistaa. Syötävien hyönteisten tulee myös olla tuoreita, sillä ne pilaantuvat herkästi, ja on huomioitava, että niissä voi esiintyä salmonellaa (Mitjonen 2014).

Suomi tutkimuksen kontekstina

Suomen sijainti pohjoisella pallonpuoliskolla aiheuttaa merkittäviä haasteita kotimaiselle ruoantuotannolle. Lämpötila- ja säävaihtelut eri vuodenaikojen välillä ovat huomattavia ja kesään sijoittuva kasvukausi on puolestaan hyvin lyhyt. Golfvirran ilmastoa lämmittävän vaikutuksen ansiosta Suomi on muiden Pohjoismaiden kanssa ainoita alueita, joilla maatalous ylipäätään onnistuu näillä leveysasteilla. Kotimaisen maanviljelyn lyhyt kasvukausi rajoittaa viljeltäviä lajikkeita, joten ruokaa tuodaan paljon myös ulkomailta. Kasvuolojen hankaluuksien lisäksi Suomen luonnonolot ja suhteellisen harva asutus aiheuttavat haasteita logistiikalle ja matkat maatilojen ja sidosryhmien välillä voivat näin kasvaa hyvinkin pitkiksi. Ankarat olosuhteet ovat asettamiensa haasteiden lisäksi kannustaneet teknologian käyttöön ja kehitykseen maataloudessa tehokkaan tuotannon saavuttamiseksi. (Kurppa ym. 2015)

Suomessa syödään pääsääntöisesti kotimaassa tuotettua lihaa. Sian- ja naudanlihaa syödään eniten. Kuviossa 1 on esitetty lihan kulutus Suomessa vuodesta 1970 vuoteen 2015 lihoittain.
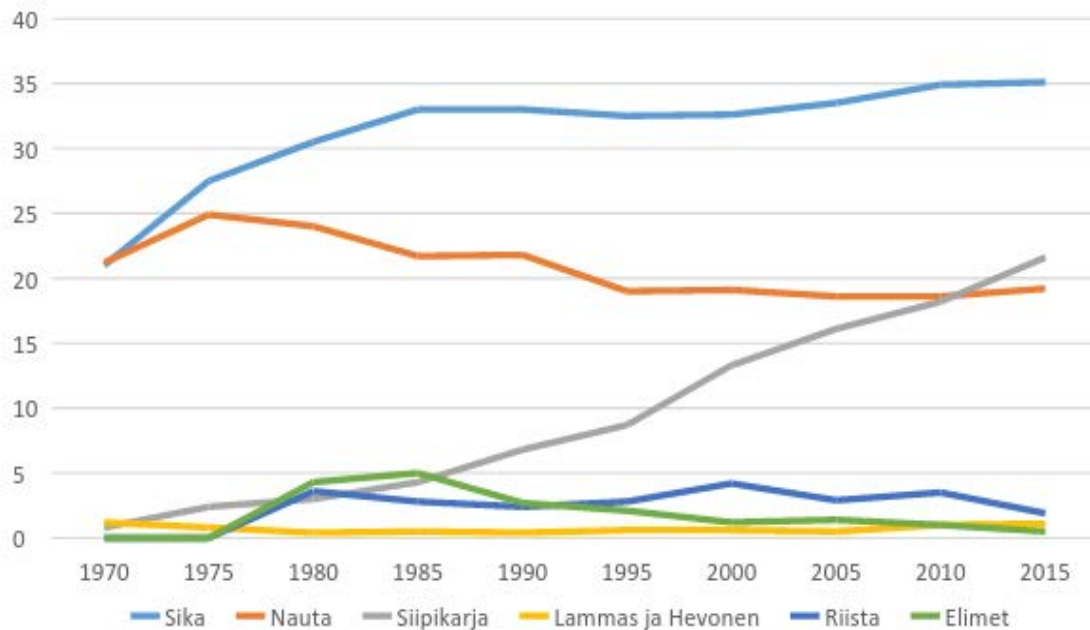
Kuvio 1. Lihan kulutus Suomessa vuosina 1970–2015 kilogrammoina per henkilö. Luvut ilmoitettu luullisena lihana. Lähde: Lihatiedotus.

Lihan kulutus ilmoitetaan tyypillisesti luullisena lihana eli ruholihana. Luullisesta lihasta tulee vähentää luiden osuus, noin 20 %, sekä kypsennyshävikki, joka vaihtelee välillä 10–30 %. Näin ollen kypsennetyn syötävän lihan osuus luullisesta lihasta on vain noin 50 %.

Kuten kuviosta 1 näkyy, lihan kulutuksen trendi on ollut kasvava 1970-luvulta vuoteen 2015. Kokonaiskulutus on noussut 44,2 kilosta per henkilö jopa 79,4 kiloon. Vuonna 1970 sikaa ja nautaa kulutettiin selkeästi eniten, naudanlihan kulutus kääntyi kuitenkin laskuun heti seuraavana tarkasteluajankohtana eli vuonna 1975. Myös siipikarjan kulutuksen trendi on ollut hyvin vahvasti kasvava, jopa 0,8 kilosta 21,6 kiloon. Sianlihan kulutus on kasvanut 14,1 kiloa henkilöä kohden. Huomattavaa on, että vielä vuonna 1970 lammasta ja hevosta syötiin hieman enemmän kuin siipikarjaa. Riistan ja elinten kulutusmääristä ei ole tarkkoja lukuja ennen vuotta 1980, mutta molempien päätrendi on ollut laskeva vuoteen 2015 asti. Vuonna 2015 eniten kulutettiin sianlihaa, siipikarjaa ja nautaa, kun taas riistan, lampaan ja hevosen sekä elinten kulutus oli alle 5 kiloa per henkilö.

Vertailtaessa eri proteiinilähteiden ravintoarvoja (ks. kuvio 2), eli proteiinia, rasvoja ja ravintokuitua, merkittävimpänä erona on sirkkojen sisältämä ravintokuitu (6 g), jota muissa proteiinilähteissä ei esiinny lainkaan. Kaikkien vertailtavien lähteiden proteiinipitoisuus sijoittuu 15 ja 20 gramman väliin, sirkat joskin lievästi suurimmalla osuudella (0,2 g ero naudanlihaan). Sirkat sisältävät vähiten myös rasvoja (5,7 g), kun taas nopeasti tehokasvatetut siat sisältävät eniten rasvoja (16,3 g). Näin ollen sirkkojen ravintoarvot ovat parhaat, vaikka erot ovatkin hyvin pieniä juuri proteiinin kohdalla.
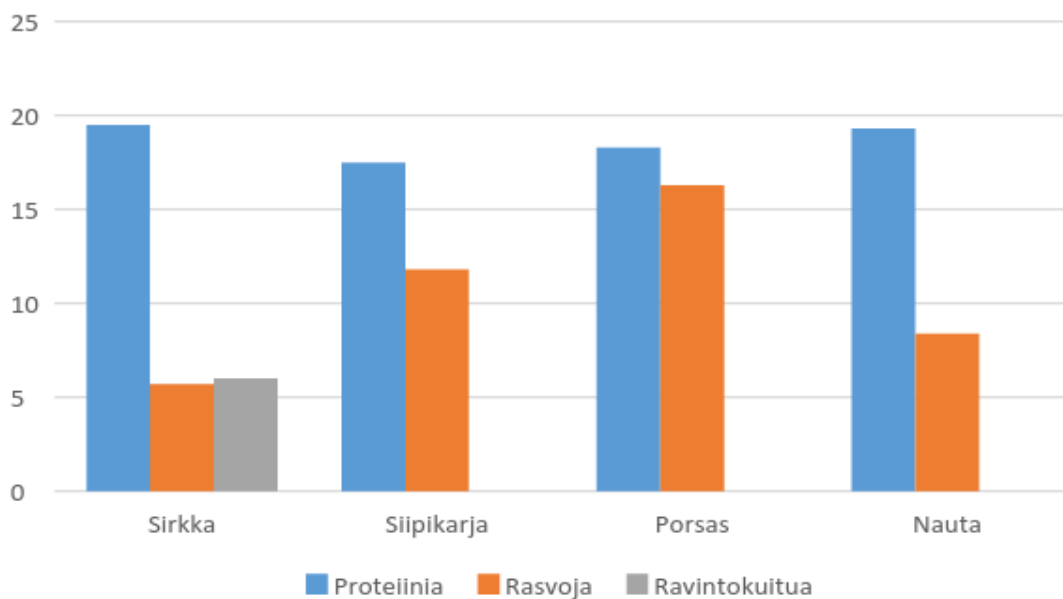
Kuvio 2. Proteiinilähteinä käytettävien lihojen ravintoarvot. Yksikkönä ravintoarvo grammoina per 100 grammaa lihaa. Lähde: EntoCube.

Kasvatusmahdollisuudet ja kehittyvä teknologia

Suomessa käynnistyi vuonna 2015 Turun yliopiston ja Luonnonvarakeskuksen yhteinen Hyönteiset ruokaketjussa -hanke, joka tutkii mahdollisuuksia hyödyntää hyönteisiä osana suomalaista ruokaketjua. Tutkimusprojektissa on mukana myös hyönteistuotannon parissa toimivia yrityksiä. Hanke keskittyy tarkemmin neljään alueeseen, jotka ovat hyönteisten tuottaminen, hyönteiselintarvikkeiden potentiaali, hyönteiset eläinrehuna sekä lainsäädännön muutosten ennakointi. (Funktionaalisten elintarvikkeiden kehittämiskeskus 2016)

Hyönteistalouden asiantuntija Santtu Vekkeli kertoo Helsingin Sanomien tiede-osiolle antamassaan haastattelussa hyönteisten kotikasvatuksesta. Positiivisia asioita löytyy paljon niin eettisestä kuin taloudellisestakin näkökulmasta. "Hyönteisille riittää pieni lämmin sopukka - ne eivät kärsi ahtaudesta kuten muut tuotantoeläimet", Vekkeli kertoo. Hyönteisille kelpaa kasvatusastiaksi vaikka halpa ja yksinkertainen muuttolaatikko. Vekkelin mukaan optimaalinen tila kasvatuksen suhteen on noin 70 prosentin kosteus ja vähintään 20 celsiusasteen lämpö; 29 asteessa hyönteiset kasvaisivat nopeammin, mutta samalla kasvaisivat myös lämmityskulut. Alle kymmenen celsiusasteen lämpötilassa hyönteisten kasvu pysähtyy. Vekkelin mielestä erityisen hyvää hyönteisissä on se, että ne eivät kaipaa erikseen vettä vaan ottavat nesteen ruuastaan. Ruokaakaan ei tarvita paljon, sillä vaihtolämpöisinä eläiminä niiden ei tarvitse lämmittää omaa ruumistaan, vaan kaikki energia käytetään kasvuun. Lisäksi niiden elinkierto on nopea, esimerkiksi kärpäsellä lyhimmillään kymmenen päivää (Kivipelto 2014). Myös hyönteisten kasvatukseen tarkoitettuja kontteja valmistavan EntoCuben perustaja Robert Nemlander (2014) painottaa hyönteisten ekologisuutta. Hänen mukaansa paikallisia ruokaketjun sivuvirtoja voi käyttää hyönteisrehuna, mikä vähentää ruokahävikkiä. Vekkeli kertoo, että hyönteisille kelpaa ruuaksi lähes mikä vaan; lajista riippuen hyönteisiä voi ruokkia puutarhajätteellä, vesikasveilla, viljankorsilla, sahanpurulla ja monilla muilla aineilla, mille ei muuten ole käyttöä (Rautio 2014).

Radio Novalle antamassaan haastattelussa Vekkeli antaa lisää neuvoja hyönteisten kotikasvatusta suunnitteleville. Hän kertoo varsinaisen kasvatuksen olevan helppoa: tarvitaan vain muoviämpäri, terraario ja ravintoa hyönteisille. Muutamalla terraariolla tuottaa Vekkelin mukaan monta kiloa ravintoa vuodessa. Helppoja lajeja aloittajalle ovat kotisirkka (*Acheta domesticus*), kanalakuoriainen (*Alphitobius diaperinus*) ja jauhopukki (*Tenebrio molitor)*. Vekkelin mukaan sirkka vaatii enemmän piiloja, tilaa ja kosteutta kuin mainitut toukat ja lisäksi ne ovat äänekkäitä. Ne kuitenkin kasvavat helposti ja nopeasti (Rautio 2014).

Suomessa hyönteisten tuottaminen ihmisruoaksi on käynnistynyt vasta aivan viime vuosina, ja tämän vuoksi tuotanto on toistaiseksi ollut hyvin pienimuotoista. Santtu Vekkeli toteaakin Helsingin Sanomien haastattelussa "hyönteistalouden olevan yhtä alkeellista kuin maatalous 1800-luvulla". Vekkelin oman yrityksen, Pohjolan Hyönteistalous Oy:n lisäksi Suomessa uraa uurtavat muun muassa EntoCube, Finsect Oy sekä Sirisee Oy. Nämä kasvuyritykset ovat ennakkoluulottomasti alkaneet kehittää innovatiivisia teknologioita, jotka saattavat tulevaisuudessa olla pohja teolliselle hyönteistaloudelle. Esimerkiksi startup-yritys EntoCube kertoo verkkosivuillaan pystyvänsä jo nyt tuottamaan varastokontteihin manuaalisesti hallitut kasvuolosuhteet hyönteisille. EntoCube vakuuttaa, että konttien sisäistä mikroilmastoa on mahdollista säätää kasvatettavan hyönteislajin mukaan. Yrityksen perustajan Robert Nemlanderin (2014) mukaan kontit on myös mahdollista varustaa aurinkokennoilla off-grid -sähköntuo-tannon mahdollistamiseksi.

Kotimaisen Finsect Oy:n Sami Lähteen mukaan, jo olemassa olevia maatalousteknologioita voitaisiin hyödyntää hyönteisten kasvattamiseen ravinnoksi. Tulevaisuudessa teknologisten innovaatioiden avulla voidaan kasvatuksesta saada lähes täysin automaattinen, jolloin hyönteisiä voidaan kasvattaa entistä suurempia määriä lähes kokonaan ilman "ruumiillista työtä". (Koski & Leiwo 2015.)

Ekologisen kestävyyden mittarit

Ekologinen jalanjälki

Ekologinen jalanjälki on yksi ihmistoiminnan kestävyyttä kuvaamaan luoduista indikaattoreista. Yleisesti ottaen sillä tarkoitetaan sitä tuottavaa maa-alaa, joka teoreettisesti tarvittaisiin kattamaan tuottamiemme tavaroiden ja palveluiden kaikki ympäristövaikutukset raaka-aineiden hankinnasta jätehuoltoon saakka (Global Footprint Network 2016). Käsitteen alla on muutamia alakäsitteitä, jotka kertovat eräiden luonnonvarojen kulutuksesta tuotantoprosessin aikana. Näitä käsitellään jäljempänä.

Ekologisen jalanjäljen laskemisessa on olennaista tietää kolme asiaa: ihmisten resurssikulutus ja luonnon kyky toisaalta resurssituotantoon ja toisaalta jätteiden vastaanottamiseen. Resurssikulutuksella tarkoitetaan sitä, kuinka paljon eri luonnonvaroja (mm. materiaalit, energia, vesi) ihminen toiminnassaan eräällä aikavälillä kuluttaa. Tätä voidaan sitten verrata luonnon resurssituotantoon, toisin sanoen siihen, kuinka paljon luonto kykenee tuottamaan näitä ihmisten kuluttamia resursseja vastaavalla aikavälillä. Jätteiden vastaanottaminen liitetään tähän yhtälöön siten, että huomioidaan koskemattoman ympäristön muita ympäristöjä parempi kyky sitoa tuotantomme sivutuotteita, ennen kaikkea kasvihuonepäästöjä. Mikäli resurssikulutus on tuotantoa suurempi, ylittää ekologinen jalanjälkemme maapallon ekologiset rajat ja kulutamme luonnonvaroja velaksi (Grant 2010, 10–11). Ekologista jalanjälkeä voidaan tarkastella globaalin ohella useilla muillakin mittakaavatasoilla, kuten yksilö-, kaupunki- tai valtiotasolla (Global Footprint Network 2016).

Ruoantuotannon ekologinen jalanjälki koostuu karkean jaottelun mukaan kahdesta osasta: tarvittavista luonnonvaroista ja syntyvistä päästöistä ja jätteistä (Rees 2004, 88–91). Maataloudessa hyvin olennainen luonnonvara on käytetty maapinta-ala. Se, kuinka paljon maata ruoan tuottamiseen tarvitaan, riippuu ensimmäiseksi siitä, tuotetaanko eläin- vai kasviperäistä ruokaa. Eläinperäisessä tuotannossa merkitystä on lähinnä eläimen fyysisellä koolla ja tilantarpeella, ja kasviperäisessä lisäksi maaperän tuottokyvyllä. Toisinaan ruoantuotannon aloittaminen eräällä alueella vaatii suurten maankäyttömuutosten suorittamista. Tämä tyypillisesti kasvattaa ekologista jalanjälkeä, varsinkin, jos peltojen ja laitumien tieltä joudutaan hakkaamaan metsää tai kuivattamaan kosteikkoja. Muita maataloudelle olennaisia luonnonvaroja ovat kasvatuseläinten rehu ja lääkintä sekä vesi, energia ja ravinteet. Valtaosa maataloudessa syntyvästä jätteestä on orgaanista, jolloin sitä on mahdollista hyödyntää esimerkiksi viljelmien lannoittamiseen, mutta myös epäorgaanisia tai muuten vaikeasti hyödynnettäviä jätteitä syntyy. Lisäksi tuotannon eri vaiheissa ympäristöön vapautuu erinäisiä päästöjä, joista typpi- ja fosforikuormitus sekä kasvihuonekaasupäästöt ovat merkittävimpiä (Tilman 1999, 5995–5997).

Hyönteistuotannon tuomisella osaksi ruoantuotantoa olisi monia erilaisia mahdollisuuksia vähentää ruokamme ekologista jalanjälkeä. Ensinnäkin, hyönteiset vaativat paljon vähemmän tilaa painokiloa kohden kuin mikään nykyään tehotuotannossa olevista eläimistä (Huis ym. 2013, 59). Suomen noin 909 000 nautaa sekä muita laiduntavia eläimiä tarvitsevat 2 280 hehtaaria peltoa ja niittyä laidunnettavakseen (Luonnonvarakeskus 2016a; FAOSTAT 2011). Esimerkiksi jauhomatoja olisi mahdollista kasvattaa valtavia määriä pienilläkin kasvualustoilla, niin, että niiden vaatimassa tilassa puhuttaisiin neliösenttimetreistä, sillä niiden ei ole todettu kärsivän tilan puutteesta lainkaan samalla tavalla kuin esimerkiksi siipikarjaeläinten. Näin myös tarve suuriin maankäyttömuutoksiin ei ole perusteltua. Toiseksi, hyönteiset eivät kasvaessaan tarvitse kovinkaan merkittäviä määriä ravintoa tai vettä, eikä niiden lääkitseminen ole mahdollista saati sitten tarpeellista (Huis ym. 2013, 59;64). Hyönteiset myös kehittyvät huomattavasti suuria karjaeläimiä nopeammin, ja niistä voidaan saada jopa kolme sukupolvea vuodessa. Kolmanneksi, kiitos hyönteisten elintoimintojen, hyönteistuotannossa ei vapaudu juurikaan kasvihuonekaasuja tai ravinteita ympäristöön (Huis ym. 2013, 62–63).

Energiankulutus ja -lähteet

On yleisesti tiedossa, että kasviperäisen proteiinin tuottamiseen tarvitaan kahdeksan kertaa vähemmän fossiilista energiaa kuin naudanlihan tuottamiseen (Cornell Chronicle 1997). Naudanlihan tuottamisen energiamenekkiä verrataan kuitenkin harvoin hyönteisproteiinin tuotannon energiankulutukseen. Energiankulutuksella tarkoitetaan tuotannossa käytetyn sähkön sekä nestemäisten, kiinteiden ja kaasumaisten polttoaineiden määrää (Mikkola). Energian mittausyksikkönä käytetään joulea (J) tai kilowattituntia (kWh), jonka lisäksi energiankulutusta mitataan nestemäisten polttoaineiden kulutuksessa litroina. Energia esiintyy eri muodoissa, joka tavallisesti muutetaan mekaaniseksi työksi tai sitä käytetään esimerkiksi talojen lämmittämiseen. Potentiaalienergia, liike-energia, lämpöenergia ja sähkömagneettinen energia ovat energian eri esiintymismuotoja, joita voidaan muuttaa muodosta toiseen. (Ahokas 2013, 9) Energiankulutusta tarkasteltaessa on otettava huomioon suoraa kuin myös epäsuoraa energiankulutusta. Tuotannossa käytettyä sähköä tai polttoainetta kutsutaan suoraksi energiaksi. Energiaa, jota käytetään palvelun tai tuotteen aikaansaamiseksi on epäsuora energiaa. (Energia-Akatemia)

Energiankulutus vaihtelee paikallisesti erilaisten muuttujien vuoksi. Energiankulutus naudanlihan tuotannossa vaihtelee maalajin, sääolojen ja maantieteellisen sijainnin mukaan (Ahokas 2013, 3).

Hyönteistuotannossa omaksutut kasvatusmenetelmät puolestaan aiheuttavat eroavaisuuksia farmien energiankulutuksessa. Tutkimuksesta rajataan ulos energiankulutukseen vaikuttavat paikalliset olosuhteet ja keskitytään ainoastaan yleistämään energiankulutuksen määrä kyseisillä tuotantoaloilla.

 Suomen maatalouden energiankulutus on 10 terrawattituntia (TWh) suoraa energiaa, joka on noin kolme prosenttia koko maan energiankulutuksesta (Ahokas 2013, 3). Maatalouden määritelmään kuuluu sekä maanviljely että karjanhoito (Otavan Opisto 2015). Energian osuus maatalouden menoista on kuitenkin koko ajan kasvamassa kun tuotannossa käytetään yhä enemmän koneita ja laitteita. (Ahokas 2013, 12) Naudantuotannon kokonaiskulutus on 698 kWh per vasikkapaikka (Posio 2012). Suomessa naudanlihan tuottaminen kuuluu maidontuotannon alaan, jossa naudanlihaa tuotetaan sivutuotteena. Tutkimuksessa onkin energiankulutusta tarkasteltaessa otettu huomioon myös maidon tuottamiseen käytetty energia ja sen vaikutus naudan tuotannon kokonaisenergiankulutukseen.

Myöskään Suomessa tuotetun hyönteisproteiinin tuottamiseen käytetystä energiasta ei ole tutkimustietoa. Johtopäätöksiä voidaan kuitenkin tehdä ulkomailla tehdyistä tutkimuksista hyönteistuotannon energiankuluksesta. Energiantarve yhtä proteiinikiloa kohden voidaan mitata monella eri tavalla. Cornell Chronicle (1997) omaksuman suhdeluvun mukaan energiamenekki yhden proteiinikilon tuottamiseen on 1:54. Sirkkojen osalta suhdeluku on 1:1,7 (Huis ym. 2013, 60).

Sähköä, fossiilisia energialähteitä, kuten diesel- ja polttoöljyä, ja uusiutuvaa energiaa käytetään naudanlihan tuotannossa suorana energiana (Ahokas 2013, 90). Navettojen suorasta energiankulutuksesta suurimman osan vievät ilmanvaihtopuhaltimet ja valaistus. Navettojen lämmitystarve on pieni ja se jatkuvasti vähenee, kun naudanlihan tuotannossa ollaan siirtymässä pois lämpimistä rakennuksista. Kuitenkin edelleen esimerkiksi lypsyasemat, juomakupit sekä muut vastaavat tilat tai laitteet ovat lämmitettyjä. Lämmin navetta kuluttaa 200–500 kWh eläinpaikkaa ja vuotta kohden. Lämmityslaitteet toimivat joko polttoöljyllä, sähköllä tai biopolttoaineella. (Ahokas 2013, 4, 28–29) Lisäksi epäsuoraa energiaa kuluu rakennusten rakentamiseen ja ylläpitoon sekä koneiden käyttöön, osuus on kuitenkin suhteellisen pieni. (Ahokas 2013, 12, 92)

Hyönteisproteiinin tuottaminen tapahtuu sisätiloissa. Näin ollen myös hyönteistuotannossa suoraa energiaa kuluu sähköön, jota käytetään ilmastointilaitteisiin, pakastimiin ja tilan valotukseen. Hyönteiset muutetaan ihmisravinnoksi pakastamalla. Eettisestä tavasta huolimatta hyönteisten pakastaminen kuluttaa paljon energiaa, sillä esimerkiksi suurikokoiset pakastimet kuluttavat 474,5 kWh vuodessa (Veldkamp ym 2012, 8; Vattenfall 2016). Hyönteisten ulostepölyä vastaan joudutaan suojautumaan ilmastointilaitteilla, jotka kuluttavat paljon energiaa. Hyönteistuotannolla on kuitenkin iso potentiaali automatisoinnille, joka voisi tulevaisuudessa tehdä hyönteistuotannosta energiatehokkaampaa samalla lisäten tuotannon kasvua.

Sekä naudanlihan- että hyönteistuotannossa energiankulutuksen osaksi voidaan laskea eläimille ja hyönteisille tarkoitetun ruoan tuottamiseen käytetty energia. Molemmat eliöt syövät rehua. Naudanlihan tuotannon epäsuorasta energiankulutuksesta merkittävä osa kuluu rehun tuottamiseen. Sen osuus on noin 85 prosenttia energiankulutuksesta. (Kurppa ym. 2015, 50; Ahokas 2013, 18). Suomessa naudoille ruuaksi annettavaa rehua on pyritty kasvattamaan omavaraisesti tuotantotiloilla. Vuonna 2015 Suomessa tuotettiin viljaa 3,7 miljardia kiloa, josta 37 % käytettiin maatiloilla rehuksi (Luonnonvarakeskus 2016b). Rehun tuottamiseen käytettyyn energiankulutukseen vaikuttaa esimerkiksi pitkä sisäruokintakausi. Rehuntuotannossa energiaa kuluu rehun korjaamiseen, säilömiseen ja varastointiin mukaan lukien kemikaaleihin, kuten lannoitteisiin ja torjunta-aineisiin, työkoneiden käyttöön ja viljankuivattaminen. (Kurppa ym. 2015, 50) Suomessa viljaa joudutaan kuivattamaan, jotta taataan sadon säilyvyys talven yli ja estetään rehun pilaantuminen. Energiamäärä, joka kuluu rehun kuivattamiseen

on riippuvainen viljalajin alkukosteudesta. Keskiverto viljankuivauksen energiankulutus on 1,5 kWh yhtä poistettua vesikiloa kohden. (Ahokas 2013, 12, 92)

Verrattuna naudanlihaan, hyönteistuotannossa energiaa kuluu hyvin vähän tuotantoa ylläpitäviin toimiin, kuten rehun tuottamiseen. Hyönteisten luontainen tehokkuus käyttää ravintoa hyväkseen vähentää niiden ravinnon tarvetta, minkä vuoksi he pystyvät kasvattamaan painoaan nopeasti. Yhden hyönteisistä saadun lihakilon tuottaminen vaatii 20 kertaa vähemmän rehua kuin nautakarjan lihakilon tuottaminen. (Kankare 2015, 7)

Top-Down analyysillä tutkitaan kuinka paljon energiaa on käytetty eläintä tai tuotettua tuotekiloa kohti. Sen mukaan naudanlihan tuotannossa kokonaisenergiankulutus per Kwh/kg on 22–28 riippuen säästä ja vallitsevista olosuhteista. (Ahokas 2013, 25–26) Kuvio 3 demonstroi hyönteiskasvatukseen ja karjankasvatuksen energiankulusta. Erojen havainnollistamiseksi mukaan on sisällytetty myös siipikarjan ja sianlihan tuottamiseen käytetyn energian. Kuten kuviosta on nähtävissä hyönteisten tuottaminen kuluttaa yllättävän paljon energiaa kun sitä verrataan naudanlihan, sianlihan ja siipikarjan tuottamiseen.
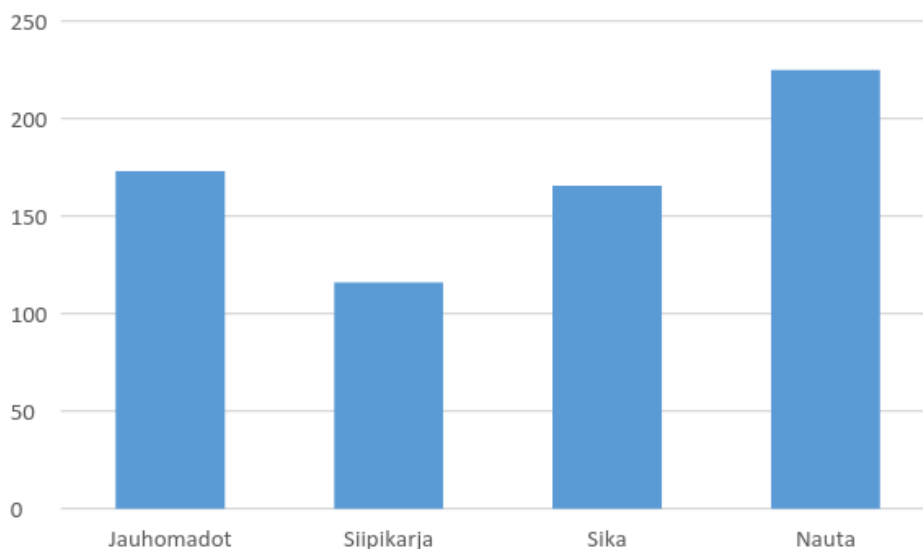
Kuvio 3. Proteiinilähteinä käytettävien eliöiden kasvatuksen energiankulutus. Yksikkönä megajoule (MJ) per proteiinikilo. Lähde: Oonincx & Boer 2012. Vries & Boer 2010.

Poikkeuksena muihin raportissa tarkasteltaviin muuttujiin, jauhomatojen tuottamiseen tarvittava energiantarve ei ole tarkastelluista proteiinilähteistä pienin. Energiankulutuksen trendi on lähes lineaarisesti kasvava eliön koon kasvaessa perinteisemmillä proteiinin lähteillä. Jauhomatojen kasvatus vaatii energiaa jopa 173 megajoulea yhtä proteiinikiloa kohden, kun siipikarjalla energiaa kuluu vain 116 ja sialla 166 megajoulea. Naudan kasvatus vaatii vertailluista proteiinilähteistä myös energiaa eniten, eli 225 megajoulea per proteiinikilo.

Heijasteltaessa edellä esitettyjä faktoja voidaan todeta, että hyönteistuotanto on ekologisesti kestävämpää ja energiatehokkaampaa kuin naudanlihan tuottaminen energiankulutuksen näkökulmasta. Hyönteistuotantoa ei voida kuitenkaan väittää olevan kaikista energiantehokkain ratkaisu ruoan tuottamiseen, sillä kaikista tarkastelluista proteiininlähteistä hyönteisproteiinin tuottaminen kuluttaa toiseksi eniten energiaa. Vielä voidaan korostaa, että naudanlihan energiankulutus on jo valmiiksi hyvin

pientä valtakunnallisessa tarkastelussa, joten suurta eroa nykyisestä siirtyessä naudantuotannosta hyönteistuotantoon ei voida katsoa syntyvän.

Hiilijalanjälki

Hiilijalanjälki kuvaa tuotteen tai palvelun koko elinkaaren aikana syntyviä kasvihuonepäästöjä. Hiilijalanjälki siis koostuu hiilidioksidi- (CO_2), metaani- (CH_4) ja dityppioksidipäästöistä (N_2O) ja sen yksikkönä käytetään hiilidioksidiekvivalenttia (CO_2-ekv). Hiilidioksidiekvivalentin muuntokerroin on yksi hiilidioksidille, 25 metaanille ja 298 dityppioksidille. (Oonincx & Boer 2012, Ilmasto-opas)

Kasvihuonepäästöillä tarkoitetaan kaasuja, jotka pidättävät lämmön takaisinheijastumista avaruuteen ja luovat maapallolle näin kasvihuoneen tapaiset olosuhteet. Kasvihuonekaasuja ovat vesihöyry (H_2O), hiilidioksidi, metaani, dityppioksidi ja otsoni (O_3); happi ja vety eivät ole kasvihuonekaasuja. Luonnollisten kasvihuonepäästöjen lisäksi ilmakehässä on ihmisen tuottamia aineita, kuten esimerkiksi freonia ja halogenoituja hiilivetyjä. Vesihöyry ja hiilidioksidi ovat tärkeimmät kasvihuonekaasut. Hiilidioksidin määrä ilmakehässä on kasvanut merkittävästi ihmistoiminnan seurauksena. Fossiilisten polttoaineiden käyttö ja trooppisten metsien hävittäminen ovat suurimpia hiilidioksidin lähteitä. Metaania syntyy aina orgaanisen aineen hajotessa hapettomissa oloissa kuten esimerkiksi riisipelloilla, soilla ja märehtijöiden ruoansulatuksessa. Metaani on huomattavasti voimakkaampi kasvihuonekaasu kuin hiilidioksidi, mutta sen vaikutusaika on myös lyhyt, vain noin 12 vuotta. Pitkäikäisempää dityppioksidia vapautuu maaperästä nitraattien (lannoitteiden) hajotessa. (Ilmasto-opas)
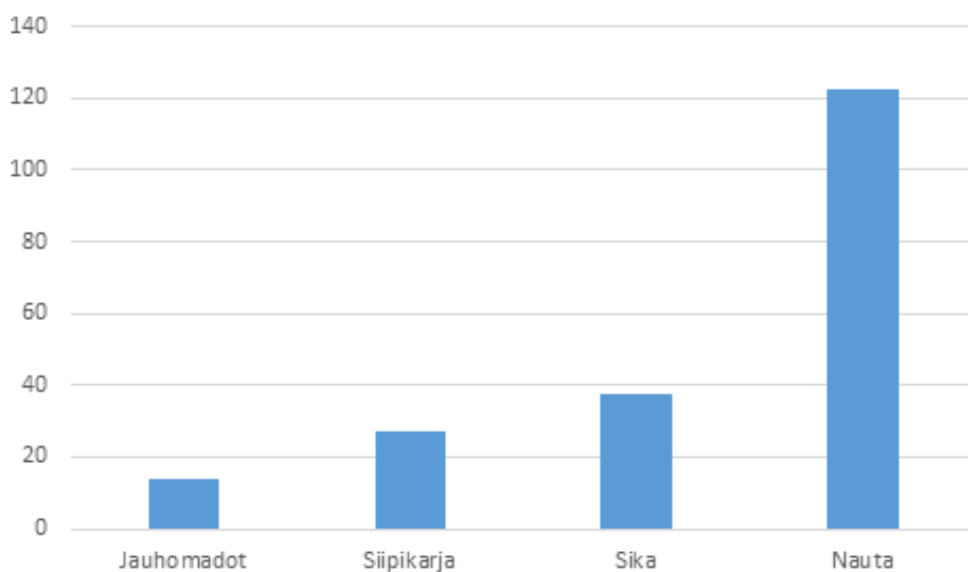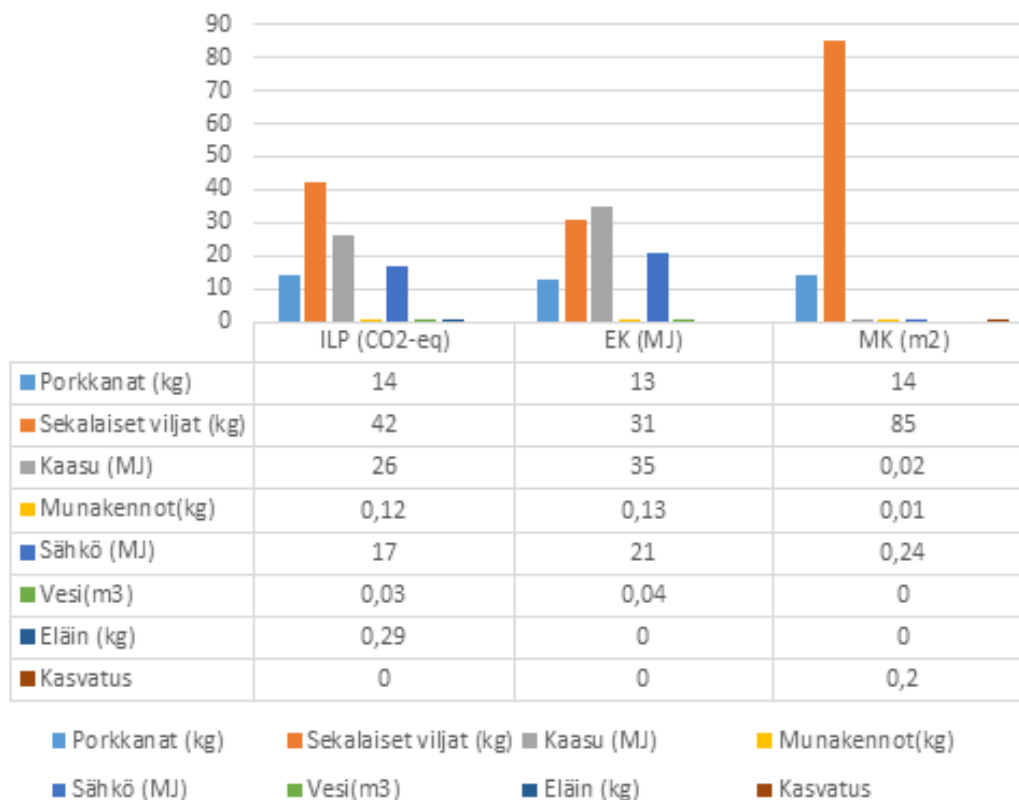

Kuvio 4. Proteiinilähteiden kasvihuonekaasupäästöt. Yksikkönä hiilidioksidiekvivalentti (CO_2-ekv), joka koostuu hiilidioksidi-, metaani- ja dityppioksidipäästöistä, per proteiinikilo. Lähde: Oonincx & Boer 2012. Vries & Boer 2010.

Kasvihuonepäästöjen trendi on kasvava eliöiden koon kasvaessa. Kuten kuviosta 4 on nähtävissä jauhomadot ovat ainut proteiininlähde, jonka päästöjen hiilijalanjälki jää alle 20 hiilidioksidiekvivalentin; siipikarja ja sika jäävät molemmat vielä alle 40 ekvivalentin, mutta naudan päästöt nousevat jopa yli 120 hiilidioksidiekvivalenttiin.

Eliön koon kasvaessa pitenee myös sen elinkierto ja lisääntyminen hidastuu, metaanintuotanto kasvaa ja ravinnon hyödyntämiskyky heikkenee. Näin eliö siis kuluttaa enemmän energiaa omien elintoimintojensa ylläpitämiseen kuin varsinaisen massansa kasvattamiseen. Hyönteiset ovat vaihtolämpöisiä, jolloin energiaa ei kulu laisinkaan ruumiinlämmön säätelemiseen vaan ne suuntaavat kaiken energiansa kasvamiseen. Tutkimuksessa tutkittu *T. molitor* lajin naaras ehtii tuottaa kolme kuukautta kestävän elämänsä aikana 160 munaa ja *Z. morio* 1500 munaa eläessään keskimäärin yhden vuoden. Täysikasvuisuuden *T. molitor* saavuttaa 10 viikossa ja *Z. morio* 3,5 kuukaudessa. (Oonincx & Boer 2012)

Naudat saavuttavat noin vuoden ikäisenä sukukypsyyden ja voisivat elää jopa 20-vuotiaiksi, mutta tyypillisesti liharotuiset sonnit teurastetaan noin 18 kuukauden ikäisinä, jolloin ne ovat saavuttaneet 400 kilon ihanne teuraspainon. Teuras- eli ruhopaino saadaan vähentämällä elopainosta pään, jalkojen, veren, nahan, sisäelimien ja ruuansulatuskanavan paino. Lypsyrotuiset sonnit teurastetaan tavallisesti jo 14 kuukauden iässä, kun taas liharotuisten hiehojen teurasikä vaihtelee 12:sta 24 kuukauteen. (Ruokatieto, 2016)

Esimerkiksi jauhomadot eivät tuota lainkaan metaania, joka taas on merkittävin naudoista vapautuva kasvihuonekaasu. Myös eliön ruokavalio vaikuttaa merkittävästi sen aiheuttamiin kasvihuonekaasupäästöihin, energian- ja vedenkulutukseen sekä maankäyttöön.

	ILP (CO2-eq)	EK (MJ)	MK (m2)
■ Porkkanat (kg)	14	13	14
■ Sekalaiset viljat (kg)	42	31	85
■ Kaasu (MJ)	26	35	0,02
■ Munakennot(kg)	0,12	0,13	0,01
■ Sähkö (MJ)	17	21	0,24
■ Vesi(m3)	0,03	0,04	0
■ Eläin (kg)	0,29	0	0
■ Kasvatus	0	0	0,2

■ Porkkanat (kg) ■ Sekalaiset viljat (kg) ■ Kaasu (MJ) ■ Munakennot(kg)
■ Sähkö (MJ) ■ Vesi(m3) ■ Eläin (kg) ■ Kasvatus

Kuvio 5. Jauhomatojen kasvatuksen osatekijöiden osuudet tarkastelluista ekologisen kestävyyden osatekijöistä. Muuttujina ilmastonlämpenemispotentiaali, ILP (summamuuttujan osamuuttujat selvitetty aiemmin), energiankulutus eli EK ja maankäyttö eli MK. Määrät on esitetty prosenttiosuuksina kaikista kaikista kyseisen muuttujan osa-alueista. Lähde: Oonincx & Boer 2012. Vries & Boer 2010.

Jauhomadoista tutkittiin kahta eri lajia, *T. molitoria* ja *Z. morio*ta. Molempien lajien päästöt olivat kutakuinkin yhtäläisiä ja lajeja onkin käsitelty tuloksissa yhtenä. (Oonincx & Boer 2012)

Tutkittaessa jauhomatojen kasvatuksen eri kulutustekijöiden ekologista kestävyyttä kuviossa 5, on trendinä ravinnoksi kasvatettujen viljojen suuri osuus kaikilla tarkastelluilla osa-alueilla. Käytetystä maa-alasta sekalaiset viljat kuluttavat jopa 85 % ja porkkanat 14 %, käytännössä kaikki käytetty maa-ala kuluu jauhomatojen ravinnontuotantoon. Myös hiilijalanjäljen suurin osatekijä on viljojen viljely (42 %). Energiankulutuksessa kaasu vie suurimman osuuden eli 35 %, kun viljojen osuus on 31 % ja sähkön 21 %. Sähkön osuus hiilijalanjäljestä on 17 %. Porkkanoiden tuottamiseen kuluu 13 % jauhomatojen kasvatukseen kuluvasta energiasta ja se muodostaa 14 % hiilijalanjäljestä. Muiden osatekijöiden, itse kasvatuksen ja hyönteisen, veden ja munakennojen osuus on kuitenkin yhteenlaskettuna huomattavasti alle prosentin. Kokonaisuudessaan hiilijalanjälki yhtä kiloa tuoreita jauhomatoja kohden on 2,7 kg hiilidioksidiekvivalenttia, energiankulutus 34 megajoulea ja maankulutus vuodessa 3,6 neliömetriä. Samat luvut muunnettuna vastaamaan yhtä proteiinikiloa ovat 14 kg hiilidioksidiekvivalenttia, energiankulutus 173 megajoulea ja maankäyttö 18 neliömetriä.
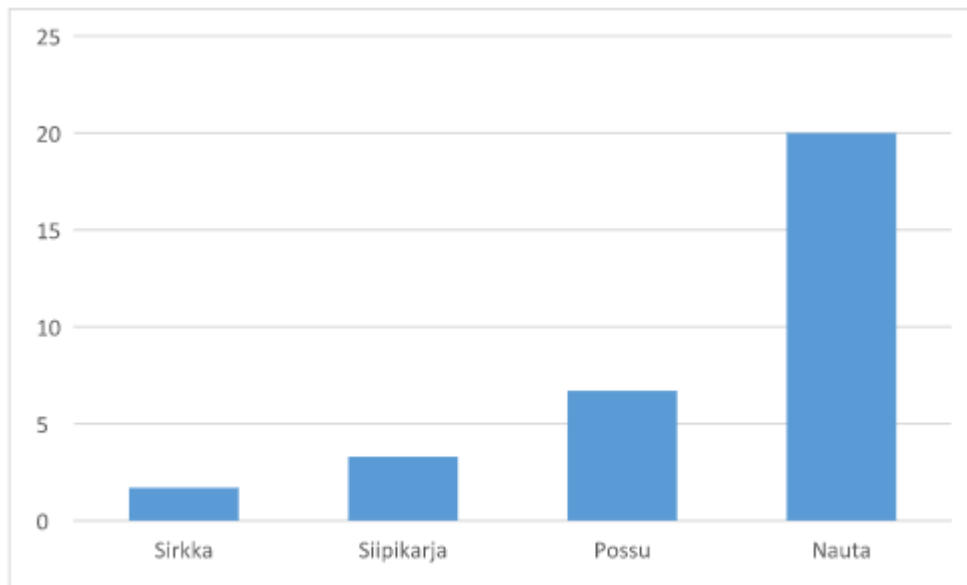
Vesijalanjälki

Veden kulutusta ruoan tuotannossa kuvataan usein vesijalanjäljellä, joka mm. Nikulan (2012) mukaan kuvaa: "käyttämiemme tuotteiden ja palveluiden koko elinkaaren aikaista kokonaisvedenkulutusta ja vaikutuksia veden laatuun, vesistöjen tilaan ja muihin vedenkäyttäjiin." Suurimpana veden käytön haasteena onkin varmistaa, että laadukasta vettä on riittävästi, eikä sen hankinta tuhoa jokia, järviä eikä pohjavesiä, joista olemme suuresti riippuvaisia. (Nikula 2012)

Maatalouden osuus Suomen vesijalanjäljessä on suuri: 82 % muodostuu maatalouden tuotannosta ja kulutuksesta, ja jopa 24 % kokonaisvesijalanjäljestä muodostuu lihan kulutuksesta ja tuotannosta (Nikula 2012). Suomen kontekstissa maatalous on myös vesistöjen suurin saastuttaja (Kurppa ym. 2015). Eläinperäisten tuotteiden vesijalanjäki muodostuu pääasiassa eläinten ruokkimiseksi tarkoitetun rehusta. Muut tekijät, kuten juomavesi ja palveluihin kuluva vesi muodostavat vain n. 2 % vedenkulutuksesta. Vesijalanjäljen voidaan siis katsoa pääosin muodostuvan kolmesta eri tekijästä: Rehun tuottosuhteesta (miten paljon rehua tarvitaan tuottamaan tietty määrä ravintoa kyseisestä eläimestä), rehun rakentumisesta ja rehun alkuperästä. Näihin kaikkiin tekijöihin vaikuttaa lisäksi tuotantotapa: teollinen laiduntaminen, niittylaiduntaminen tai sekoitus näistä. (Mekonnen & Hoekstra 2010.) Suomen pitkät talvet estävät ympärivuotisen niittylaiduntamisen, mikä on eduksi vesijalanjäljelle, sillä ravinnon tuottosuhde kasvaa niittylaiduntamisesta teolliseen siirryttäessä jopa nelikertaiseksi. Tämä ei kuitenkaan ole yksiselitteisesti verrannollinen koko eliön vesijalanjälkeen, sillä teollinen laiduntaminen lisää puolestaan rehun rakentumiseen sitoutunutta vettä. (Mekonnen & Hoekstra 2010.)

Kuten kuviosta 6 huomataan, ravinnontarpeen trendi on kasvava siirryttäessä tasalämpöisiin, suurempikokoisiin ja pitkäikäisempiin eliöihin. Sirkkojen ja siipikarjan molempien ravinnontarve on molemmilla alle 5 kiloa per proteiinikilo (1,7kg ja 3,3kg), sian 6,7 kiloa ja naudalla huomattavasti suurempi, 20 kiloa per tuotettu proteiinikilo. Sirkkojen energiahyötysuhde on hyvä, sillä niiden elonkierto on lyhyt, lisääntymiskyky hyvä eikä energiaa kulu ruumiinlämmön säätelyyn vaan kaikki suuntautuu kasvuun. Naudan elonkierto toimii täysin toisin; lihakarja voidaan teurastaa jo puolentoista vuoden iässä, mutta lypsykarja alkaa tuottaa maitoa vasta noin kaksivuotiaana ensimmäisen vasikan jälkeen ja vuosittain ennen poikimista lehmä menee myös "umpeen" eikä edes tuota maitoa. Näin ensimmäiset kaksi vuotta

lehmän elämästä kuluu pääasiallisesti vain sen omien elintoimintojen käynnissä pitämiseen varsinaisen pelkkään kasvuun keskittymisen sijaan. (Ruokatieto 2016.)

Kuvio 6. Proteiininlähteinä käytettävien eliöiden ravinnontarve kiloina per tuotettu proteiinikilo. Lähde: En-toCube.

Koska suurin osa eliön vesijalanjäljestä johtuu sen syömästä rehusta, on loogista, että kyseisen eliön vedenkulutus jatkaa samaa trendiä sen kuluttaman ravinnon määrän suhteen. Eliön vedenkulu-tuksen tehokkuuden saa selville suhteuttamalla kulutetun vesimäärän tuotettuun ravintomäärään (ks. kuvio 7).
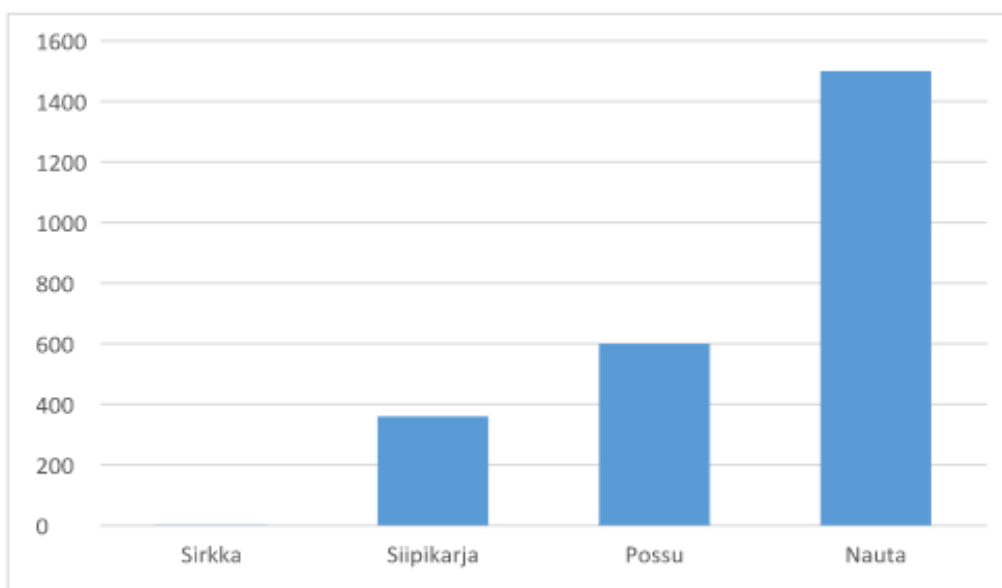
Kuvio 7. Proteiinilähteiden kasvatukseen tarvittava vesimäärä litroina per proteiinikilo. Lähde: EntoCube.

Sirkkojen kasvatuksessa vettä kuluu vain yksi litra proteiinikiloa kohden, kun vastaava luku naudalla on 1500 litraa. Hyönteisillä voi jossain tapauksissa olla jopa 20-kertainen ruoan hyötysuhde verrattuna naudanlihaan (Raloff 2008). Vedenkulutuksen suhdetta ravinnon määrään tarkastellessa huomataan, että hyönteiset ovat nautaa paljon tehokkaampia vedenkuluttajia. Vain pieni osa eliöiden vesijalanjäljestä muodostuu rehun ulkopuolisesta vedenkulutuksesta (2 %), joten eron tulee selittyä rehun vesijalanjäljestä. Hyönteisten käyttämä ravinto suhteessa naudan rehuun on täten oletetusti vähemmän vettä sitovaa tai vastaavasti lähempänä tuotettua.

Sianlihan vedenkulutus on 600 litraa ja siipikarjalla 360 litraa per proteiinikilo. Sillä merkittävin osa vedenkulutuksesta muodostuu ravinnontuotannon kautta, naudan huono ekotehokkuus nostaa myös sen vedenkulutuksen yli kaksinkertaiseksi verrattuna toiseksi suurimpaan vedenkuluttajaan eli sikaan. Lisäksi liha koostuu suureksi osaksi vedestä, kun taas hyönteisissä sitä on vähemmän, ja ne ovatkin niin sanotusti "kuivempaa" lihaa. Tämä ei auta pelkästään veden kulutuksen hillitsemisessä, mutta tekee hyönteisistä erityisen ravinnerikkaita: samassa määrässä heinäsirkkaa on enemmän ravintoaineita verrattuna samaan määrään naudassa. (Raloff 2008.)

Vesijalanjälkeä kohdistettaessa naudan eri osille, suurin osa kuuluu jalostetulle lihalle (84 %), mutta osa kohdistetaan teurasjätteisiin ja nahkaan ja muihin satunnaisiin osiin. (Mekonnen & Hoekstra 2010.) Suomessa 85 % naudanlihasta on peräisin lypsykarjasta (Maa- ja metsätalousministeriö 2014), jolloin osa sen vesijalanjäljestä kohdistetaan myös maidontuotantoon. Tämä parantaa sen ravinnon tuottosuhdetta huomattavasti verrattuna lihaksi kasvatettavaan karjaan, niitty- ja teollisen laiduntaimisen sekoituksessa olevalta karjalta lähes 40-kertaisesti. Tästä suuri osa on kiittäminen maidontuotantoa, jonka vesijalanjäki on pientä (1000 l/kg verrattuna naudan 15 000 l/kg), joka indikoi, että sen tuottosuhde on hyvä. (Mekonnen & Hoekstra 2010.) Naudanliha lypsykarjasta vaikuttaa siis olevan Suomen naudanlihatuotannon ekologisuusvaltti. Kuitenkin jäljelle jäävällä puhtaasti lihantuotantoon tarkoitetulla karjalla on huomattava vesijalanjälki lypsykarjaan verrattuna, mikä kumoaa lypsykarjasta saadut vesijalanjälkihyödyt.

Vesijalanjälki luokitellaan kolmeen eri väriin sen alkuperän mukaan. Sininen vesijalanjälki tarkoittaa pintavettä, eli jokia ja järviä, sekä pohjavettä. Vihreä tarkoittaa sadevettä, ja harmaa sitä määrää makeaa vettä, joka tarvitaan laimentamaan teollisuudesta vesistöön päässeet päästöt sovitulle vedenlaadun tasolle. (Nikula 2012, Mekonenn & Hoekstra 2010.) Jalanjälkeen lasketaan mukaan koko prosessissa kulunut ja tuotteeseen sitoutunut vesi, ja veden hukaksi lasketaan veden höyrystyminen, sen palaaminen toiselle valuma-alueelle tai mereen, tai sen sisältyminen tuotteeseen (Mekonnen & Hoekstra 2010).

Naudan vesijalanjälki muodostuu pääosin vihreästä vedestä (94 %), joka kuluu ruokintaan (98 %). Juomavesi ja muu palveluihin kuuluva vesi on suurimmaksi osaksi sinistä vettä. Suomen niittylaiduntamisen ja teollisen laiduntamisen sekoitus lisää kuitenkin sinisen ja harmaan veden osuuksia naudanlihan tuotannossa. (Mekonnen & Hoekstra 2010.) Hyönteisten ravinnossa, käytetystä maa-alasta sekalaiset viljat kuluttavat jopa 85 % ja porkkanat 14 %, joka kertoo että suurin osa hyönteisten vesijalanjäljestä muodostuu myös vihreästä vedestä. Vaikka Suomi on vesivaroiltaan rikas maa, jonka uusiutuvista makean veden varoista vain noin 2 prosenttia käytetään ruoan tuottamiseen (Kurppa et al. 2015, 15), tämä ei silti poista vesivarojen käytöstä koituvia ongelmia. Vihreän veden kulutus vaikuttaa biomassan uusiutumisen heikkenemiseen, mikä puolestaan aiheuttaa ruoantuotannon mahdollisuuksien vähenemisen. Sinisen veden kulutuksessa ongelmana ovat vesien valuma-alueet, jolloin Suomen sininen vesijalanjälki vaikuttaa maailmalla sekä vesivarojen kestämättömyyteen, että oikeudenmukaisuuteen. (Nikula 2012.)

Tehottomuus vihreän veden kulutuksessa eläinperäisessä tuotannossa voitaisiin ohjata viljelyyn, jolloin vihreästä vedestä kilpailevat tuotannot vähenisivät ja tehostuisivat. Hyönteisten vesijalanjälkeä voidaan entisestään pienentää käyttämällä esimerkiksi ruoantähteitä kasvualustana (Anthes 2015), mikä pienentää sen ravinnon vedenkulutuksen osuutta vesijalanjäljessä. Hyönteisten kasvattaminen tehtaissa puolestaan kuluttaa vettä, mutta kuten lihantuotannonkin teollistaminen, se auttaa veden-käytön tehostamisessa (Mekonenn & Hoekstra 2008).

Jätteiden rooli ekologisessa kestävyydessä

Kolmasosa kaikesta ihmisravinnoksi tuotetusta ruoasta päätyy roskiin (Surendra ym. 2015). Jätteitä, kuten ruoantähteitä sekä myös lantaa voidaan kuitenkin käyttää hyönteisten tuotannossa kasvualus-tana, mikä kasvattaa niiden ekotehokkuuta entisestään. Hollannissa on onnistuneesti kokeiltu oluen mäskiä ja hedelmien lihaa turvallisena kasvualustana hyönteisten kasvatuksessa. Tämän avulla voitai-siin hyönteisten tuotannossa saavuttaa ns. suljettu kierto, jossa edellisen tuotteen jätteistä voidaan tuottaa uutta kiertoon päättyvää ravintoa.

Tällä on kuitenkin myös omat terveysriskinsä: pilaantuneen ruoan käyttäminen ja vaarallisen ho-meen välittyminen hyönteisten kautta ihmisille, lanta saattaa sisältää haitallisia bakteereja kuten sal-monellaa, sekä karjalle syötettyjä antibiootteja tai muita aineita, jotka siirtyvät lannan kautta hyöntei-siin. Lisäksi hyönteiset kestävät suuremman määrän metalleja elimistössään kuin nisäkkäät, jolloin ih-miselle epäterveellisestä määrästä ei välttämättä saada tarpeeksi tietoa. (Anthes 2015).

Orgaanisten jätteiden käsittely tuottaa myös ympäristölle haitallisia kasvihuonepäästöjä ja sen tie-detään saastuttavan pohjavesiä. Etenkin jätteiden kuljetus eri käsittelypaikkoihin, sen kaatopaikalle menevä osuus, sekä käsittely anaerobisessa hajotusprosessissa ovat suuria ympäristön kuormittajia. (Surendra ym. 2015) Jätteen määrään vaikuttaa eliöiden hyödyntämisprosentti ihmisravinnoksi, ja kar-keasti luokitellen hyödyntämisprosentti kertoo eliön ekologisuuden tasosta.
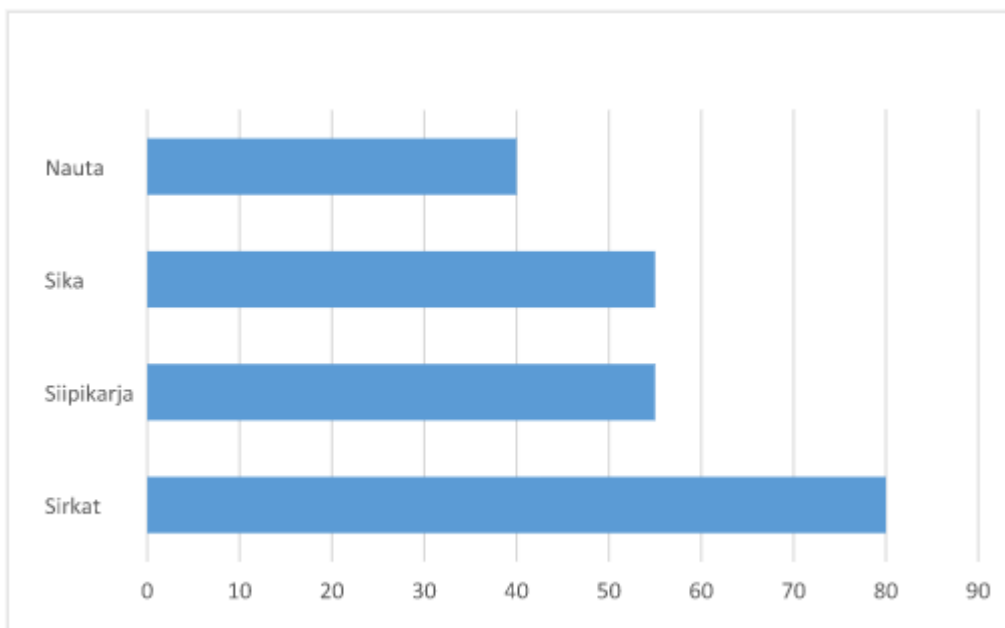
Kuvio 8. Ihmisravinnoksi käytettävien eliöiden hyödyntämisprosentti sen koko massasta. Lähde: Huis 2013.

Kuviossa 8 esitetään kuinka suuri osuus eliöstä voidaan hyödyntää ihmisravinnoksi. Eliöiden hyödyntämisaste vaihtelee jonkin verran alueittain, mutta van Huisin luvut ovat muodostettu yhdysvaltaisia tilastoja hyödyntäen. Sirkat voidaan hyödyntää jopa sataprosenttisesti, mutta naposteutarkoituksessa niiltä poistetaan yleensä jalat ja siivet, minkä vuoksi hyödyntämisprosentti laskee 80 prosenttiyksikköön. Sekä siipikarjasta että possusta käytetään tavallisesti 55 % ihmisravinnoksi. Naudasta hyödynnetään vähiten, vain noin 40 %. Näin ollen naudasta päätyy siis yli puolet ja siipikarjasta sekä possusta hieman alle puolet suoraan jätteeksi. Naudan hyödyntämisprosentti on siis puolet pienempi kuin sirkkojen. Hyönteisistä ei juurikaan synny jätteitä, sillä esimerkiksi monet muut hyönteiset, kuten jauhomadot, voidaan hyödyntää sellaisinaan.

Sen lisäksi, että jätteitä voidaan käyttää hyönteisten ravintona, itse hyönteistuotanto tuottaa erittäin vähän jätettä muihin proteiininlähteisiin verrattuna. Tämän kannalta hyönteisten ympäristökuormitus saattaisi lähestyä nollaa, tai jopa negatiivisia lukuja edesauttaen ympäristöongelmien lievittämistä entisestään.

Yhteenveto ja pohdinta

Suomalaiset kuluttivat luullista lihaa vuonna 2015 keskimäärin 79,4 kg, josta 19,2 kg oli naudanlihaa ja näin siis kypsennetyn ja syödyn naudanlihan määrä oli keskimäärin 9,6 kg. Naudanliha sisältää 193 g proteiinia per kilo ja suomalaisten proteiininsaanti naudanlihasta on vuodessa keskimäärin noin 1 853 g eli 1,85 kg. Saman proteiinimäärän saamiseksi hyönteisiä tulisi syödä 9,5 kg vuodessa, eli naudanlihan ja hyönteisten määrässä eroa olisi vain 100 g. Vuoden 2015 kulutusmäärällä mitattuna naudanlihan tuotantoon energiaa kului 417 megajoulea. Vastaavan proteiinimäärän saamiseksi hyönteistuotannon energiamenekki olisi 321 megajoulea. Vastaavasti naudanlihan hiilijalanjälki oli 227 hiilidioksidiekvivalenttia, kun se hyönteisproteiinilla olisi vain 25,9 CO_2-ekv. Naudanlihan tuotantoon käytettiin maa-alaa 372 neliömetriä vuodessa, kun hyönteisillä maata olisi tarvittu vain 33,4 neliömetriä. Vuoden 2015 naudanlihan kulutus henkilöä kohden vaati 2780 litraa vettä. Jos sama proteiinimäärä olisi saatu naudanlihan sijaan hyönteisistä, olisi vettä kulunut vain 1,85 litraa vettä. Rehua kulutettu naudanlihan määrä vaati 37,1 kiloa kun hyönteiset olisivat pärjänneet vain 3,15 kilolla.

Naudanlihan ympäristöresurssien kulutus on siis moninkertaista hyönteisproteiinin resurssikulutukseen verrattuna kaikilla muilla mittareilla paitsi energiankulutuksessa, jossa hyönteisten tuotannon osuus oli 77 % naudanlihan energiankulutuksesta. Maankäytön, rehunkulutuksen ja hiilijalanjäljen koko oli hyönteiskasvatuksella vain noin 10 % verrattuna naudantuotannon arvoihin. Naudanlihantuotannon vedenkulutus oli jopa yli 1500-kertainen hyönteisten tuotantoon verrattuna, jonka vedenkulutus oli siis vain 0,07 % naudalihantuotannon vedenkulutuksesta. Naudanlihasta siirryttäessä hyönteisproteiiniin lähes neljäsosa (24 %) koko lihankulutuksen energiankulutuksesta laskisi 23 prosenttiyksikköä; maankäyttö, rehunkulutus ja hiilijalanjälki laskisivat noin 90 prosenttiyksikköä ja veden kulutus laskisi käytännössä olemattomalle tasolle.

Global Footprint Networkin (2015) kotisivuilla olevan testin mukaan henkilön ekologinen jalanjälki pienenisi 0,3 globaalihehtaaria, mikäli lähes joka aterialla nautittu, pitkiä matkoja kuljetettu ja vahvasti pakattu liha vaihdettaisiinkin lähellä tuotettuihin ja kevyesti pakattuihin kasviksiin ja kalaa suosittaisiin proteiininlähteenä. Pelin tilanne olisi jossain määrin rinnastettavissa skenaarioon, jossa naudanliha olisi vaihdettu kokonaan hyönteisproteiiniin, sillä muiden tekijöiden kuin energiankulutuksen osuus laskisi noin 90 prosenttiyksikköä. Suomen kansallisen energia- ja ilmastostrategian tavoitteena on lisätä uusiutuvien energianlähteiden osuutta vähintään 40 % vuoteen 2025 mennessä (Hoffren 2006). Mikäli

hyönteisten kasvatuksessa käytettäisiin strategian mukaisesti uusiutuvia energianlähteitä ja hyönteisten ravintona biojätteitä tai teollisuusprosessien ylijäämätuotteita, olisi hyönteisten kasvatus lähes hiilineutraalia.

Kotimainen naudanliha tuotetaan pääasiallisesti maidontuotannon ohessa ja on näin siis kansainvälisesti vertailtuna hyvin ympäristöystävällistä. Koska liha ja maitotuotteet ovat tavallisesti suomalaiselle kuluttajalle läheisempiä substituutteja kuin liha ja kasvikset (eli lihasta luopuessaan henkilö todennäköisemmin lisää maitotuotteiden kuin kasvisten määrää), ei kotimaisen naudanlihan vähentäminen ruokavaliossa välttämättä vähennä kotimaista naudanlihan tuotantoa huomattavasti (Maa- ja metsätalousministeriö 2014). Pelkästään lihan määrän sijaan tulisikin kiinnittää huomiota yhä enemmän myös laatuun; ulkomaisen ja kaukaa kuljetetun pihvikarjalihan ekologiset haittavaikutukset ovat suurimmat ja jo kotimaisen naudanlihan ekologinen jalanjälki on merkittävästi ulkomaista pienempi. Tilastolliset erot on laskettu kansainvälisten keskiarvojen mukaan, joten kotimaisen naudanlihan ja hyönteisproteiinin ympäristökuormitusten ero ei ole aivan yhtä suuri kuin kansainvälisen keskiarvon mukaan laskettu.

Tällä hetkellä suurimmat esteet hyönteisproteiiniin siirtymiselle ovat kulttuuriset asenteet ja lainsäädäntö. Taloudelliset toimijat ja tiedeyhteisö ovat jo heränneet hyönteisten kasvatuksen lukuisiin tulevaisuuden mahdollisuuksiin kun hyönteisten taloudellisesta tuottamisesta ja myymisestä ihmisravinnoksi tulee laillista vuonna 2018 EU:n lakimuutoksen myötä. Kestävä ruokalautanen joukkoruokailun kestävän kehityksen edistäjänä -raportissa (2011) Kristiina Aalto ja Eva Heiskanen muistuttavat, että suurten yksiköiden ruoantuotannolla ja -tarjonnalla on laajat vaikutukset; julkiset ruokapalvelut toimivat esimerkkinä muille, käyttäjäkunta on laaja ja laajojen sopimusten avulla voidaan vauhdittaa esimerkiksi luomutuotannon yleistymistä sekä hinnan laskua. Luomutuotteiden tarjonnan laajeneminen onkin kasvanut julkisten ruokapalveluiden myötävaikutuksesta mm. Itävallassa (Aalto & Heiskanen 2011, 6).

Kokonaisuudessaan maatalouden kannalta haasteellisten olosuhteiden maassa hyönteisten kasvatus voisi olla avain kestävään ja omavaraiseen ravinnontuotantoon. Sen lisäksi että hyönteisten kasvatus parantaisi huomattavasti Suomen ekotehokkuutta, voisi Suomi myös näyttäytyä maailmalla tulevaisuuden superruoan kärkimaana.

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Views on Economic Sustainability of the Internet of Things and Smart Buildings

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Abstract

This report discusses the impacts of the Internet of Things and smart buildings on sustainability, primarily from economic perspective but also encompassing environmental and social factors. The topic is approached via Kalasatama/Helsinki and its smart buildings. The research question is formulated as "What are the economic views on sustainability in Kalasatama? - Case smart buildings."

The Internet of Things (IoT) refers to systems connecting physical and virtual "things" together by transferring and processing data between them. Smart buildings, essentially buildings with intelligent control systems, utilise IoT and other technology to enable safer, more comfortable, more efficient and potentially more sustainable way of living.

In this report, the economic and other dimensions of sustainability are discussed from the perspective of different stakeholders of Kalasatama and its smart buildings. While we conclude that smart buildings have potential for efficiency and improved sustainability, we also raise the question as to who will benefit from this potential. While some may find opportunities to earn, some others may be left outside of new societal development, possibly experiencing even higher economic inequality than before. We also try to point out that new technology alone does not guarantee more efficient allocation of resources or ecological sustainability. For example, people will still have an impact on the overall effect on different forms of sustainability, and while IoT may improve efficiency it will also increase the amount of obsolescent electronic components, which often end up as harmful electronic waste.

Nonetheless, in many cases smart buildings provide sustainable alternatives for living. They are one of the actors when economies are attempting to transition towards sustainability.

Introduction

Kalasatama is a former industrial area in the seaside of Helsinki, which, after the harbor was closed down in 2008, has become an appealing area for housing development in the capital of Finland, where the building land is scarce in comparison to the increasing demand of new apartments. Located just 4 kilometres from the city center, the new area of Kalasatama will by 2040 be the home of 25 000 people and numerous companies. (Uutta Helsinkiä 2016)

One of the essential marketing strengths of Kalasatama is that it is being sold as a "Smart City". According to Biotope, the project responsible for "building an IoT open innovation ecosystem for connected smart objectives" (Biotope 2016) the smartness seems to be culminated in its smart buildings with their invocation of renewable energy and self management, smart meters with energy efficiency, monitoring and enhancing air quality and solutions for charging electric vehicle and even sharing them.

This paper will evaluate Kalasatama through the various stakeholders of smart buildings and their views on economic sustainability. It will also anticipate the potential effects that smart buildings may have on sustainability on environmental and social levels.

The paper begins with presenting the methodology and formulation of the research question, followed by a concrete explanation on IoT and some relevant prevailing views on economic sustainability. After that we will analyse the economic views on Kalasatama smart buildings through the eyes of its stakeholders and continue the analysis in highlighting the effects smart buildings may have on the dimensions of economic sustainability. The paper finally assesses the future vision and applicability of IoT smart building solutions and their relevance on overall sustainability, and their potential to enhance sustainability transition.

Methodology and Research Question

The framing and purpose of this paper is to study and observe Internet of Things from the economic perspective while looking at sustainability. In order to make the task somewhat more concrete, we decided to illustrate Internet of Things through Smart Cities, and for the purposes of this work even more accurately though smart buildings.

This paper is attempting to show how IoT functions in smart buildings, who are the stakeholders and what are their motivations. From the economic point of view, we are analyzing, what is needed in the system for it to operate economically on its own, what motivates it and what keeps it moving. How will it be profitable enough for all its stakeholders to begin implementation, and what are the incentives behind developing it further? We are also asking: Who is the payer and who are the beneficiaries and how does each stakeholder benefit? Also, looking ahead into the future, we will anticipate, whether smart buildings would have the potential to be the new normal and if these features would be for example a part of construction legislation some time in the future.

As our case study, we will use Kalasatama that is a concrete housing development project that got its first residents in 2012 and will be ongoing until approximately 2040 (Uutta Helsinkiä 2016). Our research question on the described topic formulates: What are the economic views on sustainability in Kalasatama? Case smart buildings.

We will use material about Kalasatama as our sources, but also highlight the economical views on smart buildings and their sustainability through numerous other academic papers and real life examples. We will not be going too deep in the theory, but keep a practical approach on the subject. The core subject, IoT, will be introduced in more detail, however not in its most technical form, just in order to give the reader an overview of the technology behind smart building solutions. We will also give an overview of some economical views on sustainability, and reflect those on our analysis of Kalasatama.

Definition of IoT and smart cities

The Internet of Things (IoT) refers to systems connecting physical and virtual "things" together by transferring and processing data between them. The "things" can be of virtual or physical form and as such be composed of basically anything. The communication between the things can take place between "computer - computer", "thing - thing", "human - human" and "human - thing", as demonstrated in Figure 1 (ITU-T Recommendations 2012, 1). In addition to mere communication, the things can constitute complex control loops to measure, control and regulate physical and virtual things. Cloud computing and artificial intelligence are examples of technologies that are being used already and will be

used at whole new level and to a greater extent in the future in creating sophisticated new solutions within IoT.
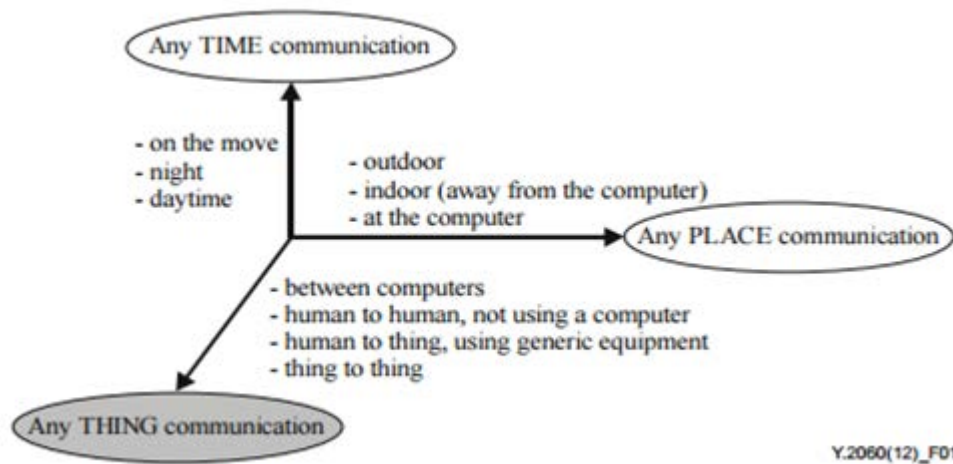

Fig. 1 The new dimension of interconnectedness introduced by the IoT (ITU-T Recommendations 2012, 3).

The IoT has potential to cover literally "everything" within a couple of decades, and it is estimated that by 2020 there are over 30 billion connected things with over 200 billion with intermittent connections. It is also estimated that 60 percent of the world population is expected to live in urban cities by 2025. (Vermesan & Friess 2013, 14, 39). In this regard it is logical that also cities have started to utilise the potential provided by IoT-based solutions.

In this report, a smart city refers to a city or an urban area using IoT-based or other smart solutions. As a term, smart city seems to have suffered from inflation: a basic Google-search lists the smart-prefix to almost any city imaginable. The implementation of any IoT-based solution seems to give city officials an incentive to call their city a smart city.

Vermesan & Friess (2013, 39) estimates that the future smart cities will have large-scale implementation of eight smart features: Smart Economy, Smart Buildings, Smart Mobility, Smart Energy, Internet of Things Strategic Research and Innovation Agenda Smart Information Communication and Technology, Smart Planning, Smart Citizen and Smart Governance (Vermesan & Friess 2013, 39). The term smart itself may refer to a variety of different issues, but often IoT-based systems are involved as demonstrated in this report.

IoT is often associated with providing tools for solving problems but it also creates new ones, especially in cities swarming with people. These include, for example, general lack of security, increased amount of e-waste and consequent health problems, as discussed in more detail later on in this report.

Case: Smart City Kalasatama

The main focus of this report is on Kalasatama, a new city area to be built in Helsinki. In Kalasatama, the plan is to build and implement IoT solutions to interact with the citizens' everyday life (Fiksu Kalasatama 2016; Uutta Helsinkiä 2016).
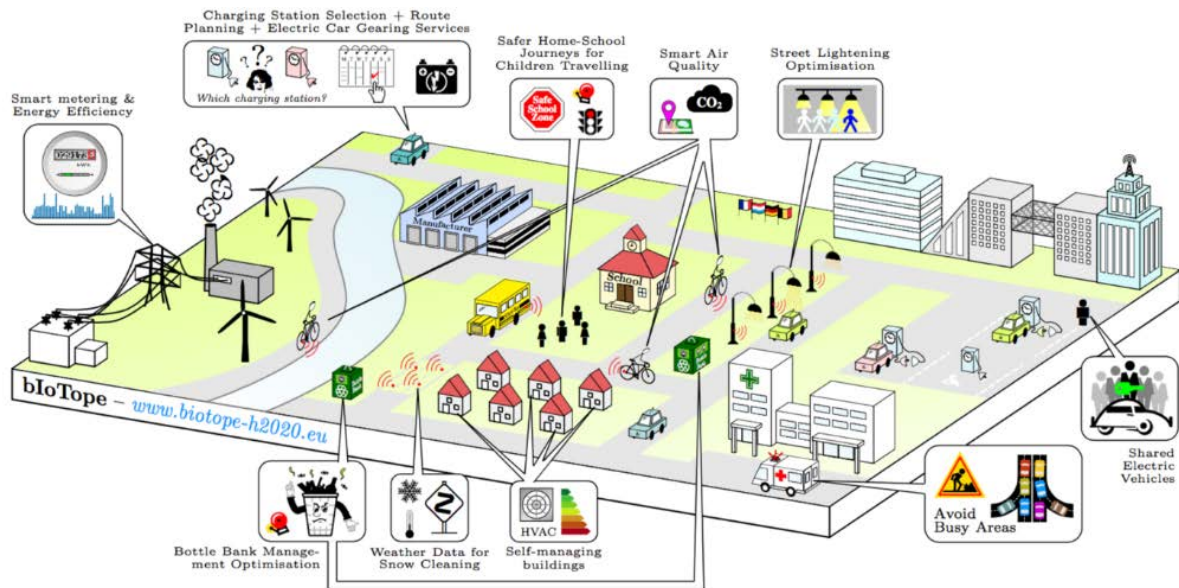
Fig. 2. The smart IoT solutions of the BIoTope project (Biotope 2016).

The smart systems of Kalasatama are developed as a part of an EU-funded project, BIoTope. The aim is to "develop smart city pilots, implemented in three cities (Helsinki/Kalasatama, Grand Lyon, Brussels Region)". The smart solutions include (Biotope 2016):

- In Helsinki/Kalasatama Smart Building, New Charging Facility Management
- In Brussels Safe Roads for Children between Home and School, Smart Mobility for Emergency Services, Smart Mobility for bikes
- In Grand Lyon Bottle Bank Management, Heat Wave Management

In comparison to what Vermesan & Friess (2013, 39) estimated typical smart cities to contain, the BIoTope cities are certainly on a similar track. The rough configuration of the listed smart solutions in BIoTope cities is presented in Figure 2.

The IoT-solutions piloted in the project cover a wide area of everyday issues the citizens are facing. While Brussels and Lyon focus on waste, weather anticipation as well as on safety and mobility, Kalasatama is set out to implement solutions for smart buildings and charging electric cars, integrated with financial transactions and costs of living. While both of the IoT applications of Kalasatama are well suited to study their effect on economic sustainability in Kalasatama, *smart buildings* are chosen as the final objective of this report.

While taking particular IoT solutions into practise, the BIoTope project, with Kalasatama a part of it, aims to tackle larger problems of the current IoT systems as well (Biotope 2016): Currently, IoT systems are based on collecting data into vertical silos owned by big cloud service providers, which complicates "the creation of cross-domain, cross-platform and cross-organisational services due to the lack of interoperability and openness". The project aims to create a System-of-Systems (SoS) that is based on open Application programming interfaces (API's), laying the foundation for open innovation ecosystems. This would enable companies to create new SOS's for connected smart objects with minimal investment. This perspective is discussed more in the latter parts of this report.

Smart buildings

Smart buildings can use the IoT in myriads of ways to attain specific targets. These targets could include efficiency of energy and costs, comfort of living, security and mobility, as shown in Figure 3.

Fig. 3. Intelligent building network (Intel 2016b).

In Kalasatama, smart buildings are set out to detect abnormalities autonomously by comparing the measurement data to "predefined optimal plans, thresholds, historical data, best-practice data from similar installations and on-line data from sensors" (Biotope 2016). The system then reacts to abnormalities by "sending requests, making handling orders, sending alarms and other notifications" according to a pre-defined plan (Biotope 2016). To put it simply, sensors measure given variables and transmit information to control systems (devices/software) which then compare the data to e.g. preset target settings. Then, they remotely and autonomously regulate operating devices, give alarms or perform other predetermined actions within the control system.

According to BIoTope, the benefits of Kalasatama smart buildings include 1) better safety and services, 2) less dependence on manual interactions and support as well as 3) higher efficiency due to e.g. automated monitoring and diagnostics, preventive maintenance, optimisation of processes and, consequently, 4) optimization of asset management, cheaper maintenance, less damages and cheaper insurance (Biotope 2016), which all can be considered beneficial to the occupants as well as the owners. This is in line with Intel's view, presented in Figure 4; Intel suggest there are similar benefits to all parties concerned attainable with their IoT-based smart building systems.

Fig. 4. Capabilities of IoT in smart buildings (Intel 2016b).

As per the topic of this report, economic view on sustainability, the optimization of revenue and minimising the costs of smart buildings via IoT deserves a closer look:

Estimates of potential savings of smart buildings vary significantly. Obviously newly built smart buildings will be more efficient than existing buildings with IoT-retrofits, but nevertheless the retrofits also have significant potential for saving energy, ranging from about one fifth upwards in commercial buildings (e.g. Tracy 2016; Stamats Communications 2016). Moreover, Nguyen & Aiello (2013, 255) take a closer look at the savings potential of different energy subsystems within smart buildings. Their investigation shows an up to 40 % energy saving potential for HVAC and lighting systems. However, they also point out that occupant behaviour have an impact on the energy savings potential (Nguyen & Aiello 2013, 246).

Another issue altogether is the price the occupants pay for living in a smart building versus an ordinary building either in terms of rent or purchase price. And yet another aspect is how the occupants value i.e. are willing to pay more for better ecological sustainability, safety or comfort the smart houses may offer. This, on the other hand, will have implications on social and economic equality from a more holistic perspective, as potential occupants are narrowed down significantly by their financial capabilities.

Economic views on sustainability

Having defined and explained the technological aspects of smart buildings and IoT in the previous chapter, we now continue with introducing the concepts of sustainability and economic sustainability from different perspectives.
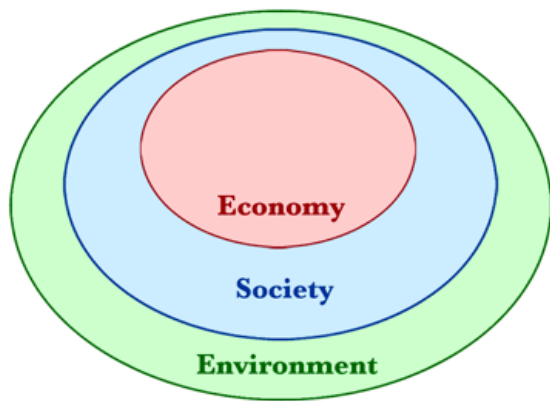
Fig. 5. The interlocking circles of sustainability (socialwatch.org 2011).

Sustainability itself can be understood in various ways, yet generally differing perspectives refer all to the same idea of a harmony between human and environmental systems. In general, this means that the human needs are not only met in the short term but also continue to be met in long term by perseverance and allowance for the regeneration of the natural environment (Khansari et. al. 2013, 47). Economic sustainability, as one of the dimensions on sustainable development, according to Castells (2000), requires attention to the ability to generate resources and wealth through better productivity and competitiveness in the market (Khansari et. al. 2013, 47). Understanding sustainability in general requires perceiving all of its dimensions, including social, ecological, cultural and economical, and the tensions between them. Sustainability is often pictured as three, or four, separate dimensions, using pillars or such as a scale. However, according to Göpel (2016, 87), "sustainable development should not be delineated with three pillars of similar importance − the dominant icon since the Earth Summit in 1992 − it should instead be portrayed as a series of embedded systems." Instead of the separation of different dimensions it should be noted that all aspects are crucial and overlapping to one another, because e.g. purely economic view on sustainability focusing on efficiency issues often neglect cultural, environmental and distributional dimensions (Khansari et. al. 2013, 47). The overlapping of the dimensions of sustainability has been visualized in Figure 5.

To put it bluntly, the core idea of economic sustainability, in case of any economic action, is to stay in profit. However, it is questionable whether there is such a thing as economic sustainability, rather economic views on sustainability. The key elements of economic views on sustainability could arguably be categorized into efficiency, equality and poverty eradication (Lauttamäki 2016, 4; DFID 2008, 14). This means that the economic process should be efficient in the sense of allocating resources, equal between different generations and social groups as well as capable of eradicating poverty in richer countries by the distribution of wealth. This framework will later in this report be used to reflect the potential effect of smart cities to its stakeholders.

An article by Solow (1993) presented an idea of what is known as the environmental economics. The article offers an economic paradigm which assumes that "goods and services can be substituted for one another". Solow argues that as long as there are different kinds of resources available for the same purpose, there is no need to worry about using up one particular resource. As the present generation is only obliged to be able to leave behind the capacity to create welfare, it could be argued that no particular thing or natural resource should be preserved for the sake of the next generation. (Solow 1993, 181-182)

According to traditional economics there are three types of capital: natural, human and physical, which "categorize different kinds of stocks that produce the range of ecological and economic goods and services used by the human economy" (Jansson et. al. 1994, 4). Natural capital includes the environment around us. Human capital refers to the knowledge, accumulated by education, and the social relations of people. Physical capital in turn covers our physical, constructed and human-made environment. Following Solow's (1993) take on capital, all types of capital could then be substituted. However, human-made capital is itself made from natural capital, e.g. energy used for physical and human capital, and therefore substitution of natural capital would not be a possibility. As an alternative to the environmental economics, ecological economics therefore concentrates on the capital's' ability to complement, rather than substitute each other. (Johansson et. al. 1994, 5-6) At present the world needs a new view for evaluating its development, as the nature is increasingly changing and suffering from the choices people have made. Therefore, as natural capital is becoming an even more limiting factor for further development (Jansson et. al. 1994, 5), the concentration of sustainability should lie on the ecological dimension, setting the boundaries for all other, especially economic, dimensions just as the Figure 5 demonstrates.

The general idea behind economics has often relied on economic growth and it has not taken into consideration the role of environment and sustainability. Even though conventional growth strategies have reduced poverty, increased access to basic services and created opportunity for mobility and participation, by maximising gross domestic product (GDP), there still are unmet needs and new development challenges (ESCAP 2013, 8). However, while the mainstream economics has disregarded sustainability aspect, the modern economic sphere also takes into account environmental matters. It must be acknowledged that while sustainability issues have been recognized in economics, there is no clear view on their place.

Sustainability Transitions

Sustainability transition studies was developed in order to challenge the orthodox economic views, which have not accounted sustainability. Sustainability transition stands for a long-time change of the technical, social, political and economic system towards a sustainable economy. The aim is to get a holistic understanding on environmental issues through a socio-technical view. (Markard 2012)

> *"Sustainability transitions are long-term, multi-dimensional, and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption. One particularity of sustainability transitions is that guidance and governance often*
> *play a particular role". (Smith et al. 2005)*

Sustainability challenges and socio-technical systems are connected with many other issues, which include dependencies, lifestyles, regulations, value chains and institutional or organisation structures. They consist of multiple actors and are therefore very persistent. As a consequence these socio-technical systems undergo a slow change, which can take several decades (Markard 2012). A prominent example of this would be a dependency of interconnected infrastructure system to the existing technology, which is in many cases outdated. The development of car, for example, was a technological achievement but required to create certain infrastructures such as roads and gas stations. In the end this development changed user-practices, institutional structures, lifestyles and is therefore not only a

technological transition but also a socio-technical. In addition to this, transition studies is the understanding both the contemporary and also historical transitions, which shape the society to have perspective. (Rip and Kemp 1998).

Policy making and social sciences have unique opportunity to tackle this and speed up the process of sustainability transitions. It can be claimed that the institutionalisation of the field can create new opportunities and closer collaboration. Furthermore it is important that sustainability transitions are becoming a legitimized field and that it can play its crucial role in promoting and creating a sustainable society (Markard 2012). The target should be to create with various frameworks and methods certain conditions where sustainability goals can be met. This requires an intervention in the societal development on a high scale where institutions, branches and whole socio-economic system collaborate. Two popular theoretical frameworks nowadays include especially transition management and multi-level management. (Markard 2012; Geels 2002)

Transition management is more or less a participatory governance method, which aims to gather different points of view regarding a certain development, by using methods like sharing problems, visioning and testing. Certain ideas are then tested for practice and through a kind of experimentation phase which includes improving and reflexion. In general transition management aims to enlarge the participation and tries to implement as many actors as possible (Geels 2002). According to Markard and Geels, there are three levels or scales within transition management, which describe where the changes happen. First of all landscape, referring to the macro level of socio-technical systems which include political directions, values, social views, and build environments like markets or trade patterns. Secondly, the regime referring to the meso level within a transition includes practices, laws and especially technologies. Changes here are usually slow, however those changes which happen mostly aim to achieve optimization. Lastly the niche, which makes up the micro level is the area where radical fast changes such as product innovations may happen. A breakthrough here can appear also at the regime level and so on, or it needs a bigger number of changes on the niche level that the regime level also changes. In general, it is an interplay of dynamics which can change the transition which is still not fully understood. (Geels 2002)

> *"There is a definite need to elaborate and specify the conceptual frameworks and methodological underpinnings for understanding both historical and ongoing transitions. This includes challenging the existing conceptual approaches in terms of where and how they can be applied, what their limitations are, upon what ontological assumptions they are based, etc."* *(Markard et al. 2012, p. 962)*

Kalasatama can be seen as an example of a sustainable transition case. However, it can be questioned whether Kalasatama is really achieving sustainability goals or whether it is just promoting these. However, Kalasatama can be an interesting case to look at since it includes many actors and uses new technologies, such as mobility infrastructure, smart buildings and energy systems as well as people and their lifestyle.

While mere speculation at this stage, there are a few points in favour of Kalasatama and its smart buildings of having an effect on sustainable transition. As classified by Forrest & Wiek (2015, 35), there are several contextual factors that are "important to successful transitions". From the point of view of socio-demographics, they suggest that the smaller the target community, the better the chances of successful transitions are. Moreover, existing community governance, skills and experience of the active members, availability of funding as well as social cohesion of the community are among the factors

that may have direct or indirect relevance to Kalasatama and its smart buildings as a way of more sustainable way of housing.

In comparison to the above, Kalasatama and its smart buildings involve a restricted amount of people, eventually about 20 000 in the whole area. There is governance involved in various ways: for instance funding (project funding for implementation and subsidies for individuals/occupants), publicity and regulations (e.g. energy certificates and other building regulations) that are bound to be in favour of promoting the sustainability related views of Kalasatama and its high tech solutions (see for example biotope (2016); Green Building Council Finland 2017). There is also public and stakeholder participation as well as professionals from many scientific fields involved in the process. While experts bring credibility, participation may promote public commitment (Jungk 1987). In light of this, there is a chance that some form of sustainability transition could happen *in and because of* Kalasatama over time.

Stakeholders of smart buildings

Concerning the buildings for smart cities, often many stakeholders are involved from the planning phase of the building until the end product is in use. Since smart buildings are diverse and intelligent, they involve many stakeholders with different expertise (Wipro 2016). Overall, the stakeholders in the context of smart buildings consist of parties that have different expertises and economical interests. These can include professionals from financial management, investors, technology experts, architects of different kinds, policymakers, citizens, businesses and so forth (Wipro 2016). Table 1 demonstrates examples of possible actors involved in a smart building project. However, it must be noted that the involvement of the actors might differ depending on the project.

Table 1. Example of potential actors (Calderoni 2015 and Wipro 2016)

Actors	Potential Involvement
Local government	assesment, governance, urban planning
Citizens	end-users
Businesses	during and after implementation phase
Service providers	service maitanance and development

Stakeholders in Kalasatama

With many stakeholders involved, smart buildings have pressure to meet sustainably goals. Given that the aim is to create an environmentally friendly building, different viewpoints and perspectives can be useful, as sustainability itself is a complex and interconnected field.

Having said this, in the example of Kalasatama one can see that many stakeholders are involved. The stakeholders in Kalasatama include the district of Helsinki, residents, companies such as construction companies and service providers and other stakeholders (Fiksu Kalasatama 2016). Inevitably, the motivations of the stakeholders can be different, while everyone is working towards the same goal. Yet often a project coordinator and owner(s) or investors will be overlooking the whole project. In the case

of Kalasatama, the city of Helsinki has played a major role when leading and supervising the city planning project (Tekes 2015), as the project is partly funded by 6Aika, which an organization funded by public money and EU funding (6Aika 2016). Investors can also have different incentives regarding the smart building. In the Kalasatama case, the owner of the land can have a great impact, as local or federal government can make the policies, put standards, give permits on the buildings and also give incentives to build environmentally friendly buildings. This is often the case in Finland, as the public sector plays an essential role in the structure of the economy.

Given this, the public sector can play a vital role in the early stages of urban planning and throughout the life of a smart building. It is to be acknowledged that the role of the public sector is often dependent on the economy itself. Secondly, private and public partnerships can appear, as is the case with Kalasatama. The officials of Helsinki city are a part of the steering group, and the head of the Kalasatama project is from ForumVirum, a partner of Helsinki city (Kalasatama 2016).

In the planning and building phase, different businesses from IT to construction will be at the core of planning the smart buildings. Furthermore, often citizens and community will be involved as well and this would add social participation, which is seen as an aspect of social sustainability (Murphy 2012). Furthermore, utility sector and providers are integral parts of a smart building. Their role is, for instance, to allocate resources and to orchestrate energy efficiency (Wipro 2015). Technology and other domain suppliers are also involved as they aim to streamline the processes and manage the efficiency of the building (Wipro 2015). When looking at the case Kalasatama, many partners are involved. However, one construction company is a major player, SRV (Fiksu Kalasatama 2016). Moreover, other partners include in utility, technology and retail sectors as well as partnerships with local universities. As seen, a spectrum of shareholders can consist of different actors from variety of sectors. With that, it can be said that in order to meet sustainability goals for smart building, many specialists are needed.

Discussion on Stakeholders and their economic views on smart buildings in Kalasatama

Private people as stakeholders; citizens and end users

The people and the future residents of smart city Kalasatama play an important part during the construction, and later evaluation of the actual functionality of the living area. They are the key to the success of the area. Furthermore, involving the future citizens already in the construction phase can increase the individual's interest to participate and therefore enhance social coherence inside the community, which would equal to better social sustainability. Smart buildings constructed based on IoT solutions promise to enhance residents' everyday lives by e.g. automating services, providing a safer living environment and reducing energy costs (Intel 2016b). However, these promises all raise a question, for what price. What would a resident have to pay for living on the area filled with smart solutions? In the case of the smart buildings, to whom are they beneficial and can they be sustainable?

Already being discussed previously in this report, smart buildings indicate benefits of which various groups or stakeholders could profit from. As for the residents of the city, the benefits include better safety and services, less dependency on manual interactions, higher efficiency, cheaper maintenance, less damages and cheaper insurance due to optimization of asset management (BloTope 2016), all of which sound desirable to pursuit. On the other hand, for those that have the possibility to aim at these services are already considered privileged. New technology, especially when built from scratch, does

not come free of charge. The resources required for living in a smart building include not only financial capital but also a solid human capital such as interest in sustainability matters, which makes the individual already equipped with better possibilities and lifestyle.

The individual is in fact the actor whose standards, values and demands are the decisive factors when marketing Kalasatama for consumers. The investment in smart buildings might be profitable for residents for many reasons, such as better security, efficiency and especially quality of life. Having ownership of something that is not accessible for everyone is a temptation on its own, it may bring such benefits that gave no direct price, like reputation and status among peers. Being able to choose to live more ecologically sustainably is a question of resources in many places, not willingness. Arguably smart buildings can be more ecologically sustainable, in making living and the systems around the house more efficient, decreasing e.g. the costs of energy, by automated optimisation (Intel 2016b), making smart buildings beneficiary for all stakeholders and therefore economically sustainable. Nevertheless, it is questionable, whether smart buildings will be socially sustainable, referring to that they could be reached by anyone at any time, regardless of their social status, social and cultural capital or geographical location. Social sustainability can be characterized by the substantial and procedural elements, substantial being the basic human needs and procedural meaning the procedure of achieving sustainability (Boström 2012). In the sense of smart buildings, the substantial elements have arguably been already met and the people are aiming to achieve better quality of life, in their own terms.

Consequently, the construction and maintenance of smart buildings need not only be profitable for the property or business owners but also to the residents of the city. Making this reachable, there should be more discussion on the stands of the residents on the issues at hand, i.e. involving the citizens in the decision making as well as offering them education on the systems that drive the households. Things like cutting down energy costs may be tempting in the sense of marketing, but considering the actual enticement for luring in residents offering a better and more efficient lifestyle is the key. From the occupants' point of view, there may be direct or indirect financial effects via IoT, depending on how the occupants pay for the energy or water. If occupants pay per use, efficiency translates into direct savings. It must be acknowledged that only a certain part of the society has the possibility to live in smart cities. Therefore, building new smarter cities cause differentiation of already existing social groups, meaning the gaps between the rich and the poor get wider and the possibilities get more tied into individual's social status. As for the living area and lifestyles, they start diverging and groups become stigmatised to a certain place. The social coherence between people would in fact impair.

The prices of houses is Kalasatama (Redi 2016) average around 7500 euros per square meter, which results a price for a small one bedroom apartment to be around 350 000 euros. The price level of central Helsinki is high, which also reflects to the prices of new apartments. This also gives implications, that Kalasatama will be out of reach for most people, which does indicate to inequalities in reaching social sustainability in Kalasatama. Buying an apartment is not the only way to live in Kalasatama, so technically it is possible for people with moderate income to live in Kalasatama though rental apartments and state subsidised apartments, which are also being built to the area. Some buildings will be dedicated to students and seniors, which will work for providing more equal opportunities for wider selection of people to accommodate Kalasatama. (Uutta Helsinkiä 2016) Still, this does not hide the fact, that somebody needs to pay for the premium of smart buildings in order to function economically. If the payer is a state or a city in form of subsidies, that leaves us with the question whether it is sustainable for a city or a state to subsidise high cost and level of living for some individuals, and whether

these funds are the missing from another cause, that could promote social sustainability more efficiently and for more people.

Business operators, service providers and their motives as stakeholders

The role of the business operators consists of different parties, which include first and foremost the investors, businesses that operate buildings such as maintenance and partners that are involved in the development phase and after that. The business model for smart buildings differs from the traditional business model, since the costs of building intelligent solutions can be costly and they might require more labour to implement in the beginning. Smart buildings are a new concept and for instance, a project like Kalasatama is a pilot project in Finland. Because of this very fact, it might be difficult to estimate the cost structure and the revenue streams for investors and business partners. For instance, implementation costs for smart buildings and long-run returns can be hard to forecast as there is not much evidence on smart buildings.

The motivation of the parties may differ. For instance, the construction company as well as other stakeholders can see smart buildings as an opportunity to be part of something new and exciting. One critical point of view could be in fact marketing and branding that can add value and have a positive impact on the company's image. As environment has become a buzzword, it can be expected that businesses want to be associating with environmentally friendly and innovative buildings. This can also add value to the companies that partner with smart building projects and thus positively impact company's future sales. However, it is hard to estimate marketing value that would generate revenue.

From an investor's point of view the importance is the potential returns of the investments, whereas other parties might have different motivations. Investor could be a private company or a public organization or an owner that is also a resident. First and foremost, the role of technology and intelligent solutions might be unclear and also it might be hard to quantify the impact of technology in numbers (Greentech media 2013). While implementation of technology will require capital investments, they can bring savings in facility costs in the long-run (Greentech media 2013). On the other hand, there is research that backs up the fact that intelligent solutions can be beneficial for investors (Wipro 2016). However, it can be difficult to know the extent to which the technological advancements are economically beneficial for the investors. In addition, the value for intelligent solutions might be different in the short and long run.

Secondly, it is hard to quantify the quality of life and the way of living. Regarding enhancing the productivity of smart buildings from an investor's point of view can be tricky. The return on investment, ROI, is quite long in housing market (Wipro 2016). If a smart apartment is bought for investment purposes, it could be that from a business point of view smart housing can be a risky investment or at least its returns are hard to forecast. Investors could potentially lack the motivation to keep investing into the eco-friendly smart buildings and enhancing automation and bringing state of the art technology. However, developing constantly and adjusting new technologies in smart buildings can be seen integral aspect as new innovations will evolve. Because of this very fact, a smart building can be constantly changing and taking in new technologies. From a business perspective, this can be challenging and costly. However, in Kalasatama that is both publicly and privately funded and governed, it can be that a smart city like Kalasatama will evolve and take advantage of new innovations if there is public incentive to invest into best technology and automation practices.

On the other hand, a smart building management might bring benefits to investors as well as tenants who have bought an apartment in a smart building. Intelligent management systems and data gathering could make detecting problems swift and easy (Greentech media 2013). From the owner's point of view, operating expenses can be reduced by minimising the time required for troubleshooting. This is achieved by maintenance management receiving relevant information from the system in real time to spot the problems reliably and to assign the repair tasks to most suitable persons. IoT also enables predictive maintenance with constant monitoring of systems and service only when needed, reducing costs compared to scheduled routine maintenance. Best practices data can be utilised to implement cost saving schemes across different types of building systems. Internal information sharing between property management and outside locations can be simplified with networks and databases reducing the need for manual intervention and, thus, errors. Energy costs can be reduced by automated optimisation of HVAC (heating, ventilation and air conditioning) based on information on weather forecasts and occupants' living habits. Safety measures, such as "facial recognition, motion detection, elevator access control, intrusion alerts and real-time information on incidents" may not have direct financial impacts, but they could lead to reduction of possible security staff or general feeling of safety that occupants may be willing to pay substantially higher prices for the services, rent or for the ownership (Intel 2016b; Biotope 2016). Therefore, it could be said that smart buildings could also bring money savings in maintenance and repairing of the building. Moreover, it could be that smart buildings are safer and healthier and therefore, one could think that there are lower risks involved.

The intelligent and automated maintenance and energy systems are integral parts of smart buildings. As stated, the maintenance costs for these could be essentially lower than in traditional buildings in the long term, while capital investments may be greater. The companies within energy, water and transportation sector could potentially combine their strengths and have strong partnerships to provide smooth solutions to buildings. Even though these solutions and new applications could conserve resources, the efficiency and popularity of these services would decide the company's contribution margin. Long-term contracts could evolve, which would be a positive aspect for companies and this would generate income in the long term. Also, maintenance companies will play a major role in smart building management. However, the traditional maintenance companies will have to adapt and change their practices, which may affect their business model.

On the other hand, businesses have had challenges generating service revenues from IoT services (Capgemini Consulting 2014). Successful monetization of IoT services could come from interlinked services. Connecting all services and making IoT as a one big ecosystem that connects all interfaces could have great potential for the end-users, while the profitability for services providers will still be somewhat unclear. However, from the IoT suppliers' point of view, Kalasatama's open API's and SoS offers possibilities to a wider range of operators than in some other cases. Further promotion of such ideology could reduce the risk of polarised winnings to a few big players. On the contrary, the new applications developed for the smart buildings could also generate revenue and bring visibility, which may attract new clients (Calderoni 2015).

Furthermore, data is an integral part of smart building management. With data, there is a great deal of information, which aims to optimize the buildings. However, the open question regarding this data is the ownership of it and also the security of it. Given that, there are countless opportunities for businesses, vendors and investors to operate and be involved in smart buildings. Yet, it is somewhat unclear how and to what extent will businesses benefit from this. Nevertheless, the aspect of money and the motives may be different depending on the party in question.

This chapter aims to explain how the city government and other public parties are involved in the smart city Kalasatama project. The aim is to show that modern governance and participation methods were used among all actors to enhance a better collaboration.

First of all it needs to be mentioned that smart city Kalasatama is a part of the Six City Strategy, which includes the 6 largest cities in Finland: Helsinki, Espoo, Vantaa, Tampere, Oulu and Turku (6Aika), which runs from 2015-2017 (6Aika). The vision is to create a smarter urban community by sharing urban problems on a larger scale and enable these cities to a new experiment. The project is funded by the EU, the Ministry of Employment and the Economy and the city of Helsinki (Fiksukalasatama 2017).

To ensure the optimal development of the Smart Kalasatama project, the collaboration between the city, companies and residents can be seen as a great advantage. This collaboration used methods such as living labs from early on, forming interest groups, conducting surveys and also implementing an open data infrastructure, which is also a basis for IoT and the development of smart buildings. Public administration, businesses, organizations and private individuals are often motivated to give their opinion about the further development. With that in mind, Smart Kalasatama has multiple stakeholders, whose target is to visualize new solutions and innovations, which could then be implemented later through Six City Program. (Forum Virium 2017)

> *"Fiksu Kalasatama aims to be a development environment that joins together the research, development and innovation activities of businesses, and the development of city services. Companies and the city bring their projects to Fiksu Kalasatama; the ideas are being developed, tested and composed together with the inhabitants and those working in the area". Project Manager Hannu Asikainen of the City of Helsinki.*
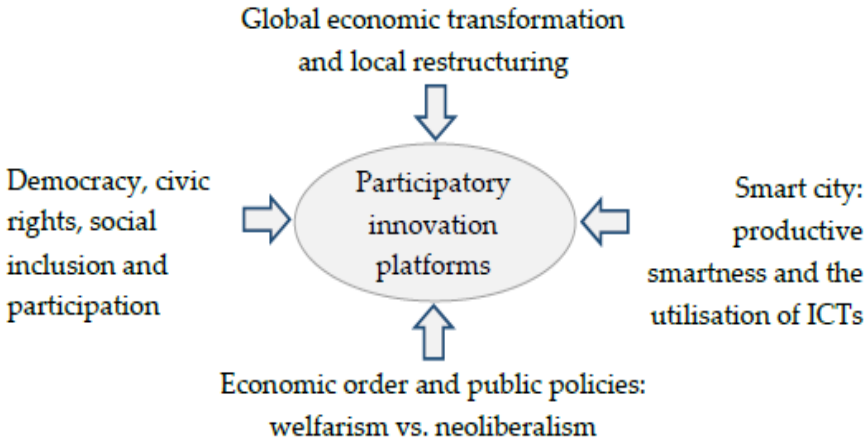
Fig. 6. Towards citizen centred platform governance (Anttiroiko 2016)

Given this, public involvement and co-creation can be seen as core concepts in Smart Kalasatama. Furthermore, the residents play important roles as they are testing the local smart services of sustainable and efficient lifestyles. The *Nifty Neighbor,* which is a co-created sharing economy platform, for

example aims to help and trade with the residents. For instance, there are already ideas from the population, which have been successful. One of these ideas included playgrounds and landscaped construction sites. Given this, citizens are encouraged to develop tailored housing concepts, and the outcomes of these can be beneficial to many. One example is a co-created Senior House, a property and community in which elderly people live together assisting each other with everyday routines. (Abu-Fadil 2017)

European Network of Living Labs

The aim of the European Network of Living Labs (ENoLL) is to collect information about innovation communities from different countries in one place. This is a network, which uses user-driven methods and is based on international collaboration between various living labs around the globe. Nowadays around 300 LLs around the world are existing and one of the examples of this is Forum Virium Helsinki. In the case of Kalasatama this living lab is used for practical testing and urban laboratory for innovative services like IoT tools. In addition to this, it boosts co-creation of new urban services by creating a hub. In other words, it can be described as an environment for various branches where users and people can participate. This platform allows a mix of ideas from start-ups, residents, SMEs, researchers, large companies, builders, and the city come together and facilitate change. (Open Living Labs 2017)

The relationship between the stakeholders and sustainability in the context of smart buildings

To close and summarize the discussion on stakeholders, let's speculate how typical smart building stakeholders *may* affect economic sustainability from the perspective of the three key elements defined earlier in the text: efficiency, equality and poverty eradication (Lauttamäki 2017, 4; DFID 2008, 14). When appropriate, other forms of sustainability are also discussed.

Residents and owners

Smart building residents, flat owners and tenants, have a chance to reside so that all resources are allocated in an energy and cost efficient way, thus potentially having a positive impact on economic and ecological sustainability. Economic sustainability may become an issue via inequality, since the rent/purchase costs may be higher than in conventional housing; not all can afford to live in an expensive smart house, and those who can, may be facing financial trouble due to high initial and continuing costs of their housing (e.g. rent, mortgage).

IoT produces an immense amount of data utilising the residents; living habits, departure/return times, use of energy and electricity to name a few examples. That information has financial value, and as always, it is debatable as to whom it belongs to (Best 2016). In the worst-case scenario, misuse of information could lead to issues with social sustainability.

Smart building owners, including the owners of flats put up for rent, provide residences with potential for efficiency and safety, thus also promoting sustainability from the ecological and social point of view. Generally speaking, however, the owners try their hardest to make sure it is financially feasible for them; only rarely will an owner accept prices (e.g. rent) that are lower than the market price or what is profitable for them. This may be an economically sound situation for the owners, but not necessarily for the residents or those not capable of residing, as discussed above.

Local governments

By promoting the emergence of smart buildings, local governments may promote, or at least try to promote, various forms of sustainability. However, while new buildings may have higher potential for efficiency compared to smart IoT-retrofits, their sustainability may not be optimal if they are built for the wrong reasons. These wrong reasons could refer to constructing new buildings while existing ones are either demolished or left unused without a proper cause, e.g. solely for the financial purposes of a given instance.

Local governments could reduce economic inequality and poverty eradication via subsidies so that more people could afford living in modern smart buildings. This could be reached by subsidising the residents or the owners/builders so that prices are kept at a certain level. However, not all people or causes can be subsidised at the same time. Hence, subsidising one instance often means there is reduction of subsidies in another instance. So, subsidising smart buildings for the wrong reasons could in theory result in higher inequality and hindrance of poverty eradication.

Service providers (IoT)

Service providers could promote ecological sustainability by constantly improving the energy efficiency. This is enabled by rapid technological advances within the IoT and smart building sector, but there is risk of purposeful obsolescence of electronic components in pursuit of profits, which could have an overall negative effect on sustainability via unnecessary e-waste. In addition to ecological problems, e-waste may also cause health problems and thus issues with social sustainability. Nonetheless, energy efficiency often translates into economic efficiency, thus having an impact on economic sustainability one way or another.

Kalasatama promotes open SoS's and API's. This means that constant development and implementation of new systems can be done with minimal costs. This improves the economic equality of service providers, since small companies are less overshadowed by the big influential players, thus having better chances of getting their share of development projects. Whether this will accelerate the risk of unnecessary development and consequent e-waste, remains to be seen.

Future vision and applicability to other cities/locations

The future for smart buildings is manifold and includes many aspects regarding monetizing. It is often stated that IoT is hard to monetize and its impacts are somewhat unknown, while there lies enormous potential in it. The core of the question often regarding smart building is whether technological advancements are seen as spending or capitalizing. However, it can be argued that investing in the future technology is valuable and enhances growth. Moreover, the comfort as well as safety of living will probably be issues in the growing middle class in the future.

Given that, adding smart solutions to the new buildings can be seen as the natural trend of development. However, another target with large potential is the restoration of existing buildings with smart solutions. An example is to link existing buildings with modern smart grids (e.g. U.S. Department of Energy 2016; U.S. Department of Energy 2016b; Savon Voima 2016) (as they become more common) and retrofit the buildings facades with energy (solar) collecting materials. That way each building could primarily produce its own energy and only buy energy in excess demand. Alternatively, a building could sell the energy it does not use. Retrofitting IoT into existing buildings has significant potential for more

efficient living; estimates on energy savings scale from 20 % upwards. Due to tighter environmental regulations, energy efficiency is bound to become one of the key issues in the future. Smart systems have the potential to provide means to provide efficiency in different sectors. For building contractors and service providers this means huge market opportunities. However, this development requires the modernisation of electricity grid, which will be a massive investment. IoT does enable this technically, but the realisation of it also depends on the market size and the additional profits the system may generate in relation to the existing one. An interesting question is, whether the local energy production would be in the interests of those who are able to do the investments on the technology. And if it were to actualize, what would be the cost vs. benefit to the shareholders of for example apartment buildings? Private consumers might be hesitant to collectively invest in causes that have a longer return time on investment, at least it might be difficult to achieve consensus of all apartment owners in notoriously difficult housing corporations' shareholder meetings.

Looking back to new construction projects, we may ask whether smart IoT solutions have the potential to become the new normal in buildings? Would IoT solutions in form of smart energy, apartment automation or security solutions be in the building legislation one day? Now trending in luxury apartments, could they be demanded in lower priced condominiums as well? How about detached homes? This could be justified for example with lower consumption of energy or similar, but how much would that reflect the freedom of choice on individuals. How far would be the remote surveillance if this type of development was to take place. The investment on the equipment also needs to be kept in mind, would this only be economically possible in developed countries, not in developing ones? Or more likely within the wealthier areas of countries, not the poorer areas? Is this really a development, that is needed by people or is it just something, for which the demand is created through artificial reasoning?

Another topic to consider is the future aspect and transition to smart buildings in general, which also traces back to the idea of sustainability transitions. As smart buildings are emerging, we could suspect that economies are shifting towards more sustainable thinking, which shows that there is concern for degrading planet's life support. Transition towards smart building models can be challenging, as it can be seen more of a nice thing to have rather than necessity. On the contrary, public incentives and environment consciousness can contribute to the demand for smart buildings, which would affect the supply of the housing. Still it is questionable whether the market is ready and mature enough for smart buildings. Moreover, it might be that some economies will adapt intelligent solutions into housing quicker than others. In Finland, the market for alternative housing may be maturing and trendy and therefore, the future of adapting intelligent solutions into housing could be bright.

Effect on environmental sustainability

In consideration of smart buildings in general and their implications on environmental sustainability, it is interesting to raise a question about the impacts of smart housing solutions to the environment. Does this development really work in favor of achieving environmental sustainability goals or is it mainly superficial in relation to those and only promoted through environmental sustainability attributes in marketing purposes? Why is Kalasatama attractive to its future residents, the ones that ultimately see it worth their investment to pay the price in living in this area? Is at about the location, reputation and the area itself and what is the premium they are ready to pay for the smartness of solutions? It is evident through the scale of the project, that there are numerous stakeholders, who are involved in order to make a profit, which is how it is supposed to be in order to function economically. A tension with

ecological sustainability is created through direct and more subtle promises about the area being eco-logically sustainable, but without concrete data or plans on how to achieve it. One example of it is the promotion of the smart grid, that enables the use of renewable energy sources (Uutta Helsinkiä 2016; Green Building Council Finland 2017), which is also directly involved in smart buildings. It is claimed in the marketing material, that there will be local production and storage of energy, but it is not implicitly stated, whether this will cover all or just a portion of the energy used. Somewhat more information is found under the energy provider, Helsingin Energia, who states that the goal for renewable energy pro-duction by 2020 is 20% of total production and carbon neutrality is the goal by 2050 (Helen 2017). However, these are not figures for Kalasatama alone, but concern the production of the company in general, which indicates there is no clear ecological premium for the smart buildings of Kalasatama. The concrete positive implication on ecological sustainability, that is reported is the 2015 piloted apart-ment automation system, which increases the comfortability of living through a system where usage of electricity and water is monitored and the user is being reported about the changes in the pattern. This, according to Helen (2017), has the potential of decreasing the energy usage by 15%. This, being a potential and still dependent of human action, whether it is actualized, does not seem to be as positive ecological impact as it is being promoted for.

IoT is often associated with providing tools for solving problems but it also creates new ones, es-pecially in cities swarming with people. These may have consequences with regards to ecological and social sustainability as described briefly below.

The general lack of security is considered as one the main concerns of IoT (e.g. Franceschi-Bicchi-erai 2016), which could lead to serious consequences with regards to social and financial sustainability. Moreover, the lack of standardization and international cooperation (Vermesan & Friess 2013, 6) could lead to uncontrolled development. There are also ecological concerns to IoT, since the amount of elec-tronic waste is bound to increase as IoT solutions emerge. This in turn could have social impacts to many via health problems (Koloseni & Shimba 2012, 338 - 340). While technology may provide solu-tions for some of these problems, new problems are bound to emerge with them. Nanotechnology, for example, could be an answer to significantly improve the performance of electronics and reduce the use of harmful chemicals in electronic components, but they may also cause health problems via nano-dust (Byrne & Baugh 2008, 43-44; Buzea, Pacheco & Robbie 2007, 28-29). All in all, when planning smart buildings/cities and IoT solutions associated with them, all aspects of sustainability should be taken into consideration.

Conclusions

Overall, smart buildings provide an interesting case from the point of view of sustainability. The use of IoT solutions in smart buildings could provide environmental benefits in many sense. In other words, smart buildings are expected to influence and improve issues within utilization, energy conservation, transportation, waste management and change the overall lifestyle.To be more specific, the aspect of sustainability can be viewed from looking at different stakeholders involved, their motivations as well as their sustainability aspect.

First and foremost, residents and tenants are the ones that can experience smart buildings on the end-user level. For instance, they have a chance to exploit the resources in a more sustainable way and enjoy lifestyle that supports sustainability in a new way. In other words, smart buildings promise expe-riences to the residents that ultimately would boost the quality of life. This can be seen as an essential

part of smart buildings. On a positive note, investing in the quality of life can be seen valuable as itself, as it may contribute to health and economic benefits for instance. However, on a social note, the accessibility of smart housing could only be available for a few. Secondly, public sector can play an integral role in smart building projects. This can be seen in the case of Kalasatama as local government orchestrates urban planning and its development. It could be expected that local governments could impact greatly and provide incentives to support sustainability. Thirdly, the private sector and other parties consist of business operators, vendors and service operators, which have an integral role in the lifespan of smart building. However, their motivation in projects like Kalasatama can vary. Certainly, these actors see that smart buildings provide an interesting business case, while it is hard to estimate the full business opportunity in all engagement levels.

The promise of the smart building is that they would bring intelligent solutions, which would make the building more efficient when operating and regarding maintenance. This in turn would cut down the costs of energy use, for instance. Given that, smart housing would have a smaller environmental footprint. Even though the goals and aims of the smart buildings may be apparent, there is no clear view on the economic benefits they would bring to the stakeholders involved. Evidently, if planned and implemented well, these urban areas might provide serious sustainability as well as economic benefits to the stakeholders.

It is however questionable, how the current pilot projects such as Kalasatama will be able to provide sizable economic benefits to all stakeholders. As discussed above, it is evident that sustainability as a whole is a complex issue and transitioning into sustainable solutions might not be straightforward. Nonetheless, smart buildings attempt to provide sustainable alternatives for living, which can be seen as one of the essential actors when economies are attempting to transition towards sustainability. Because of this, the development of smart buildings holds a great potential and henceforth, if invested and implemented well, they can shift the housing industry into a sustainable model.

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TUTU4 TULEVAISUUDENTUTKIMUKSEN MENETELMÄT KÄYTÄNNÖSSÄ

TUTU4 Tulevaisuudentutkimuksen menetelmät käytännössä -opintojakson (5 op) tavoitteena on tulevaisuusajattelun syventäminen ja tulevaisuusnäkökulman soveltaminen tutkimuskohteeseen, aiempien kurssien teemojen (tieteenfilosofinen teoria, ontologia, epistemologia ja metodologia) syventäminen, tieteellinen kirjoittaminen, argumentointi sekä tutkijan ammatti professiona. Opintojaksolla perehdytään tieteellisen tulevaisuudentutkimuksen menetelmiin ja työskentelytapoihin sekä tieteelliseen argumentaatioon ja tutkimuksenteon perusteisiin. Opintojakson suoritettuaan opiskelija osaa soveltaa valitsemaansa tulevaisuudentutkimuksen tutkimusmenetelmää omassa tutkimuksessaan.

TUTU4-jakson esseen on arvioinut Tulevaisuudentutkimuksen Verkostoakatemian koulutussuunnittelija **Hanna-Kaisa Aalto**.

Harjoitustehtävään liittyi poikkeuksellisen suuri prosessi. KTM **Johanna Lähteenmäki** itse kontaktoi toimeksiantajaa ja tarjoutui tekemään pienimuotoisen tutkimuksen. Sinnikkäällä työllä, substanssitietämyksellä ja metodologisella osaamisella kirjoittaja sai haastettua arvovaltaisen raadin aidosti pohtimaan tulevaisuutta.

Harjoitustyö ei edusta kuivaa akateemista raportointia, vaan onnistuu popularisoimaan tiedettä kivalla ja lukijaa kunnioittavalla tavalla. Kirjoittaja omaa Delfoi-ohjelman manageroinnin lisäksi laaja-alaisesti erilaisia tietoteknisiä valmiuksia ja artikkelin taitto on tästä mainio esimerkki. (Lisätietona, että artikkelin akateemiset vajavuudet on täydennetty erillisellä liitteellä.)

Harjoitustyö on julkaistu Elinkeinoelämän Valtuuskunnan sarjassa "EVA Arvio" ja on luettavissa verkossa http://www.eva.fi/wp-content/uploads/2017/03/arvio_009a.pdf. Työ julkaistaa tässä e-julkaisussa EVAn luvalla.

Kansan konsultti

Johanna Lähteenmäki

Helsingin yliopisto

> *"Ainostaan hänellä, joka on varma, ettei hän hajoa siihen, että maailma hänen näkökulmastaan kat-*
> *sottuna suhtautuu liian tyhmästi tai ilkeästi sitä kohtaan, mitä hän maailmalle tahtoisi tarjota ja joka*
> *kaikkea sitä vastaan kykenee sanomaan: "sittenkin", vain hänellä on "kutsumus" politiikkaan".[1]*

Näin ylevästi saksalaisfilosofi Max Weber kuvaili poliitikon ammattia sata vuotta sitten. Kuvailu on osuva yhä, vaikka Weber tuskin aavisti teknologian kehittymisen johtavan keskusteluun poliitikkojen "julkisen kusitolpan" asemasta.

Tässä EVA Arviossa selvitetään, miten digitalisaatio, globalisaatio ja muuttuvat päätöksenteon tasot vaikuttavat poliitikon työhön. Miten poliitikon työ muuttuu? Millaisia poliitikkoja tulevaisuudessa tarvitaan? Minkälaisia henkilöitä politiikka houkuttelee?

Tutkimus perustuu 37 asiantuntijan näkemyksiin, joita selvitettiin paneelissa tulevaisuusväittämillä. Mukana oli toimittajia, tutkijoita, kansanedustajia, virkamiehiä, aktivisteja sekä elinkeinoelämän, puolueiden ja järjestöjen edustajia.

Tulevaisuuden kansanedustaja on jatkuvasti äänestäjiään
konsultoiva tiedon ja näkemysten välittäjä

- Kansanedustajan työ muuttuu lähivuosikymmeninä konsultointia muistuttavaksi tiedon ja näkemysten välittämiseksi. Kansanedustaja on todennäköisesti teknologian avulla jatkuvasti yhteydessä äänestäjiinsä.

- Digitalisaatio ja avoimuuden vaatimukset voivat johtaa eduskuntatyön avaamiseen: kansanedustajien eturyhmätapaamisista voi tulla julkisia, samoin valiokuntakuulemisista.

- Silti jokaisesta kansalaisesta ei tule päättäjää, eikä suora demokratia juuri yleisty. Perinteiset poliittiset instituutiot, kuten puolueet, pitävät todennäköisesti pintansa.

- Henkilökeskeisyys korostuu politiikassa tulevaisuudessakin, joten kansanedustajan keskeisimmät taidot ovat kyky esiintyä ja viestiä.

- Kansanedustajiin ei vuonna 2035 kohdistu muodollisia pätevyysvaatimuksia, eikä heiltä vaadita esimerkiksi poliitikkopassia.

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1   Risto Ikonen, Kasvatus&aika (2009): Aiotteko tutkijaksi vai poliitikoksi? Max Weberin analyysi tieteestä ja politiikasta ammatteina.

Teknologian kehittyminen haastaa poliittisen järjestelmämme. Käynnissä oleva digitalisaatio parantaa kansalaisten mahdollisuuksia osallistua ja vaikuttaa, mutta myös muuttaa päätöksenteon toimintaympäristöä.

Edellinen yhteiskunnallinen murros, teollinen vallankumous, laajensi äänioikeutta ja toi mukanaan puoluelaitoksen. Miten poliitikon työ muuttuu kahden seuraavan vuosikymmenen aikana? Mitä kansanedustajalta odotetaan, ja miten hän tekee työtään vuonna 2035?

Parin vuosikymmenen aikajänteellä voi jäädä historiaan nykyinen toimintatapa, jossa kansanedustajaksi haluava kiertää vaalipiiriään ja hakee äänestäjiltä avointa valtakirjaa vaikuttaa eduskunnassa. Todennäköisesti kansanedustajasta tulee konsultti – tiedon ja näkemysten välittäjä, joka toimii päätöksenteon ja kansalaisten rajapinnassa. Hän pitää teknologian avulla jatkuvasti yhteyttä äänestäjiinsä ja avaa heille työnsä koukeroita.

Näin arvioivat tulevaisuuden poliitikon työtä pohtineet asiantuntijat, joiden näkemyksiä selvitettiin paneelikeskustelussa väitteiden avulla. Mukana oli 37 politiikkaa eri puolilta tuntevaa asiantuntijaa: toimittajia, tutkijoita, puolueväkeä, kansalaisaktiiveja, virkamiehiä.

Panelistit myös pitävät tarpeellisena muutosta, joka veisi kansanedustajat yhä syvempään vuorovaikutukseen äänestäjiensä kanssa. Tällaista muutosta ajavat paitsi teknologian kehittyminen, myös kasvava avoimuuden vaatimus koko yhteiskunnassa.

Jatkuvaa dialogia

Panelistien mielestä eduskunta voisi tarjota kansanedustajille työvälineet, joiden avulla he voivat pitää reaaliaikaisesti yhteyttä äänestäjiinsä. Käytännössä kansanedustaja voisi puida yhteiskunnallisia kysymyksiä äänestäjiensä kanssa omassa digitaalisessa kansalaispaneelissaan (kuvio 1).
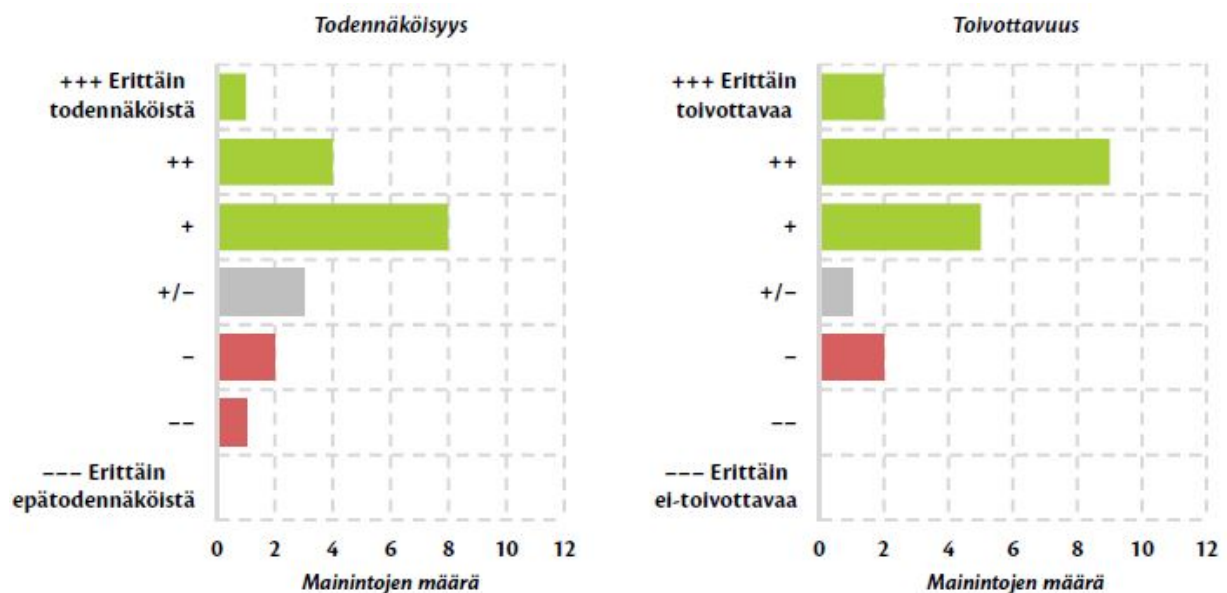
Kuvio 1. "Eduskunta tarjoaa digitaaliset työkalut, joiden avulla kansanedustajat voivat pitää reaaliaikaisesti yhteyttä äänestäjiinsä ja järjestää esimerkiksi kansalaispaneeli ja heidän keskuudessaan näkemysten vaihtamiseksi".

Kansanedustajat käyvät toki tälläkin haavaa keskusteluja kansalaisten kanssa esimerkiksi sosiaalisessa mediassa. Laajoja kansanjoukkoja nämä keskustelut eivät kuitenkaan tavoita. Tilastokeskuksen mukaan vain 7 prosenttia kansalaisista on kirjoittanut nettiin yhteiskunnallisen tai poliittisen mielipiteen ja vain 11 prosenttia kansalaisista käyttää yhteisöpalveluja yhteiskunnallisiin asioihin tai politiikkaan.

Kansanedustajan oma kansalaispaneeli lisäisi luottamuksellista dialogia edustajien ja äänestäjien välillä. Edustaja voi selvittää äänestäjiensä näkemyksiä, mutta myös perustella omia päätöksiään. Hyvällä kansanedustajalla pitää myös olla rohkeutta tehdä vaikeita päätöksiä, jotka saattavat heikentää joidenkin etua.

Näin asiantuntijapaneelissa perusteltiin tarvetta lisätä dialogia:

"Asioiden kompleksisuuden lisääntyessä on selvää, että kansanedustajien on avattava omaa kannanmuodostustaan ja tiedonkeruutaan yleisölle. Ainoa muu vaihtoehto on se, että lobbaajien valta kasvaa, sillä heillä on resurssit ja motivaatio muodostaa monimutkaisista asioista yksinkertaistettuja (omaa etuaan ajavia) näkemyksiä kansanedustajien käyttöön."

"Tottahan tietotekniikan kehitys tuo mahdollisuuksia tiivistää kansanedustajan yhteyksiä kansalaisiin. Mikään ihmelääke se ei kuitenkaan ole. Nykyisinkin pieni äänekäs vähemmistö mekkaloi somessa."

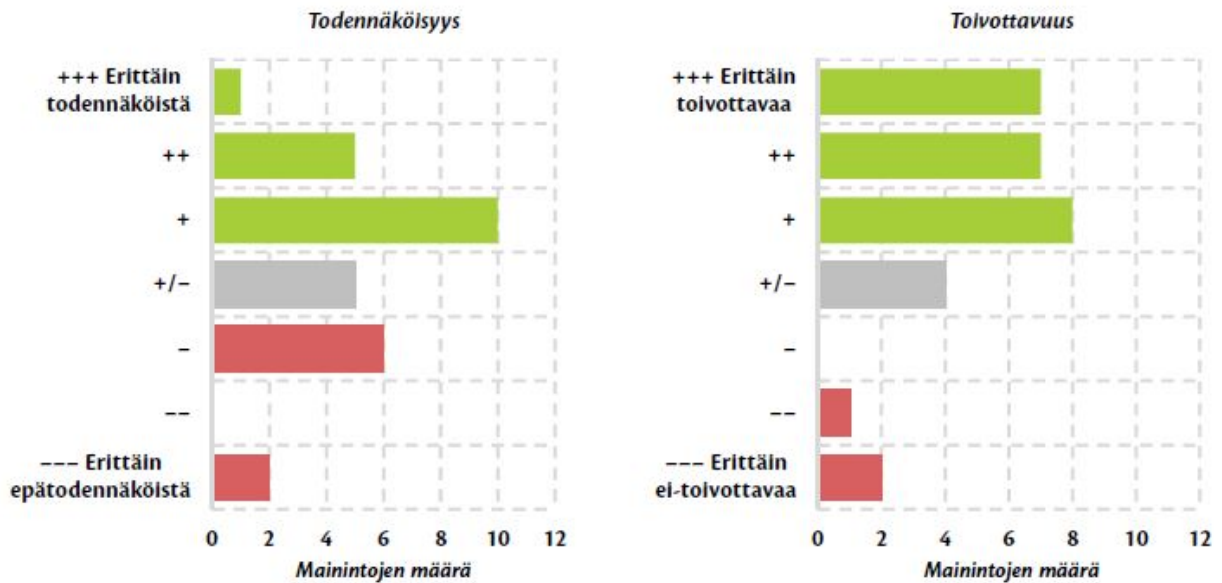*"Tietotekniikka ei ole mikään ihmelääke."*

Avoimuutta valmisteluun

Kun avoimuus ja läpinäkyvyys lisääntyvät kaikkialla yhteiskunnassa, ei eduskuntakaan voi taistella muutosta vastaan menettämättä omaa legitimiteettiään. Merkkejä voimistuvasta avoimuudesta nousee yhteiskunnassa esille tämän tästä.

Esimerkiksi sijoitusyhtiö Bridgewater Associates nauhoittaa kaikki johtoryhmän kokoukset ja tallenteet ovat työntekijöiden saatavilla[1]. Kauppatieteiden ja tekniikan tutkimukseen apurahoja myöntävä KAUTE-säätiö taas jakoi digitalisaation tutkimukseen apurahoja videohakemusten perusteella. Videot julkaistiin netissä, ja kansalaiset saivat äänestää niistä suosikkiaan.

Panelistit pitävät kaikkiaan toivottavana julkisen päätöksenteon avoimuuden lisääntymistä. Tulevaisuuden kansanedustaja raportoi avoimesti tapaamisensa erilaisten eturyhmien kanssa ja valiokuntatyön avoimuutta lisätään (kuvio 2).

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[1] Bock (2016).

Todennäköisyys / **Toivottavuus**

Charts y-axis labels (left): +++ Erittäin todennäköistä, ++, +, +/−, −, − −, − − − Erittäin epätodennäköistä

Charts y-axis labels (right): +++ Erittäin toivottavaa, ++, +, +/−, −, − −, − − − Erittäin ei-toivottavaa

X-axis: Mainintojen määrä (0, 2, 4, 6, 8, 10, 12)

Kuvio 2. "Vuonna 2035 eduskunnan valmistelutyö on avointa. Kansalaisten kiinnostuksen ja luottamuksen lisäämiseksi eduskunnan päätöksentekoon kansanedustajat julkaisevat kaikki tapaamisensa ja lainvalmistelutyössä tehtävät valiokuntakuulemiset ovat julkisia."

Valiokunnissa käytävä keskustelu ja asiantuntijakuulemiset voitaisiin esimerkiksi streamata nettiin, jolloin tieto olisi vaivattomasti myös kansalaisten käytössä.

Täysin avoimeksi valmistelutyö ei kuitenkaan voi muuttua, sillä käsittelyyn tulee myös esimerkiksi kansallisen turvallisuuden kannalta merkittävää aineistoa. Näin panelistit perustelivat avoimuuden lisäämistä:

"Kun laitetaan joukko erimielisiä ihmisiä samaan tilaan pohtimaan jonkun tietyn lain problematiikkaa, heiltä vaadittaisiin epäinhimillisiä kykyä vaieta ja saada piiloon kaikki vähänkin kiinnostava debatointi."

"Olisi läpinäkyvyyden ja vastuullisuuden kannalta tärkeää uudistaa eduskuntatyön avoimuutta. En ole kuitenkaan varma, onnistutaanko sitä perustavanlaatuisesti avaamaan, kun päätöksentekijöinä ovat kohteet itse."

Mutta muuttaisiko valiokuntatyöskentelyn avaaminen kokoukset performanssiksi? Jotkut pitävät nykyistä televisioitavaa eduskunnan kyselytuntia performanssina, jossa kansanedustajat kerran viikossa esittävät ajavansa kansalaisten asioita.

Kauhuskenaariossa valiokuntatyöskentelykin voisi muuttua tv:n ohjelmaformaatiksi, jolloin todelliset päätökset tehtäisiin piilossa julkisuudelta. Tavoiteskenaariossa taas valmistelun julkisuuden lisääntyminen vahvistaisi kansanedustajien työn arvostusta ja legitimiteettiä.[1]

Työvälineiden kehittyminen mahdollistaa joka tapauksessa sen, että kansanedustajat tekevät tulevaisuudessa etätöitä. Heidän ei tarvitsisi olla paikan päällä eduskuntatalossa esimerkiksi valiokuntien kokoontumisten tai äänestystenkään aikana. Panelistit pitävät tämänkaltaista etäyhteyksien hyödyntämistä hyvin todennäköisenä ja myös toivottavana.

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1   Avoimuuden legitimiteettiä lisäävästä vaikutuksesta kirjoittavat Juho Vesa ja Anu Kantola (2016). Heidän tutkimuksensa mukaan laaja enemmistö virkamiehistä (70 %) arvioi, että kansalaisten verkkokuuleminen lainvalmisteluvaiheessa vahvistaa ennen kaikkea kansalaisten luottamusta poliittiseen päätöksentekoon.

Valtaosa panelisteista uskoo myös, että vaaleissa on käytössä sähköinen äänestäminen 20 vuoden kuluttua. Eduskunta selvittää paraikaa sähköistä äänestämistä, ja siihen liittyviä kyberuhkia, joita tieto-turva-asiantuntijat ovat ottaneet esille.

Puolueet pitävät pintansa

Tulevaisuuden kansanedustaja elää ulkoisen, nopeaa reagointia vaativan ja vanhojen, hitaiden rakenteiden ristipaineessa. Kun edellinen yhteiskunnallinen murros, teollinen vallankumous, laajensi äänioikeutta ja toi mukanaan puoluelaitoksen, muuttaako nykyinen teknologinen murros valtarakenteet kokonaan?

Tuskin. Panelistit uskovat, että nykyiset rakenteet pitävät pintansa: päätöksenteossa ei siirrytä suoraan demokratiaan, eikä edustuksellisesta demokratiasta luovuta. (Kuvio 3.)
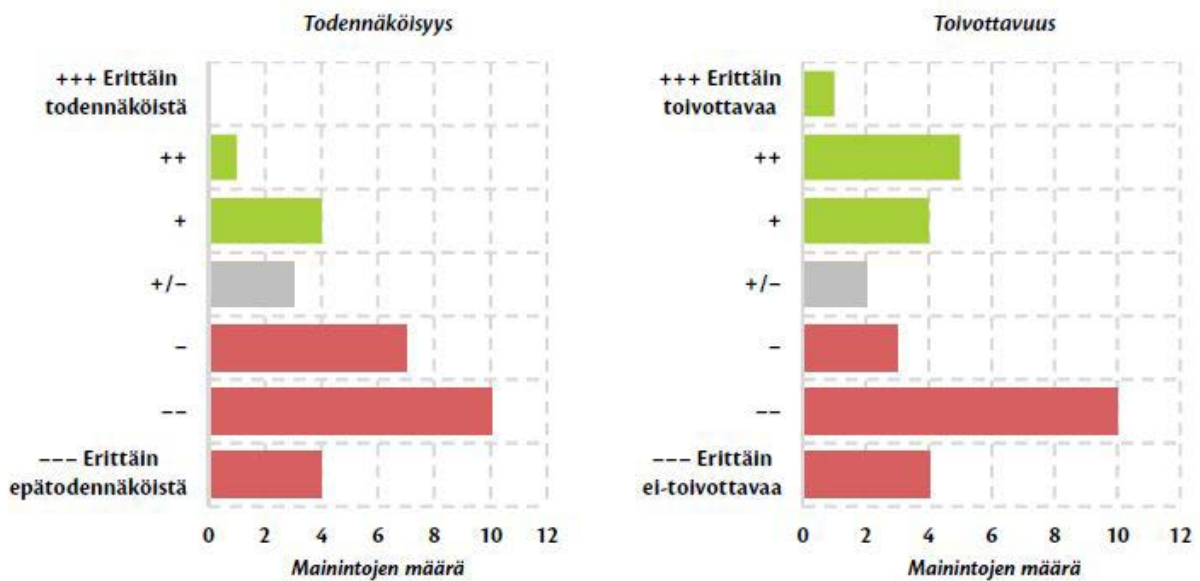
Kuvio 3. "Vuonna 2035 jokainen suomalainen on päättäjä. Kansanvallan lisäämiseksi Suomessa järjestetään kolme kertaa vuodessa kansanäänestyksiä, joissa äänestäjien on mahdollista tukea tai hylätä eduskunnan lakiesityksiä".

Osa panelisteista arvioi, että kansanäänestykset lisäisivät kansalaisten kiinnostusta ja täydentäisivät edustuksellista demokratiaa.

Suoran demokratian lisäämistä vastaan taas puhuvat esimerkiksi Britannian lopputulokseltaan yllättävän EU-kansanäänestyksen Brexitin kaltaiset kokemukset. Suoran demokratian laaja käyttö voisi tuoda epävakautta päätöksentekojärjestelmään, kun esimerkiksi tunnekampanjointi saa vallan.

Useakin panelisti antoi kommentissaan tuen edustukselliselle demokratialle:

"Suomessa etsitään edelleen myös tulevaisuudessa politiikasta isähahmoja, jotka päättävät, ettei tavallisten ihmisten tarvitsisi vaivata päätään."

"Tämä söisi edustuksellisen demokratian valtaa ja edellyttäisi järjetöntä perehtymistä kansalaisilta...kansalaisilla ei ole samaa tietotaitoa kuin virkamiehillä ja poliitikoilla yhteensä."

Nykyjärjestelmään luottaminen näkyi myös, kun panelistit arvioivat sitä, miten äänestysprosentti tulevaisuudessa kehittyy. Kukaan panelisteista ei arvioinut eduskuntavaalien äänestysaktiivisuuden laskevan alle 60 prosentin kahden lähivuosikymmenen aikana.

2000-luvun eduskuntavaaleissa äänestysprosentti on liikkunut 67,9 ja 70,5 prosentin välillä. Äänestysaktiivisuus voi panelistien mielestä siis hieman laskea nykytasolta. Moni uskoo toisaalta siihen, että ajoittain mielenkiintoiset henkilöasetelmat ja protestiliikkeet saattavat nostaa äänestysprosenttia. Puolueiden roolia paneelissa arvioitiin muiden muassa näin:

"Demokratian luonne ohjaa ihmisiä liittymään yhteen samanmielisten kanssa. Puolueiden nimet ja toimintamuodot muuttuvat, mutta puolueiden kaltaisia yhteenliittymiä tulee silti aina olemaan."

"Puolueet on ollut Suomessa toimiva tapa organisoida poliittista toimintaa ja eduskunnan työskentelyä. Ennakoitavuus on ollut hyvää."

Panelistien mukaan puolueiden kautta toimiminen tuo poliittiseen päätöksentekojärjestelmään vakautta ja ennustettavuutta. Puolueet enemmänkin muuttuvat ehdokkaidensa mukana. Panelistit uskovat laajojen, valtakunnallisesti ehdokkaita kokoavien puolueiden säilyttävän asemansa eduskunnassa myös tulevaisuudessa (kuvio 4). Sitoutumattomien ehdokkaiden määrä tuskin merkittävästi nousee.

Vaikka globaaleihin ongelmiin kaivataan globaaleja ratkaisuja, panelistit eivät pidä todennäköisenä, että syntyisi uusia globaaleja instituutioita. Tätä selvitettiin väittämällä "On perustettu Maailmanparlamentti, joka päättää esimerkiksi globaalista verotuksesta (esim. hiilivero)". Jo olemassa olevien YK:n ja EU:n toimintakykyyn suhtaudutaan skeptisesti.

Tunteet, arvot ja esiintymiskyky

Poliittisessa keskustelussa tunteisiin vetoamisella ja arvoilla on erityinen merkitys. Politiikka ei tulevaisuudessakaan pohjaa pelkkiin faktoihin, vaikka Big Data, robotiikka ja algoritmit tekevät valtavien tietomassojen käsittelystä ja jalostamisesta helpompaa. (Kuvio 5.)
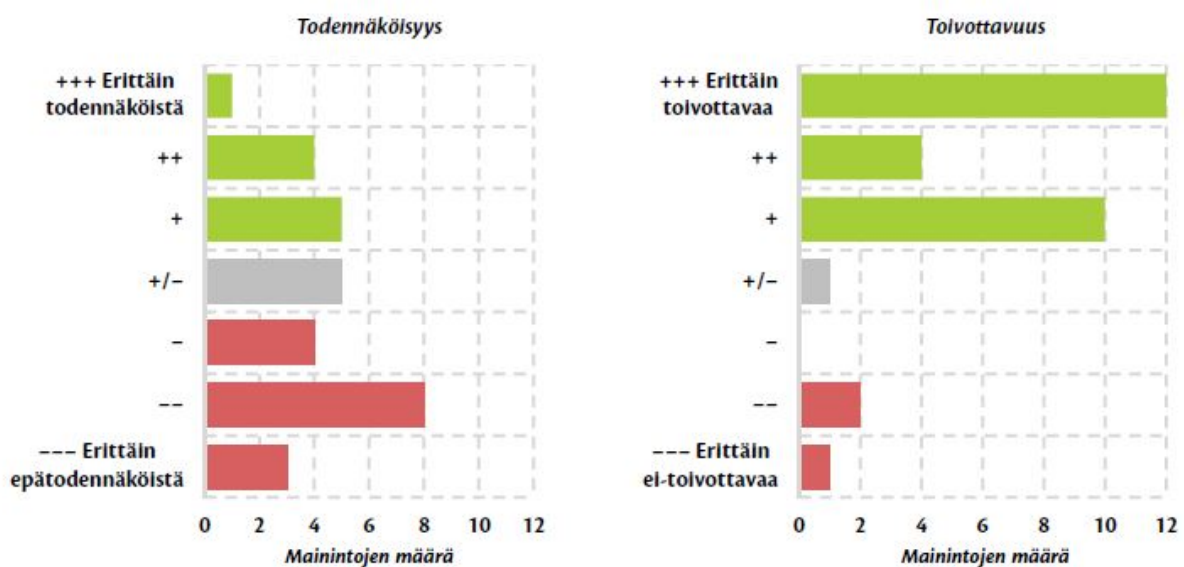
Kuvio 5. "Vuonna 2035 poliittista keskustelua käydään erittäin asiapitoisesti. Tiedot on helpompi tarkistaa, kun Big Datan, suurten tietomassojen, algoritmien ja robotiikan hyödyntäminen luovat pohjan keskustelulle".

Todennäköisempää on, että kehitys kulkee kohti yhä henkilökeskeisempää politiikkaa. Poliitikon tärkeimpiä ominaisuuksia ovat hänen viestinnälliset valmiutensa: kyky tiivistää monimutkaisia vaikutussuhteita ja esiintyä uskottavasti. Panelistit pitävät todennäköisenä, että tulevaisuuden vaaleissa korkeimman äänimäärän keräävät taitavimmat esiintyjät.

Tulevaisuudessa politiikkoja voidaankin määritellä oikeisto–vasemmisto-akselin sijaan asiapitoinen–tunnepitoinen-akselilla, yksi paneelinasiantuntijoista arvioi. Populistisista virtauksistakaan tuskin päästään eroon.

> *"Menestyvä kansanedustaja sitä vastoin on useimmiten esiintymistaitoinen ja oppimiskykyinen generalisti – sellainen, joka kykenee suodattamaan valtavasta asiantuntijalausuntojen määrästä olennaisen, tekemään siitä arvomaailmansa mukaiset johtopäätökset ja perustelemaan kantansa äänestäjilleen."*

> *"Saamme todennäköisemmin näennäisasiallista keskustelua, jossa yhä taitavammat puhujat käyttävät niin retorisia keinoja kuin taidokasta esiintymistä (eleet, äänenpainot ym.) luodakseen uskottavuutta ja luotettavuutta, jotka vetoavat ihmiseen yli rationaalisen järjen."*

> *"Populismi on osa politiikkaa; faktatkaan eivät aina ole yksiselitteisiä."*

Todennäköinen kehitys heijastelee myös panelistien näkemystä siitä, mitä kansa odottaa edustajiltaan. Monimutkaisessa maailmassa myös kansalaisilla pitäisi olla kiinnostusta ja kykyä hyödyntää massiivista tietomäärää ja haastaa päättäjiä keskusteluun.

Maailma ympärillä monimutkaistuu ja poliitikoilta vaaditaan yhä tiiviimpää vuorovaikutusta kansalaisten kanssa. Olisiko poliitikoille tarpeen asettaa pätevyysvaatimuksia, kuten virkamiehille?

Muodollista pätevyyttä ei vaadita

Suhtautumista muodollisiin pätevyysvaatimuksiin kartoitettiin poliitikkopassia koskevalla väitteellä. Poliitikkopassin suorittaminen antaisi muodollisen pätevyyden toimia kansanedustajana. Passin suorittaminen ei vaatisi taloudellisia resursseja, vaan sen voisi tehdä esimerkiksi verkkokurssina. Passi mittaisi henkilön asiantuntemusta yhteiskunnasta, lainsäädäntötyöstä ja kansantaloudesta.

Vaikka osaa panelisteista ajatus poliitikkopassista houkutteleekin, ei pätevyysvaatimuksia pidetä todennäköisinä.

Panelistien mukaan rehellisyys ja kansalaisuus ovat poliitikon ainoat pätevyysvaatimukset myös tulevaisuudessa. Pätevyysvaatimukset saattaisivat sulkea joitakin kansanryhmiä ulkopuolelle, ja pätevyyden mittaaminen puolueettomasti voisi osoittautua mahdottomaksi.

Lähivuosina kansanedustajana ei myöskään nähdä palkkasotureita. Panelistit uskovat, ettei kansanedustajien palkkioita merkittävästi koroteta.

Monet panelisteista toivovat, että politiikkaan hakeudutaan nimenomaan vaikuttamisen halusta, ei rahan vuoksi. Kansan edustajuus on kutsumusammatti.

> *"Olen tyytyväinen äänestäjä, kun vaikuttajan motivaattori on muu kuin raha. Poliittisen järjestelmän tehokkuutta on kehitettävä, ei houkuteltava nykysysteemiin palkkasotureita."*

Useammat panelistit olivat kuitenkin sitä mieltä, että nykyisessä korvaustasossa on ongelmia: se ei houkuttele kaikkia politiikkaan ja palkasta suuri osa pitää käyttää vaalirahoitukseen.

Julkisen sektorin säästöpaineet ja poliitikkojen palkkaukseen liittyvä keskustelu estävät palkkioiden korottamisen. Kansanedustajan ammatin legitimiteettiä voitaisiin panelistien mielestä parantaa luopumalla verovapaista kulukorvauksista ja korottamalla vastaavasti palkkiotasoa.

Samaan tapaan toivottavana pidettiin ohjeellisen vaalibudjettikaton asettamista, mutta sen käyttöönottoa ei pidetty todennäköisenä. Maltillista kannatusta pätkätöiden maailmassa sai myös edustajakauden jälkeen maksettavasta sopeutumisrahasta luopuminen.
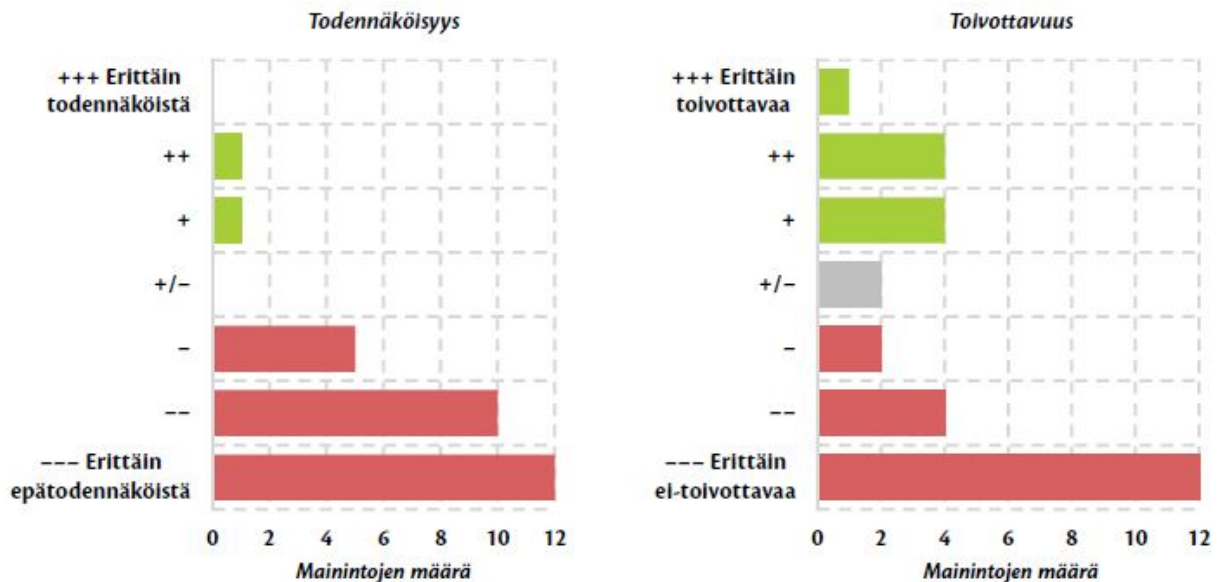
Kuvio 6. "Vuoden 2035 eduskuntavaaleissa ehdolle voivat asettua ainoastaan muodollisesti pätevät henkilöt. Pätevyys saavutetaan suorittamalla poliitikkopassi, joka mittaa henkilön Asian tuntemusta yhteiskunnasta, lainsäädäntötyöstä ja kansantaloudesta. Poliitikkopassin suorittaminen ei vaadi taloudellisia resursseja, vaan sen voi suorittaa esimerkiksi verkko koulutuksena".

Kolme skenaariota poliitikon ammatista vuonna 2035

Paneelikeskustelun pohjalta voidaan muodostaa kolme erilaista tulevaisuuden politiikan skenaariota. Skenaarioihin on poimittu keskustelussa esiin nousseita näkemyksiä, mutta ne eivät edusta panelistien yhteistä konsensusta tai yksittäisen panelistin näkemystä. Digitaalisuuden läpäisemä toimintaympäristö tuottaa työstä toiseen hyppelehtiviä freelancer-poliitikkoja ja täysipäiväisiä superedustajia. Avoin edustuksellisuus taas vie poliitikon jatkuvan luupin alle ja jatkuvasti äänestäjäkuntansa kanssa keskustelevaan kansanedustajuuteen. Kolmas skenaario nojaa instituutioiden arvokkuuteen ja hitaaseen muuttumiseen, ja kansanedustajan rooliin päätöksenteon asiantuntijana.

Digiajan superguru

Digidemokratiassa jokainen suomalainen on poliitikko. Digitalisaatio on mahdollistanut sen, että kansalaiset voivat valita käyttävätkö ääneensä itse kaikissa äänestyksissä vai delegoivatko äänensä edustajalle.

Vieläkin merkittävämpi digitalisaation tuoma muutos on mahdollisuus äänestää useita ehdokkaita ja vaihtaa edustajaa myös vaalien välillä. Kansalaisen on siis mahdollista delegoida äänensä eri edustajille politiikkalohkoittain: yksi edustaja talousasioihin, toinen sosiaaliasioihin.

Päätöksenteossa kansanedustajan painoarvo määräytyy hänen keräämiensä äänten perusteella. Tämä on johtanut kansanedustajien erikoistumiseen eri sektoreille keräämiensä äänien mukaan. Äänestäjät arvioivat edustajien suoritusta kuten asiakkaat yrityksen palvelua, sillä ääni on mahdollista siirtää toiselle edustajalle, mikäli valitun edustajan toimintatavat eivät miellytä.

Digidemokratiassa poliitikko on freelancer, joka hyppii sujuvasti työstä toiseen politiikan ja oman työn välillä. Raja poliitikon ja kansalaisen välillä on liukuva: osa on antanut äänensä pois, jotkut äänestävät omilla ja tuttavapiirin äänillä ja sitten superedustajat työskentelevät politiikassa täysipäiväisesti.

Suurempia äänimääriä käyttävät superedustajat ovat johtohahmoja, jotka etsivät ahkerasti kumppaneita muista poliitikoista omien hankkeidensa edistämiseksi. Johtohahmot toimivat vahvasti omalla persoonallaan bisnesgurujen tyyliin ja kokoavat ympärilleen oman kabinetin aiemman puoluekoneiston sijaan.

Kun ääniä on mahdollista siirtää koko ajan, ei edustajuus vaadi enää mittavaa vaalikampanjointia. Kansalaisopistot järjestävät poliitikkokursseja, joilla edustajiksi pyrkiville opetetaan yhteiskunnan, kansantalouden ja lainsäädäntötyön toimintamekanismeja. Poliitikkopassin suorittaminen on edellytys edustajana toimimiselle.

Superedustajien puheille pyrkii aktiivisesti erilaisia lobbareita, sillä heillä on suuri vaikutusmahdollisuus päätöksentekoon. Mutta koska kansalaisilla on mahdollisuus myös siirtää äänensä pois, punnitsevat edustajat tarkkaan äänestyspäätöksensä. Poliittisten analyytikkojen algoritmit analysoivatkin tarkkaan äänien muutoksia ja pyrkivät ennustamaan nousevia supervaikuttajia.

Keskusteleva projektipäällikkö

Avointa edustuksellisuutta painottavassa toimintaympäristössä kansanedustaja on keskusteleva projektipäällikkö. Teknologian hyödyntämisestä on tullut arkipäivää työssä.

Valiokuntien kokoukset ovat pääosin julkisia ja niihin voi osallistua myös etäyhteydellä. Erityisesti maakuntaedustajat ovat innostuneet etätyöskentelystä, mikä on mahdollistanut esimerkiksi äänestyksiin osallistumisen omasta vaalipiiristä käsin.

Valiokuntatyön avoimuus on lisännyt edustajien työtaakkaa, sillä kokouksista on tullut näytönpaikkoja. Vaikeimmat kysymykset pyritään selvittämään etukäteen. Kun kokouksista on tullut julkisia, pyrkivät taitavimmat kansanedustajat niiden avulla saamaan laajemman tuen ajamilleen asioille.

Näin kansanedustaja kokee olevansa koko ajan valvovan luupin alla. Vaikka etä-äänestäminen on lisännyt kansanedustajan liikkumavapautta, pitää hänen kuitenkin jatkuvasti pitää mielessään missä ja kenen seurassa hän on äänestäessään, jotta mahdollisilta jääviysskandaaleilta vältytään. Monet edustajat pyrkivätkin tekemään yhä selvemmin rajaa yksityisen ja julkisen välille.

Kansanedustajalla on käytössään oma kansalaispaneeli, jonka kautta hän käy jatkuvaa vuoropuhelua äänestäjiensä kanssa. Kansanedustajan sosiaalisilla taidoilla onkin paljon merkitystä. Edustajan taidoista riippuu millaisia henkilöitä ja osaamista hän saa paneeliinsa houkuteltua avukseen.

Avoimuus on lisännyt eduskunnan valtaa ja kansalaisten kiinnostusta politiikkaan. Yritykset ja kansalaisjärjestöt pyrkivät saamaan aktiivisesti asiantuntija-aseman kansanedustajien lähipiirissä. Liike muiden sektoreiden ja politiikan välillä on vahvistunut, kun julkisesti näyttöjään antavat poliitikot saavat mielenkiintoisia työtarjouksia politiikan ulkopuolelta.

Puolueet ovat löyhästi aatteiden ympärille muodostuneita yhteenliittymiä, joiden ideologinen liima ei ole erityisen vahva. Ne houkuttelevat ehdokaslistoilleen valovoimaisia esiintyjiä ja mielenkiintoisia henkilöhahmoja laidasta laitaan. Poliitikoksi pätevöidytään hyvin erilaisilla taustoilla, mutta halutuimpia ehdokkaita ovat ne, joilla on jo näyttöjä julkisesti toimimisesta.

Teknologinen murros ei ole vielä puhkaissut eduskuntatalon seiniä. Arvokkaita instituutioita korostavassa toimintaympäristössä kansanedustajat toimivat kuin edeltäjänsä vuosikymmeniä sitten. Edustajat kokoontuvat edelleen kerran viikossa kyselytunneille nauttimaan poliittisesta teatterista.

Päätöksenteon kohteena olevat asiat ovat kuitenkin monimutkaistuneet entisestään, eikä poliittinen keskustelu puhuttele helposti kansalaisia. Kansanedustajien tukena ovat puolueiden laajat viestintäkoneistot, jotka muokkaavat politiikan kieltä kansalaisille.

Haasteista huolimatta edustajat kokevat kunnia-asiakseen toimia poliittisen päätöksenteon asiantuntijoina, mutta ovat varovaisia kokeilemaan uusia toimintamalleja. Epäonnistumisten pelätään rapauttavan kansanedustuslaitoksen arvokkuutta. Kansanedustajat ovat tiivis porukka, joka aina ajoittain kokee vastakkainasettelua ulkopuolisen maailman kanssa. Yhteistä näkemystä haetaan yhä edelleen kokoushuoneissa, joiden ulkopuolella viestijät kärkkyvät uutisia. Yhteyttä kansalaisiin haetaan myös kansalaisraatien kautta, joita kuullaan päätöksenteon valmistelussa.

Arvokkaita instituutioita korostavassa ympäristössä kansanedustaja toimii kutsumusammatissa, jota voi olla vaikea ymmärtää ulkopuolelta alan kirjoittamattomien sääntöjen vuoksi. Monet kansanedustajat kuuluvat tunnettuihin poliitikkosukuihin ja ovat kasvaneet edustajiksi puoluekoneistojen ja edunvalvontajärjestöjen hellässä huomassa.

Koska eduskunnan työtapoja ei ole juurikaan muutettu, riippuu teknologian hyödyntäminen jokaisesta kansanedustajasta. Toiset käyttävät innokkaasti käännösrobotteja ja hakevat tietoa globaalisti, toiset edustajat rakentavat maailmankuvaansa tapaamalla kansalaisia kasvotusten.

Poliitikon työssä suurimmat muutokset koskevatkin työn sisältöjä, eivät niinkään toimintatapoja. Keskusteltavana on esimerkiksi, miten sosiaaliturvapäätöksiä tekevät algoritmit painottavat henkilön työhistoriaa. Samaa kieltä poliitikkojen kanssa puhuvat ennen kaikkea virkamiehet ja työmarkkinajärjestöt, joiden kanssa kansanedustajat ovatkin eniten vuorovaikutuksessa.

Suuryritysten ja kansalaisjärjestöjen valta kasvaa, työmarkkinajärjestöjen ja puolueiden hiipuu

Panelisteilta pyydettiin myös arviota siitä, miten yhteiskunnallinen vallankäyttö muuttuu lähivuosikymmeninä. Suurin osa panelisteista piti todennäköisenä, että yhteiskunnallista valtaansa lisäävät tulevaisuudessa suuryritykset (17 panelistia) ja kansalaisjärjestöt (16).

Suuryritysten vallan kasvu selittynee globaalien tuotantoketjujen merkityksen kasvamisella. Eri arvioiden mukaan kansainvälisestä kaupasta reilu kolmannes käydään monikansallisten konsernien sisällä, joten sadan globaalisti suurimman taloudellisen toimijan listalle mahtuu enää 31 valtiota.[1]

Kansalaisjärjestöjen vallan kasvu taas voi selittyä sillä, että nopeatempoisessa ja sirpaloituvassa maailmassa teemapohjaisuus puhuttelee ihmisiä. Yksittäisen teeman ympärille muotoutuvat liikkeet pystyvät parhaimmillaan myös organisoitumaan ketterästi.

Panelistien mukaan yhteiskunnallista valtaansa menettävät työmarkkinajärjestöt (23), kirkko (19) ja puolueet (15). Näiden toimijoiden vallan uskotaan heikentyvän, kun niiden jäsenmäärät laskevat.

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1   Myers (2016).

Työmarkkinajärjestöjen valta muuttuu luultavasti hitaasti, sillä ne käyttävät pitkälti rakenteellista valtaa. Järjestöt sopivat hallituksen kanssa tai jopa keskenään useista työmarkkina- ja sosiaalipolitiikan kysymyksistä.[1]

Panelisteja pyydettiin määrittämään myös, minkä tahojen he toivoisivat lisäävän yhteiskunnallista valtaansa tulevaisuudessa. Ylivoimaisesti eniten mainintoja sai eduskunta (21). Eduskunnan asemaa vahvistettiin 2000-luvun perustuslakiuudistuksessa, mutta käytännössä enemmistöhallitukset ja puoluekuri ovat keskittäneet valtaa eduskunnan sijaan puolueille ja niiden johtohahmoille[2].

Sekä työmarkkinajärjestöjen että puolueiden yhteiskunnallisen vallan pieneneminen jäsenmäärien suhteessa ei siis ole yksiselitteistä. Panelistien arvioiden perusteella molemmat tahot joutuvat kuitenkin perustelemaan vahvasti legitimiteettiään vallan ytimessä tulevaisuudessa.

Muutokset yhteiskunnallisessa vallankäytössä (mainintoja)
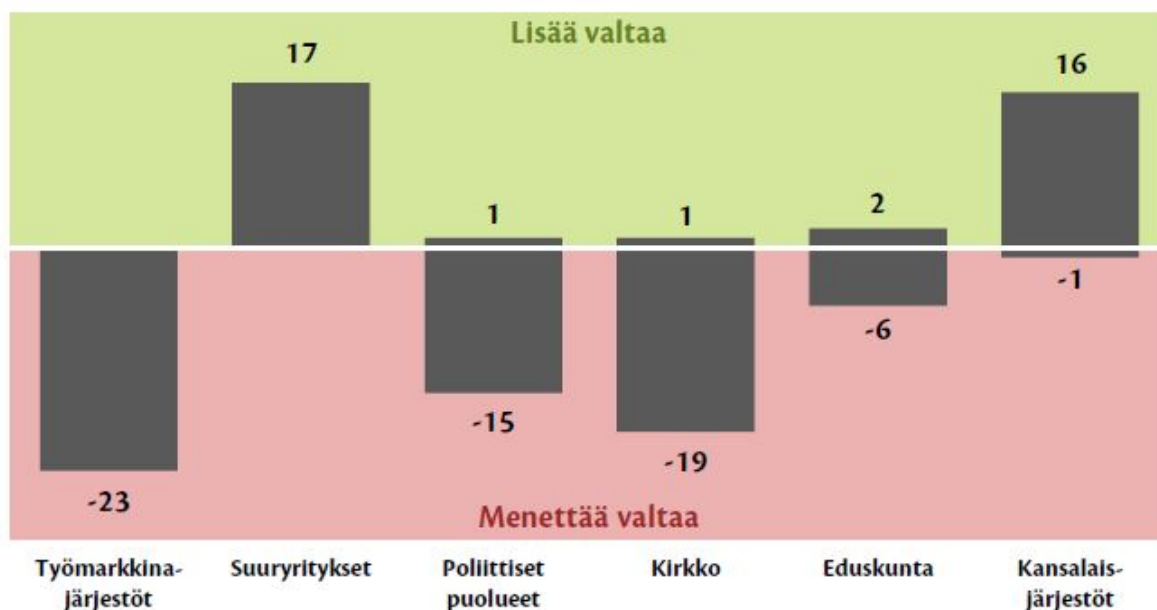
Näin tutkimus tehtiin

Paneelitutkimus toteutettiin vaihtoehtoisia tulevaisuuksia penkovalla Delfoi-metodilla. Delfoissa tutkimuskohdetta eri puolilta tuntevat asiantuntijat osallistuvat paneelikeskusteluun. Pääosan keskustelusta muodostaa tulevaisuusväitteiden kommentointi ja arviointi. Panelistit arvioivat väitteitä sen mukaan, kuinka toivottavina ja todennäköisinä he niitä pitävät.

Delfoi-menetelmää käytetään tulevaisuudentutkimuksessa usein. Se sopi hyvin tutkimuskohteisiin, joissa muutokset ovat idulla, koska se antaa mahdollisuuden hahmotella parhaaseen kehitykseen johtavaa sopivaa toimintastrategiaa.

Tulevaisuuden poliitikko 2035 -tutkimuspaneeli toteutettiin verkossa kahdella kierroksella. Kaikkiaan panelisteina toimi 37 poliitikon ammattia tuntevaa asiantuntijaa: kansanedustajia, puolueiden

1   Ruostesaari (2014).
2   Ruostesaari (2014).

työntekijöitä, toimittajia, tutkijoita, virkamiehiä ja kansalaisaktiiveja sekä elinkeinoelämän ja järjestöjen edustajia.

Keskustelut toteutettiin loka-joulukuussa 2016. Tämä EVA Arvio pohjaa paneelissa esitettyihin näkemyksiin, muttei sellaisenaan edusta paneelin konsensusta tai yksittäisen panelistin näkemystä ja mielipidettä.

Paneeliin osallistuivat (osa ei halunnut nimeään julkisuuteen):

- Ahva, Tiina, Perussuomalaisten nuorten 2. vara-puheenjohtaja
- Elo, Simon, kansanedustaja, Perussuomalaiset
- Fjäder, Sture, puheenjohtaja, Akava
- Haapala, Timo, politiikan erikoistoimittaja, Ilta-Sanomat
- Helle, Minna, valtakunnansovittelija
- Jokinen, Juho, toimitusjohtaja, Dingle
- Jori, Talvikki, toiminnanjohtaja, Varsinais-SuomenSos.dem. Piiri
- Karvala, Kreeta, artikkelitoimittaja, fil.tri, Iltalehti
- Kasvi, Jyrki, kansanedustaja, Vihreät
- Kokkonen, Antti, vastaava päätoimittaja, Lapin Kansa/Pohjolan Sanomat
- Korkeaoja, Lauri, viestintä- ja yhteiskuntasuhde-johtaja, Attendo
- Kuparinen, Susanna, ohjaaja, toimittaja
- Kuusi, Osmo, Innovaatio- ja tulevaisuudentutkimuksen dosentti, Aalto yliopisto
- Laurén, Hanna, Director Market Access and Aeropolitics, Finnair
- Mickelsson, Rauli, VTT, dosentti Turun yliopisto, valtio-oppi
- Pekkala, Juhani, toimitusjohtaja, Kaupan liitto
- Pekkanen, Joonas, kansalaisaktivisti
- Purojärvi, Jonna, puheenjohtaja, Piraattipuolue
- Puura, Heli, puheenjohtaja, TEAM Teollisuusalojen ammattiliitto
- Rehn, Alf, professori, Åbo Akademi
- Rydman, Wille, kansanedustaja, Kokoomus
- Salonranta, Jussi, analyytikko, Toivo ajatuspaja
- Siren, Saara-Sofia, kansanedustaja, Kokoomus
- Sund, Ralf, pääekonomisti, STTK
- Torvinen, Janne, ylitarkastaja, Puolustusministeriö
- Valtonen, Olli, toiminnanjohtaja, Helsinki Missio
- Vehviläinen, Anu, ministeri, kunta- ja uudistusministeri, Valtiovarainministeriö
- Vento, Heikki, politiikan toimittaja, Suomen Kuvalehti
- Vihriälä, Vesa, toimitusjohtaja, Elinkeinoelämän tutkimuslaitos
- Virtanen, Arto, Public Affairs Director, H+K Strategies

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TUTU5 VAPAAVALINTAINEN ESSEE

TUTU5 - vapaavalintainen essee oman mielenkiinnon mukaan. Suorituksen ohjeistus on hyvin väljä. Essee saa mielellään olla kriittinen ja kirjoittajan on keskusteltava omien oivallusten lisäksi myös lähdeaineiston kanssa, mutta esimerkiksi artikkeliin verrattuna tyyli saa olla epämuodollinen.

Kurssin esseet on arvioinut Tulevaisuudentutkimuksen Verkostoakatemian koordinaattori **Hanna-Kaisa Aalto.**

Anu Harju-Myllyaho on kiinnostavalla tavalla hyödyntänyt tulevaisuustiedon laaja-alaista aineistokäsitystä (scifi, utopiat, dystopiat) ja linkittänyt sen onnistuneella tavalla kahteen isoon kokonaisuuteen; sukupuolirooleihin ja populäärikulttuuriin.

Essee pureutuu terävästi tulevaisuusajattelua ohjaaviin yhteiskunnallisiin rakenteisiin ja sukupuolen – yllättävänkin – merkittävään rooliin tulevaisuuskuvien raaka-aineena. Kirjoittajan kyky ja rohkeus nostaa käsittelyyn perususkomuksia ja jopa tabuja, on ihailtavaa. Tällaista soisi lukevansa enemmänkin osana vaikka digitalisaatioskenaarioita. Hieno essee!

Aino Heikkinen: Tällaista heittäytymistä ja pohdiskelua voisi lukea loputtomiin. Kirjoittaja on haastanut itsensä oppijana, palannut takaisin (pinnallisesti) opitun äärelle ja pakottanut itsensä jäsentämään aiemmin irrallisiksi jääneet palaset osaksi isompaa kokonaisuutta.

Tulevaisuudentutkimuksen kulmakivet (systeeminen maailmankuva, kompleksiset ongelmat, moniäänisyyden sallivat työkalut, jne.) on esseessä huomioitu hyvin ja valittu vapaamuotoinen ja henkilökohtainen tyyli sopivat vaihean aiheen käsittelyyn mainiosti. Juuri tällaisissa harjoitustöissä ilahduttaa tulevaisuudentutkimuksen ja oman oppiaineen uusi yhdistäminen opintojen tarkoittamalla tavalla. Mainio essee!

Sukupuolittuneet dystopiat – Naishahmot science fiction -elokuvissa 80-, 90- ja 2000-luvuilla

Anu Harju-Myllyaho

Lapin yliopisto

Johdanto

Science fiction (SciFi) on ollut aina osa tulevaisuudentutkimuksen menetelmiä tavalla tai toisella, vaikka osa tulevaisuudentutkijoista on tavannut erottaa mielikuvituksen tuotteena syntyneet SciFi-tarinat tulevaisuudentutkimuksen menetelmistä. Encyclopedia of the Futuren toimituskunta on kuitenkin äänestänyt alan vaikutusvaltaisimmiksi henkilöiksi useita SciFi-kirjailijoita, ja SciFi-kirjailijat ovat kirjoittaneet monia kuvitteellisia, mutta paikkansa pitäviä ennusteita. (Lombardo 2006, s. 120, 166.) Tulevaisuudentutkimuksen menetelmien näkökulmasta SciFillä on merkitystä, koska tulevaisuudentutkijat saavat SciFi-tarinoista ideoita ja päinvastoin. Toisin sanoen, ennakointikyvykkyytemme vahvistuu yhdistämällä luovan SciFin kuvitellut tulevaisuudet ja tulevaisuudentutkimuksen tieteelliset menetelmät. (Lombardo 2006, s. 170).

Tässä kirjoitelmassa tarkoituksenani on pohtia populaarien SciFi -elokuvien dystopioita sekä niissä esiintyviä sukupuolirooleja erityisesti naishahmojen näkökulmasta. Toisin sanoen tutkielmassani päällimmäisenä kiinnostuksen kohteena on: Kuinka sukupuoliroolit ja erityisesti naisoletetut esitetään popkulttuurin tunnetuissa, usein nyky-yhteiskuntaa peilaavissa tai yhteiskuntakriittisissä, elokuva- ja tv-tuotannoissa? Tutkielma koostuu kolmesta osasta: käsitteet ja terminologia, esimerkkielokuvien teema-/sisällönanalyysi sekä johtopäätökset. Tutkielma sisältää joitakin voimakkaita kategorisointeja sekä vastapareja, kuten miespuolinen-naispuolinen, utopia-dystopia tai menneisyys-tulevaisuus, hyvä-paha.

Tulevaisuudentutkimuksen ja SciFin yhdistämisellä on siis pitkät perinteet, mutta samalla voidaan pohtia sitä, millaisia erilaisia elementtejä niissä on yhdistelty. Kuten Lombardo (2006, s. 169) on todennut, kirjailijat tuottavat yksityiskohtaisia ja konkreettisia tarinoita, jotka ovat tulevaisuudentutkimuksessa hyödyllisiä, koska niissä yksityiskohdat yhdistyvät osaksi kokonaisuutta. Näin ollen esimerkiksi sukupuolirooleja ja naisen asemaa kyseenalaistava ajatusleikki on kiinnostavaa, koska se liittyy muihin yhteiskunnan tasa-arvo- ja yhdenvertaisuuskeskusteluihin sekä siihen, kuinka yhteiskunta on valtasuhteiltaan järjestäytynyt. Samalla voidaan pohtia, mihin sukupuolen narraatioihin elokuvissa olevat roolit liittyvät tämän päivän todellisuudessa.

Käsitteet

Seuraavassa avaan hieman niitä käsitteitä ja konsepteja, jotka ovat olennaisia aiheen tarkastelun kannalta. Keskeisimmät käsitteet tässä kirjoitelmassa muodostavat oikeastaan käsiteparit: "dystopia - utopia" ja "sukupuoli – sukupuolettomuus".

Dystopia

Dystopia ymmärretään usein utopian vastakohdaksi, joka on arviona varsin osuva. Vapaavuoren ja Bruunin (2003, s. 317) mukaan dystopia on

> *"1. Jossain tulevaisuudessa oleva paikka ja/tai aika, jossa asiantila on huonommin kuin nykyisyydessä tai siinä paikassa ja/tai ajassa, johon sitä verrataan.*

> *2. Tällä hetkellä vallitsevien huonojen asiantilojen jatkumo ja siirtäjä."*

Samaan määritelmään ovat päätyneet myös Kamppinen, Kuusi ja Söderlund (2003, s. 890). Dystopioista kirjoittaminen vaatii pohtimaan myös utopioita. Masini (1993, s. 4) kirjoittaa, että utopiat pohjaavat usein filosofien esiin nostamiin Ranskan vallankumouksen teemoihin: Jumalan, rakkauden, viisauden ja oikeudenmukaisuuden yhteiskunta, tieteen ja teknologian ajama edistys. Utopiassa on kuitenkin mukana kontrasti tai dilemma yksilön tarpeiden ja yhteiskunnan tarpeiden välillä. Samalla tavalla myös dystopiassa voidaan nähdä joidenkin kannalta hyviä tulevaisuuksia. Margaret Atwoodin romaaniin perustuvassa Handmaids tale -sarjassa tuodaan myös esille tämä näkökulma. Päähenkilö Junen (Offred) ja komentaja Waterfordin keskustelussa komentaja toteaa yllä viitatun tapaan, että sarjan totalitaarinen yhteiskunta pyrkii parempaan tulevaisuuteen. Se ei vain ole parempi kaikille. Tämä on yksittäinen esimerkki siitä, kuinka mielikuvituksen tuotteena syntyneissä television ja elokuvamaa käytetään samoja kielikuvia ja samaa ajattelumaailmaa kuin tulevaisuudentutkimuksessa. Dystopioissa esimerkiksi teknologia ei välttämättä vain ratkaise ongelmia, vaan voi myös aiheuttaa niitä. (Masini 1993, s. 4.)

Mahida (2011, s. 1) kirjoittaa, että dystopia-aiheeseen ovat tarttuneet useat Hollywood-ohjaajat. Hän mainitsee mm. Spielbergin, joka on ohjannut elokuvat Minority Report ja Artificial Intelligence. Hänen mukaansa dystopiakirjallisuus puolestaan on syntynyt kanavoimaan tunteita, jotka johtuvat teknologian nopeasta kehittymisestä ja sen mukanaan tuomasta epävarmuudesta. (Mahida 2011, s. 1.) Mahida toteaa, että dystopiakirjallisuutta voidaan käyttää myös lievittämään ihmisten pelkoja, sillä voimme lukea kauheuksista ja kuolemasta, kunhan emme itse joudu niistä kärsimään, ja voimme huokaista helpotuksesta. (Mahida 2011, s. 2).

Sukupuoli

Butler (2006) on avannut näkökulmia sukupuoleen ja feminismiin kirjassaan Hankala sukupuoli. Hän keskustelee mm. biologisen ja sosiaalisen sukupuolen erosta sekä subjektin ja Toisen välisistä valtasuhteista. Butler (2006, s. 54) toteaa, että sosiaalinen sukupuoli ei ole kausaalinen seuraus biologisesta sukupuolesta. Näin ollen, vaikka biologinen sukupuoli jakaantuisi kahteen, ei ole syytä olettaa, että sukupuolia olisi vain kaksi. Vaikka tässä kirjoituksessa en niinkään ota kantaa juuri sukupuolten määrään, on tämä mielestäni oikein hyvä esimerkki siitä, miten sukupuoli ja feminismi nähdään usein turhan yksinkertaisina ja mustavalkoisina.

Butler (2006, s. 55) kysyykin, mitä "biologinen sukupuoli" on. Hän pohtii mahdollisuutta, että biologinen sukupuoli olisikin aina jo sosiaalisesti määrittynyt sukupuoli. Kuitenkin niin, että sukupuoleen liittyvissä keskusteluissa säilyy aina tietty determinismi, joka määrittelee sosiaalisen sukupuolen diskursiivisia rajoja. Keholla ei ole sukupuolta ennen kuin siihen liitetään sosiaalisen sukupuolen merkkejä. (Butler 2006, s. 55–60.)

Butler (2006, s. 60) viittaa Beauvoiriin, jolle "subjekti" on misogynian eksistentiaalisessa analyytikassa aina valmiiksi maskuliininen ja universaalin kanssa yhteen sulautuva ja feminiinisestä "toisesta" erottautuva. Butler (2006) toteaa, että misogynistisessa keskustelussa nainen liitetään usein luontoon, ruumiiseen ja heikkouteen siinä missä mies kytketään kulttuuriin ja aktiivisuuteen. Mieheen kuuluvat siis järki ja mieli, nainen taas odottaa miehiseltä sukupuolelta merkitsemistä. (Butler 2006, s. 96.)

Muiden muassa edellä mainittuja näkökulmia sukupuoleen on nähtävissä suorasti ja epäsuorasti populaarikulttuurissa ja varsinkin Hollywood-tyyppisissä tuotannoissa. Nainen/ feminiininen sukupuoli on usein heikko ja/tai pelastamista tarvitseva objekti siinä missä mies/maskuliininen nähdään voimakkaana subjektina. Mainittakoon tässä, että sukupuoli ei yksin määritä henkilön identiteettiä. Usein feministisissä keskusteluissa tuodaan esille intersektionaalisuus, eli lähestymistapa, jossa ihmisen identiteetti muodostuu eri identiteettikategorioiden risteyksissä. Identiteettikategorioita ovat sukupuolen lisäksi luokka, seksuaalisuus, etnisyys jne. (Esim. Crenshaw 2006; Crenshaw 2016.) Näin ollen myös miehen identiteetti ja sukupuoli tulevat elokuvatuotannoissa esille hyvin yksipuolisesti. Valkoisen heteropatriarkaatin olemassaoloa on hankala kieltää, kun Hollywood-tuotantoja katsotaan näistä näkökulmista.

Dystopiaelokuvat eivät tässä mielessä eroa paljonkaan muista elokuvista, mutta niissä käsitellään usein teemoja, jotka ovat tuttuja myös tulevaisuudentutkimuksen tiedonalalle. Esimerkiksi ihmiskunnan säilyminen, ilmastonmuutos, toivottavat ja epätoivottavat tulevaisuudet sekä vallan jakautuminen ja demokratia ovat tällaisia. On siis kiinnostavaa tarkastella, kuinka sukupuoli näyttäytyy dystopiamaailmoissa, millaisia yhteiskunnan rakenteita ja ajattelumalleja nämä sukupuolen representaatiot toistavat (sekä kuvitteellisia, että todellisuudesta ammentavia rakenteita). Ne eivät oikeastaan eroa muista elokuvatuotannoista. Jos asiaa pohtii, niin esimerkiksi useat Disney-elokuvat ovat pitkälle perustuneet prinsessan pelastamiseen, vaikka lähivuosina on alkanut näkyä myös toisenlaisia tulokulmia aiheeseen.

Sukupuoli tulevaisuudentutkimuksessa – feministisiä tulevaisuuskuvia

Tässä kappaleessa tarkastelen sitä, kuinka sukupuoli on otettu huomioon näkökulmana tulevaisuudentutkimuksessa. Teemaan liittyvät esimerkiksi feministiset teoriat, jotka ovat poikkitieteellisiä ja siten osa monia tieteen- ja tiedonaloja, myös tulevaisuudentutkimusta.

Sukupuolta on käsitelty tulevaisuudentutkimuksessa jonkin verran. Bhavnani ja Foran (2008) ovat esimerkiksi tarkastelleet kehittyvien maiden naisten mahdollisuuksia vaikuttaa omaan tulevaisuuteensa, vaikka oltaisiin matkalla kohti dystopiaa. Heidän johtopäätöksensä ovat varsin abstraktilla tasolla, kun he toteavat:

> *"The actions and visions of the women portrayed in this article provide yet another reminder that imagination, coupled with the courage to dream and love, and to transmit these, in many ways, may yet change the world for the better." (Bhavnani & Foran 2008, s. 326.)*

Bhavanin ja Foranin johtopäätöksessä dystopian uhka siis voitetaan mielikuvituksella ja rohkeudella unelmoida ja rakastaa. Kuulostaa kauniilta, miltei proosalliselta, mutta tarjoaa vain vähän konkreettisia asioita joihin tarttua.

Salleh (2009) keskustelee artikkelissaan ekofeminismistä, joka hänen mukaansa on syntynyt vastaamaan länsimaalaisen modernisaation mukanaan tuomiin haasteisiin. Lähtökohtana ekofeminis-

missä on ajatus siitä, että ensimmäinen naisen kohtaama ympäristö on hänen ruumiinsa. Tämä on kiinnostava näkökulma, koska ruumiillisuus on yleisesti tärkeä osa keskusteluja, jotka liittyvät naissukupuoleen. Varsin teoreettisessa artikkelissaan Salleh (2009, s. 205) toteaa:

> *"Old hegemonic binaries like sex/gender, nature/culture, production/reproduction, self/other, developed/undeveloped, are indeed, inflicted upon contemporary societies through the discourses of capitalism, liberalism, and science. The artificial duality of 'sex versus gender' receives much attention from postmodern feminists, but the radical political potential captured in the 'humanity versus nature' binary is usually left for ecofeminists to explore." (Salleh 2009, s. 205.)*

Lainauksessa tulee selkeästi esille kahtiajako, joka näkyy monissa keskusteluissa. Milojevic ja Inayatullah (2008) toteavat, että yleisesti naisten esittämät tulevaisuuskuvat eroavat miesten vastaavista siten, että naisten hallitsemissa yhteiskunnissa painottuvat kestävä kehitys, tasa-arvo ja niissä eletään paremmin sopusoinnussa luonnon kanssa. Heidän mukaansa merkittävimmät tulevaisuudentutkimuksen naisnäkökulmat ovat utooppisia. (Milojevic & Inayatullah 2008, s. 19.) He jatkavat provosoimistaan toteamalla, että

> *" [...] on odotettavissa, että tulevaisuudentutkimusta kuormittaa mieskeskeinen vääristymä. Miehet ovat vuosituhansia hallinneet tulevaisuutta joten ei ole ihme, että heitä on pidetty kaiken "uuden", radikaalisti erilaisen ja edistyksellisen luojina." (Milojevic & Inayatullah 2008, s. 20.)*

Abbott (2010) on pohtinut dystopian vastakohtaa, utopiaa, ruumiillisuuden näkökulmasta. Hän kysyy, kuuluvatko utopioiden täydellisiin maailmoihin myös täydelliset ruumiit. Naisen ruumiin näkökulmaa hän valottaa kirjoittamalla, että jotkut utopistit näkevät ruumiin ikään kuin vankilana, josta on vapauduttava. Esimerkiksi Sokrates on nähnyt naisen ruumiin biologisesti huonompiosaisena ja sikäli nähnyt tarpeen ratkaista lasten teko uudella tavalla. Herlandissa olisi ainoastaan naisvartaloita. (Abbott 2010, s. 877.) Abbott viittaa monien muiden tavoin Donna Harawayhin [1991], jonka mukaan kyborgi ruumis voisi olla post-ruumiillinen keino, jonka avulla päästäisiin eroon sukupuolittuneisuuden kahleesta. Miksi ruumiillisuuden pohtiminen on tärkeää, kun ajatellaan dystopioiden naishahmoja?

Abbott (2010, s. 878) toteaa, että utopiamaailman täydellinen ruumis on joko sukupuoleton tai käsittää monia sukupuolia. Sukupuolia voitaisiin vaihtaa kuten vaatteita. Ihmisillä olisi mahdollisuus saada täydellinen ruumis, mutta täydellisten ruumiiden kirjo olisi runsas. (Abbott 2010, s. 878). Tästä näkökulmasta voisi ehkä todeta myös, että dystopian ruumis olisi Abbottin kuvauksen vastakohta; sukupuolen kahlitsema, viallinen tai heikko ruumis. Naisen ruumis? Abbott (2010, s. 879) ei kuitenkaan näe kyborgi-ruumiiden maailmoja pelkästään utopioina, vaan mainitsee esimerkiksi Robocopin, kyborgin, jonka toimintaa ohjaavat dystopiamaailman auktoriteetit. Tämän kaltainen Cyber punk yhtenä dystopian alalajina tarjoaakin kiinnostavaa pohdittavaa sukupuolen ja sukupuolettomuuden näkökulmasta.

Feministinen tulevaisuuden tutkimus ei siis kuulosta lähtökohtaisesti erikoiselta sanayhdistelmältä, eikä se oikeastaan sitä olekaan. Vaikuttaa kuitenkin siltä, että tulevaisuudentutkimus on tavannut edustavan jokseenkin maskuliinista näkökulmaa. Tähän ajatukseen minut on johdattanut artikkeli, jonka on kirjoittanut ja johon on haastateltu vaikuttava joukko naispuolisia tulevaisuudentutkijoita. Mukana on mm. suomalainen Vuokko Jarva. Artikkelin tarkoituksena on saada kuuluviin naisten ääniä tulevaisuuskeskusteluissa. Artikkelissa pohditaan mm. naisia koskevia tulevaisuuden haasteita, ja niitä ajureita, jotka näitä haasteita lisäävät. Asioista, jotka vaikuttavat naisiin, on usein mainittu esimerkiksi

hyvinvointivaltioiden rapautuminen, globalisaatio ja polarisoituminen tai ääriajattelu (esimerkiksi us-konnollinen) sekä ilmastonmuutos. (Hurley et al. 2008). Patricia Kelly mainitsee erityisesti median tuottamat ongelmat Hänen mukaansa ongelmat liittyvät siihen, kuinka media manipuloi naisia ymmär-tämään sotaa ja väkivaltaa ja siten puoltamaan (öljy)sotia. (Hurley et al. 2008, s. 392.) Milojevic ja Inayatullah (2010, s. 19) toteavat, että katsommepa sitten menneisyyteen, nykyisyyteen tai tulevaisuu-teen, on helppo huomata, että yhteiskunta kohtelee naisiaan huonommin kuin miehiään. Näin tapahtuu sekä globaalilla että paikallisella tasolla.

Naisten osalta dystopia-utopia-keskustelu on todella kiinnostava, koska naisten nähdään olevat utopia-ajatteluun taipuvaisia. (Milojevic & Inayatullah 2008, s. 19.) Miloevicin ja Inayatullahin (2008, s. 21) mukaan olisi hankala kuvitella naisten visioimia tulevaisuuksia, joissa kantava voima olisi sotate-ollisuus. Miehinen tulevaisuuden tutkimus sisältää suhteettoman paljon teknologian kehittymisen en-nakointia. Tulevaisuudet sisältävät esimerkiksi lasten tuottamista tehtaissa, naisia istumassa pelkääjän paikalla avaruusaluksissa miesten ajaessa, keinotekoisten raajojen, elinten ja otsonikerroksen luomista jne. Tulevaisuuksissa naisten asema on alisteinen, mitä kuvataan esimerkiksi cyborgeilla ja virtuaalisilla naisrooleilla, jotka ovat alisteisia. Milojevic ja Inayatullah kutsuvat tätä "tulevaisuuden kolonisoinniksi". Mikä tarkalleen siis naisen rooli dystopiassa on?

Tulevaisuudentutkimuksessa on nähdäkseni nostettu usein esiin teemoja, jotka liittyvä naisiin, su-kupuoleen ja dystopia-aiheisiin SciFi-elokuviin, mutta itseäni kiinnostavat erityisesti dystopiaelokuvien naishahmot, koska olen erityisen kiinnostunut feministisestä tutkimuksesta sekä tulevaisuusorientoi-tuneesta ajattelusta.

Esimerkkejä elokuva- ja tv-tuotantojen dystopioista

Dystopia-kuvaukset ovat osa populaarikulttuuria, ja suosittuja dystopiakuvauksia on runsaasti. Tauluk-koon 1, olen esimerkin omaisesti kerännyt joitakin suuren yleisön (ja omani) kiinnostuksen saavutta-neita dystopia-elokuvia, joita on tehty pääasiassa 1990 ja 2000-luvuilla. Olen esimerkiksi karsinut pois elokuvia, joita en ole henkilökohtaisesti katsonut, sillä en voi kirjoittaa niiden sisällöistä kovin tarkasti. Joidenkin tuotantojen kohdalla on huomioitava, että ne ovat kirjallisuuden pohjalta tuotettuja, joten niiden sisältöjä määrittelevät myös alkuperäisteokset.

Taulukko 1. Dystopia-aiheisia elokuvia.

Tuotanto	Dystopia
Terminator (1984, 1991, 2003, 2009, 2015)	Ihmisen kehittämä AI kääntyy isäntäänsä vastaan tuhoten ihmiskunnan muutamaa poikkeusta lukuun ottamatta.
Nälkäpeli-trilogia (2012, 2013, 2014, 2015)	Totalitaarisessa yhteiskunnassa yhteiskuntarauhaa pidetään yllä järjestä-mällä vuosittainen "Nälkäpeli", jossa lapsia ja nuoria lähetetään yhteiselle areena tarkoituksenaan selvitä elossa tappamalla toinen toisiaan.
Handmaids tale (2017)	Margaret Atwoodin romaaniin perustuva tv-tuotanto totalitaarisesta yhteis-kunnasta, jossa ilmansaasteiden ja myrkkyjen vaikutuksesta ihmiset (naiset) ovat tulleet hedelmättömiksi lukuunottamatta "orjattaria", jotka on pakotettu tekemään lapsia rikkaille isännilleen.
Matrix (1999)	Maailma, jota ihmiset pitävät todellisuutena, ei ole totta, vaan ohjelmoitus todellisuus (virtuaalitodellisuus).

Divergent (2014)	Totalitaarisessa yhteiskunnassa ihmiset on jaettu ryhmiin omaaviensa hyveiden mukaan. Ryhmiin sopimattomat tuhotaan.
Elysium (2013)	Vuonna 2154 vauraat ovat muuttaneet asumaan avaruustukikohta Elysiumiin ja köyhät jääneet tuhottuun maahan vailla mahdollisuuksia.
Battle Royale (2000)	Nälkäpeli-elokuvien japanilainen "isoveli", jossa uudet sukupolvet pelottavat vanhempia ja yksi luokka lähetetään taistelemaan hengestään peliin, jossa voittaja on se, joka on viimeisenä elossa.
12 apinaa (1995)	Post-apokalyptinen tarina, jossa maailman väestö on tuhoutunut bioterrorismin vuoksi.
Minority report (2002)	Delfoin oraakkeleitakin sisältävä tulevaisuus tuo mukanaan uusia mahdollisuuksia, kuten ennakoivaa rikosten torjuntaa. Oraakkelit kertovat viranomaisille, mikäli hengenriisto on tapahtumassa, jolloin surmaaja ehditään pysäyttää ennen itse tapahtumaa.
Children of men (2006)	Vuonna 2027 naiset ovat muuttuneet hedelmättömiksi. Raskaana oleva nainen täytyy saattaa turvapaikkaan.

Edellä mainitut ovat pieni otanta kaikista elokuvista, joissa leikitään ajatuksella dystopian toteutumisesta. Yhteistä näille on se, että dystopiat ovat usein toteutuneet ihmisen oman toiminnan vuoksi. Usein dystopioissa nähdään seuraavia teemoja:

- Teknologian kehittymisen mukanaan tuomat ongelmat: vaikeus hallita teknologioita ja/tai eettiset näkökulmat
- Valtasuhteet tai vallanhimo, totalitarismi
- Ilmastonmuutos tai muutokset ympäristössä.
- Maailmanloppu, joka voi ilmetä kirjaimellisesti maailmanloppuna tai tuntemamme maailman loppuna.

Mahida (2011, s. 2) kirjoittaa, että dystopiat ovat usein käsitelleet juuri yksilönvapauden menetystä, diktatuurien vastustamista sekä teknologian vaikutusta ihmisiin. Hänen mukaansa dystopiat sisältävät erityisesti seuraavia elementtejä:

- kastijärjestelmää mukaileva yhteiskunta ja sitä tukeva propaganda
- yksilöllisyyden puute/poisto
- uskonnon ja symbolien käyttäminen muihin tarkoituksiin
- valvonta
- toimintaympäristön radikaalit muutokset pakottavat muutoksiin sosiaalisessa järjestyksessä
- kehittyneet teknologiat jne. (Mahida 2011, s. 2.)

Elokuvissa ei välttämättä liikuta sukupuolittuneisuuden teemoissa, mutta selkeitä merkkejä teeman olemassaolosta on havaittavissa. Huomioitavaa on myös se, että tutkielmassani mainitut tuotannot ovat pääasiassa Pohjois-Amerikassa toteutettuja, joten kulttuurisidonnaisuus ja suuriin amerikkalaisiin tuotantoihin liittyvät sukupuolen representaatiot ovat elokuvissa esillä. Seuraavassa kappaleessa analysoin kevyen sisällönanalyysin / teemoittelun avulla, millaisia naishahmoja dystopiasarjat ja/tai -elokuvat sisältävät. Lähestyn aihetta seuraavien kysymysten avulla:

1. Millaisessa roolissa naishahmo(t) ovat?
2. Millaista naisen/naisten toiminta on elokuvan dystopiassa?
3. Millainen on naishahmon identiteetti (etninen tausta, luokka, ikä jne.)

Naisen rooli dystopioissa: Naisen ruumis hedelmällisenä pelastajana

Kiinnostava näkökulma sukupuoleen, naiseen ja naiseuteen löytyy pohtimalla asiaa ruumiillisuuden näkökulmasta. Naisen ruumis on usein nähty heikompana, kuin miehen, mutta dystopioissa se on myös maailman pelastaja. Naisten hedelmällisyys on esillä useissa elokuvissa ja sarjoissa. Terminator-elokuvien Sarah Connorin tärkein tehtävä on säilyä hengissä, jotta voisi myöhemmin synnyttää John Connorin, joka puolestaan pelastaa maailman koneilta. Sarah Connor voi siis tosiaan pelastaa maailman, mutta ainoastaan olemalla äiti. Terminaattori-elokuvat ovat kiinnostaneet tutkijoita jokseenkin paljon. Osa on tarkastellut ruumiillisuutta, joskin usein kyborgi-ihminen ja lähestyen aihetta maskuliinisesta näkökulmasta. Elokuvassa Sarah Connor ei ole heikko, mutta ainoastaan hänen poikansa (mies) pystyy nostamaan vastarinnan koneita vastaan ja pelastamaan ihmiskunnan. Terminaattorissa kyborgi ei ole Donna Farahayn kuvaama sukupuoleton vaan maskuliininen Arnold Schwarzenegger.

Hedelmällisyyden teemasta keskustellaan myös Handmaids Tale -sarjassa, jonka HBO on tuottanut Margaret Atwoodin samannimisestä romaanista. Kirjan dystopiassa ihmiset ovat tulleet hedelmättömiksi. Jälleen kerran naisen ruumis (orjattaren ruumis) on avainasemassa maailman pelastuksen ja ihmiskunnan jatkumisen kannalta. Orjatar on kuitenkin pakotettu luopumaan identiteetistään ja seksuaalisuudestaan, joten siinä mielessä hän on sukupuoleton, vaikka ei samalla tavalla kuin esimerkiksi Donna Farahayn luoma sukupuoleton kyborgi.

Nälkäpeli-elokuvassa Katniss Everdeen, elokuvan päähenkilö, saa osakseen myötätuntoa palatessaan Nälkäpeli-areenalle, kun hänen ajatellaan odottavan lasta. Katniss ei ole oikeasti raskaana, mutta ajatus raskaana olevan naisen lähettämisestä kuoleman areenalle vaikuttaa ehkäpä ratkaisevasti hänen (ja näin ollen koko ihmiskunnan) kohtaloon. Katnissin asu areenalla on cyber punk -henkinen, eikä näin ollen vihjaa mitenkään naisellisuudesta, mutta vauva-uutinen on myös tapa tuoda esille se, että Katniss on kuin onkin nainen ja potentiaalinen äiti.

Muissa elokuvissa naispäähenkilöitä on vähän, mutta heidänkin roolinsa liittyy usein äitiyteen, naiseuteen. Tämä ja yllä olevat huomiot tukevat esimerkiksi Milojevichin ja Inayatullahin (2010) ajatuksia. Heidän mukaansa science fiction näyttää varsin erilaiselta, kun sen tuottaa nainen. Sama pätee monia muita tulevaisuudentutkimuksen menetelmiä, kuten Delfoi-menetelmää, koska naiset ja miehet muodostavat paneelit eri tavalla. Tulevaisuuden mahdollisuudet tulisi aina asettaa sosiaaliseen kontekstiin ja tätä taas määrittävät valtasuhteet ja erilaisten valintojen mahdollisuudet. Tulevaisuudentutkimus edustaa patriarkaalista tapaa ymmärtää naisen asema: nainen on tehty heikoksi rajoittamalla naista perinteiden, politiikan, perheen, talouden ja koko yhteiskunnan keinoin. (Milojevic & Inayatullah 2010, s. 19.) Yllä olevat esimerkit eivät välttämättä kaikki tuota naiselle alisteista asemaa (Handmades Talen ääriesimerkkiä lukuun ottamatta), mutta niissä tulee selkeästi esille se, että naisen rooli on sidottu hedelmällisyyteen ja ruumiiseen.

Milojevic ja Inayatullah (2010, s. 19) toteavat provokatiivisesti, että miehet ovat aina pyrkineet hallitsemaan naisen osallistumista lisääntymiseen, ja että näin on ollut patriarkaatin alusta saakka. Feministien mielestä tämä on tärkeä näkökulma, koska kyseessä on naisen geenit ja naisen ruumis, mutta erityisesti siksi, että naisella on päävastuu lisääntymisessä ja naisen identiteetti on pitkälti rakentunut biologisen historian pohjalta. Teknologian kehittyessä voidaan tämä naisen rooli tehdä tarpeettomaksi, mikä marginalisoisi naista edelleen. (Milojevic & Inayatullah 2010, s. 19.) Tämäkin näkökulma on esillä Handmaids talessa, jossa kaikki kansalaiset on alistettu orjattaria alistavaan lisääntymisjärjestelmään. Kuitenkin niin, että orjattarella on oikeastaan enemmän valtaa kuin esimerkiksi isäntäväen vaimolla, koska hänellä on jotakin, mitä vaimo ei voi koskaan saavuttaa; hedelmällisyys.

Naisen asenne ja toimintatavat

Nainen ja rationaalinen ajattelu ovat asioita, jotka on usein erotettu toisistaan: kuten alussa totesin, nainen on liitetty luontoon siinä missä mies edustaa kulttuuria. Voidaan siis sanoa, että naisen ajattelu ja päätöksenteko perustuvat tunteeseen ja intuitioon siinä missä mies perustelee valintansa tiedolla ja järjellä.

Nälkäpeli-elokuvassa Katniss Everdeen on luonteeltaan poikatyttö, joka olosuhteiden pakottamana on opetellut metsästämään ja kalastamaan eli tekemään asioita, jotka yleensä yhdistetään miehiin, Elokuvassa Katniss kuitenkin suhtautuu sisareensa varsin äidillisesti ja uhraa itsensä ilmoittautumalla sisarensa tilalle Nälkäpeli-areenalle. Sisaren nimi on huudettu arvonnassa, joka ratkaisee Nälkäpelin osallistujat. Kirjassa, johon elokuva perustuu, kuvaillaan hänen toimintaansa tilanteessa seuraavasti:

> *"Yritän muistaa, miten henki saadaan kulkemaan, en pysty puhumaan, olen täysin typertynyt, ja nimi kimpoilee päässäni.[...] ja hän kävelee jäykin pienin askelin lavaa kohti, ohittaa minut, ja huomaan, että puseron helma on taas noussut hameen päälle. Juuri tuo pikkuseikka, pyrstöksi noussut puseronhelma, saa minut tointumaan."* (Collins 2009, s. 28–29.)

Elokuva mukailee hyvin kirjan kuvausta. Päähenkilö toimii tunteen ja äidinvaiston sytyttämänä ja toimii, ennen kuin oikeastaan on ehtinyt ajatella. Toisessa kohtauksessa Katniss laittaa tahtomattaan tai puolivahingossa alulle kapinan autoritääristä ja julmaa hallintoa vastaan, kun hän Nälkäpelin areenalla järjestää "muistotilaisuuden" kuolleelle tytölle. Tässäkään hän ei ole samalla tavalla kapinanjohtaja kuin esimerkiksi John Connor on Terminatorissa: määrätietoinen johtaja, joka johtaa joukkonsa voittoon koneita vastaan. Katniss on kyllä oikeudenpuolustaja, mutta hänen kapinansa on sisäistä ja symbolista, ikään kuin vahingossa tapahtuvaa. Kapinaa johtavat muut.

Atwoodin teokseen perustuvassa Handmaids talessa Frediläinen puolestaan pyrkii säilyttämään taisteluinhalunsa ja kytköksen entiseen identiteettiinsä Juneen. Hänen toimintaansa näyttää sarjan perusteella vaikuttavan suuresti rakkaus omaan lapseen sekä aviomieheen, mutta myös heikkous ja intohimo. Frediläinen on kapinallinen, mutta tekee sen varsin huomaamattomalla ja sovinnaisella tai passiivisella tavalla. Todettakoon kuitenkin, että tässä vaiheessa kaikkia sarjan jaksoja ei ole julkaistu, joten tilanne voi vielä sarjan edetessä muuttua.

Naisen passiivisuus elokuvissa yleisellä tasolla tulee hyvin esille myös tutkimuksessa, jossa todettiin, että miehillä on enemmän vuorosanoja jopa romanttisissa komedioissa, kuten Pretty woman, kuin naisilla. Tämä asia kannattaa ottaa huomioon, kun tarkastelee dystopia-elokuvia. (Anderson & Daniels 2016.)

Kuitenkin naisten käsissä maailman on ajateltu olevan oikeudenmukaisempi ja kestävämpi. Tämä on toinen seikka, mikä nähdäkseni aiheuttaa ristiriitaa dystopian edustaman kriittisen ajattelun ja televisiotuotantojen representaatioiden välillä.

Vieraus ja Toiseus dystopioissa

Dystopiat kuvaavat usein cyber punk-tyyppistä, sukupuoletonta tulevaisuutta, jossa erilaisuus on pahasta ja tuomittavaa. cyber punkia symboloivat koruttomat ja usein mustat vaatteet, jotka ovat lähtökohtaisesti unisex-mallia (Nälkäpelin 13. vyöhyke, Matrixin kapinalliset, Dauntless-henkilöt elokuvasarjassa Divergent muutamia mainitakseni). Näkökulma on kiinnostava, koska amerikkalaisissa elokuvatuotannoissa päähenkilöistä on saatava houkuttavia koruttomuudesta huolimatta.

Millainen ruumis dystopiaelokuvissa sitten edustaa naissukupuolta? Tämän kirjoitelman esimerkeistä lähes jokaisessa päähenkilö on 1) valkoinen 2) hoikka tai atleettinen 3) voimakas tai taitava. Länsimainen elokuvateollisuus toisintaa yleensä länsimaisen heteropatriarkaatin tuottamaa kuvaa naisvartalosta. Erilaisuus ei siis tule esille naisen ulkomuodossa, vaikka naiset edustavat elokuvassa usein Toista, erilaista. Divergent-elokuvissa Tris ei sovi yhteiskunnan rakenteisiin. Erilaisuus edustaa jotain, mitä yhteiskunta ei hyväksy, joten hän yrittää piilottaa erilaisuutensa mahdollisimman pitkään.

Handmaids talessa Frediläisen tuntema orjatar on lesbo, elokuvassa heitä nimitetään sukupuolen pettureiksi, sillä samansukupuoliset suhteet estävät ihmiskunnalle tärkeää lisääntymistä. Homoudesta on rangaistuksena kuolema, jonka Frediläisen tuttava välttää, koska hän voi saada lapsia. Totalitaarisissa dystopiamaailmoissa erilaisuus on siis väärin, mutta näin on myös tämän päivän yhteiskunnassa. Esimerkiksi Venäjällä homojen oikeudet huononevat ja Tšetšeniassa homojen kohtaamat ihmisoikeusloukkaukset ovat saaneet jo äärimmäisiä muotoja ja rasistinen vihapuhe on yleistynyt ja arkipäiväistynyt (Seta 2017; MTV 2017). Dystopioiden tarkoituksena ei ole pelotella, mutta ne saattavat saada meidät tarkastelemaan oman aikamme tapahtumia kriittisemmin. Mahida muotoilee asian näin:

> *"Hopefully, one will take away from these sci-fi books a desire to pay closer attention to the often overlooked, but greatly important issues of the day; this is the common thread of all dystopian fiction"* (Mahida 2011, s. 3).

Dystopiassa äärimmilleen viety tasapäistäminen ja armeijamainen kuri ovat usein läsnä. Erilaisuudesta on tehty rikollista ja jokaisen tulee hyväksyä annettuna oma paikkansa yhteiskunnassa. Vaikka elokuvien naishahmot esitetään erilaisina, he tuntuvat kuitenkin edustavan vallalla olevaa länsimaalaista heteropatriarkaalista kuvaa tulevaisuuden naisesta. Alussa totesin lähteisiin nojaten, että myös tulevaisuudentutkimus tuottaa miehistä tulevaisuuskuvaa, joten yhtymäkohta tulevaisuudentutkimuksen ja SciFi-tuotannon välillä tulee tässä selvästi esille.

On jokseenkin ristiriitaista huomata, että useissa elokuvissa, joissa naispäänäyttelijä on tavalla tai toisella "erilainen" kuin muut, hän edustaa samaistuttavaa hahmoa vain niin harvalle. Samalla kun tuotetaan kuvaa dystopiasta, jossa yksilönvapaus on rajoittunutta, onnistutaan kaventamaan naiskuvaa hyvin kapeaan muottiin. Dystopiatuotantojen voidaan kuitenkin ajatella olevan kritiikkiä vallalla olevaa kehitystä kohtaan.

Johtopäätökset

Tässä kirjoitelmassa olen pohtinut erilaisia dystopiaelokuvia, sekä niiden tuottamia naishahmoja. Dystopia elokuvan muodossa on yhtäältä viihdettä, mutta toisaalta tällaiset tulevaisuuskuvat voivat antaa näkökulmia siihen, millaiseksi tulevaisuus voi pahimmillaan muodostua. Dystopioita onkin käytetty kritiikkinä esimerkiksi teknologian nopealle kehitykselle sekä luonnon tuhoamiselle. Feminististä SciFi- ja dystopiakirjallisuutta edustaa mm. Margaret Atwood, johon on viitattu myös tässä kirjoitelmassa. Kirjoitelman aihe kumpuaa omasta kiinnostuksestani feministiseen tutkimukseen ja kirjoittaminen on ollut inspiroivaa. Kirjoitelmani johtopäätöksinä voidaan todeta kolme asiaa:

Ensinnäkin: Nainen dystopiaelokuvissa on yhtäältä erilainen, Toinen ja vahva. Toisaalta naisen ruumis on nähty jokseenkin aina länsimaalaisen kauneusihanteen kautta ja siten se toisintaa länsimaalaista patriarkaalista kuvaa naisesta. Tämä johtunee pääasiassa ohjaajien ja tuottajien valinnoista.

Tästä syystä dystopian tuottama kriittinen viesti menettää terävimmän kärkensä. Samalla tavalla tulevaisuudentutkimus menettää osan kantaaottavuudestaan, jos se tarjoaa ainoastaan länsimaalaisen patriarkaatin mukaista tulevaisuuskuvaa.

Toiseksi: Nainen ja tulevaisuus nähdään toisinaan tulevaisuusorientoituneen ajattelun vastakohtana. Siinä missä mies edustaa kehittymistä, kulttuuria, tietoa ja eteenpäin menemistä, edustaa nainen puolestaan pysähtyneisyyttä ja perinteitä. Tulevaisuudentutkimus ja tulevaisuuksien hahmottaminen jäävät kuitenkin vajaiksi, ellei näkökulmaa laajenneta heteropatriarkaatin ulkopuolelle.

Kolmas ja ehkä voimakkaimmin kirjoitelman aikana esille noussut teema koskee äitiyttä dystopioissa. Kiinnostavaa kyllä, nainen voi valikoitua tai joutua maailmanpelastajaksi, mutta hän on aina ennen kaikkea äiti tai ainakin potentiaalinen äiti. Pelastajana tai johtajanakin nainen toimii tunteidensa varassa tai äidinvaistolla. Hän toimii ikään kuin passiivisesti, eikä itse aktiivisesti ota paikkaansa johtajana. Nainen peittää erilaisuutensa ja pyrkii hiljaiseen kapinaan.

Tämän kirjoitelman suppeuden vuoksi aineistona käytettyjen elokuvien määrä on jokseenkin pieni, mikä vähentää tulosten yleistettävyyttä. Sisällönanalyysi-tyyppisissä tutkimuksissa ei kuitenkaan aina pyritäkään yleistettäviin tuloksiin, vaan tulokset esitetään siinä valossa kuin ne aineiston kontekstissa näyttäytyvät. Feministiset teoriat ja tulevaisuudentutkimus ovat jo ammentaneet paljon toisiltaan, mutta uskon, että tässä yhteydessä voi olla vielä paljon tutkimisen arvoisia avauksia, joista dystopiat ovat vain yksi esimerkki.

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Kestävän kehityksen paikalliset ulottuvuudet – metodien matsi

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Johdanto

Pirullinen ympäristö sopii pirullisten ongelmien ratkaisemiseen. Olemme hankintalain edellyttämän kilpailuttamisvelvoitteen perusteella valikoituneessa kokousympäristössä eli laivakonferenssissa. Minä ja kollegamme olemme kokoontuneet ratkomaan tänne yhtä ja samaa ongelmaa eri näkökulmista. Minun tehtävänäni on ottaa kantaa, mikä valitusta kolmesta metodista toimisi parhaiten ongelman ratkaisussa. Muut ovat jakautuneet metodien mukaisiin heimoihin. He koettavat kaikki omissa ilmastoiduissa, mutta vähävirikkeisissä huoneissamme ratkoa ihmiskunnan suurta ongelmaa. Koska Wifi ei toimi, meillä on vain toisemme, tietämyksemme, aikaa, kokouskahvia, tarralappuja ja fläppitauluja.

Mutta mikä on tämä pirullinen ongelma, jota olemme tänne tulleet ratkomaan? Ongelman nimi on paikallisyhteisöjen rooli kestävän kehityksen päämääriin sitoutumisessa. Pelkästään määritelmän aikaan saaminen siitä, mitä on a) kestävä ja b) kehitys aiheuttaa suuria ristiriitoja eri koulukuntien välillä. Samoin ongelman ratkaisemisen lähestymistapa herättää suuria tunteita. Tämä on kaikki puhdasta simulointia eli tarkoitus ei ole viedä loppuun saakka aloitettavaa tulevaisuustyötä, vaan vertailla metodeja ja valita paras tai parhaat.

Kestävä kehitys – antakaapa kun täti kertoo

Mitä me jo tiedämme?

Joitakin yhteisiä näkemyksiä meillä toki on. Puolivillaisena ympäristöpolitiikan harjoittajana pidän tästä henkeä nostattavan luennon kollegoille. Tiedämme, että kestävän kehityksen käsitteestä on keskusteltu viimeiset kolmekymmentä vuotta sekä tieteessä että politiikassa.[1] Lisäksi tiedämme, kuten äsken jo väkevästi spekuloin, että käsite ei suinkaan ole yksiselitteinen, vaan se tarkoittaa eri asioita riippuen merkityksen antajan agendasta. Taustaksi olen kerrannut kirjan "A New Agenda for Sustainability", jossa koetetaan tuoda uusia avauksia asiaan. Siinä fokus on tulevaisuuden sukupolvissa, koska näiden osalta suuret ratkaisut puuttuvat.

Miksi tämä on niin tärkeää?

Kestävä kehitys on vuosisatamme tärkein yhteinen projekti. Sen merkitystä verrataan yhteiskunnallisena prosessina 1800-luvun demokratian kehittymiselle.[2] Eli kovassa seurassa kestävä kehitys on.

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1   Figueroa, Elling, Jelsøe, Aagaard Nielsen 2010, 1
2   Hvid 2010, 15

Melko vakiintuneita elementtejä kestävän kehityksen määrittelylle ovat olleet ympäristön suojelu ja uudistuminen, sosiaalinen vakaus ja kehitys sekä taloudellinen uudistuminen ja kehittyminen. Yhtä yhtenäistä linjaa kestävän kehityksen saavuttamiseksi ei ole, mutta joitakin maailmanlaajuisia yhteisiä tiekarttoja löytyy. Kestävän kehityksen saavuttaminen edellyttää sitä edistävän toimenpiteiden arkipäiväistymistä ja laajaa kannatusta demokraattisessa prosessissa. Muussa tapauksessa se jää poliittiseksi horinaksi ja pahimmillaan siitä ilmiö nimeltään kameli – komitean suunnittelema hevonen.

Aika ennen ja jälkeen Bruntlandin komission

Erityisen suuri merkitys kestävän kehityksen määritelmiin on ollut Gro Harlem Brundtlandin kestävän kehityksen komissiolla vuodesta 1987 lukien.[1] Komission tekemän määrittelyn mukaan kestävä kehitys sisältää kolme eri näkökulmaa, joiden validius edellyttää uutta harkintaa. Kuinka olennaista on, että ihmisen hyvinvointi voittaa ympäristön hyvinvoinnin? Entä olemmeko miettineet sukupolvien välisen oikeudenmukaisuuden loppuun saakka? Ja vielä – mikä on kehityksen suhde ympäristön tasapainoon? Kumpi tulee ensin? Yhteenkään edellä mainituista kysymyksistä ei ole sellaista ratkaisua, joka toimisi kaikissa kulttuurissa konteksteissa, vaan huomio on kiinnitettävä nimenomaan kulttuurisidonnaisuuteen.

Bruntlandtin komission määrittelemien suuntaviivojen jälkeen keskustelu on jatkunut ja näkökulmia on tullut lisää. Esimerkiksi talouskasvun korostamista on alettu kyseenalaistaa.[2] Yks uusi näkemys on mm. se, että kestävä kehitys on jatkumo imperialistiselle politiikalle, jossa länsimaat vievät ja muut, kuten alkuperäiskansat vikisevät.[3]

Kestävän kehityksen uudet vaatteet – nyt myös etiikka ja paikallisuus

Jos siis kestävän kehityksen periaatteet halutaan saada oikeasti toimimaan, koko käsite on miettivä uudestaan ja siihen on lisättävä mausteiksi mm. eettisiä aspekteja ja ihmisen arkielämän kokemus.[4] Luonnontiedekeskeisyys on vieraannuttavaa ja epäosallistavaa, jolloin myöskään päämäärät eivät toteudu. Käytännön politiikassa on huomioitava eettiset kysymykset, erilaiset elämäntyylit- ja rytmit ja miettiä, kuinka kestävän kehityksen periaatteet saadaan sopeutettua näihin. Muutokset tehdään paikallisessa toiminnassa, mihin on kiinnitettävä erityistä huomiota. Toimenpiteiden on oltava sellaisia, että ne sopivat paikalliseen kulttuuriin. Nykyisessä kestävän kehityksen aallossa on siis olennaista se, että on alettu ymmärtää ilmastonmuutoksen todellinen ulottuvuus ja sen vaikutukset paikallisesti, alueellisesti, kansallisesti ja globaalisti. [5] Kestävä kehitys ei ole pelkästään ilmastonmuutos, vaan myös muutos osallistumiseen, demokratiaan ja vaikuttamiseen.[6] Siksi tätä ei voida käsitellä vain luonnontieteiden näkökulmasta.

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1   Figueroa, Elling, Jelsøe, Aagaard Nielsen 2010, 3
2   Figueroa, Elling, Jelsøe, Aagaard Nielsen 2010, 3-4
3   Figueroa, Elling, Jelsøe, Aagaard Nielsen 2010, 4
4   Elling, Figueroa, Jelsøe, Aagaard Nielsen 2010, 292
5   Figueroa, Elling, Jelsøe, Aagaard Nielsen 2010, 6
6   Elling, Figueroa, Jelsøe, Aagaard Nielsen 2010, 297

Nykyistä lähestymistapaa kestävää kehitystä kohtaan kuvaa parhaiten holistinen lähestymistapa. Siinä kiinnitetään huomiota paitsi tekijöihin, jotka vaikuttavat kestävän kehityksen saavuttamiseen, niin myös taustalla oleviin käyttäytymiseen vaikuttaviin tekijöihin.[1] Uusia vaikuttavia tekijöitä ovat mm. teknologian hyödyntäminen, talous, tasa-arvo ja oikeus, jotka täydentävät kestävän kehityksen kokonaisuutta.[2] Itse lisäsin myös kulttuuriperimän vaikuttavien tekijöiden listalle, koska sillä on suuri vaikutus siihen, kuinka kestävän kehityksen periaatteet otetaan vastaan ja mikä on näkökulma, jolla siihen suhtaudutaan. Olemme kulttuurimme tuotteita, joka tapauksessa.

Jos päätöksenteon fokus on tulevaisuudessa, pelkkä luonnontieteiden näkökulma ei riitä. Tieteellisen tiedon luonne on enemmän tietoa menneestä. Päätöksenteon ajallinen ulottuvuus on taas tulevaisuudessa, mikä aiheuttaa ristiriidan. Jotta nämä kaksi näkökulmaa voidaan yhdistää, myös muita näkökulmia ja systeemejä kuin vain luonnontieteellinen on otettava huomioon. Pelkkä käsitys "luontoäidistä" ei ole tarpeeksi kattava, koska siinä helposti jää huomioimatta kulttuuriset, taloudelliset ja muut systeemit.

Kenellä on oikeus päättää asioista?

Jotta kestävään kehitykseen päästään, se vaatii päätöksiä. Päätökset vaativat päätöksentekoprosessin, jonka takana on usein demokratia. Demokratian tehtävänä on ratkoa kestävyyden kaltaisia kompleksisia, moraalisia ja eettisiä kysymyksiä yhteiskunnan tasolla.[3] Kestävä tulevaisuus on utopia ja utopioita lähestytään monitieteisesti, mikä on tulevaisuudentutkimuksen luennoillakin tullut varsin selväksi. Utopiaa kohti mentäessä tarvitaan demokratiaa, ei pelkkää luonnontiedenäkökulmaa.

Kestävä kehitys ymmärretään usein niin, että meidän tulisi toimia luonnonvarojen asettamissa rajoissa. Nämä rajat ovat kuitenkin yhteisön määrittelyn tulos ja sitä myötä kulttuurisidonnainen asia.[4] Määrittelyyn vaikuttavat tavat ja normit ovat yhteisön tuottamia – eivät objektiivisia ja jaettuja. Tämä näkökanta syventää sitä vaatimusta, että paikallisten yhteisöjen autonomialla on iso merkitys kestävässä kehityksessä. Toki voidaan esittää vaatimus objektiivisesta määrittelystä, mutta sen tulkinta löytyy aina paikallisyhteisöstä. Tämän takia pirullinen ongelmamme on paikallisyhteisön rooli toisessa pirullisessa ongelmassa eli kestävässä kehityksessä.

Modernisaatiolla tarkoitetaan prosessia, joka muuttaa yhteisön kulttuuristen traditioiden, normien ja tapojen määrittelemästä yhteisöistä joustavuuden ja yhteiskunnallisen jaon kautta autonomisiin osiin, sektoreihin ja rakenteisiin.[5] Yhteisöt asemoituvat uudestaan ja yhteiskunta toimii näiden sektoreiden ja rakenteiden välisessä vuorovaikutuksessa. Yhteiskuntien voidaan ajatella olevan hajallaan ja jännitteessä toistensa kanssa, koska ne toimivat omien lähtökohtiensa näkökulmasta. Tämä täytyy ottaa huomioon myös päätöksenteossa.

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1   Tolnov Clausen, Hansen, Tind 2010, 229
2   Tolnov Clausen, Hansen, Tind 2010, 230
3   Tolnov Clausen, Hansen, Tind 2010, 232
4   Elling 2010, 34
5   Elling 2010, 31

Uusi agenda kestävyysajattelulle pitää sisällään kriteerin, joka perustella pitää ottaa systeemiset rationaliteetit (kuten yhteiskunnalliset instituutiot) huomioon, mutta samalla ns. arkijärki mukaan. Arkijärki syntyy vallitsevan ympäristön tuotteena ja näiden kahden yhdistelmästä syntyy kestävä kehitys. Lähestymistapana tämä on valtaistava, osallistava ja selvästi demokraattisempi kuin ylhäältä asetettu normitehtailu, joita sanktioiden pelossa noudatetaan. Toteutustapa voi sitten vaihdella aina markkinalähtöisestä järjestelmästä poliittiseen säätelyyn sekä yhteisiin rationaalisiin systeemeihin.[1] Ongelmana ovat toki erilaiset tulkinnat ja poliittiset agendat, jotka halvaannuttavat päätöksentekoa ja sitä kautta tekevät toiminnan konsensushakuiseksi ja hitaaksi.

Tulevaisuustyö alkakoon – metodit kilpasille

Tehtävänanto

Myönnän toki itsekin liikuttuneeni omasta puheestani, mutta samaa on ilmassa muuallakin. Väki on jakautunut kolmeen ikkunattomaan koppiin. Yhdessä ovat Pehmeän systeemimetodologian edustajat, toisessa Delfoin oraakkelit ja kolmannessa skenaarioihin tähtäävät, tulevaisuustaulukkomenetelmän uskolliset seuraajat. Aikaa ei ole kamalasti – puhutaan tunneista ja heidän tehtävänään on nyt myydä minulle metodi, jolla alamme lopullisesti tunkeutua tulevaisuuteen. Ydinvisio on, että ilmasto ei enää lämpenisi vuonna 2030. Tupit lentelevät hajuttomista tusseista, kun väki rientää töihin. Saa suorittaa!

3.2 Pehmeä systeemimetodologia

Pehmeän systeemimetodologian väki pitää itseään nimestään huolimatta varsin kovana luuna. He ovat Rubininsa lukeneet, joten sen puolesta he ovat valmiita pelastamaan maailman. He tietävät, että heidän näkökulmansa sopii erilaisten organisaatioiden tulevaisuustyökaluksi.[2] Heitä ei haittaa organisaatiolähtöisyys, koska he ovat systeemiorientoitunut ryhmä, joka uskoo, että kehitys tapahtuu systeemisessä vuorovaikutuksessa. Rubinin lisäksi he ovat keränneet tietoa tulevaisuuden tutkimuksen kolmannella kurssilla, jonka perusteella heillä on vahvat lähtökohdat lähteä ratkomaan ongelmaa.

Pehmeän systeemimetodologian väki on tehnyt pohjan, jonka avulla he lähtevät kohti pirullista haastetta. Asiat näyttävät strukturoituna hallittavimmalta. He etenevät vaiheittain.

Vaihe 1: Ongelman määritteleminen

- Ongelma: Ongelma määrittyy pehmeän systeemimetodologian näkökulmasta organisaatioiden kesken tapahtuvan vuorovaikutuksen ongelmaksi. Jos tilanne on sellainen, että ylhäältä annetut toimintaohjeet eivät riitä kestävän kehityksen päämäärien saavuttamiseksi, silloin tar-

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1   Elling 2010, 40
2   Rubin 2002, 171

vitaan paikallista toimijuutta, mikä systeemisessä yhteiskunnassa tarkoittaa paikallisorganisaatioiden välistä yhteistyötä. Näin ollen ongelma on se, kuinka saada paikalliset toimijat edistämään kestävää kehitystä omalla tavallaan.

- Historia: Kestävän kehityksen suuntaviivat on annettu ylhäältä alaspäin. Tämä ei ole tuonut toivottavaa lopputulosta esimerkiksi ilmastonmuutoksen torjunnassa. Tämän takia on siirrytty holistisempaan näkökulmaan, jossa otetaan huomioon paikallisyhteisöjenkin autonomia sekä muutkin näkökulmat kuin vain luonnontieteet.
- Tilanteen omistajien nimeäminen: Suureellisesti – koko maailma ja sitä myötä Suomi, ja lokalisoituna luonnonsuojelujärjestöt, teollisuus, ympäristöministeriö, kunnat ja maakunnat, kaupungit, kansalaisjärjestöt
- Tilanteen mahdolliset muuttajat: Kansalaisjärjestöt, kaupungin, kunnat ja maakunnat, elinkeinorakenne, teknologiset innovaatiot
- Sisäiset muutospaineet: Kansalaisilla on huoli ympäristöstä, mutta toisaalta myös omaan rutinoituneeseen arkeen on hyvin vaikea tehdä muutoksia. Huoli tulevista sukupolvista.
- Ulkoiset muutospaineet: Ilmastonmuutoksesta vallitsee melko hyvä tieteellinen konsensus, vaikka soraääniäkin kuuluu. Joka tapauksessa tiedetään, että ilmasto on lämpenemässä, vaikka se ei ihan jokaisen arjessa tällä hetkellä vielä näkyisikään.

Vaihe 2. Visioiden määritteleminen

Mitä olemme nyt – CATWOE
- C – asiakas: Tulevaisuuden sukupolvet
- A – toimijat: Paikalliset yhteisöt, järjestöt ja kunnat
- T – muutosprosessi: Elintottumusten muuttaminen kestäväksi arjen tasolla
- W – maailmankuva: Tulevaisuusorientoitunut maailmankuva, jossa pyritään turvaamaan hyvät elinolosuhteet myös tuleville sukupolville
- O – muutoksen mahdolliset pysäyttäjät: Ilmastoskeptikot, osaoptimointi, sitoutumattomuus päämääriin
- E – rajoitukset: Kuinka saada prosessi toiminaan arjessa, elinkeinorakenne, taloudellisten kannustimien puute

Ydinmääritelmä: Paikallistasolla pyritään muuttamaan arjen valintoja mahdollisimman paljon sellaisiksi, että kestävän kehityksen päämärät toteutuvat ja tulevaisuuden sukupolvien elinolosuhteet voidaan turvata.

Ydinvisio: Vuonna 2030 ilmasto ei enää lämpene ja ihmisten arjen valinnat ovat kestäviä.

Vaihe 3. Nykytilan analyysi ja vertailu vision kanssa

Pehmeän systeemimetodologian iskuryhmä toteaa, kuinka tällä hetkellä ihmisten arjen valinnat eivät ole sellaisia, että niillä saavutettaisiin kestävän kehityksen päämääriä. Heidän nähdäkseen jatkossa tämä täytyy ottaa erityiseen huomioon paikallisten yhteisöjen asiantuntemus, kun kehitetään toimintatapoja. Jos paikallisyhteisön pääasiallinen elinkeino on poronhoito, silloin keinojen on oltava ihan toiset kuin vaikkapa Jyväskylän keskustassa.

Tässä vaiheessa ryhmä on myöskin tullut siihen tulokseen, että tietyt osatoiminnot ja -systeemit edellyttävät tarkempaa luuppia, joten he alkavat miettiä ilmastonmuutoksen paikallista torjuntaa paitsi kyläseuran niin myös paikallisen maataloustuottajan näkökulmasta.

Osatoimintojen ja -systeemien analyysi, osa 1, kyläseura
- C – asiakas: Kylän asukkaat
- A – toimijat: Kyläseuran hallitus ja muut aktiivit, kylän asukkaat
- T – muutosprosessi: Kyläseura voi edistää halutessaan kylän asukkaiden ekologisia valintoja. Elinkeinorakenne voi muuttua jatkossa, kyläseura voi tukea tässä aktiivisesti ihmisiä.
- W – maailmankuva: Kaikki kylän, kylä kaikkien puolesta.
- – muutoksen mahdolliset pysäyttäjät: Jos ihmiset eivät lähde mukaan muutokseen, se kyllä hyydyttää toiminnan pahemman kerran.
- E – rajoitukset: Ihmiset toimivat vapaaehtoispohjalta, joten sitoutuminen ei voi olla samaa kuin palkkatyössä.

Alasysteemin ydinmääritelmä: Kyläläiset voivat kyläseuran tuella yhdessä muuttaa toimintaansa kestävän kehityksen mukaiseksi sopeuttamalla elämäänsä paikalliseen kulttuuriin sopivaksi.
Alasysteemin ydinvisio: Vuonna 2030 kylän elämä on kaikkien valintojen kohdalta mahdollisimman kestävän kehityksen päämäärien mukaista.

Osatoimintojen ja -systeemien analyysi, osa 2 – paikallinen maataloustuottajayhdistys
- C – asiakas: Paikalliset maataloustuottajat
- A – toimijat: Seuran hallitus ja muut aktiivit, Maataloustuottajien keskusliitto, mahdollisesti palkatut paikalliset työntekijät
- T – muutosprosessi: Maataloustuottajayhdistys voi edistää paikallista maataloutta ottamaan käyttöön kestävän kehityksen erilaisia työkaluja ja -prosesseja, jotka sopivat erityisesti vallitsevaan kulttuuriin.
- W – maailmankuva: Päämääränä on edistää sekä kestävää kehitystä että maataloustuottajien etuja.
- O – muutoksen mahdolliset pysäyttäjät: Taloudelliset seikat, epäluulot, kulttuurikysymykset
- E – rajoitukset: Mahdollisesti voi tulla vastareaktio, jos henkilöt kokevat, että heille sanellaan toiminta. Lisäksi muutokset vaativat investointeja.

Alasysteemin ydinmääritelmä: Maataloustuottajayhdistys voi auttaa paikallisia toimijoita muuttamaan tuotantoprosessia heille sopivalla tavalla kestävän kehityksen ihanteiden mukaiseksi.
Alasysteemin ydinvisio: Vuonna 2030 paikallinen maataloustuotanto on kestävän kehityksen ihanteiden mukaista, mahdollisen hiilineutraalia ja kuitenkin sellaista, että tuottaja pystyy saavuttamaan sen avulla kohtuullisen toimeentulon ja elintason.

Sosiaalisen systeemin analyysi: Tuskin kukaan, ellei Internetin ilmastoskeptikkoja sekä muutamaa tilastoja luovasti tulkitsevaa tutkijaa laskea, vastustaa ilmastonmuutoksen torjuntaa. Vaatii kuitenkin aika paljon työtä ja muutosta, jotta kestävän kehityksen päämäärät saavutetaan. Paikallisten ihmisten huomiosta kilpailee moni muukin asia ja koska ilmastonmuutos tapahtuu "siellä jossakin" ja vaikutuksia ei voi vuonna 2017 havaita vaikkapa Pyhännällä tai Orivedellä omin silmin, muutoksen tärkeys voi olla

vaikea hahmottaa. Kärjistäen: Jos naapuri ajaa häkäpönttöä muistuttavalla överimaasturilla, miksi minun pitäisi pyöräillä töihin?

Poliittisen systeemin analyysi: Ilmastonmuutoksen kenttä on erittäin poliittinen. Ongelma on isossa mittakaavassa se, että ne, jotka ovat ilmastonmuutoksen ennen kaikkea aiheuttaneet (teollisuusmaat) eivät elä vakavimpien seurausten kanssa niin välittömästi kuin he, joihin ilmastonmuutos kipeimmin koskee (kehitysmaat). Tämä aiheuttaa valtavan jännitteen poliittiseen kenttään.

Vaihe 4. Missio eli tilanteen muuttaminen ydinvision määrittämään suuntaan

Tässä vaiheessa iskuryhmämme muistuttaa ydinvisiosta, jonka perusteella vuonna 2030 ilmasto ei enää lämpene ja ihmisten arjen valinnat ovat kestäviä. Täysin ongelmaa ei tietysti paikallistason toimijuudella ratkaista, vaan edelleen tarvitaan isompia kuvioita. Paikallistasolla missioksi muodostuu seuraava: Kestävän kehityksen päämäärät otetaan huomioon ja toiminta sopeutetaan niiden mukaiseksi siten, että tämä sopii paikalliseen toimintaympäristöön ja kulttuuriin. Etenemisaskeliksi hahmotellaan seuraavat.

Ensimmäinen askel: Luodaan yhteinen näkemys siitä, mitkä ovat ne kestävän kehityksen päämäärriin vaikututtavat asiat ylätasolla, jotka on otettava huomioon.

Toinen askel: Palastellaan nämä vaikuttavat asiat pienempiin osasiin ja mietitään eri osallistujien kesken se, mitä se tarkoittaa kunkin intressiryhmän näkökulmasta käytäntöön vietynä. Mitä riskejä tässä on, mitä etuja?

Kolmas askel: Löytyykö edellisen perustella sellaisia yhteisiä päämääriä, joita voidaan tavoitella yhdessä? Tarvitaanko yhteisiä taloudellisia satsauksia? Saadaanko tähän yhteistä rahoitusta ja ihmisiä sitoutumaan? Voidaanko esimerkiksi paikallisten yritysten yhteistyönä saavuttaa jotakin, joka yksin tehtynä olisi kallis? Sopisiko vaikkapa yhteinen jätteenkäsittelyjärjestelmä tai tuotannon yhdistäminen?

Neljäs askel: Kun yhteisiä hankintoja voidaan tehdä ja sitä kautta saavuttaa paitsi ympäristö niin myös ehkä taloudellisia etuja samalla, kun ratkaisu on löytynyt meistä itsestämme, markkinoidaan ratkaisuja toisille paikallisyhteisöille. Ehkä hekin löytävät sitä kautta oman tapansa tehdä asiat ja oppia samalla meidän (täysin teorieettisista) virheistämme.

"Hyvin me vedettiin"

Pehmeän systeemimetodologian iskuryhmä on enemmän kuin ylpeä saavutuksestaan. He ovat mielestään ratkaisseet kestävän kehityksen ja paikallisautonomian välisen yhteyden ja rakentaneet uskottavat askeleet, jotta päämääriin päästään. He katselevat silmät kirkkaina kuin kemikaalipuhdistettu Littoistenjärvi minua ja odottavat mielipidettäni. Käännän katseeni Delfoin suuntaan.

Delfoi-menetelmä

Delfoi-menetelmän edustajat kutsuvat itseään vaatimattomasti oraakkeleiksi. Oraakkelit muistuttavat, kuinka tulevaisuuden ennustamisessa mandaatti on asiantuntijoilla.[1] He ovat sitä mieltä, että vaikka

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1   Kuusi 2013, 248

modernin delfoi-menetelmän juuret ovatkin sotateknologiassa, sitä voidaan käyttää myös inhimilli-sempään näkökulmaan, kuten kestävän kehityksen paikallisen näkökulman huomioimiseen.

Jotta oraakkelit saavat pöhinälleen muotoa ja jotta he löytävät paremmin tulevat asiantuntijat, he ovat tehneet PESTE-analyysin, jossa käsitellään tutkimusongelmaa viidestä eri näkökulmasta – poliitti-sesta, taloudellisesta (ekonominen), sosiaalisesta, teknologisesta ja ekologisesta näkökulmasta.

Koska kyse on nyt paikallisesta ongelmakentästä, myös asiantuntijat on löydettävä paikallisista asi-antuntijoista, joskin jotakin yhdistävää, yli paikallisrajojen menevää asiantuntemusta on löydettävä. Oraakkelit ovat tietoisia siitä, että asiantuntijat eivät asiantuntemuksestaan huolimatta aina käytä saa-tikka jaa parasta mahdollista tietoaan, vaan tiedon käyttöjä ja säännöstelyä saattavat ohjata myös omiin päämääriin sidoksissa olevat intressit.[1] Koska yhteiset päätökset ovat politiikkaa, joita ohjaavat eri näkökulmat, tämän kanssa on vain elettävä ja koetettava saada asiantuntijapaneeli mahdollisimman rikkaaksi näkökulmiltaan ja pluralistiseksi lähestymistavaltaan. Oraakkelit käynnistävät organisaatio-namedroppingin hyvässä hengessä.

Asiantuntijamatriisin valinta

Asiantuntijamatriisin valinta ei ole aivan läpihuutojuttu. Jotta paikallisen tason asiantuntijoita löytyy poliittisesta, ekonomisesta, yhteiskunnallisesta/sosiaalisesta, teknologisesta ja ekologisesta näkökul-masta, voi olla, että täytyy heittäytyä erityisen luovaksi. Osa osaamisesta on sellaista, että se on kes-

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1   Kuusi 2013, 254

kittynyt tai keskitetty melko ylätasolle, mutta oraakkelit yrittävät silti. Tässä vaiheessa oraakkelit jättä-vät kuitenkin ottamatta kantaa aluehallintouudistuksen viimeisimpiin kiemuroihin, koska tilanne on niin epäselvä. Tämä tuleva organisaatiohattara kuitataan termillä "aluehallinnon toimijat" ja se tarkoittaa sitä tahoa, jolle nykyisen organisaation hoitama (kuten esimerkiksi nykyiset AVIt ja ELYt) kyseinen tehtävä jatkossa tullaan osoittamaan. Paikallisten järjestöjen apuna ovat luonnollisesti myös kattojär-jestöt.

Vastaajan edustama taho	Politiikka-asi-antuntijuus	Ekonominen asiantuntijuus	Yhteiskunnal-linen/sosiaali-nen asiantun-tijuus	Teknologinen asiantuntijuus	Ekologinen asiantuntijuus
Julkinen sek-tori	Kunta (virka-miehet ja luot-tamushenkilöt) ja aluehallinnon toimijat, yli-opistot	Kunta (virka-miehet ja luot-tamushenkilöt) ja aluehallinnon toimijat (ent. ELY)	Paikalliset sosi-aaliviranomai-set sekä yli-opistot	Yliopistot, kunta ja alue-hallinnon toimi-jat	Aluehallinnon toimijat (ent. ELY)
Kansalaisjär-jestöt	Poliittiset jär-jestöt	Poliittiset jär-jestöt, elinkei-nojen edunval-vontajärjestöt kuten maata-lous- ja metsä-talous, myös karjatalous ja poronhoito alu-eesta riippuen. Kauppakamarit.	Poliittiset jär-jestöt, sosiaa-lialan järjestöt eli ns. kolman-nen sektorin järjestöt	Paikalliset tek-nologia-alan järjestöt sikäli kun niitä alu-eelta löytyy. Kauppakamarit yms.	Luonnonsuoje-lujärjestöt ja muut ympäris-töjärjestöt, joita alueelta löytyy.

Kartoittava kysely

Asiantuntijapaneelit tuskin ovat keskenään erityisen harmonisia. Vaikka päämäärästä, kestävän kehi-tyksen tärkeydestä, oltaisiinkin samaa mieltä, keinot tulevat oraakkelilauman hypoteesin perusteella olemaan kaukana toisistaan. Oraakkelit alkavatkin kartoittaa tilannetta siten, että he esittävät joitakin väittämiä, joiden perusteella he uskovat, että pääsevät sellaisiin tulevaisuusteeseihin, että asiantunti-jaraadilla on – jos ei muuta – ainakin yhteinen yhdistävä vihollinen, oraakkelit.

Väittämät, joiden perusteella skenaarioita aletaan hahmotella, ovat kyllä ja ei -väitteitä. Niitä ovat esimerkiksi seuraavat:
- Talouskasvu alueella on turvattava, vaikka se heikentäisi ympäristön tilaa.
- Olen valmis tinkimään omasta energiankulutuksestani ympäristön hyväksi.
- Olen yrityksessäni miettinyt ratkaisuja, joiden avulla voisimme edistää kestävää kehitystä.
- Kestävä kehitys on eliitin juoni, jolla pyritään keskittämään omaisuus tietyille tahoille.
- Koen, että voin aidosti vaikuttaa keinoihin, joilla kestävää kehitystä edistetään paikallisesti.
- Paikallisella toiminnalla on merkitystä kestävän kehityksen päämäärien saavuttamiseen.

Tulevaisuusteesit

Oraakkelit ovat simuloineet prosessin tulevaisuusväittämiksi tai -teeseiksi, joiden avulla he eivät välttämättä nykyisen Delfoi-menetelmän mukaisesti pyri konsensukseen, vaan perusteltuihin näkemykseen tulevaisuudesta ja sen kehityksestä.[1] Tulevaisuusteesejä ovat mm. seuraavat:

Teesi 1. Parhaat mahdollisuudet kestävän kehittämisen edistämiseen tullaan saamaan yhdistämällä paikallinen kulttuuri globaaleihin ja valtakunnan tason päämääriin sekä vähentämällä talouskasvun odotuksia.

Teesi 2. Osa paikallisista elinkeinoista tulee poistumaan kestävän kehityksen periaatteille vahingollisena, mikä tulee muuttamaan paikallista elinkeinorakennetta ja edellyttää ihmisten kouluttautumista uudestaan.

Teesi 3. Paikallisella tasolla ei voida sopia kestävän kehityksen päämääristä, koska päätöksenteko on liian "hyhmäistä" ja paikallisia ikiaikaisia voimasuhteita heijastavaa. Päätösten ja rajoitteiden on tultava ylempää ja niiden noudattamatta jättäminen on sanktioitava.

Kohti maalia

Oraakkelit eivät esikuviensa mukaisesti uhraa vuohia, mutta ovat vuohenjuustosalaattinsa ääressä kuitenkin hyvin tyytyväisiä. He tietävät, että kun kysely-teesikierroksia tekee tarpeeksi, yhteinen näkemys tai edes jollakin tasolla relevantteja näkemyksiä löytyy. He ovat vakuuttuneita siitä, että delfoi-menetelmä on paras tapa tuottaa yhteistä dataa ja ääntä vaikean kysymyksen äärellä, johon ei tule löytymään yksiselitteistä vastausta.

Skenaarioprosessi tulevaisuustaulukon avulla

Skenaarioväki ehti osallistua Anita Rubinin skenaariotyöskentelyluennoille ja on vakuuttunut, kuinka skenaarioiden avulla tullaan pääsemään perille.[2] He haluavat simuloida sitä, kuinka he tulisivat toteuttamaan skenaarioprosessin tulevaisuustaulukkomenetelmällä, jos vain saavat tilaisuuden. Mielenkiintoista olisi voida järjestää laajempi tulevaisuusseminaari tai työpaja – siis laivan ulkopuolella, kuten Yrjö Seppäläkin aikoinaan on tehnyt.[3] Mutta koska ympäristö on nyt ymmärrettävän rajattu, täytyy mennä rajoitetulla rationaliteetillä eteenpäin.

Tulevaisuustaulukko

Tulevaisuustaulukko keskittyy tehtävänannon mukaisesti kestävän kehityksen paikalliseen näkökulmaan. Tämä on todettava siksi, koska joka tapauksessa globaalit linjaukset eli esim. YK:n alaisten ympäristöjärjestöjen linjaukset ja muut tiekartat sekä valtiositoumukset vaikuttavat taustalla tilanteesta riippumatta. Nyt on kuitenkin kyse siitä, kuinka ne implementoidaan arjen tasolla ja kuinka ihmiset saadaan sitoutumaan arjen päämääriin. Fokus on vuonna 2030. Suurta eroa implementoinnilla ja päätöksenteolla ei tehdä, koska kyse on tässä yhteydessä toiminnaksi jalostuvasta päätöksentekoketjusta. Siksi niitä ei voida erottaa.

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1   Kuusi 2014, ei sivunumeroa

2   Rubin, ei vuosilukua

3   Seppälä 2013, 137

Vertikaalisessa osassa tarkastellaan käytännön päätöksenteon ja implementoinnin tasoja siten, että ensimmäisessä vaihtoehdossa ollaan kauempana arkea eli valtiojohtoisessa tasossa, toisessa implementoinnin taso on hybridimalli eli yhdistää valtiotasoa ja paikallista päätöksenteokoa ja kolmantena päävastuu on paikallisella tasolla.

Horisontaalisella tasolla skenaarioväki haluaa tarkastella päätöksenteon kohdetta ja sitä myötä toiminnan suuntaa. Tekijöitä tarkastellaan ensisijaisesti niiden päätöksentekoon vaikuttavan roolin näkökulmasta. Teknologisilla ratkaisuilla tarkoitetaan kestävän kehityksen päämääriin sitoutuvia teknologisia ratkaisuja. Elinkeinorakenteen ratkaisuja tarkastellaan samasta päämäärästä, mutta ensisijainen tulokulma ovat elinkeinorakenteeseen vaikuttavat ratkaisut ja toisaalta markkinaohjautuvaisuus (joskin itsekritiikin nimissä he myöntävät, että myös teknologisilla ratkaisuilla voi olla markkinaulottuvuus). Kolmas vaihtoehto ovat ympäristövaikutukset implementoinnin keskiössä.

Tämän skenaarioväki sai aikaiseksi.

	A. Teknologiset ratkaisut päätöksenteossa	B. Elinkeinorakenteen ratkaisut päätöksenteossa	C. Ympäristö-vaikutukset päätöksenteossa
1.Valtiojohtoisuus ylhäältä alaspäin	Teknologisten ratkaisujen rooli pieni	Elinkeinorakenteen rooli pieni	Ympäristövaikutuksen rooli pieni
2.Jaettu vastuu valtiojohtoisuuden ja paikallisen tason välillä	Teknologisten ratkaisujen rooli ennallaan	Elinkeinorakenteen ratkaisut ennallaan	Ympäristövaikutuksen rooli ennallaan
3.Päävastuu paikallisella tasolla	Teknologisten ratkaisujen rooli kasvanut	Elinkeinorakenteen ratkaisujen rooli kasvanut	Ympäristövaikutuksen rooli kasvanut

Tämän jälkeen he ovat alkaneet tehdä vaihtoehtoisia polkuja, joista työryhmä haluaa nostaa esiin seuraavat lukuisista vaihtoehdoista. Värit eivät sisällä poliittisia kannanottoja, vaan ovat valikoituneet lähinnä sattumalta.

	A. Teknologiset ratkaisut päätöksenteossa	B. Elinkeinorakenteen ratkaisut päätöksenteossa	C. Ympäristö-vaikutukset päätöksenteossa
1.Valtiojohtoisuus ylhäältä alaspäin	Teknologisten ratkaisujen rooli pieni	Elinkeinorakenteen rooli pieni	Ympäristövaikutuksen rooli pieni
2.Jaettu vastuu valtiojohtoisuuden ja paikallisen tason välillä	Teknologisten ratkaisujen rooli ennallaan	Elinkeinorakenteen ratkaisut ennallaan	Ympäristövaikutuksen rooli ennallaan
3.Päävastuu paikallisella tasolla	Teknologisten ratkaisujen rooli kasvanut	Elinkeinorakenteen ratkaisujen rooli kasvanut	Ympäristövaikutuksen rooli kasvanut

Kahvitaukojen ja yhteishenkeä kohottavien konsulttitapaamisten välissä skenaarioväki on ehtinyt laatia muutaman hätäisen skenaariokuvauksen, jotka pukevat sanoiksi sen, mitä yllä olevat nuolet kuvaavat.

Skenaario 1 - Paljon porua vähän villoja -malli (sininen nuoli)

Visio 2030: Viisaus asuu vahvassa valtio-ohjauksessa

Tässä skenaariossa sopeutuminen kestävän kehityksen haasteisiin tapahtuu valtiojohtoisesti, jolloin paikalliselle luovuudelle jää vähän, jos ollenkaan, tilaa. Hyviä puolia ovat tasalaatuisuus, mutta toisaalta, jos sekä teknologiset että elinkeinorakenteen muutokset ja vielä ympäristövaikutusten roolit ovat pienet, silloin myös vaikuttavuus jää heikoksi. Malli ei ole kaikista uskottavin sen takia, koska megatrendinä osallistuminen ja osallistaminen ovat olleet jo joitakin vuosia ilmassa eivätkä ne vaikuttaisi olevan hiipumassa.

Skenaario 2 – Jaettu vastuu on puoli vastuuta (vihreä nuoli)

Visio 2030: Jaettu vastuu, ympäristö ja talous edellä

Tässä puolitien skenaariossa sekä valtiolla että paikallisyhteisöillä on oma roolinsa kestävän kehityksen keinovalikoiman sopeuttamisessa paikalliseen toimintaympäristöön. Teknologian merkitys arvioidaan vähäisemmäksi kuin elinkeinorakenteessa tehtävät muutokset ja ympäristövaikutuksen rooli päätöksenteossa. Paikalliselle implementoinnille varataan tilaa erityisesti elinkeinonäkökulmasta, jolloin markkinaehtoisuus korostuu teknologiaa enemmän päätöksenteossa, vaikka eivät nämä toki toisiaan poissulje.

Skenaario 3 – Kyllä kansa tietää (oranssi nuoli)

Visio 2030: Paikallinen näkökulma ratkaisee ongelmat

Kolmannessa skenaariossa valtio on luovuttanut ohjakset paikallistoimijoille. Keskiössä ovat sekä teknologiset ratkaisut että elinkeinorakenteen mahdolliset muutokset ja ympäristövaikutusten arvioinnin rooli on kasvanut. Skenaario edellyttää luottamuksen kulttuuria ja vallan jakamista pois sieltä, missä sitä on totuttu käyttämään.

Tällä skenaariolla on turvanaan jopa ns. taivaalliset sotajoukot, sillä katolisesta traditiosta lähtevä subsidiariteettiperiaate eli läheisyysperiaate pyrkii lähentämään vallan niin lähelle päätöksenteon kohteita kuin mahdollista.[1] Skenaariolla on toki riskinsä eli se voi pahimmillaan mennä puuhasteluksi, jos jotakin ylempää tsekkauspistettä ei ole.

> *"Sitten nää tekis vielä erilaisia polkuja"*

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[1] Subsidiariteettiperiaate on hyvin vakiintunut hallintotieteen termi, joka opetetaan ihan peruskursseilla, ellei peräti pääsykoemateriaalissa. Lähteitä on siis useita.

Tulevaisuustaulukoitsijat haluaisivat tehdä vielä, jos siis heidät valitaan tulevaisuustyön toimittajaksi, erilaisia yksilötasolle tai ainakin pienelle paikallisyhteisötasolle meneviä narratiivejä, jotka kuvaavat miltä vaikkapa sinisen nuolen skenaario – paljon porua vähän villoja – näyttäytyy Vesilahden Rämsöön kylän asukkaiden näkökulmasta vuonna 2030. Onko kylässä enää maataloutta? Entä miten käy paikallisen teollisuustuotannon? Voivatko rämsööläiset asua vielä kylässä, vai ovatko hekin siirtyneen ns. kirkolle? Koska aika on rajallinen, koetan vielä hillitä ryhmän luovuutta ja totean, että olen kuullut tarpeeksi.

Metodien vertailu

Kaikki ovat kerääntyneet samaan seminaaritilaan, joka kesäisin toimii lasten leikkipaikkana. Nyt tästä on kuitenkin leikki kaukana. Kiitän kauniisti eri työryhmien jäseniä ja toivon, että he pystyvät kaikesta huolimatta jatkamaan hyvää yhteistyötä, vaikka oma metodi ei tulisikaan tässä yhteydessä valittua.

Aloitan ensin siitä, että kun osallisuudesta keskustellaan, myös tulevaisuustyöhön osallistuminen olisi tällöin oltava laaja-alaista. Tämän takia delfoin matriisimainen lähestymistapa osallisten valintaan tuntuu perustellulta, vaikka laajapohjaisuus on myös muilla vahvuutena (tässä kohtaa tulee erityisen voimakasta protestia sitä kohtaan, että tulevaisuustaulukoijat eivät saaneet simuloida tulevaisuustyöpajaa). Jos puolestaan etsitään konkretisoivaa ja lähelle tulevaa, jopa viihteellistä lähestymistapaa, skenaariot ovat siinä tapauksessa hyvä tapa lähestyä. Riskinä on toki, että skenaarioita tehtäessä metodologinen poni lähtee kiitolaukkaan ja hallinnasta, mutta toisaalta, hauskahan villejä visioita ja mustien joutsenten jumalkoneita on tutkailla.

Jos sitten ongelma pitää rakenteellistaa, niin kuin se herra paratkoon pitää, silloin pehmeä systeemimetodologia tuo konkreettisimman avun, sillä se huomioi laajasti ongelman eri ulottuvuuksia ja taustoja. Sen vahvuus on erityisesti sosiaalisten ja poliittisten tekijöiden havainnointi, vaikka samaa on kyllä myös delfoissa havaittavissa.

Palataan vielä ydinongelmaan. Meidän pitää ratkaista se, mikä on paikallisyhteisöjen rooli kestävän kehityksen päämääriin sitoutumisesta. Tämä tarvitsee useita eri näkökulmia. Tämä ei ehkä kaipaa hurjia skenaarioita, mikä saa tulevaisuustaulukkoväen hartiat lysähtämään. Delfoin konsensushakuisuudessa on omat riskinsä (edelleen kameli on komitean suunnittelema hevonen), mutta siinä on päätöksenteon kannalta paljon hyvää ja se on pluralistinen näkökulmiltaan. Toisaalta pehmeä systeemimetodologia puolestaan rakenteellistaa ongelman hienosti ja lisäksi he tekevät hyvää työtä, kun määritellään nykytilan ja tavoitetilan välistä eroa. Koska olen ammatiltani virkamies ja neuvottelija, päädyn hybridimalliin, jossa päämetodi on pehmeä systeemimetodologia ja aina, kun tulee totaalinen pattitilanne – eli siis säännöllisesti – otamme mahdollisesti delfoin apuun, jos se vain suinkin toimii. Ihan varma en tästä ole, mutta kokeilla kannattaa. Ja vielä lopuksi, jonkun on totta kai kyettävä tekemään hurjia skenaarioita ja polkuja, joten myös ginitonicille karanneiden tulevaisuustaulukoitsijoiden aika tulee.

Jälkitilitys

Olen nyt opiskellut (uskoakseni) 25 opintopistettä tulevaisuudentutkimusta. Pää on ollut todella kovilla, koska tämä ei ole suinkaan helppoa. Joskus 18-vuotiaana teatteritieteilijätaimena 22 vuotta sitten hengasin viimeksi Aristoteleen kanssa heikolla menestyksellä. Olin yllättynyt strategiaorientoituneessa todellisuudessa siitä, kuinka filosofista tämä on ollut. Tulipa siirrettyä dementiaa jokunen vuosi eteenpäin.

Analysoin yleensä oppimaani Bloomin taksonomian (löytyy ihan wikipediasta) avulla. Se jakaa osaamisen tasot kuuteen eri tasoon.

1. Tietää – osaa ulkoa
2. Ymmärtää – ymmärtää esim. kaavan olemassaolon ja mihin sitä käytetään
3. Soveltaa - osaa soveltaa kaavaa eri tilanteissa
4. Analysoi – osaa analysoida, miksi esim. kaavan eri osat toimivat niin kuin ne toimivat.
5. Syntetisoi - ymmärtää itsenäisesti ilman suurta simulointia, kuinka kaava toimii eri toimin-taympäristössä
6. Arvioi – kykenee arvioimana vaikkapa kaavan merkitystä muilla osa-alueilla.

Sanoisin, että olen tällä hetkellä tulevaisuudentutkimuksessa tasojen 3-4 välillä. Missään nimessä en ole tasolla 5–. Muutenhan tämä äskeinen simulointiharjoitus olisi ollut ihan turha. Kaavat sinällään ovat helppoja, mutta näitä on nyt vain sovellettava jatkossa.

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