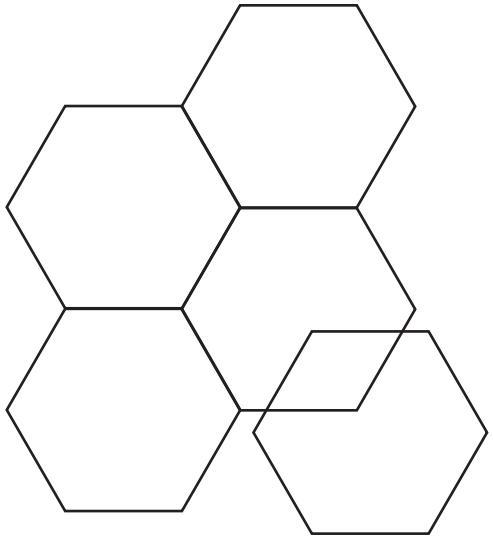
Sofi Perikangas

VISUALIZING CHANGE

COLLABORATION TOOL FOR TRANSITION PATHWAY CREATION



Visualizing change –
Collaboration tool for transition pathway creation

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Abstract

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Master of Arts thesis abstract

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The main question inspiring this study can be phrased as such: ”How to support visualization and deliberation during a transition implementation arena, by utilizing game design process?” I answer to that question by explaining the process of the design of a pathway creation tool for transition management context. It was conducted as part of a transition arena (TA) during a research project, Smart Energy Transition. The project aims to find out, how could Finland benefit from disruptive energy models and innovations in the future. The transition arena held in Helsinki during 2017 was a so-called translation of the TA method for Finnish context. It introduced a redesign of the arena, which put a heavy focus on the formation of transition pathways by utilizing the co-designed Pathway Creation Tool.

The problem that the design team faced when planning the upcoming arena, was that the preceding manuals that introduce the usage of the method, fail to present a concrete and plausible way to create and visualize transition pathways. This is why the transition arena planning team in Helsinki decided to design a context specific tool for the creation of pathways. The Pathway Creation Tool, that was born as a result, is a co-planning tool that draws its inspiration from design game studies and iterative critical game design method. The tool is based on the actions that have to be made during transition arena process in order to create transition pathways.

In this study, my main research questions handle, how can the pathway creation tool with game structure support deliberative planning in a policy design context, and how does game structure, as a way of designing and implementing the tool, support the overall design process? As the result of the study, I suggest that a game structure in the center of the design process of the Pathway Creation Tool, held qualities that supported a successful implementation of pathway creation during the transition arena process in Helsinki during 2017. As further developments, I suggest a need for further studies of applying tools with game structure in co-design processes which aim at policy (re)design. I propose especially a need for more arenas, with use of the Pathway Creation Tool to be established, to evaluate whether this redesign of the original method is translatable and brings value in other contexts.

Keywords: collaborative design, design games, game design, policy design, transition management

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Tutkimustani inspiroineen kysymyksen voi muotoilla seuraavasti: “Kuinka tukea muutospolkujen visualisointia ja deliberaatiota murrosareenan aikana hyödyntäen pelisuunnitteluprosessia?” Vastaan kysymykseen kuvailemalla polkutyökalun suunnitteluprosessin murros-tutkimuksen konteksissa. Suunnittelu tapahtui osana murrosareena -prosessia, Smart Energy Transition -tutkimusprojektissa. Tutkimusprojektin tarkoituksena on selvittää, kuinka Suomi voisi hyötyä disruptiivisista energiamalleista ja innovaatioista tulevaisuudessa.

Helsingissä vuoden 2017 aikana järjestetty murrosareena oli Suomalaiseen kontekstiin luotu “käännös” alkuperäisestä murrosareena-metodista. Se esitteli areenan uudelleenmuotoilun, joka keskittyi vahvasti murrospolkujen luomiseen yhteissuunnitteluprosessin avulla tuotetun Muutospolkutyökalun avulla.

Muotoilijoiden kohtaama ongelma areenaa suunnitellessa oli, etteivät metodia esittelevät edeltävät ohjeistot kyenneet esittelemään konkreettista ja uskottavaa tapaa muodostaa ja visualisoida muutospolkuja. Tämän vuoksi Helsingin murrosareenan suunnittelutiimi päätti suunnitella kontekstiin sopivan työkalun, jonka avulla polkuja voitaisiin muodostaa. Muutospolkutyökalu syntyi suunnittelun lopputuloksena. Se on yhteiskehittelytyökalu, jonka inspiraationa toimivat muotoilupelitutkimus ja iteratiivinen kriittinen pelisuunnittelu -metodi. Työkalu perustuu toimille, joita vaaditaan muutospolkujen luomiseksi murrosareenaprosessin aikana.

Tutkimukseni keskeiset tutkimuskysymykset ovat, kuinka pelirakenteeseen perustuva muutospolkutyökalu voi tukea deliberatiivista suunnittelua politiikkasuunnittelun kontekstissa, ja kuinka pelirakenne suunnittelun ja työkalun jalkauttamisen perustana tukee designprosessia kokonaisuutena? Tutkimuksen tuloksena esitän, että pelirakenne Muutospolkutyökalun suunnittelun keskeisenä tekijänä sisälsi ominaisuuksia, jotka tukivat mutospolkutyöskentelyn menestyksekästä jalkautusta murrosareenan aikana Helsingissä 2017.

Jatkoksi opinnäytteelleni ehdotan lisätutkimusta pelirakenteen omaavien työkalujen hyödyntämisestä yhteissuunnitteluprosesseissa, jotka tähtäävät politiikan (uudelleen)suunnitteluun. Näen erityisesti tarvetta järjestää uusia areenoita, joissa Muutospolkutyökalu on käytössä. Näin voitaisiin arvioida, onko esittämäni alkuperäisen metodin uudelleenmuotoilu käännettävissä muihin konteksteihin ja tuottaako se niissä lisäarvoa.

Avainsanat: yhteissuunnittelu, muotoilupelit, pelisuunnittelu, politiikan suunnittelu, transitiotutkimus

Index

1

1. Introduction

1.1 Motivation of the Research – Transition Management translation for Finland

In this study I am introducing a pathway creation tool developed to be used in three workshops over the passage of a Transition Arena (TA) workshop series concerning energy transformation in Finland by 2030. The three workshops concentrated on the formation of transition paths for 2030 vision and change objectives created in forerunning workshops.

In this chapter I introduce the transition management method behind our project, main actors of the project and the main motivation behind the study: need for tools of concretization in policy design for transitional change, focusing on a Finnish translation of the method in question.

Transition Arena (TA) is a methodology that has been introduced in several guidance manuals that handle the implementation of a process for transformative change (ie. Franzeskaki et.al 2012, Roorda et.al 2014, Franzeskaki et.al 2015). Transition arena is a part of transition management (TM) approach. TM aims at addressing persistent problems of our society. Its objective is to influence a fundamental change, not a marginal one. Its practices happen through creating spaces for searching, learning and experimenting on the transformation of the current systems. Transition Arena is one of those co-creation processes that operates at a strategic level. (Wittmeyer et al. 2018).

Wittmeyer et al. (2018) describe transition management as governance approach through which cities and other urban actors can deal with persistent problems that are highly difficult to solve and complex by nature. These kinds of persistent problems are often so deeply built in our society, that not a single application can solely solve them. Thus the writers propose that through transition management, a fundamental change, transition, can be seeked. Transition management is a strategic level approach, and seeks primarily for opportunities in current or future situation by allowing for variety of viewpoints in influencing the needed transition. Transitions and transition management have been studied already over several research projects, including scalable projects working in several urban contexts. Common for these projects was that they usually worked on sustainability issues, which often appear to be of persistent kind. (ibid.)

An example of these persistent problems is private motoring with vehicles powered by fossil fuels. Their existence is enabled by several factors that support the continuance of such sociotechnical system: fuel concentration and distribution networks, road networks and land use planning that support private motoring, taxing, maintenance, consumer habits, and established lifestyles between home, work and hobbies amongst others. (Hoogma et al. 2002) Advancing a change in such landscape though, needs the kind of method of working that puts effort in changing the organization of system conditions for new sustainable solutions to proceed, instead of focusing on single regulatory actions or design projects. In these cases, focus cannot be in the self-interest of any one company or other actor but in all actors' will to foster transition. (Mok&Hyysalo 2017, p.3) In that case, solving problems which restrain the wider employment of electric cars can help forward the whole transition of the system. Systemic changes are slow to implement though, and in an ideal situation they could be advanced step-by-step in such way that the citizens and society in general would have time to adapt to their side-effects.

Transition management method in use

Transition management contains several actions that can be taken during policy design processes. The first phase is establishment of transition arenas, which help in creating long term vision(s) for the change. These visions can be communicated as scenarios reaching over 40-50-year timespan. They are linked with the present day by using back casting method in creation of transition pathways, which communicate the way in which these goals should be achieved. The first steps on the transition pathways work as immediate change needs that trigger the slow systemic change. A final goal for the process is that the trials and pilots established over the TM process, will eventually replace the problematic qualities in the existing system, making way for a new one. (Loorbach&Rotmans, 2006). This way it allows for a systemic change.

Indeed, transition management is strongly focused as a tool for contemplating the possibilities of sustainable development. Finding out and repeating a process of probing pathways for meeting relevant goals, is distinctive to usage of the method. The goal is to create a perspective on intersectional dynamics that can encourage transitional chance. "The general approach is one of nurturing and growing rather than planning and controlling long-term societal change." (Voß et al. 2009. p.

277) In order to plan for long-term change, the focus must be not only on the positive expectations for change, but also on negative ones, that may threaten or hinder the change goals from unfolding (ibid. p. 280).

By having a nurturing and growing perspective, the aim of TM is at planning of seeds for thought, that can be utilised in political decision making, but its aims extend the traditional cycle of elections and decision making. (Voß et al. 2009. p. 278) Nevertheless, transition management as a method for long-term policy design has faced also some challenges over the years, when it has been practised in several projects. Uncertainty is a comprehensive aspect of transitional concepts: a question of whether these supposedly adaptive concepts can be concrete at the same time has been raised. Also, focusing on one selected goal even in a situation of planning great amounts of events sometimes possibly leading in other directions too, has been challenging for the planners. A third notable challenge is the democratic over the planning process. Disruptive and such unneeded behaviours of some actors may redirect the whole process in unwanted directions, but are difficult to prevent. Although the process should always aim at legitimacy (ibid. p. 282).

Voß et al. (2009 p. 281-282) mention social learning as one of the key drivers in transition management process and continues presenting three main aspects that should be considered when planning for a long-term policy design process. *Politics* refers to an aim to secure the democratic legitimacy of the process, and ensuring of a learning-oriented approach where no interest group gets a predominant position over discussions. *Context* refers to the understanding of a situation in which the planning happens, and a need for practical approach in new designs. *Design as process* refers to the need of paying attention to the societal interaction within the planning process. Insight in the current system is essential in planning interventions and alternative systems, in this the selected "fore-runners", participants of the workshops, are most important. They are a variety of societal actors. (ibid. p. 284)

As for the requirements for establishing a transition arena, a transition management manual by DRIFT (Roorda et.al 2014 p. 16) introduces transition arena as a temporary "safe space", where the selected change-agents, or fore-runners (Voß 2009, Heiskanen 2009) are empowered to exchange different thoughts related for example to their perspectives, personal agendas or expectations. They put high expectations to the change-agents, believing in their transformative capacity and networking skills. These agents are not understood as mere stakeholders, but are personally contacted and selected on account of connectedness to the issue at hand, willingness to push the boundaries of current system, and empathy towards other peoples' opinions. The group should be diverse enough though, introducing people from various back grounds. It should also be small enough (10-15 persons), allowing for the participants' mutual intimacy and alignment.

During their critique over transition management concept Voß et al. (2009) mention some important issues that our team also had to consider when planning the transition arena process in SET. There is a need for political robustness in design. Evolution, that is promoted by several transition management projects, cannot replace politics: difficult decisions still need to be made. Our concern with the planning of the game was in-

clusivity and deliberation over the planning sessions. Voß et al. (2009 p. 287) have seen them as clear problems with transition management: "TM as a concept for policy design lacks effective provisions for inclusive participation and fair deliberation within 'transition arenas'." Our challenge was to think about whether the mechanics of our tool could somehow enable a more democratic and deliberative attitude in the actors. It is also important to remember, that policy design, even through a co-creation tool, is always also embedded in policymaking and thus any reconfigurations may raise political processes that are not planned as such (Voß et al. 2009 p. 289).

In our project, biggest emphasis was put on the pathway development through a back-casting method that was transformed into a design game. The "fore-runners" were carefully selected from Finnish change makers who were familiar and already interested in the topic, energy transformation. The selected 23 persons together formed the frontiers of Finnish political, industrial and societal powers together and got a chance to examine the topic from many different angles.

Transition management implementations in Finland

Heiskanen et al. (2009) examine the adoption of transition management methodology in different countries since its establishment in the Netherlands. They use examples from different countries to evaluate the possibilities of the methodology in varying governing contexts. They assume that the method as it is, is best translated to countries that have a rather similar governing system with the Netherlands, but also note that variations of TM have been also successfully achieved in some countries. Nevertheless, translating the TM model is difficult, and Heiskanen et al. introduce two cases from Finland, where implementing the methodology has proven difficult due to various reasons and the methodology has lost some of its core elements. Transferring different policy concepts does not automatically lead to convergence of policy practice in different countries. Political agendas and the dynamics of non-state actors, combined with TM methodology may well be a double-edged concept. Transferring the methodology should thus be seen more as a process, emphasizing the practice of policy making rather than translating mere knowledge of its potential (Heiskanen et al. 2009 pp. 213-414). Also, translation process can be seen as a source of innovation in itself, thus adding a positive flavor to it, and making it also policy redesign. Thus translations may vary heavily from different hybridizations to more profound implementations that question and rework the methodology pervasively (ibid. p. 415).

Heiskanen et al. (2009) conclude their analysis with a suggestion that in order to enhance the methodology "empirical cases of implementation and redesign in various national and local contexts can make a useful contribution to such theoretical development" (ibid. p. 425). Regarding the Finnish context, there are a great number of energy transition related experiments (www.energiakokeilut.fi) and relatively established parliamentary roadmaps for long term (to year 2050) and midrange (to year 2030) climate planning as well as governmental energy and climate strategy for midrange planning (Ref: PTIS, KAISU, EIS). What is currently missing in Finland is particularly means to connect the visions and goals with experiments on the ground, ie. means to deliberate over the change pathways.

These contextual elements guided the research group to shift the focus of the workshop series. Instead of focusing mainly on creating a vision of change and scrutinizing resilience, most effort was put on finding the tools to structure the sociotechnical paths affiliated with transitional change. One of the main issues was to design a tool through which actors could relate to each other and different knowledges would be considered, and peoples' pervasive knowledge could be realized. Thus, the Transtion Arena became called "Transition Implementation Arena".

Main actors in the project

The transition arena team, that was formed when the transition arena was established, consisted of design researchers, designers, innovation scholars and social scientists. Altogether 15 people were involved in execution of the arena process and 7 in designing it. The Pathway Creation Tool was created through a collaborative and iterative process, and the knowledge and skills of creating concrete design tools and understanding of transition management and back-casting methodologies were both needed.

The main actor in this project, to whom I will mostly refer, was the "TA core planning team" of four persons, that consisted of two design researchers, one designer and one expert from the field. My role in the project was to work as a designer of the tool, taking care of such as planning the rules, game mechanics and actual design and production of the game. I was part of the "core planning team".

The Pathway Creation Tool was collaboratively designed so that main design contributions came from myself, prof Sampsa Hyysalo and TaM Tatu Marttila and comments, testing and smaller design ideas were gathered from transition arena team and fellow ARTS students. The first prototypes were produced by Aalto University students in Autumn 2016 during the Collaborative and Industrial design master degree course, Strategic Co-design. I was part of one of the student groups, and thus I took part in designing also one of the first prototypes for the tool.

The Transition Arena workshop series handled in this study is a part of a larger project, Smart Energy Transition (SET), that takes place in Finland and is funded by the Academy of Finland, Strategic Research Council. SET is a consortium led by Aalto University School of Business, and includes several other universities, research institutes and organizations. It is planned to continue working until 2020. The consortium investigates on how Finland could benefit from disruptive energy models and innovations in the future. The project consists of six work packages, and TA is included in WP6, led by Aalto University School of Arts, Design and Architecture.

Transition Arena In Helsinki

SET positions the research project in a context where disruptive technologies are considered to radically change the Finnish energy sector: "Improved energy efficiency and the replacement of fossil fuels with increasingly cheaper renewable energy change the ways in which energy is produced, distributed and used in all sectors. For example, in the electricity system, an increasing share of intermittent production creates the need for new market models, products and services: demand response, storage and flexible production. The ener-

gy disruption can create new opportunities for Finland's expected spearheads of growth: the bioeconomy, cleantech and digitalization" (Smart Energy Transition). The Transition Implementation Arena was set from this perspective, to concretize the possible steps towards transitional change, leaning on the Transition Management (TM) methodology.

The Transition Arena process in Helsinki was carried out over six workshops once a month. One workshop lasted over the afternoon, providing 3 to 4 hours working time for the participants. Also, the preliminary results were commented in between the workshops through a private website to which the participants had an access.

The workshops were as follows:

Workshop 1. The drivers, hinders and contingencies for transition

Workshop 2. Vision and transition goals for 2030

Workshop 3. Formation of pathways, part 1

Workshop 4. Formation of pathways, part 2

Workshop 5. Immediate actions for launching the pathways

Workshop 6. Completing the results and commenting on the final report

The schedule was tight, and thus boosted by working templates, which were used at co-creation. The participants were further encouraged to comment on and vote for preliminary results between each workshop. Eight pathways were formed out of twelve planned ones. Some of the transition goals for pathway creation, that the participants came up with in workshop 2, had to be fitted to work the pathway creation format. Anyhow, some of the transition goals were more abstract, and their formation required more imagination and guessing than some others, that were more concrete and based on easily measurable steps. The alternative paths and branches of the pathways, as well as the resilience analysis based on contingency factors had to, for the most part, be left out from this process because of the strict timeframe.

Design challenge

The problem motivating this thesis was the fact that most of the introduced transition arena manuals describe only a somewhat metaphorical pathway creation system, due to a long-term (30-50 years) focus of transition (see Franzeskaki et.al 2012, Roorda et.al 2014, Franzeskaki et.al 2015). The pathways have been conducted by a back casting method (Robinson 1988) originating from futures studies. Although, lack of concreteness and isolation of systemic elements have resulted in vague descriptions for precise actions, that could be implemented in the future (see Melbourne manual etc.). The needed steps of pathways, and their interrelationships have sometimes been left to such superficial level, that the participants have had little chance to handle the actual transition activities, or the potential activities may have not efficiently served further planning. Also a challenge for the whole transition arena was, how to engage a big group of people behind one goal: the motivation should be raised in several forms to serve varying "silos" of experts. To these challenges, we answered partly by the design of the Pathway Creation Tool.

Earlier in this chapter, I described in detail the TA method and existing problems in the manuals and reports from the planning processes. Lack of structured guide for carrying out pathway creation workshops has resulted in indefinite visualisations in the end. Our biggest design challenge was, thus, to find a way to form, discuss, document and communicate transition pathways during the Transition Arena 2017 in Helsinki. The chosen arena implementation method set the following restrictions for the final design of the pathway creation tool:

- Working time with the pathways would be limited.
- Participants would be busy and they should quickly be able to understand how to use the tool, thus the tool should be as effective as possible.
- The tool should be flexible, so that it could be modified during the pathway creation process if needed.
- The tool should support exchanging knowledge and visualizing information easily.
- The tool should support team work.

The above requirements could be divided in more detailed ones:

- Tool's materials should be easily recognizable, so that the participants wouldn't confuse them with each other
- Materials should be easily movable over the game board, and the game board should also be light and preferably modular
- The materials should enable documentation of a lot of information
- The information should be easily digitized
- Game boards should allow at least four persons to work on an individual pathway at a time.
- Tool should allow for a deliberate working attitude
- Tool should take support the democratization between all participants.

These needs and requirements were evaluated and iterated over the design process of the Pathway Creation Tool. I will explain the process in detail over chapter four, thus showing that the requirements were possible to achieve, working as a basis for the whole structure of the tool.

1.2 Research Focus and Research Questions

In most of the earlier transition processes, the vision making has played a major role. For example, according to Melbourne Manual (Frantzeskaki et al. 2012), it can be estimated that approximately 40% of the time has been used in constructing the vision. At the time, the main idea of transition arena was to start with finding a new, shared objective. The standard process emphasizes also instant transition actions, hence the steps between those and the main transition goals remain more non-specific. The transition arena that Helsinki team established, was a transition implementation arena, focusing on a time span of 15 instead of 30 years, and the focus was in

putting into practice the transition agenda, by considering individual steps on a transition path very closely.

The Arena for Smart Energy Transition (SET) thus took a considerably more elaborate attitude towards the transition pathways. It happened by utilizing a collaborative design tool in planning. The pathway creation workshops aimed at helping the participants to multidisciplinarily deliberate the following aspects:

- Recognise a critical transition path and the steps through which a wanted transition goal could be achieved.
- Perceive the interrelationships between steps and the timing of needed actions.
- Evaluate the realism of the suggested steps and the actions with which the essential steps can be supported.
- Recognise the most critical steps, in which societal choices have to be made. Without these steps the transition goal would be unlikely to actualise or the steps are especially prominent for achieving several transition goals.
- Consider the actions from perspectives of different fields, in which the overlapping of the critical steps can be supported.

In addition to this, it was recommended to pay attention to alternative ways to achieve transition goals and consider the concretization of the cross effects. The rest of the tool considered "highlighting the most distinct alternative transition paths in respect of the most essential drivers" and "considering the most distinct uncertainty factors in respect of their speed". (Perikangas&Hyysalo 2018)

Especially these latter phases of the pathway creation work took after the back casting work in futures studies. It is notable though, that the required time for utilising back casting method is a lot more than what the Energy Transition Arena was able to offer. The strengths in transition pathway working were in the concreteness of middle term planning. Its wider goal was in aspiration to strengthen the motivation of the participants in advancing transition in the different sectors of society. Also it aimed at creating better understanding of what potential transition actions people should be prepared for, and what could the means for achieving this transition be like.

When TM processes were done for the first times, in the beginning of 2000s in the Netherlands, the idea that people have to make transitions that pass the whole society was very new. Many of the obvious transitions nowadays, such as circular economy, were considered seriously by a quite small community. Since then, for example the profitability of solar and wind power has gotten a lot better, and it can be thought that over this time we have gotten from the beginning of transitional thinking to a situation, where the implementation of several visions and strategies that have been created can be implemented and turned into concrete actions for change. This is possible only because the vision is somewhat shared already. Thus it is the time for the focus of tools of implementation. The implementation of transition arena needs more talk about the tools, with which solutions and concreteness is searched, since they will affect directly the end result of arena process, that will be documented in the final reports. The aim was to create a will to

change the existing formulas and focus on searching for transformative, over sectoral change in the long term.

To address the objectives of my thesis I attempt to answer the following research questions: Firstly, how does the tool help in deliberating over the change pathways that need to connect existing pilots and experiments with created visions and goals? I handle this question in the context of transition management and co-creation tools literature and research projects, and analyse game structure as a means for enabling meaningful and deliberative knowledge co-creation and deliberation. This existing literature consists of transition management methodology, transition arena translations, co-creation tools and game structure in planning processes. I compare these to the data, that we collected during and after the transition pathway creation workshops. The things that I consider as supporting qualities for deliberative working in a workshop during transition arena are:

a. The timeframe that the participants had for the creation of each pathway

b. The dynamics and knowledge power relations during the co-creation sessions

c. Each participant's ownership born over the process

d. Player's and facilitator's guides as support for structured pathway creation

e. The supportive information packages provided for creation of each pathway

Secondly, what are the attributes enabling the (co-)design of a planning tool that is supposed to support a translation of the transition management methodology? My hypothesis in this study has been that game structure, as a pervasive tool, may hold the qualities needed for the creation and usage of a co-creation tool meant to concretize and visualize transition pathways created during transition arena.

1.3 Literature

In the following, I briefly introduce the main readings that have supported my study. My reading has been two-partite, focusing on the tools of collaboration in design and on the other hand studies on games and game design. There does not exist a comprehensive study on the design of co-design tools used in design processes with game-like qualities. Thus I have looked in the direction of game design practices, that provide more structure in the design process of a system, that requires participants' interaction. The Pathway Creation Tool, lying heavily on the rules and participant's interactions with each other while working on the pathways, can benefit from the more formal game study approach I have taken. I will study these topics in relation to the translation and implementation of TA method, and review how the requirements for implementation of the method may benefit from a co-creation tool and game structure.

The following readings supported the construction of thought regarding the design process of the Pathway Creation Tool in my study: Kirsikka Vaajakallio (2012) has written pervasively about design games in service design. She introduces a prac-

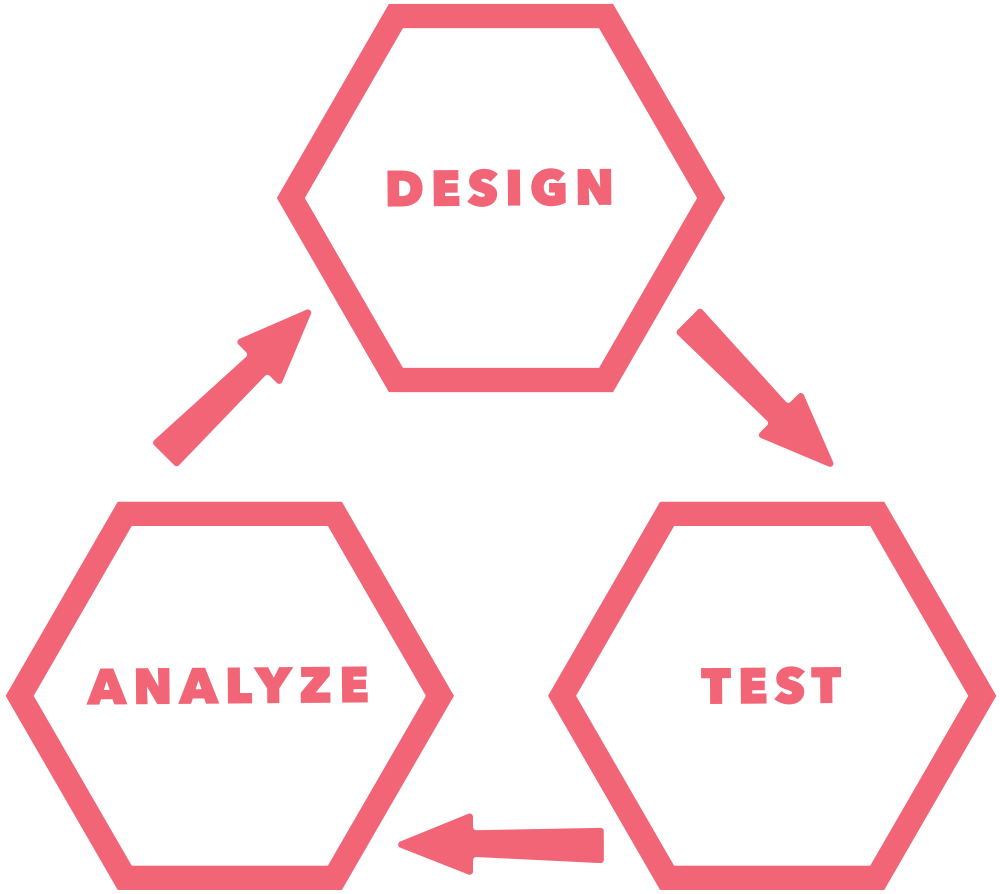


Figure 1: The iterative design process by Eric Zimmerman (2003).

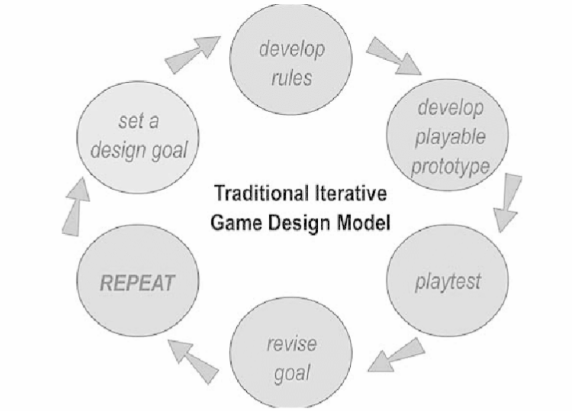
tical and theoretical framework for design games-driven co-design that worked as a stepping stone for my study. Her work is some of the few deeper analyses on the game structure in collaborative design projects. I will also introduce game design theories, including modern views (Salen&Zimmerman 2004, Flanagan 2009) in relation to classic definitions for games and play (Huizinga 1950, Caillois 2001).

Vaajakallio (2012) has introduced an ambitious definition for ways to create and interpret design games. She argues that "games" nor "design games" can't be thoroughly defined, for there are as many kinds of them as there are contexts and aims for the game. Design games also serve in various design fields, and are thus understood differently in those contexts too (ie. Hannula et al. 2014). The ground for the study of design games has been laid in design research and co-design contexts (Mattelmäki 2006), but Vaajakallio relies heavily on some classics of the game research (Huizinga, Caillois, Salen&Zimmerman), which I am also going to introduce briefly. In her dissertation (2012), Vaajakallio has introduced a Play framework to help defining and applying design games in co-creation. She defines design games according to the experience of different actors in a design process. The three main viewpoints are one of a product or service designer, players and design game designer making the games work as a tool, mindset and a structure. In this thesis, I am focusing mainly on the viewpoint of a design game designer, using the Play framework as an inspirational source for design game design, but also looking at other emergent design research and game design approaches that introduce design as tools for creating knowledge and innovation for systemic change.

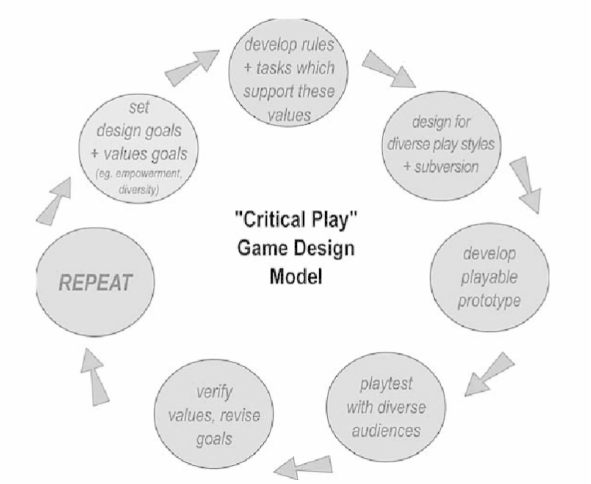
Huizinga (1950) introduces a definition for play, and from his study, a common term magic circle has become an established term for describing the event of game play in game studies. Caillois partly critiques Huizinga, and introduces his own definition of games. Salen&Zimmerman (2004) offer a game designers' point of view to game studies and game design in practice, and Mary Flanagan (2009) offers a comprehensive study to the history of games, and introduces a framework for modern critical game design. It is important to note that my focus in the study of these authors is considered in relation to the Transition Management method, which I introduced in the beginning of chapter one. I will be reviewing the mentioned literature and trying to find there characteristics that support the structuring and visualization of the transition arena pathway creation.

1.4 Data and Methods

The process of designing the Pathway Creation Tool was an open-ended explorative study, a research through design. Over the process I experimented on how to implement a design planning tool to support an existing methodology, and its complicated nature. I have conducted this study in qualitative methods, comparing the documentation of the design process, pathway creation workshops and interviews to the preceding literature on the topics of co-creation tools, design games, games and transition management. In this chapter I will shortly introduce the different types of data that has supported my thesis, and the methodological approach that I have used: iter-



| Figure 8.1 |
Mary Flanagan, model of iterative design process.



| Figure 8.2 |
Mary Flanagan, model of critical play method.

Figure 2: Comparison of traditional iterative design model to Flanagan's (2009) "Critical play" model.

ative design method. It has both supported both my planning and research process.

The data that I have used consists of pictures and notes from the pilots, different versions and iterations of the tool over the design process, monthly recorded discussions with the core planning team members, recordings and videos from the pathway creation workshops, two inquiries that the participants were asked to fill in after the last pathway workshop and participants' feedback discussion and comments on the whole workshop series. The gathered data has been utilized during the process iteratively, and it has guided the design process of the tool, and later the analysis of the process and workshops.

In this thesis, I consider design as "exploration people do together" (Koskinen et al. 2011, p. 83). Still, when I refer to designer, I will refer to one of the members in the TA core planning team, who were responsible for the design of Transition Pathway Tool. The workshop participants' work alongside the tool I will call planning, although, I do call the whole process as policy design.

Iterative design process

In addition to the wider constructive design research paradigm (Koskinen et al. 2011) that I use to analyze the whole transition pathway design project, I introduce iterative design methodology, that was an important method in the design process of the Pathway Creation Tool. I handle that process here in the context of game design, hence the several game-like qualities and structure that the Pathway Creation Tool has.

Eric Zimmerman (2003) introduces a process-based iterative design methodology (Figure 1) in his article *Play as Re-*

search: The Iterative Design Process. He claims iterative design as "interaction with a designed system that is used as a form of research for informing and evolving a project as successive versions or *iterations* of a design are implemented". In this process, the design decisions are based on the experience of the prototype in progress, since the experience of a user cannot be predicted. An important part of the process is the ongoing dialogue between the designers, the design and the testing audience (ibid. p. 176). In our project, the testing audience consisted of the Transition Arena planning team members, who were to be either facilitators or note takers during the pathway creation workshops.

Zimmerman describes the process by a structured, iterative game design process, playtesting. Each time the game is played, the designer needs to observe the situation, ask questions, and then adjust her design and playtest again. An easy way to start the process is identifying the project's play values, such as: what kind of audience is this aimed at, does this need a lot of technological skills, is this easy to learn and play, is this a social game? (Zimmerman 2003, p. 177) In each design decision, the main focus should be in the choices and alterations that will get the designer to the next prototype (Zimmerman 2003, p.178). As a form of research, each iteration will also raise questions outside of the design problem. The players experience is born in play, which the designer can influence by testing and prototyping, aiming for an improvisational balance. Zimmerman's understanding of the process covers the domains of design not limited to games: Rules and play can be understood as game design terms for structure and experience. The roles of actors too, blend in iterative design: designer and user, creator and player, design by reinventing the play in an iterative cycle. (Zimmerman 2003, p.184) In our project, the design work was divided in five phases and handled iteratively, I will handle each phase in detail in chapter four.

The iterative design method should in our case be supported with the Critical Play method by Mary Flanagan (2009). Her model is based on IDP method, but adds and important value of modern design thinking to the process: a critical enquiry. An important aspect for our work was to understand the principles and values lying behind the game design and methodology that we used. A safe and inclusive environment, and a feeling of democratic planning were some of the main starting points for our design process. These kinds of aspects should be included in the design process from the beginning. Flanagan's approach thus partly appraises some of the core elements in iterative design method (Flanagan 2009, p.255). (Figure 2.)

Flanagan's approach supports the design of design games and tools of planning with game-like features. Critical play is about "designing spaces where diverse minds feel comfortable enough to take part in the discovery of solutions". According to her, critical play can ease in the problem that often social challenges and ways to solve them are presented in overwhelming or depressing ways. She concludes the usage of her method as follows: "If a designer or artist can make safe spaces that allow the negotiation of real-world concepts, issues, and ideas, then a game can be successful in facilitating the exploration of innovative solutions for apparently intractable problems." (Flanagan 2009, p.261). This kind of framework is valuable in designing a system for facilitating policy design.

1.5 Structure of the Thesis

This study is divided in two parts, which both serve the purpose of designing a co-creation tool to serve in a research method's implementation for policy design but on the other hand also work as a methodological tool itself.

Part one consists of an introduction to the design context and challenge, and a literature review about designed tools for co-creation and game structure as a framework for creating the Pathway Creation Tool. Chapter two handles the existing tradition of knowledge co-production and co-creation with designed tools and games, also diving deeper into games, introducing classic literature handling the definition of games and play, and specifies the elements of games that are relevant to the context of this study. At the end of part one I will compare these approaches to each other and explain, why I see that game structure was useful in the design of our Pathway Creation Tool.

Part two consists of the description and analysis of the design process and utilization on the Pathway Creation Tool. I will introduce the elements of the tool shortly: rules for how to use the tool, and the material elements with which to work with. After that, I will describe in detail the whole planning process, following with an analysis based on the documentation from design process and the workshops in which the tool was utilized. Part two consists of two main chapters:

In chapter three, I will introduce the Pathway Creation Tool. In chapter four, I will explicate the design process step by step, describe the utilization of the tool in three workshops during summer 2017, and analyze the outcomes and feedback of the pathway creation workshops. In chapter five I will conclude the overall findings I have made during the design process and the utilization of Pathway Creation Tool, and propose a further need for studies in design for facilitative tools in co-creation in policy design context.

2. Knowledge production with designed tools and games

In order to better design and understand the requirements that the TA core planning team had set for the Pathway Creation Tool, I reviewed literature about both games and design games, and aimed at finding out, how could the described design processes and structures of them support our goals fot the tool. In chapter two, I will go through the features and practices that I found may be helpful in creating such tools as the Pathway Creation Tool. I start my review from the very basics though: the definition of games.

2.1 The classic approach to play and games

In the following, I will introduce three classical and modern viewpoints to the essence of games. I chose to use them, because they all have aimed at defining play and game like actions in relation to the surrounding society, and are considered as essential classic readings in the context of game studies (Salen&Zimmerman 2006). Johan Huizinga (2006) and Robert Caillois (2001) have discussed the requirements of games, play and game-like actions. Mary Flanagan (2009) studies history of games and criticizes the traditional game design method,

iterative design process, proposing her own: critical play method. Even though the Pathway Creation Tool is not a traditional game, it can be considered as a design game or simply as a co-creation tool with game-qualities. It does exist in the same sphere with games in general, by comprehending of several game-like features. The features that I consider important for our tool are: rules, limited time and goal-oriented action.

In previous chapters I already discussed the design games and game qualities in design processes. A lot of the literature that handles them, has drawn inspiration from the studies I introduce in this chapter, and for example Kirsikka Vaajakallio (2012) handles design games in the same sphere with traditional games. Often, play and games are discussed jointly in studies (Salen&Zimmerman 2013), thus they are both referred here in relation to game structure. According to Johan Huizinga (2006, pp. 89-100), the essence of play can be traced to a few essential elements: the fun of play (fun-element), a social element (social construction), limitedness & repeatability. Huizinga considers play as universal activity. Although, when playing, we know we play accepting its irrationality while doing so. We also tend to give symbolic meanings to play, thus playing with words and creating a play world as a metaphor for their poetics. This play world can be called a stage, referring to acting in a play, where each individual plays their parts. In play happens imparting of meaning to action, giving it a non-materialistic quality (Huizinga 2006, p. 97).

A commonly used term for play world is the magic circle (Huizinga 2006), a space and time in which the play happens. According to Huizinga (2006 pp.104-105) this play-ground supports the act of play, always guided by rules. A play world is always complete, lacking any imperfection in its limitedness. The fun of play can be traced to certain elements such as tension, a feeling of uncertainty which leads to strive for completion. The play space is marked either materially or ideally, and encloses its performers within (ibid. 113). According to Huizinga we can take a special attitude towards play, a mood of play (a playful attitude) (Huizinga 2006, pp. 114-115).

In his Definition of Play, Roger Caillois (2001, pp. 3-4) criticizes some of Huizinga's thoughts on play. Firstly, he suggests that his work is not a study of games, but an inquiry that looks mainly at the occurrence of play spirit in competitive games. He also suggests that when the act fulfils a sacramental function, it becomes institutional, losing its play element. Caillois (ibid. pp. 4-7) claims that a characteristic of play is to not be able to produce any end product, thus differing from making art. Professionals involved in game activities do not play, but do it for their work. Thus Caillois draws a strict line: play is always voluntary activity devoted to spontaneously. In this character it escapes any responsibility and routine. At the same time, while a place for escape, the game world (which resembles Huizinga's magic circle) shuts outside everything but included within its sphere as irrelevant. Also Caillois sees a game as very timely action, a pure space within a limited time.

The limitations are further defined by rules, which according to Caillois (2001 pp. 7-8) are imperative and absolute beyond discussion. Rules can be broken though, but what ruins a game is not breaking them but a situation where even one player does not find the act meaningful. The pleasantness in playing comes from the restrictions and toughness of the game. Caillois considers a play act as fiction following that

rules create fictions. Although, he separates the rules and act of make-believe, claiming that make-believe is not necessary for game playing (ibid. 8-9).

A more recent study on the essence of games has been conducted by Mary Flanagan (2009). She studies games from the viewpoint of Critical Play Method. According to her, "critical play can and should be included in the traditional game design process". She describes it as play activity, which is more diverse and equity-promoting than traditional game design and activities. Games can be seen as tools, but also as "systems of information, cultural products, and manifestations of cultural practice". They always represent current cultural norms and biases, which is often forgotten in design and play of games. Thus, the game creation process must change, to consider these matters critically. (2009, pp.252-254)

Flanagan's main viewpoints of games and play are that play is "a safety space", offering "a way to capture player interest without sacrificing the process of thinking through problems that are organized subjectively". Also games are "affective and relational systems", and game is "an opportunity: an easy-to-understand instrument by which context is defamiliarised" just enough to allow for magic circle of play to occur. (2009, p.261-262) During her handling of board games, Flanagan (2009, pp. 63-64) notes that board games embody very different philosophies depending on the materials and rules of the of the game: some, like chess, include all the necessary information of the game on board all the time, whereas some games are based on an element of imperfect, to which the players have to react by building their own puzzles.

Historically, not all games were intended to work as pastimes, holding for example ritualistic or spiritual importance (Flanagan 2009, p.68-69). Some games assisted in the development of conceptual processes or helped in forming a connection with time and the future: the main struggles of players over time remain quite the same, trying to gain agency and understand uncertainty through gameplay (Flanagan 2009, p.73). This kind of sense making of the world through a game system can be connected with a modern idea of knowledge co-creation through game structure (Hannula 2014). Games are reflectors of the culture they are created in and through play, they reveal the present context as well (Flanagan 2009, pp.88, 94-96).

Flanagan (2009 p.89) cites Walter Benjamin, noting that "it is only through the intensification of everyday experiences that social change can occur", and continues: "Play, in this case, could function not only to attract players from across the social spectrum but also to revolutionize culture by expressing what might otherwise manifest as dangerously repressed desires". In her quote, Flanagan talks about the 20th century Surrealist approach to games, but voices the fact that a game structure can help in understanding the present time in a new way, and give ideas for the need of change. Recently, games have been used to foster collaboration and dialogue and map paths of action in environmental issues (Flanagan 2009, pp.105-107). In this context, I understand games, and thus design games, as actions guided by set of rules played over a limited amount of time.

2.2. Game forms in design research

"A mesh of different professional, social, or ideological perspectives and interests is typical for design processes" (Johansson&Linde 2005 p. 10). This may be partly why designers have over the years tried to come up with new solutions and tools for sense making during the varying processes. In the following, I will briefly introduce some sense making and knowledge creation tools that have either predecessed or inspired design games, and several viewpoints of how different design researchers have understood and used design games. Since design game design is a somewhat little studied area of co-design, I will use the framework that Kirsikka Vaajakallio (2012) has introduced, and supplement it with relevant notions from other authors.

In our project, one main component of the process has been a question of how to create a feeling of community amongst workshop participants from varying fields. Sanders and Danvanate (1999) use the term Make Tools to describe solutions for facilitating the interaction and knowledge sharing of people, who can represent different perspectives and disciplines. These tools are supposed to help designers in designing experiences, and represent the more immaterial interaction with design. They are often based on non-verbal modes of expression, and include material with which a design researcher tries to find a way for a user to express their thoughts, feelings and dreams. A common example of these are cultural and design probes addressing an empathic point of view to the user's experience (Mattelmäki 2006). These kinds of probes can be taken into account as inspiration for some design games, often being well prepared and designed and embodying certain playfulness, although working more as inspiration for designers than as informants and lacking the quality of dialogue (Johansson&Linde 2005 p.9), which has been important in the design of our tool. We can still draw inspiration from such tools to better understand the co-creation context we work in.

According to Johansson&Linde (2005) design tools can reveal peoples' unspoken feelings and ideas by creating a language that relies both on visual literacy amongst with verbal literacy. These kinds of tools and toolkits have worked as an inspiration for design game research (Vaajakallio 2012 p.21). The problem with defining design tools and design games comes from the fact that most studies handle the topic of designing a product or service with the help of a design tool or game (Sanders 2006) whereas in our case we designed a tool to support a methodology through which to plan for a systemic change. The so-called end product is not a service nor any tangible product, but a shared vision and visualization of a desired future. This sets a certain difference to the point of view that I am going to take when handling the Pathway Creation Tool: My focus is on the design process and the participants' experience of the tool instead of the results that were gotten from the "finished" pathways.

Erling et al. (2012, pp. 105-107) understand design games as part of a design Things category Binder&Ehn (2014): as ways to conceptualise participatory design. The Things can be understood either as "presenters" for the design task at hand or they may work as boundary objects, binding together the designers and users. These design Things can eventually form bigger infrastructures, or become visible to the users as event. The design

	DESIGN GAMES AS A RESEARCH TOOL	DESIGN GAMES FOR BUILDING DESIGN COMPETENCE	DESIGN GAMES TO EMPOWER USERS	DESIGN GAMES FOR ENGAGING MULTIPLE STAKEHOLDERS
RESEARCHERS / RESEARCH GROUP	Habraken & Gross	Iversen & Buur (and their students)	Ehn & Sjögren	Buur & Söndergaard; Brandt and Messeter; Johansson
FOCUS	Studying design processes and designers' concepts	Emphasis on the social interaction in PD	Empowering users in PD	Engaging multiple stakeholders in co-design
CONTEXT	Architecture/design research	(interaction) design education	Workplace design/ computer supported work	Roots in interaction design (nowadays wide design domains)
PLAYERS	Design researchers	Design students (with company partners)	Users	Stakeholders and users
EXAMPLES	CONCEPT DESIGN GAMES: Silent game	"DESIGN IS A GAME" -COURSE: Students create their own design games	ORGANIZATIONAL GAMES: Layout Kit Game Carpentrypoly Specification Game Organizational Kit Desktop Publishing Game	EXPLORATORY DESIGN GAMES: Video card game User game Landscape game Technology game Scenario game
BASE / INSPIRATION	Austrian philosopher Wittgenstein's (1953) language-game.			
VIEW ON DESIGN	Design as a social activity happening within certain time limits and guided by negotiation and a set of rules.			
MATERIALITY	Tangible, predesigned, context-specific or abstract game pieces to make the activities, knowledge and roles of the participating people explicit and to make it possible for participants to exchange perspectives, conceptualise design and negotiate between various viewpoints, for example by creating and acting out scenarios.			

TABLE 1: KIRSIKKA VAAJAKALLIO'S (2012) PRESENTATION ABOUT THE DIFFERENT VARIATIONS OF DESIGN GAMES.

Thing, or design as infrastructuring, is born in the participation of each stakeholder. Infrastructuring of design things originates from 1970s' attempts of democratising workplaces (Erling et al. 116). This approach is close to challenges such as design for social innovation where design is not really seen as a tool for designing an individual product, but as a means for affecting radical change in a societal context (Erling et al. 2012, p.110), coming close to our transition arena aims.

Vaajakallio (2012 pp 97-100) states that the application context defines design games, and within this context, there may be various kinds of games (although excluding some, ie. simulation games) which still share commonalities that may justify them as design games. Vaajakallio presents these commonalities in her table (Table 1), where she has analyzed several different design games and the reasoning behind them.

Commonalities that justify as design games

1) "They create a common design language, 2) They promote a creative and explorative attitude, and 3) they facilitate the players in envisioning and enacting what could be." (Vaajakallio 2012 pp 100-101)

One of the main aspects in the topic "Creating a common language" is the way it immerses the player in by providing game material that helps the player to make considerate choices, understand them and, on the other hand leaves enough freedom for exploration during playing (Vaajakallio 2012 p 100). Hannula&Harviainen (2016) handle constructed Service Design Games (SDGs) in a similar manner to Vaajakallio, and argue that they are efficient tools for creating productive dialogues in order to create knowledge. Separating the ideation from its original context, by setting it in the magic circle of game play[1], the games allow for reflection through simple simulations, that are often based on very simple or participant-driven rules. Although, they also argue that SDGs tend to be often so structured that they can't be perceived simply as playful co-creation tools. They see SDGs as an original methodology for knowledge creation purposes.

Hannula&Harviainen (2016) claim also that as games, SDGs are inefficient, by allowing for delays in design process, not always guiding strictly towards the wanted design goal. Although, they argue, for this reason SDGs are efficient for design purposes, allowing for such ideation, creation of approaches, and understanding, that would not be possible otherwise. In addition, Sanders (2006) describes four levels of creativity: doing, adapting, making and creating. They concern the ways of work and motivations for so-called "everyday people" (Sanders uses the term instead of referring simply to "users"). The fourth and most advanced level, creativity, requires domain knowledge and passion from the actor and also a will to create something new. The game structure can be thought as a method supporting such actions. Brandt&Messeter (2004 p. 130) on the other hand see the development of conceptual design games as "a promising approach for supporting collaboration between different stakeholders in collaborative design". For the transition implementation arena, participants' ability to create together new approaches to achieve transitional change, was an important factor, and thus strongly focused on during the design process of the Pathway Creation Tool.

Emma Westecott (2003 pp.129-134) handles game forms as systems for new outcomes in design research. She states that

[1] J. Huizinga (1950 pp. 12, 19) describes the magic circle of game play as an experience of being in a special game world with its own laws and rules, that do not necessarily follow any of the real worlds. In game theory, talking about magic circle usually refers to Huizinga, who was the first to introduce it.

"(digital) games are powerful as research tools in two ways: as a medium made for modeling and as a framework for focus. New knowledge can be produced and communicated through them. She also sees game form as productive framework for exploring concepts that are truly new (Westecott 2003 p.132). She (2003, pp.130-132) lists some important qualities in games that support research. These are the active nature of games, a narrative experience, interplay between action and consequence, player as performer and a constructive nature, enabling modeling of systems and scenarios. These qualities provide enough emotional distance from any issue at hand that it can be discussed productively. Even though the Pathway Creation Tool is a tool for planning for a specific goal for a community of fore-runners from the field, it can be considered also as a research tool, allowing design researcher to analyze pathway creation process and transition pathways.

Due to its nature, handling systemic change as a topic, the Pathway Creation Tool seems to have some similarities to "simulation games" that Vaajakallio (2012 pp 103-105) excludes from her definition of design games. One of these is the remarkably big role of the game's facilitator. Also typical for simulation games is to have more than one facilitator. The primary facilitator's role in our game included such features as requirement of good knowledge in transition management as a method and the Finnish energy system, facts, issues and debates. They had to understand clearly what the goals of the game playing were, and they had to be available in serving support and ideas, and solving problems for or with the players during playing.

Possible approaches to focus on in design games

Most preceding literature about designing design games does not include others but the (design) researchers in the designing of the game. Although, during the design process of the game, some important decisions must be made, and this is why for example Kirsikka Vaajakallio (2012 p. 219) proposes that a wider team of key players of the project should be included in the design process. This is in line with the principles of iterative design process and Critical Play framework which I have introduced earlier. As a starting point for designing a design game for co-creation, the following four principal aspects (Vaajakallio 2012 pp. 175-178) can be considered: 1) Shared focus of attention, 2) Visual traces left behind, 3) Design games as tools for binding inputs from various people, 4) Transporting participants into another world.

Eva Brandt (2006) introduces exploratory design games in her study. They are designed rather for smoothing the design process instead of working as mere artefacts. Typical for these games is a gameplay that does not aim at finding a specific winner for the game. Instead the game invites the participants to explore and form scenarios together, advancing from the participants' varying backgrounds and skillsets, usually aiming at a mutually created end of the game. The same method has been used also by Johansson&Linde (2005).

One way to look at design games is through their game materials. Vaajakallio claims (2012, pp. 175-178.) that predesigned game materials can help maintain the focus of the players in the topic. The materials may even enable a shared focus amongst players, although be it often temporary throughout the whole

game session. Collaboration takes place each time the design game materials are jointly referred to. Although, badly provided game materials may as well work conversely, distracting the focus of an individual to an irrelevant aspect of the game during a phase that requires each player's shared attention. A lot of effort was put into designing the game materials of the Transition Pathway Tool. Over the pathway creation process, game materials were referred to, not only during construction of pathways, but also when sharing, narrating and videotaping the achieved results.

Vaajakallio (2012, p. 178) claims that design games are not played for fun since they always incorporate a certain predefined agenda that has been set from outside of the game world. She does admit though that design games embody certain play-qualities that are often connected with games too. But why then do we play design games? It is not clear that a design game might be the most effective tool in planning for a system. According to Brandt & Messeter (2004 p 121) "the overall aim of design games is to help facilitate usercentered design process for cross-disciplinary design groups..." According to them, using games as the format for cocreation, "improves idea generation and communication between stakeholders".

Focusing on the game has a democratizing impact on the group work (although, this depends a lot on the game rules, whether power relations can be downplayed or not). Brandt&Messeter (2004 p. 129) have identified two main properties in design games: "the use of game pieces as vehicles for expressing design moves" and "the structuring of concept design activities through game and play". They (ibid. pp. 121,123.) lay their understanding and focus to players that are not just users, but members of different stakeholder groups. Their examples of design games concentrate on the questions of "how do design games function as tentative platforms for scenario-based design?" and "how can challenges be addressed and means provided for multiple stakeholders to negotiate and express a shared understanding?".

The focus in design games should not be as much in the evaluation of the correctness of system descriptions produced over the process, but in projecting whether they make sense to the participants or not (Brandt&Messeter 2004 p.122). In this, design games as facilitators for creating a common language, discussing existing reality, investigating future visions and making requirements for the system, may help. Design games don't have to be finished as such, but can ideally be played with different variations, and invite other design game designers to in to develop them (ibid. p. 129).

2.3 Material Components of a design game

A lot of the literature addressing the material components of design games focus on the "expressive game pieces" (ie. Brandt&Messeter 2004, Johansson& Linde 2005). Some literature also briefly addresses space as a material component of a design game (Johansson&Linde 2005). More literature about the spatiality of games can be found in game studies (Salen&Zimmerman 2006), also Paul Dourish has argued the "place as experienced space" in his 2001 article "*Where the action is: The foundations of embodied interaction*". In this chapter I have collected perspectives from researchers discussing the

materiality of design games, and will try to justify the material design of the Pathway Creation Tool.

Brandt&Messeter (2004 p. 129) argue that the game pieces "used in the design games allow stakeholders to become more fluent in the language of expressing design moves". Game pieces also help to stay focused on the issue at hand and speed up the process of design, allowing several different interpretations of the game at the same time. For our project, speeding up the process was an important factor, since the original structure of Transition Arena working had to be downplayed. When designing the game pieces, it is important to understand that they must be "rich enough in content to span the gap between different understandings and/or interests of different stakeholders" (ibid.).

For the Pathway Creation Tool, we tried to design game pieces that would be both intriguing, and little bit fun to play with, but at the same time convincing for serious discussion over selected topic. Johansson&Linden (2005 p. 5) see design game pieces as communication devices and mediators, becoming carriers of discussions over the process of playing a game. For these purposes, our key game items, the "pathway step" and "step action" magnets consisted of a written topic for the theme of each magnet and for writing down details, the participants were provided with easily recognizable symbols for each theme.

Johansson&Linde (2005 p. 10) describe their design game pieces as "placeholders for different voices, trying to create situations where different perspectives can meet". Same kind of point of view can be taken when viewing the Pathway Creation Tool and its central material pieces, the hexagons which themselves imply an action by presenting a certain topic (such as legislation or energy production), but are not really meaningful until filled in and placed on the game board in consensus by the participants. Participants thus have to empathize with possible actors for each topic. Johansson&Linde also argue that these "objects" can create a situation where not only opinions are exchanged, but the game pieces work as enablers for each participant to step in and out their own perspective. The core of a design game is a process during which the players try to build on the visions they have not necessarily created by themselves, in order to achieve a result or an ending, negotiation is needed (2005 p. 10).

According to Vaajakallio (2012), the materiality of design games "promote explorative and creative attitude". The material and rules play a significant role in inviting the player to act by the game and in respect of the topic encouraging "...moving between intuitive and rational thinking, being spontaneous and using imagination..." but in the end "...to consider alternatives to the consequences they may have...". By facilitating, envisioning and enacting what could be, design games allow for a story-telling mode for participants. The players tell stories of what they have created thus filling the gaps left by the game material (Vaajakallio 2012 p 101). In Pathway Creation Tool, this is actualized in the video recordings as part of the pathways creation process, where the participants had to explain their process and findings to the camera and other groups. In design games, the aim is often to enable "individual sense making and collective learning through discussions, as well as identifying gaps between the reality and the desired situation" (Vaajakallio 2012 p. 104).

It is not insignificant, how the game looks and feels. For example, a game such as "Star of Africa" (Afrikan tähti) could be played on any blank cardboard. But the fun in it comes as much from the map of Africa pictured in it, as it comes from the dynamics of playing it. A person's imagination is triggered in a totally different way, and given a chance to create a story over the playing process. This kind of make-believe system turns the elements of the game into reality of the game world, and makes it more immersive. The elements represent something that draw from the real life, but are accessible because they exist in the game world only, and everything there is accessible to the player.

2.4 Game Mechanics and Rules

Earlier in this chapter, I took the rules of a game into the centre of my understanding of games and design games. Because the requirements for visualizing the Transition Arena pathway creation were many and complicated, we created two sets of rules for the tool (participants' and facilitators'), which were supposed to ease out and structure (but also limit) the process of pathway creation. Also, an important factor of the use of the pathway creation tool, documentation, had to be planned and guided by solid rules, in order to ensure that the final report would have enough and coherent documented material. Thus, I introduce here the use of rules in games and design games, to support the way in which our rules were built.

No matter the medium of the game (board game, table top, mobile...), rules are what define the game from a formal point of view. They give a game the unique identity that sets it apart from other games and compose the player's experience. Games can be examined as formal systems when we create an artificial separation between studying the structure of a game and player's experience of the structure. (Salen & Zimmerman 2004, pp. 120-121) They also define games as artificial systems, that are separate from our daily life. The system is defined by the game rules, but they hold an authority over players only within the finite context of the game. (ibid. p.122) Thus also the impact of the game is effective only inside the magic circle of the game. The primary purpose for rules is to limit the players' actions in the game. To be able to define game rules, Salen & Zimmerman (ibid.) introduce a list of characteristics that can be addressed to game rules: 1) Rules limit player action, 2) Rules are explicit and unambiguous, 3) Rules are shared by all players, 4) Rules are fixed, 5) Rules are binding 6) Rules are repeatable.

Salen & Zimmerman (2004, pp. 129-137) use framework consisting of three parts to better define game rules and how they work. These are the operational rules, constitutive rules and implicit rules. The way of setting up a combination of these three types of rules defines the kind of experience a designer wants the players to have and gives the game a certain unique formal identity. In such way, games can be understood as systems of expression when seen through rules only: "one form of rules allows for the expression of others". When looking for a creating a meaningful game experience to the players, the designer must create such rules, that allow for both action and outcome that maintain a proper player focus. The outcome must be discernible and integrated in order for this to happen. For the Pathway Creation tool, the act of selecting a

pathway step or step action magnet, filling it, and placing it on a suitable spot on the game board, work as a structure of making an action and getting an outcome.

Commitment to the rules of the game is never ultimate, although it often means that one stops playing the game, or the game is not the same anymore if this happens. It cannot command absolute loyalty from the player. (Suits 2006, pp.177-178) Thus the game should have some other qualities that tie the player to itself. Earlier I have claimed that a game's material components can be such. Accepting the games' rules is important for game playing to succeed: the rules' acceptance defines whether you are playing a game at all, and what game you are playing. In games, action happens only in obedience to rules. (Suits 2006, pp. 181-182) Thus, rules work as a limitating factor, but also they allow for game to happen. According to Mary Flanagan (2009, p.252), "The creation of rules of operation makes interesting constraints to provoke innovation in both the designer's process and the player's role".

Rules in design games

Rules have been handled in varying ways in the tradition of design game studies. They have been usually seen as an encouraging factor amongst the game play, but not as something that is to be followed too strictly. Our approach to the rules of Pathway Creation Tool was similar, even though, a lot of time and effort was put in the creation of them. Kirsikka Vaajakallio has found rules in design games central when considering design games as a mindset, since their "underlying purpose is to evoke a playful minset in the participants instead of providing explicit guidelines. According to her, rules are important in "giving boundaries to design, within which the participants can move freely".

She also suggests that rules are "the overall script of a specific game; they describe its progress, materials, goals and roles". Rules can be implicit, given by just explaining out loud or as images picturing the process, or they can be very detailed, guiding the participant through game step by step. Rules as printouts can work as a reminder and guideline in facilitating, and they ensure rather similar starting points and topics for group work, usually still leaving space for freedom. Vaajakallio suggests that since rules are usually associated with traditional game playing, they "work as a bridge between ordinary work practises and the special play sphere – the magic circle". (Vaajakallio 2012, pp. 224-225)

Brandt&Messeter (2004 p. 122) recognise several similarities between design process and playing games: they "are both social enterprises, evolve over time and are based on a set of rules". Also, "The design assignment, the resources, the participant's roles and responsibilities and the ways of working establish, like game rules, the boundaries for the work. In both playing games and designing the rules can be subject to negotiation and change." Brandt&Messeter (2004 p.129) understand the rules of the design game as a driving force in the dialogue rather that something that would restrict creativity. Johansson&Linde (2005 p. 6) on the other hand describe a game that focused on exploration and evolution of design ideas in a collaborative process, framing it by creating rules that were explicit from the beginning and if they needed to be changed, it had to be negotiated as a part of the playing of the game.

Reflective understanding can be created by playfulness[2] that is enabled by free use of language (within the magic circle where rules are already agreed upon). Design games allow for production of meaning through interlacing of different voices which shapes language in the specific situation. (Johansson&Linde 2005 p.8) Johansson&Linde (2005 p. 9) also refer to Howard Becker (1998), stating that their design games strongly ask "how" instead of "why". Asking "how" "encourages a more straightforward storytelling" which "makes part of the playfulness that eases up participatory design processes". For the Pathway Creation tool, the question of "how" proved to be very important through the creation of the transition pathways. In order to create meaningful pathways, the participants had to not just create pathway steps and place them in an order, but also to structure actions around certain steps, to prove how in their opinion the step could be achieved.

Over chapter 2, I have handled the essence of games and design games from a design research perspective, as well as game features in relation to our Pathway Creation Tool, and put a special focus on materiality of games and game rules and their meaning for game structure in general. The game features that I see support the creation and structure of the Pathway Creation Tool are: a) its rules, concretized by two separate guides, for the participants and facilitators, b) a certain make-believe composition, meaning that the participants are supposed to plan for possible and realistic, but still unsure actions for achieving a desired future, c) limited and somewhat structured timespan for the usage of the tool, d) a goal-oriented approach by implying that the pathways need to be finished, and there is a limited set of means for how to do it, e) a material game board and pieces, which are supposed to motivate the participants and with which the planning is expected to happen.

Although, some features considered typical for games, such as competition, imperativeness and unproductivity are not features that could be easily connected with Pathway Creation Tool. Also, the seriousness of the purpose of the tool, and the quality of it possibly working also as a mere visualization tool, take it a little bit further away from the world of games with magic circles. Still, the game features and structure, that is based on the careful and iterative construction of the rules of the tool, allow us to assume that the Pathway Creation Tool is a co-creation tool with a game structure, and this possibly supports the aims of the transition arena method. I will explain and analyze the design process of the tool over part 2.

[2] De Groot et al. (2010) describe a structured play platform created for collaboration purposes. Their aim was to study, how participants would respond to an invitation to act playfully.

2

3. The Pathway Creation Tool

Overview

In this chapter I introduce the material elements of the Pathway Creation Tool. The explanations are based on the game guidance manual, that introduces the whole pathway creation process in detail (Perikangas&Hyysalo, 2018). The way in which we decided to solve the challenges described in first chapter, ended up to being a co-creation tool with game structure. The tool took inspiration from an iterative working process, often used in game design, and consists of several features that can be understood together as a game structure.

I have listed these features in previous chapter. The whole of the pathway creation process consisted of three workshops, during which the Pathway Creation Tool was used. The game materials consisted of info packages, different material elements, vision persona description, rules, preset transition goal for each group and a guide for digitization as well as a private website for the participants. The ways to reach the shared goal of the workshop, create a transition pathway, required negotiation, trust and forward looking attitude from the participants.

Elements

The Pathway Creation Tool consists of several different game elements, linked to each phase of the game. In each phase, the participants are supposed to mostly use only the elements dedicated to that phase, but the usage of them is free. The players can freely pick any individual element and place it on the game board as long as they are able to justify it to their fellow

player companions. Preferable would be, if the players mutually decided on an element and built the pathways discussing it all the time while doing it.

The material elements of the Pathway Creation Tool are:

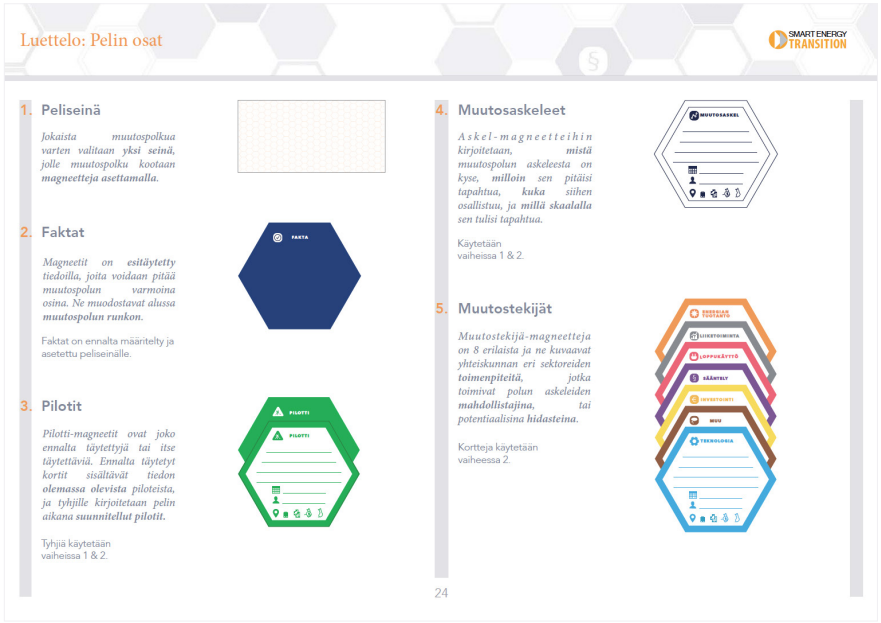
- Rules
- Magnets
- Stickers
- Magnetic board
- Vision persona poster.

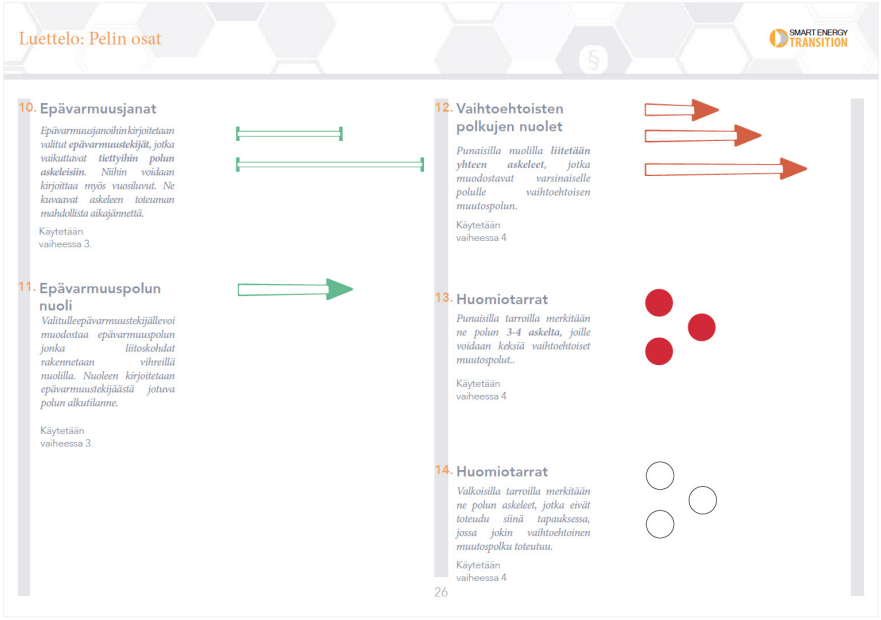
Figure 4: A Table of Contents from the participant's pathway creation guide.

Pathways are formed by connecting pathway steps (white hexagons, Figure 5) and step actions (seven themes, Figure 5) to each other, and creating continuances of thus formed clusters by placing arrows between them. Selected steps or step actions are marked with a colorful round sticker, according to the instructions. Uncertainties are marked with green uncertainty lines, and paths depicting uncertain or alternative paths are formed by using green and red arrows and pencils for the magnets.

Prefilled magnets can be used to mark commonly known facts on the timeline, already existing pilots, or pathway steps that are so evident, that they can be placed on the game board in advance, to also help the participants to start constructing the pathway. The material components of the tool were complemented with three new hexagon magnets between pathway creation workshops 1 and 2. They work as markers, supporting identifying the different factors on the pathway.

The game board serves two purposes, it is magnetic, allowing for easy building and modifications of pathways. It also presets the timeline of the timeframe in which the pathways must be built within. The timeline can be adjusted though.





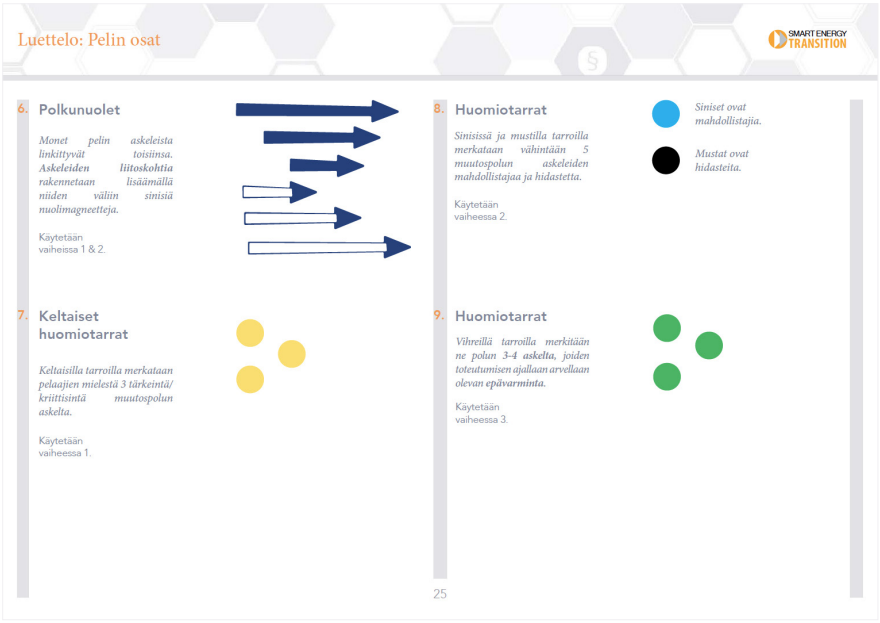


FIGURE 5: THREE PAGE DIRECTORY OF ALL THE ELEMENTS OF THE TOOL, FROM THE END OF THE PARTICIPANT'S AND FACILITATOR'S PATHWAY CREATION GUIDES.

Figure 6: Factor markers that were designed during the already ongoing game workshop series. A need for additional ways of marking important things was noticed, so the magnets were designed and produced ad hoc during the process.

Figure 7: A pathway board setting before the start of pathway creation session. Existing pilots, facts and pathway steps are placed on the board accordingly. To the right from the pathway board, on the table, are all the necessary materials for creating the pathway.

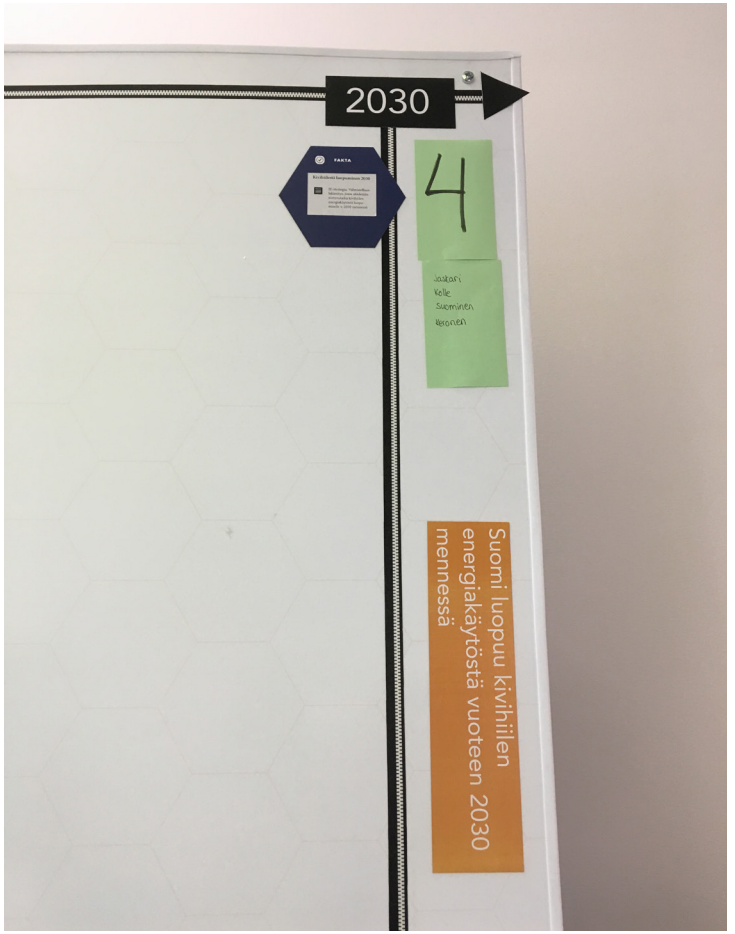


Figure 8: A detail of a pathway board. The timeline for this TA implementation was set until 2030. Each of the years on timeline were separate magnets, so that the players would be able to adjust them if the pathway they created required that. The transition goal toward which the participants are supposed to build the pathway toward, is placed to the end of the timeline as a magnet, with an orange background.

Figure 9: Original covers for the participant's guide and facilitator's guide. Later, after the pathway creation workshops, and based on the given feedback, a combination of these was produced, to enable sharing the method for public (Perikangas&Hyysalo 2018).

Muutospolkujen dokumentointi

Pelin aikana yksittäistä polkua dokumentoidaan:

Nauhurilla

Kirjuri huolehtii, että nauhuri on pelaajatiimin läheisyydessä jatkuvasti, ja että sekä pelaajien että fasin äänet tulevat tallennetuiksi.

Videoimalla (videokameralla)

Jokaisen pelivaiheen (vaiheita on neljä) lopuksi kirjuri ottaa videokameran, ja kuvaa pelaajatiimin yhteenvedon vaiheen tuotoksista. Fasi toimii tarvittaessa yhteenvedon haastattelijana ja avustajana.

HUOM!

Kirjurin ei tarvitse tehdä näiden lisäksi erikseen muistiinpanoja.

Pelin jälkeen muutospolku digitoidaan:

1. Kun peli on pelattu ja pelaajat pääsevät tauolle, kirjurin tehtävä on **kirjoittaa pelimerkkeihin niiden koodit.** Koodien perusteella voidaan yhdistää pelin eri osat toisiinsa digitaalisessa muodossa.

2. Seuraavaksi kirjuri **ottaa valokuvan koko pelistä** puhelimensa kameralla. Voi olla tarpeellista jakaa polku useampaan kuvan riittävän tarkkuuden saavuttamiseksi.

3. Kun työpaja on ohi, otetaan esille valokuvat poluista, ja **aletaan kirjoittaa pelin sisältöjä** dokumentointi-tiedostoihin.

Figure 10: A caption from the documentation info package for the note takers and facilitators.

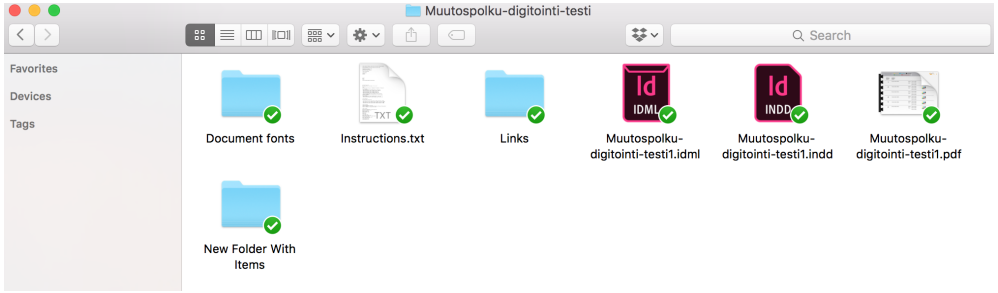


Figure 11: A test folder from the digitation training, that each note taker was asked to download on their own computer.

Figure 12: A cover of an example for a final report from an individual pathway.

The usage of the tool relies heavily on the instructions of the tool. Pathway creation process consists of several phases, each differing from each other. In order to move to the next phase, there is always certain things that must be achieved first. The instructions are handed over to the players beforehand, thus setting a lusory attitude (Suits 1980) in players' minds in advance. The facilitator fosters that the process goes somewhat according to the rules during the pathway creation.

To enable a smooth process for all the participants in the transition arena several, varying, instructions were created. The participants got their own instructions, but also the facilitators got an own version of them. The facilitator's instructions were supplemented with method and phase specific notes, that would help also non-designers in the facilitation process. Most of the facilitators were not designers but researchers and experts from energy consumption related fields.

In addition to "how-to-play" –guides, separate instructions and a training for digitizing the pathways were designed. They were supposed to unify the process of digitizing the contents on the game board. The digitation process was given to the note takers.

The digitation instructions were planned in the form of the final report layout. The idea was to save some time and document the content in as final form as possible right away. Each pathway got their individual Dropbox folder that contained a layout for the documentation, and the facilitator and note taker would take care of documenting the materials in those folders.

VISION PERSONA

Smart Energy Transition

FAMILY KUKKONEN & JOKINEN

SOFIA KUKKONEN: 48 years
Teacher, 3600€/month

ARI JOKINEN: 46 years
Teacher, 3500€/month

LINDA KUKKONEN: 8 years
Grade schooler

LIVING

Centre of Oulu, Torikatu, 82m2 apartment building, built 1972.
Sofia is in the board of housing cooperative together with Erkki 74 years, Markku 78 years and Lasse 55 years.

ENERGY CONSUMPTION AND USAGE

Heating: District heating, indoor air temperature 22-24C
Electricity: 2400kW per year

FREE TIME

Each family member has their hobbies in the centre of Oulu.

TRANSPORTATION

Own car and public transport in the centre of Oulu

INTEREST

– Improve the real estate energy efficiency cost-effictively.
– Save in expenses, support climate friendly energy.

ASSUMPTIONS RELATING TO PATHWAY IN 2030

"Reducing household energy consumption by change in behavior by 15%"

A) Pipe and roof repairs planned for the house, window repair in 10 years' timeframe. Sofia has suggested the housing cooperative that everything should be done simultaneously. She has also proposed for 20m2 solar panels, 30m2 solar heat collectors, extra insulation, forced ventilation and connecting the house in remote controlled demand response system for heating. The rest of the board is doubtful about how can the residents finance big repairs. The middle age of residents of the house is 63 years.

B) Sofia has ordered a preliminary review from ESCO company, but the role of its actions in the middle of other repair projects is unclear.

FIGURE 13: ONE OF THE TRANSLATED VISION PERSONAS REFLECTING THE VISION THAT THE PARTICIPANTS HAD CREATED IN A TA WORKSHOP THAT PRECEDED THE PATHWAY CREATION WORKSHOPS. SEE ORIGINAL FINNISH VERSION IN APPENDIX 1.

To help players imagine better, in what kind of visionary world people would live in 2030, the TA team created personas with pictures and superficial information about them (Moritz 2005, p. 216). The characters' features are not strictly based on research, but are fictional, considering basic key characteristics of key implied groups of people (Figure 13).

4. Design process: The iterations that we went through to get a complete game

In this chapter I will describe the design process of the Pathway Creation Tool in detail. The description, with which I have adapted journal like style, is based on interviews of the members of TA core planning team, memos from piloting workshops and discussions, and other documentation that was produced during the design process. The game was designed through an iterative process by using collaborative design methods. The basis for the game was set by Aalto University students during a master program course in Autumn 2016. The process lasted for approximately ½ year and a wide group of people from students to researchers, experts from the field and TA participants were included in the planning. The design of the Transition Pathway Tool consisted of several phases over the iterative design process:

Step 0 – Initial ideas for the design game: realizing the demand for a co-creation tool

Step 1 – Strategic co-design course: students designing the first prototypes of the tool

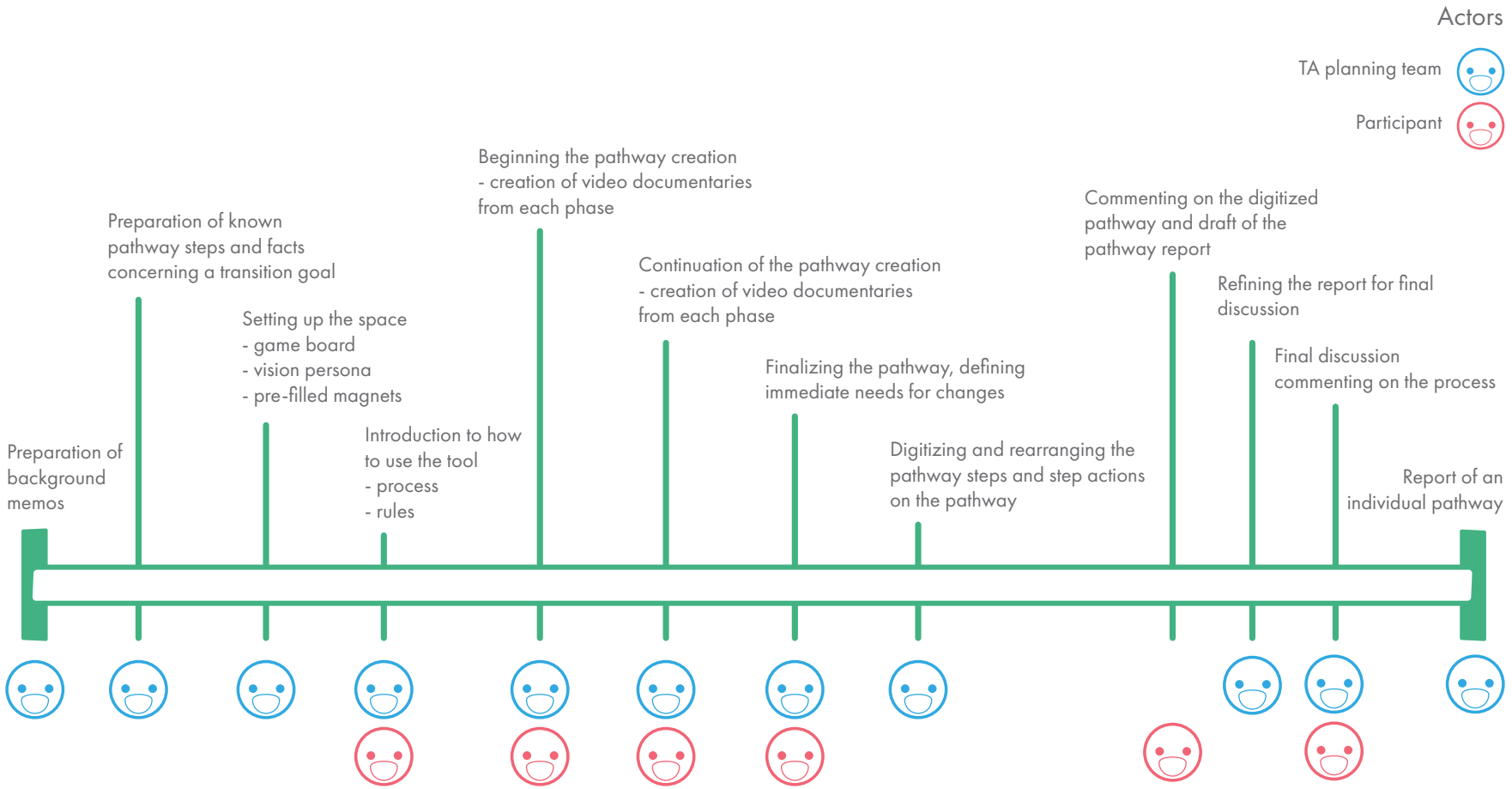
Step 2 – Pilot 1: Co-design sessions and piloting among the TA planning core team

Step 3 – Pilot 2: Taking along the whole TA planning team through play testing and feedback sessions

Step 4 – Pilot 3: Passage of the ready game materials and instructions in detail with the facilitators and note takers

Each step included planning and iterations based on the findings and feedback from the previous step. The iterative design process, which I have introduced earlier in this thesis, was implemented in the form of playtesting the Pathway Creation tool in several pilots, and continuing the iteration throughout the actual transition implementation arena workshops: modifying and adding on elements to it when needed. Enclosed to the process was also the design and training of the pathway digitizing materials. The material was prepared when the actual game materials had been finalized. I designed the material to work as a tool for structuring the most relevant information on the pathway in a visualized manner, and TA core planning team held a co-design workshop and training, over which the rest of the TA planning team got to practice the usage of the graphic tools (Adobe InDesign& Illustrator) and develop the digitizing manual towards a direction they saw best.

Our process can be strongly considered as co-design for co-design. The pilots, planning sessions and trainings all included a clear component over which the TA planning team ideated the Pathway Creation tool, its rules or other guides



GRAPH 1: A LINE PRESENTING THE MOST VISIBLE STEPS FOR TA PLANNERS AND PARTICIPANTS, RELATED TO PATHWAY CREATION.

further based on the material that the designer had brought to them. By planning on sharing this designed material and ways of how to build one's own similar tool, we are touching a point where it can be said that this tool also has a certain meta-design component in it. (Erling et al. 2012) The design process was strongly focused on the iterations of the actual rules, mechanics and trainings since the style and material components of the game had been defined already after the first pilot. The essence of the game was not tied to only the material pieces, but the creation of the experience was seen as a wider process that included several actors, starting from before the actual workshop and ending only sometime after the workshops (Graph 1).

4.1 Step 0 – Initial ideas: realizing the demand for a co-creation tool

The early thoughts of what the pathway creation tool could consist of were born in September 2016, when Prof. Hyysalo read through manuals for setting up transition arenas (Melbourne manual and other guidance manuals). In these manuals, his attention was caught by the notice, that when describing the transition paths, the representations of the pathways were pictured very metaphorically. Some individual elements from the pathways were indicated in the manuals, but overall, it was not visualised what the actual steps on the pathway were, what were the other elements on the pathway, or how the pathways were created in the first place. Whereas other parts of transition arena were described in detail, such as vision building, or carefully elaborated, such as "immediate actions and responsibilities tables", the pathways appeared difficult to construct within limited time and were discussed in broad terms only. Thus, the first design challenge for transition implementation arena in Helsinki was, that the TA core planning team would have to come up with some new kind of way to structure the sociotechnical pathways connected to transitional change and the focus should have to be in visualising 15-25-year timespan transition pathways.

Creating tools that did not exist, would most likely be a major part of the whole TA project. The transition pathway planning would include a lot of different, interlinking factors. The steps on the pathway would not be plain simple moves, but there would be several different factors linked to each of them, such as technological transition, financing, legislation and new business models. Common for these factors would be, that in order to achieve one, there might have to be several preceding factors to enable it.

This raised the question, whether those factors' handling could benefit from tools that would be playful or gamified. A game like structure might allow for building mechanics, that could help the participants to contribute in a way that would be something they are not used to in conventional strategic planning practices. The strength in the workshops series and Transition Arena in general is, that it collects a multidisciplinary group of people together, and they all have knowledge that complements the others' (Loorback et al. 2015). Those people would have to come up with actions, plan them and time them in a reasonable manner. They should also be able to tell, what ideas are good and might work in their opinion,

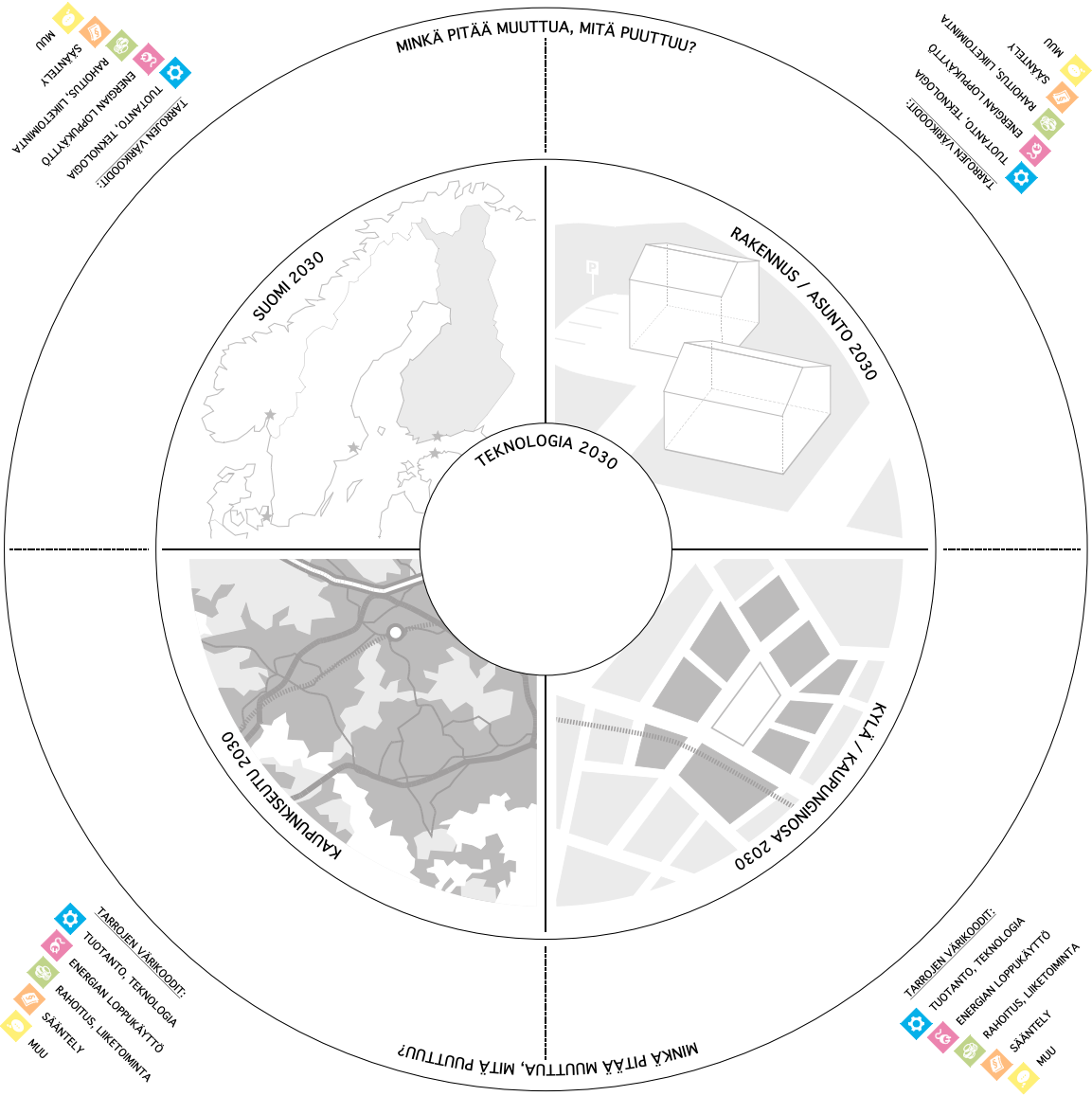


Figure 14: The template that was used in the 6th June 2016 workshop by Hyysalo's research group, and was later introduced to the students at the Strategic Co-design course.

or need some changes elsewhere at the same time. And they would have to be able to plan what comes after these moves.

The tool for creating pathways should be planned so, that it would support the knowledge of the participants in the best way possible. Hyysalo's hypothesis concerning the preceding manuals was that it seemed that the pathway planning sessions had been constructed in a traditional workshop facilitation manner, thus creating the threat of wasting time in planning and difficulties to work effectively towards each pathway element and their interrelations.

Considering these requirements for the tool, Hyysalo came up with an initial idea, which he got from the circle template that was used in a SET workshop in 6th June 2016. It was used to examine different technologies scale by scale towards 2030. This template was too simple to cover all the needs of TA pathway creation though, thus a more comprehensive tool should be designed separately. First prototypes for the tool would be produced by students during the Strategic Co-design course in Autumn 2016 in order to take the idea of a tool further and get to test different solutions to it quickly.

4.2 Step 1: Strategic co-design course: students designing the first prototypes of the tool

October 2016 and planning of Strategic Co-design course

The restricted timeline of the whole TA workshop process was an important starting point for planning the assignments for the Strategic co-design course. The time used for the creation of the pathways would have to be divided between several other parts of the TA process, and still some features of the original process would have to be dropped from the upcoming implementation arena. The consortium decided, that the implementation arena length should be a maximum of five to six workshops to ensure that the busy high level participants who were sought after would volunteer and then commit to the process.

Thus, the tools for creating pathways should be as compelling as possible. Initial requirements were, that formation of pathways should be effective, and the documented information should be visualised in such a way, that the TA organising team could easily supplement the information into digital format, and while doing so also give the participants the possibility to comment and iterate between workshops. Thus, students' focus should be put on understanding how to motivate the participants of the TA, and structure a process that would be easy to adopt for both the participants and organizers. The expectation was that working with traditional materials, such as sticky notes might feel too undefined to the participants, who would be expected to create something very concrete, instead of focusing on talking and visioning.

In the beginning of the Strategic Co-design course, students were introduced to the transition management methodology, Transition Arena (TA), and how it had previously been used in planning for transitional change in sociotechnical landscape. Students also became familiar with the aims and timetables for the ongoing transition management project. The course project work was to be exploratory concept design, out coming with a visual or material result to be presented for discussion

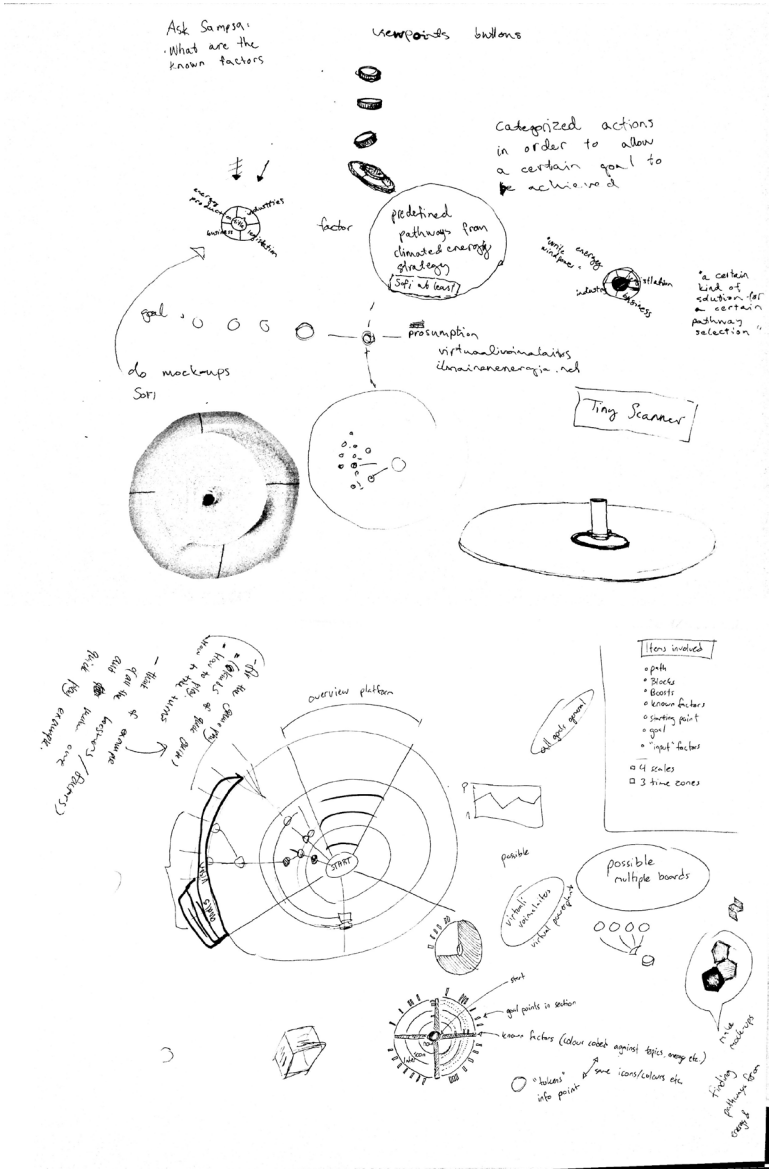


Figure 15: Early sketches of the pathway tool from group B.

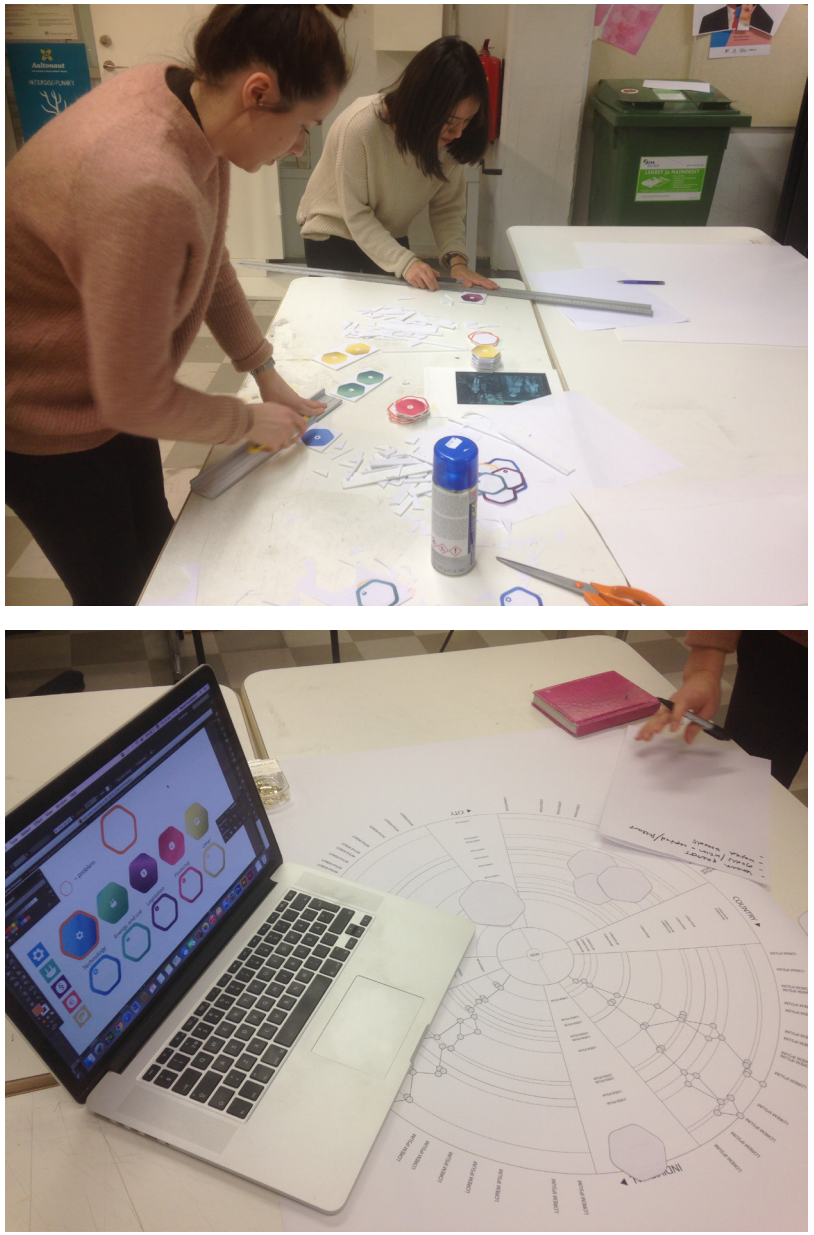


Figure 16: Group B students preparing paper prototypes (top) according to the design (bottom).

and evaluation. Students were divided in groups, and several assignments concerning the topic were divided between them.

Students were asked to work on several phases of the TA process, but in this discussion I am concentrating on the ones that handle the usage of pathway creation tool in three workshops. Central for this discussion are two of the four concepts developed: "Brief B – Phase 2: Pathway visualization" and "Brief C – Phase 3: Pathway resilience and continuities". At the time, I worked on the brief B, in a group with my fellow students. Our work was considered as a good starting point for the Pathway Creation Tool, and that is why I am putting more weight on describing it here.

Brief B was instructed as follows:

- "Device a way to visualize the pathways of change, pathway interrelations and key actors in these pathways. These need to support moving items around in a "pathway" and depicting interrelations, blocking and boosting relations.
- Pathways need to be built from current experiments forwards and from 2030 vision backwards.
- Pathways are formed in four different scales, each scale likely featuring several paths.
- Added benefit if all the pathway depictions can be physically consolidated in analysis stage."

Brief C was instructed as follows:

- "Design a way to create pathway depictions;
- How to depict pathway changes with resilience factors,
- How to depict discontinuation and continuation of institutions (i.e. taxation forms)"

Brief B was assigned for two different groups, and brief C was developed by one group. In this study I will only handle the other concept for brief B, the one I took part in. Thus, when I refer to Group B, I mean my working group for brief B, and when I refer to group C, I refer to the group that worked with brief C. Group C was encouraged to have discussions and get inspired by both of B groups' concepts, because their concept would be a continuation phase of the previous one in the TA process. All three groups came up with interactive board game style solutions for the visualization. Although, the level of "gameness" varied among the concepts. These concepts were followed up until to the final game concept that was developed in Spring 2017.

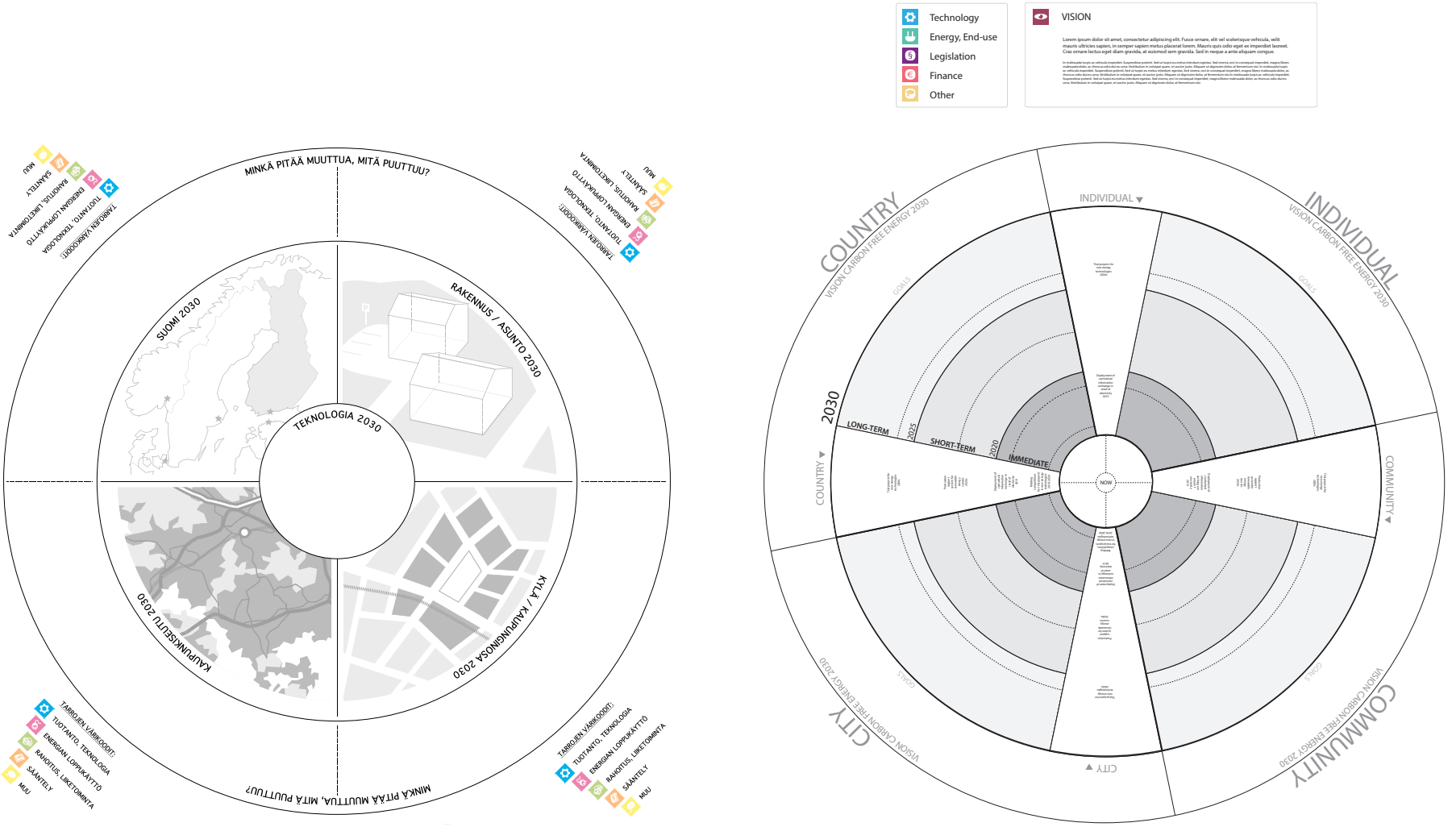


Figure 17: A pathway visualization board (right) by group B students, which was based on a round shape that would showcase each scale for pathways separately. It is similar to the 2016 summer workshop template that it took after (left).

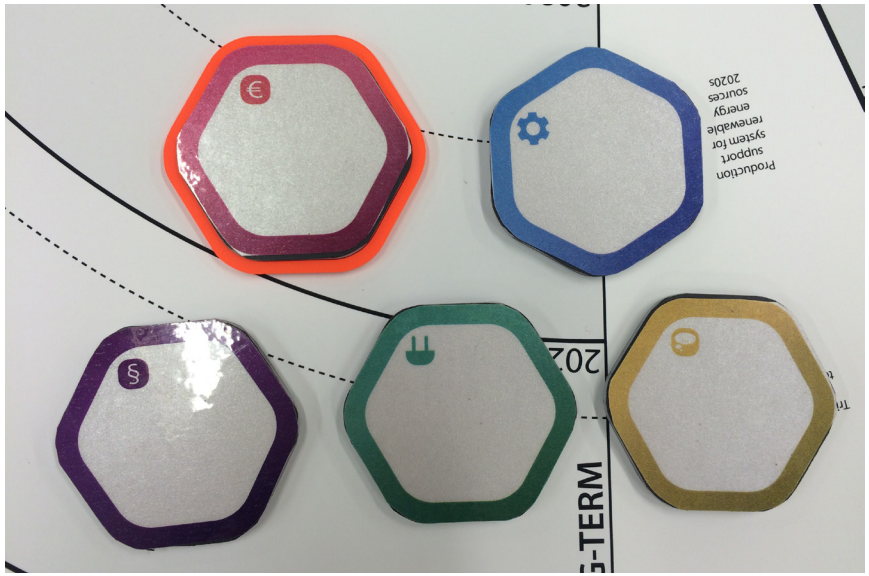


Figure 18: Pathway step magnets with different themes and an orange acrylic frame that worked as an attention marker. A part of the prototype by group B.

Figure 19: A poster from the group C's work that visualizes pathway resiliencies as a puzzle on a square board.

Figure 20: An example of a pathway formation the students suggested. Pathway starts from the centre of the round game board, and proceeds towards the edge. In this model, each scale is handled separately so, that for example the city scale would get several dedicated pathways. The scale of the game board prototype was circa 1:2.

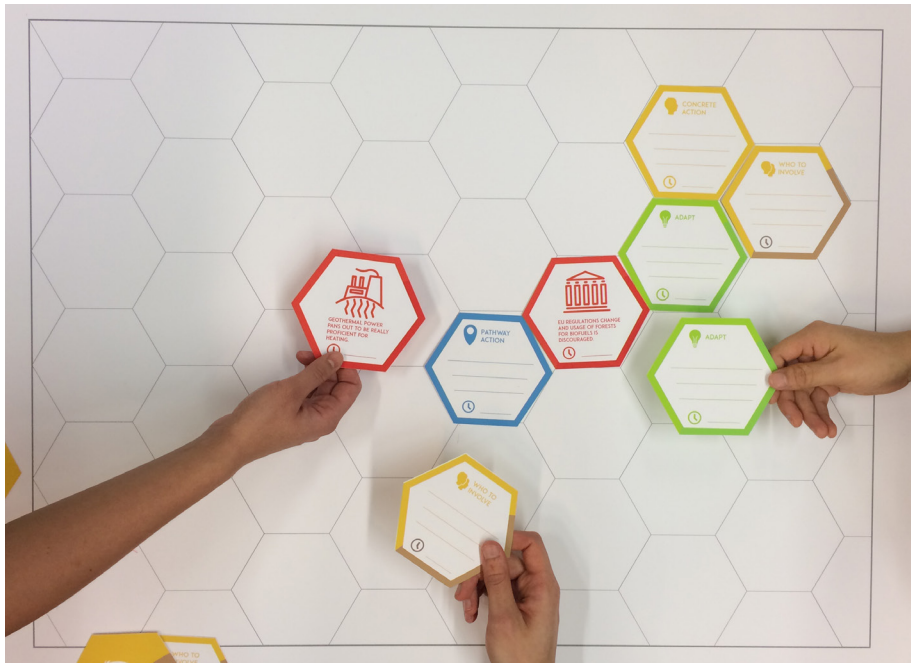
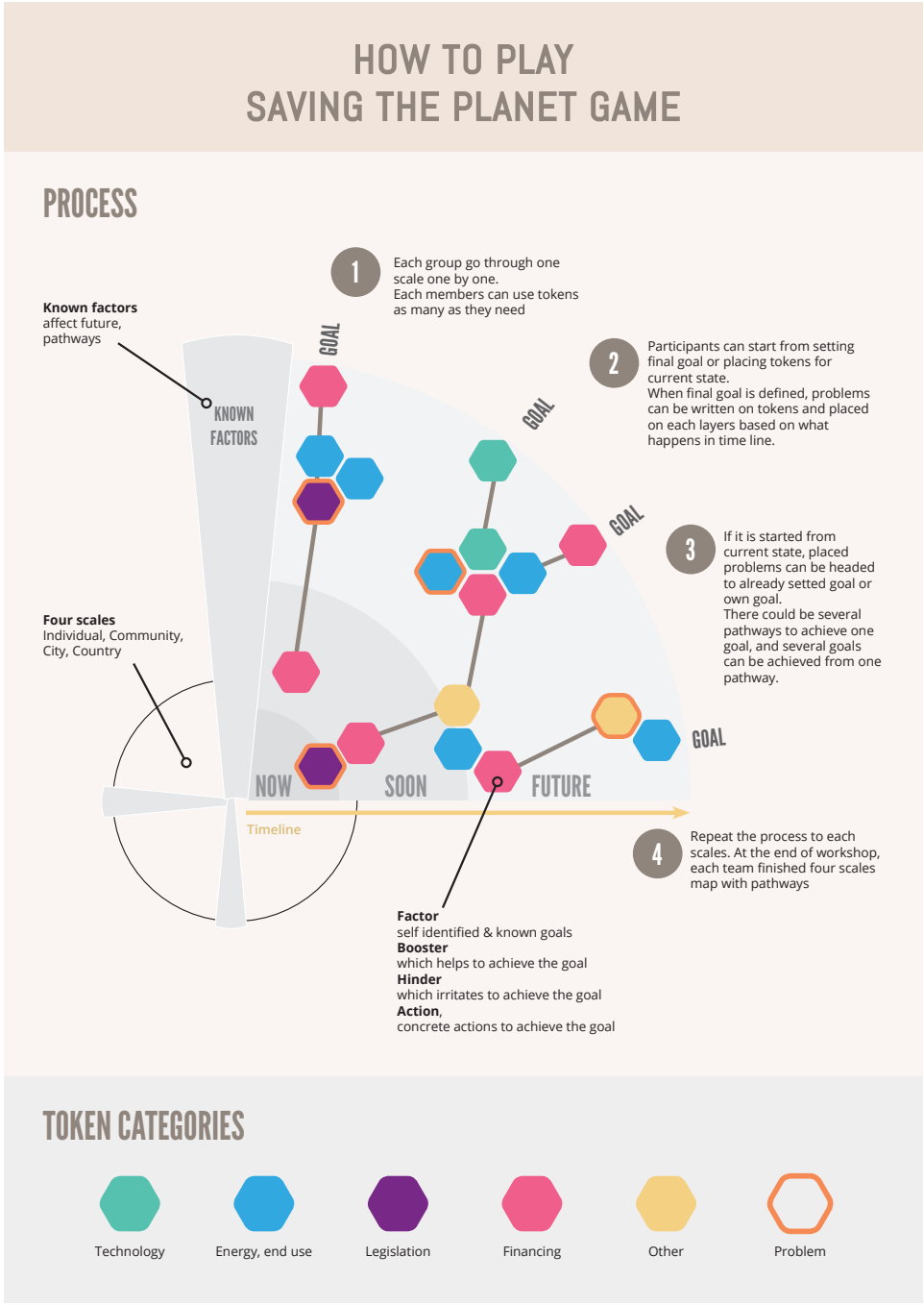


Figure 21: The same honeycomb model was used in two student group's work. The inspiration for using descriptive icons came from group C's work. Also the bigger size of the hexagons with group C was seen as more useful.



Student groups' work

The prototypes by students (Fig. 20&21) introduced two somewhat similar solutions with methods to visualize the transition paths. Some of the selected methods for follow-up development after co-design course included a round game board model which included a sectorial inspection of different scales of the paths steps. The paths would be created by using movable magnets, and linking of different steps together would happen by attaching pieces to each other.

After the co-design course

After the co-design course, the TA core planning team evaluated the prototypes and concepts that the students had produced, and chose which characteristics and features would be preserved for further development of the Transition Pathway Tool. The TA core planning team saw that the B group's game model of was good in several ways. Game board was based on the template that the SET team had prepared for a workshop in Summer 2016 to consider things by four different scales, instead of technology fields. Considering all the pathways scale by scale was a considerable idea. Also the B group's idea of using easily movable magnets and connecting them to each other were valuable ideas. As well as the ideas of supplementing the magnets with specific frames as attention markers. The prototype by group B was also visually convincing and interesting. From group C, the most valuable solutions were the size of the hexagons, and a squared game board with a honeycomb structure.

Figure 22: Group B's proposal for the playing process. The visualisations and thorough game guide were based on the hypothesis that the TA participants would be motivated by the thought of their effort being meaningful, and not losing any valuable time by attending the workshop session. Also motivation would be raised in the mere interest for using the tool, seeing it has been personally planned for them.

Thus, after consideration, the circle game board model by group was given up. That was due to two main reasons. The TA core planning team believed that there would be a lot of pathways in the end of the workshop series. Many of the pathways would be such, that they would connect to several different scales. This would raise a question of how to visually connect these relations between the paths. The second point focused on the shape of the board in a very concrete way. Auvinen had experience in planning climate road maps before, and in all of them, the tendency was that a lot of actions would have to be made in the beginning of the road map, in near future. That is why a game board model with a starting point in the centre would be most likely too narrow for the pathways. Inversing the game board would probably be difficult to embrace visually and also, towards the ending of the timeline, there would likely be planned a new set of pilots, as preparation for the time after 2030, thus making the centre of the round game board too narrow again.

The motivation factors of the tool for participants were also considered at the time. The tool itself should motivate the participants to work, instead of motivation coming from outside of the pathways creation context. The participants' inner motivation would be good, since they would each be experienced experts in their own fields, willing to develop them. The best way for the TA organizing team to feed the motivation of the participants would be to show that they have put effort on the planning of process in order to best evoke the participants' knowledge. A best guess for what the participants might be thinking when taking part in the process was:" is this going to be the most useful thing for me to put my important time in?". One motivator was also thought to be the chance for the participants to learn from each other. To these requirements, the planning team decided to answer by a careful design of the game tool. The tool would be based on the existing prototypes and its central features would be:

- Plausibility
- Attractivity
- Attention on different scales
- Multidisciplinary approach on different technology fields.

The last feature would be notably important, since a traditional way to create energy and climate strategies in Finland has traditionally put emphasis on considering each technology separately. That kind of thinking does not support well the idea of transitional change where different kinds of actions are needed in order to create new kind of production and structure of consumption. A more concrete approach, that encourages the participants to think what would have to change in order to reach the big goal and how would each of those changes affect different actors and scales were central for the planning team.

Planning of the tool among TA core planning team

After considerations, the planning team decided that each of the pathways would have to be formed separately. Initial idea was, that at the end of TA, there would be about 30 transition

pathways, as this seemed a plausible minimum for covering Finnish energy system. It would be up to the TA participants to decide the final amount of them though. Planning of the tool was started by considering how to construct an individual pathway. A clear risk in that kind of formation of a pathway could be that it might be created in a technology driven manner, forgetting about the scales and other important factors of society. This had to be prevented in facilitation in such manner, that the facilitators could react to and redirect the style of working if needed. The core planning team also considered that having a clear target "persona" whose perspective would be key to the transition in the pathway, might help retain reality and societal considerations in the pathway considerations. This could help also in tying the pathway to a certain scale.

On the other hand, it might be possible to build pathways without any extra material. Some of the transition goals might not work in alignment with the scales anyway, if they wouldn't have a naturally identifiable scale. Defining a strict scale for a goal might be a risk too, for not looking at any other possibilities in such case. On the other hand, a risk of using the national level as the only scale did exist, since in Finland, many energy related issues have been handled before from that point-of-view. Already the participants' invitation to the transition arena process and later the instructions had emphasized that energy and climate change was examined on different scales and in a cross sectoral manner. Resilience analysis was decided to be left out at this point, since it was thought to take up too much time and energy. During the TA process. Although, it was reconsidered later over the process in piloting workshops, and decided to take in by adding two new phases to the pathway creation process.

Material components of the game

A plain honeycomb game board was selected for design because the core planning team wanted it to be as simple and versatile as possible. It would allow for changes along the pathway planning process if needed. Instead, the different play elements, magnets, stickers and personas, would refine the overall image of the game board. The idea of connecting the hexagons with each other was already visible in the students' prototypes over the Strategic co-design course, with both groups, B and C. Also, group B had an idea of marking individual hexagons and that the formation of pathways could be done in separate phases, after which the information would be complemented.

The dimensions of the game board and hexagons were planned in December by Hyysalo and Marttila. Things to consider included keeping the scales visible, and how many steps would fit on one board. The students in group C had made a usable model of the hexagon size that allowed writing and reading text on it. Hyysalo and Marttila counted that over 13 years, at least 10 steps should fit on the board. After that, they estimated how many step action magnets would have to fit next to one step. The assumption was set in seven factors, and whether there would be more than seven, the planning team could come up with a way to for example pile them on each other. At least one empty hexagon should fit between two steps, to prevent them from getting mixed with each other. Thus, with this simple mathematics it was decided that the board should be 240cm long. The pathway needed to be able

Figure 23: Instructions for filling the magnet in participant's pathway creation guide. Both pathway steps and step actions are filled in the same manner: Writing down a short description of the event and defining its date, actor(s) and scale.

to branch and it could be assumed that pathways with three branches would be born over the formation. Thus, given the visible size of text within the hexagons and thus the minimum size of each hexagon the board should be at least 120cm wide, preferably even 130cm or 150cm. Dimensions were calculated based on the existing hexagon prototype size and assumptions of possible pathways.

4.3 Step 2 Pilot 1

Planning of the first pilot with the TransitionArena planning core team

I (re)joined the TA core planning team in step 2 of the design process, as a master thesis worker and research assistant. During this step, the ideas gotten from earlier phases had been concretised, and I started designing the final elements of the pathway creation tool, at first concentrating on the design of the hexagons: transition steps and step actions.
For the first pilot, an average number of necessary pieces was counted, and printed on a thick paper, to represent the magnets, and pathway board was printed on paper as well, in actual size. The actions' scales were still something to work on: how to present them clearly but not too space consumingly. Finally, the team came up with presenting the scales as icons related to each pathway step and step action in the magnet (Figure 23). All the magnets should thus be marked with scale(s) intended for the pathway step or step action.

Co-planning sessions

In the first planning workshop in January, the core planning team went through the design of the hexagons and decided what different kinds of themes there should be. At the time, the idea was that the magnets would be thick and made of stiff acrylic board. Also, the team pondered what kinds of ways there could be to notate different hexagons, whether they would be some frames or stickers, or other magnets to work as attention markers. The hexagon should have enough space for writing. For example, if the theme was "Investment" it should be possible to describe it in more detail on the hexagon. Also, a list of the needed themes for the hexagons were made, as well as a plan of pathway elements for the first pilot. They were at the time:

1)Hexagon–pathway board 150cm*240cm

2) Pathway piece, hexagon:
Step on transition pathway (white)
Pilots (green, prefilled & empty)
Operating models / Business models (grey)
Investment (yellow)
Energy end use (red)
Energy production (orange)
Regulation (violet)
Technology (blue)
Other (brown)

3) Pathway piece, parallelogram:
2030 goal (colour coded?)

Each hexagon should include:
Theme symbol and text (top)
Year (foot)
Actor (foot)
Scale icons (apartment, community, region, national)

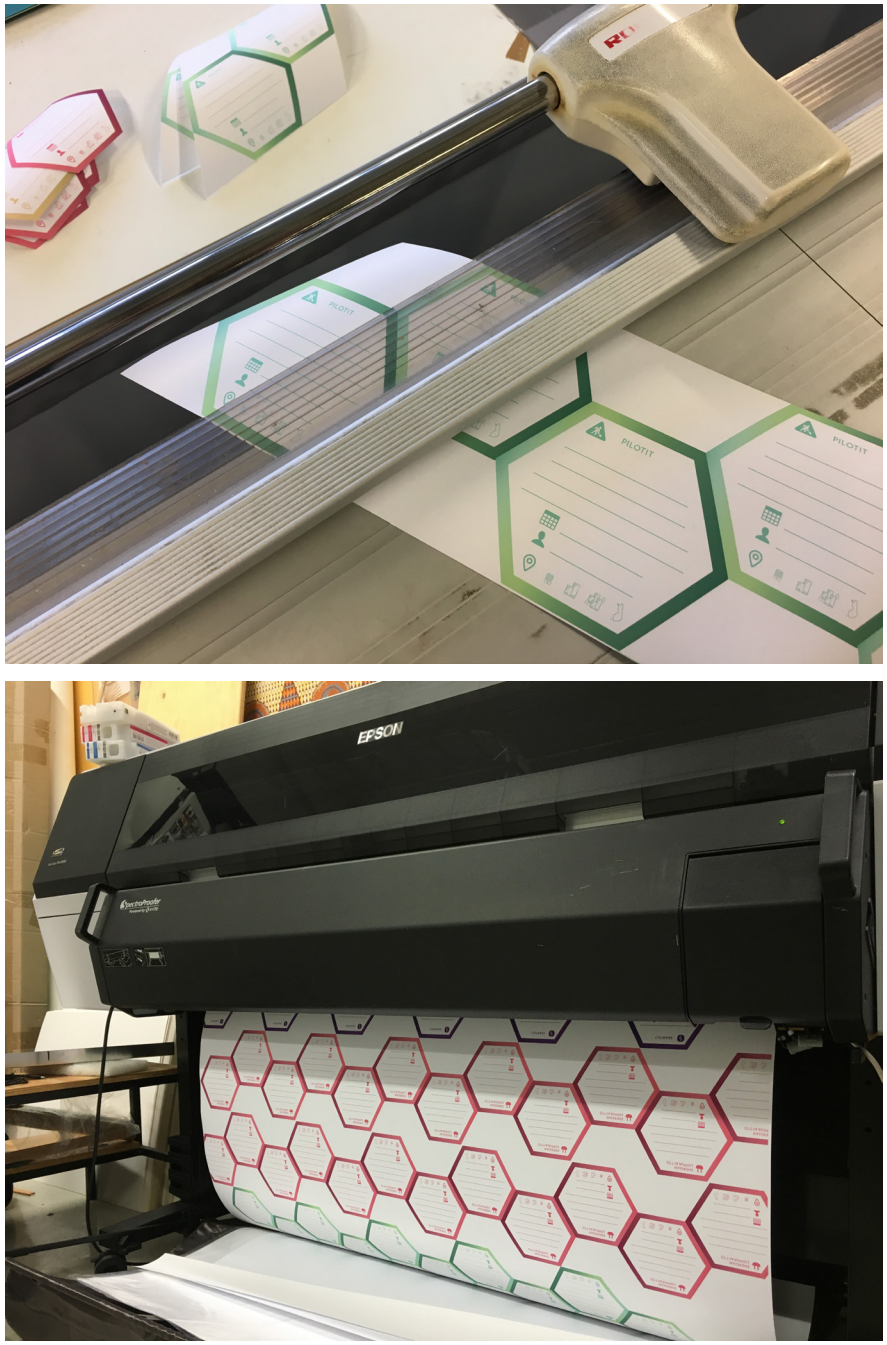


Figure 24: The prototype for Pilot 1 was prepared by printing the hexagons and pathway board on thick paper.

These pieces should be printed on paper in real size for the pilot workshop. In addition, some empty hexagons, sticky notes and pens would be needed. The planning team decided that the final pieces of the tool would be ordered from selected manufactures, which would allow for the designers to plan for game elements that might otherwise have been too time consuming to produce by themselves. The assumption for the number of magnets for all six planned game boards was approximately 1000 pieces. The game boards TA core team decided to produce by themselves though, since the dimensions and usage for them was somewhat special, and readymade alternatives could not be found in the market. During the first pilots, initial idea was to put the boards over a table, but eventually it proved to be a better idea to produce stands for the boards, which supported the creation of pathways better.

Instead of drawing on the pathway board, the core planning team thought that it might be better to use arrow magnets to connect the steps of the pathways to each other. One thought was to have also some marker for notifying whether one path converges with another. At the time, the core planning team thought that the pathway could have several transition goals. The design of the goals was not ready though, and for the first pilot it was decided to use just sticky notes, on which the goals would be written. Also the idea of arrows should be tested with sticky notes or something else, since those were not prepared for the first pilot.

After planning of the material elements of the tool, the question of how to present the existing energy pilots in Finland was considered. The starting points for the pathways are in present time. In 2017, there was already about 140 different

pilots going on in Finland, regarding energy transition. The existing pilots should be gone through and connect to the chosen transition goals. Some new pilots might also be planned during the workshops. The existing pilots would work as a starting point for back casting from 2030, and they could be placed on the game board before the beginning of the timeline, so that they would not confuse the participants. Working on the pathways could work to both directions, by back casting and forward casting.

Pilot 1

The first internal testing of the tool was held on 20th January 2017. The main finding was, that the size and initial design of the pathway board worked well. Also, the idea of magnetic hexagons worked. Some iterations were needed in order to make space for existing pilots before or in the beginning of the timeline, thus the marker for the year 2017 should be moved by 30cm to the right. The kind, naming and amount of each hexagon magnet was discussed, and the team decided to make some changes in the current versions. It also became clear that the arrows would be needed to connect the steps of a pathway, and the kind and variation of those was discussed. The team also realized that the pathways would not necessarily be very simple and clear, but more complex than first expected and contain several optional paths towards the main goal. Thus it would be quite important to design the visuality of the pathway in such a way that even if it contained a lot of information and details, it would look understandable and clear.

Figure 25: The core planning team testing the formation of a pathway in pilot 1. Pathway board and hexagons were printed on paper, and pens and sticky notes were used as arrows and transition goals.

Planning of vision personas

The core planning team decided that concretising the transition goals would happen with persona descriptions, which could be put up to the walls as posters. The persona description would include the personal history of the character, with the elements from daily life which are communicated in respect of the big picture in the background. This kind of system could work also as a way of communication in the final report. For instance, the Melbourne resilient futures project had a similar system (McGrail et al. 2015), but it could be taken into more detail, explaining visually step by step the procession of the pathway.

The TA core planning team had already earlier assumed a need for persona descriptions concerning each transition goal, in order to focus each pathway to as concrete level as possible. Thus Hyysalo and Perikangas started drafting an exemplary persona before the beginning of the workshop, after this need had been recognized over a talk through of the pathway. The pilot would focus on a transition goal of ”250 000 electric cars in Finland in 2030”, and for such scenario, was created the family Nieminen, who lives in Vantaa, and uses an electric car daily. The planning of vision personas was continued after the pilot session, and the team decided to create several personas, to better fit them in varying pathways. Each persona description would include the personal history of the character, with the elements from daily life which would be communicated in respect of the big picture in the background.

More detailed requirements for the personas included that the information in them should be something that would be easily created based on expectations related with present. The persona description should also include a reference to the main scale that would be handled. For example one persona should be in the detached house scale, but in case of for example giving up carbon, should the team create a character who is responsible for district heating issues in her company and has to ponder them from a wider perspective, in regional scale. The team decided to create a template for personas in such a way, that the creation of new ones would be easy. Providing a template with an anonym icon of a character, and empty space under fixed headings, could allow for new personas to be made even during the pathway creation if the facilitator felt a need for it. The case would be for example, if the pathway should be considered in a new context such as countryside, distinguishing the point of view from a person living in a city. In the end, due to a lack of time, during the workshops, the personas were used just as predefined material.

Planning of information summaries and phases of the pathway creation

Another key finding over the first pilot was, that the TA planning group would have to prepare information summaries of each pathway for the participants. Hyysalo had assumed that the expert participants would be so knowledgeable of the facts related to pathways that they could just deploy this in-depth knowledge during the pathway construction process. It however became evident that many facts and calculations were rather complex and Auvinen and Marttila who had work histories related to Finnish energy sector change faced uncertainties regarding some of the key facts. Auvinen started drafting memos for likely paths first, and later the whole TA planning

team took part in preparing and writing the information summaries which were provided to the participants a week before the first actual pathway creating workshop. Sending the materials in advance became necessary after the evaluation of first draft of an information summary: they would contain so much information that reading and assimilating all of it during a workshop session would be impossible. Also, sending preliminary materials was seen as a motivating factor, since the participants would gain information and be activated in between each workshop.

The timing of the pathway creation was tested also for the first time during the first play testing in pilot 1. It was done separately for both creating the initial steps for the pathway, and then clustering step actions around the steps. The creation of pathway steps took one hour, and clustering took 20 minutes from two people. Although in the beginning, a lot of time was used in discussing material factors of the tool itself, which implied that the pathway creation could be done over a shorter period of time. The goal was to set the timing in 20+20 minutes in the workshop, and it was partly based on the idea that the pathway board would contain also some prefilled information which would help the participants to proceed faster. The hope was, that with a 40-minute timing for each pathway, one group would be able to produce three complete pathways in three hours, and start creating a fourth one. In the second pathway creation workshop the participants could possibly create two more, after which the interdependencies of the different pathways could be contemplated. This would result in 20 complete pathways, if the participants were divided in four groups, and each group would produce five pathways.

The first pilot convinced the TA core planning team that the pathway creation should be divided in several phases, requiring different actions from participants. The team thought that the pathway creation session should be structured quite strictly in such way, that the 1st phase would contain going through the pilots, steps and prefilled steps as well as familiarizing with the vision personas. The vision personas could also be printed and set close to the working area. If they were explored in too much detail in the beginning of the pathway creation, might too much time would be lost in the process. Delivering the personas to participants beforehand might solve this problem.

In the end of the 1st phase the clustering of steps with step actions would be started. However, the need for prioritization of pathway steps arose, when the team quickly became uncertain about which steps to cluster first. The team realized that there were so many individual steps on the pathway, rather closer to 20 than the originally assumed 5-8, that the participants would not be able to cluster all the steps during one pathway creation session. Thus the steps should be prioritized, making sure that at least the most important steps would be deepened enough to get more thorough information out of them. This realization was evident only on realistic and content specific go through of the pathway creation with participants who were familiar enough with the energy system change in Finnish context.

If the prioritization of the steps was included in the rules, it would also force the participants to process all the steps on the pathway together. During the passage it was soon noticed, that when each participant could fill and place steps on the pathway board as they wanted, sharing knowledge did not happen

very smoothly. In order to jointly create pathways and come to conclusions, should each participant go through every step and explore the ones she didn't notice during playing. That is why some ideas for marking the prioritizations on the pathway board were imminently planned. There should be markers, such as exclamation marks, with which to tag the chosen steps for further inspection.

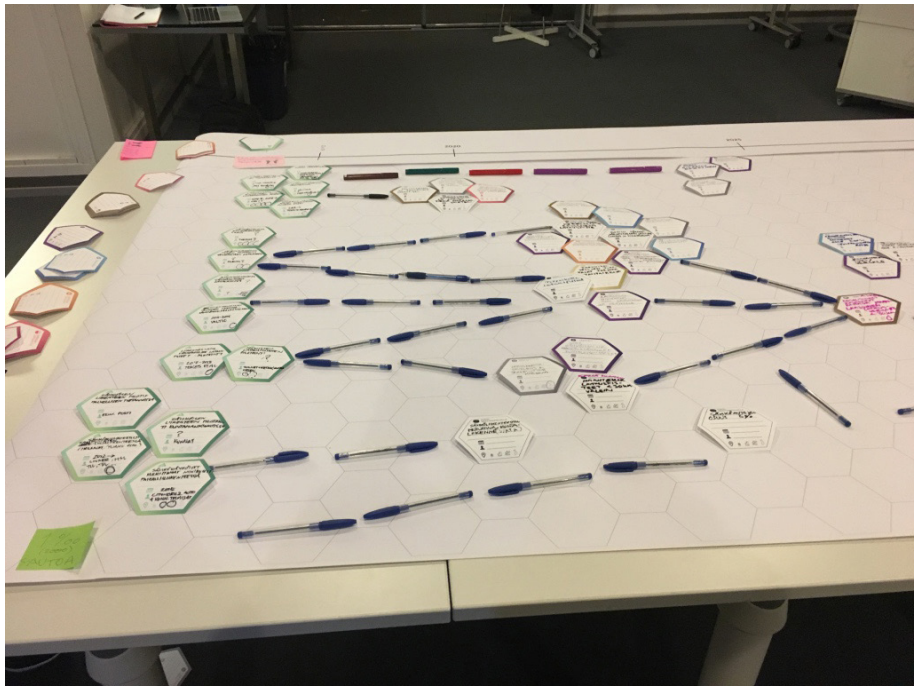


Figure 26: Paths start from the pilots on the left. Many of the steps were deepened by placing step actions around them, but it was done quite indefinitely.

Adding step actions to deepen and concretize the information of the prioritized steps would happen in phase 2. Only the most important ones would be chosen, and if some time would be left, could the other steps be defined more deeply too. As a side note the team decided, that if obvious step actions would be remarked already during the phase 1, could the facilitator write them down, but the players wouldn't have to worry about it before phase 2. In phase 2, the participants could work individually again, and create content to step actions in a way they would see best. Although, at the end of the phase 2, should the participants come together, go through the pathway again, and mark the critical components in the step actions as enablers or hinders or threats for a certain pathway step. These findings would then be crystallized on a videotape at the end of phase two.

The timing of connecting the different steps to each other was discussed too: when should the arrows be placed and should there be some limitations to it? It was decided though, that placing the arrows could happen in free order in any phase of the pathway creation, since the idea of using them would be to clarify and visualize the different flows of a pathway. The team also decided that the different phases of the pathway creation should be communicated clearly. Printouts should be placed in the workshop space, and smaller versions should be set next to each participant group's area. Both the participants and facilitators should know all the time, what should be done next, and the facilitators should be able to clearly instruct the participants of it.

After going through the needs for clarifications of phases and the order of actions, the team decided to write actual

rules for the next pilot, which would be held with TA planning members outside of the core team. The documentation and discussion after the first passage would work as a basis of the rules, and writing them for next pilot would help in seeing the big picture in pathway creation. Some discussion was held over how structured the rules should be. It was remarked that groups that don't get enough guidance, work very randomly, but on the other hand too strict rules stiffen the groups, making working less effective and fun. The design team had a mutual understanding, that no one could embrace too defined rules in such a short period of time, which would only create feelings on uncertainty and discomfort amongst the participants. The ground rule should be though, that the participants will have to know what is expected from them. Thus, rules would be created and tested, and the facilitators would have a lot of freedom for their own interpretations of them.

4.4 Step 3: Pilot 2

Planning of pilot 2 to be ran with Smart Energy Transition Consortia Leaders

Compared to the pilot 1, preparations for pilot 2 were more ambitious. The goal was to get as ready as possible a proto to be played by the test group.

The play testing participants got the information summaries prepared by TA core planning team members and they were divided in groups in advance. The structure of the instructions for pathway formation was planned. Instructions would have to include the different phases of the pathway creation session and step-by-step descriptions for each phase. Also, the participants would need some examples of how to fill in steps on the path. There would also have to be pre-filled pilot and pathway step cards on the board to look example from and work as a starting point for the participants. Also, the persona planned during the first pilot, would be taken in as part of the tool officially, to work as immersive future scenarios for how to orient oneself. For pilot 2, it was estimated that each phase would take approximately 40minutes and the whole pathway creation session would last about 1,5 hours.

The planning of pilot 2 included some thinking of the workshops coming after the ones with the game. The interdepend-

Figure 27: Cardboard hexagons, printouts of the vision profiles and stickers with which the prioritizations, enablers and hinders could be marked.

Figure 28: On the left, an illustrator drawing of a predefined pilot. On the right, a picture of a pilot format that was applied in the final version of the tool: The magnet is entirely green without any specifications apart from the theme "pilot", and a sticker with needed information can be attached to it. This made the magnets reusable.

encies of the paths for example would be examined after the 2nd pathway creation workshop. The first assumed amount of paths that could be created, started to seem unrealistic. For the Transition Arena to add value and to be able to produce a readable report, it would be better to create a limited number of transition paths and rather make them thoroughly, than create a big number of paths that would not be fully thought through. The pathway steps should be marked somehow to point out probable and predictive steps versus realistically realisable steps.

Observing the pilot 2

The simulation of one pathway creation session was executed as much in the same manner, as it was planned to be played in the real situation. The tool was pre-set for the participants on a table, and the rules for pathway creation had been sent to them beforehand. In the following I am describing the sequence of the piloting session according to the notes and comments I made during my observation. The focus was in the usability of the tool. The pathway creation session consisted of two phases at the time, and both phases were gone through over to separate sessions.

The pilot session started with reading the informational summary concerning the transition goal at hand. The team of participants consisted of the SET project team members, and they very quickly noticed things that should be improved in the advancing materials. For example, the idea of existing pilots (see figure 28) to be set on the pathway creation board by organizers was good in their opinion, but it was also information that should be included in the memos that would be handed to the participants in advance.

Figure 29: From the beginning of the first pathway creation session in pilot 1. Some prefilled steps had been placed already on the board by the facilitator. At this point the pathway creation was still meant to be done on top of a table. In this picture, the participants have started to fill in the pathway steps (on the right) and facilitator (on the left) gives instructions. The cards with green background represent the already ongoing pilot projects that are related to the topic of the pathway in creation.

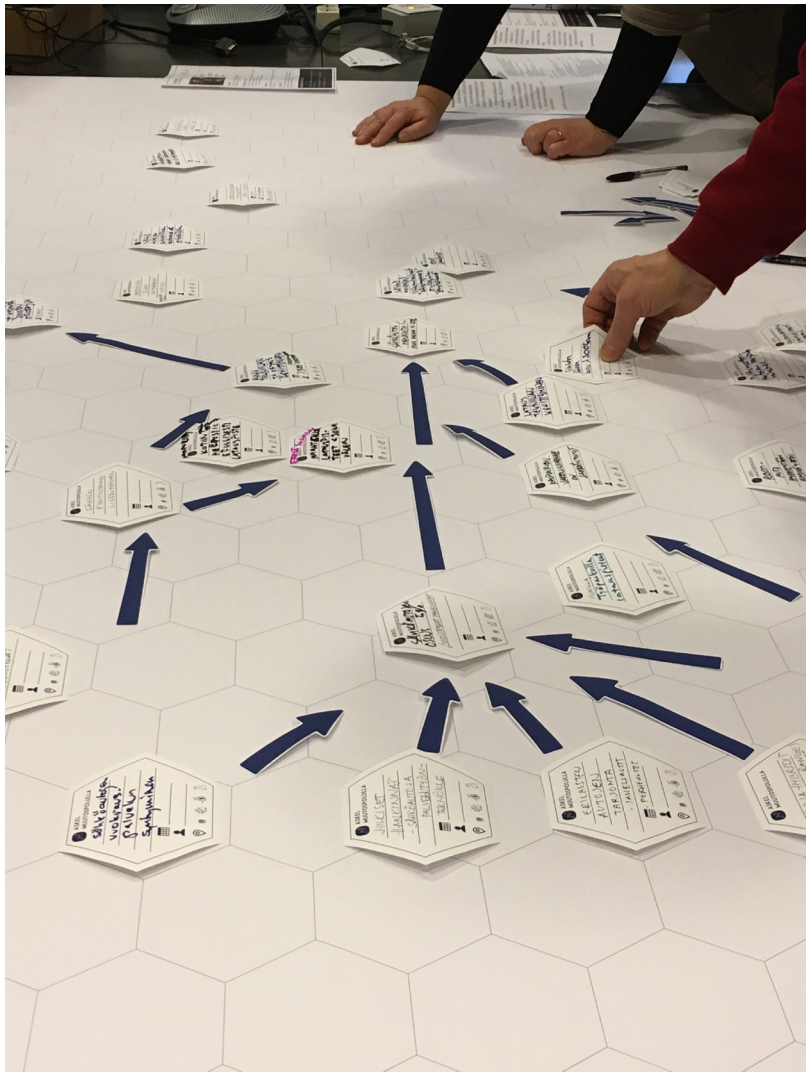
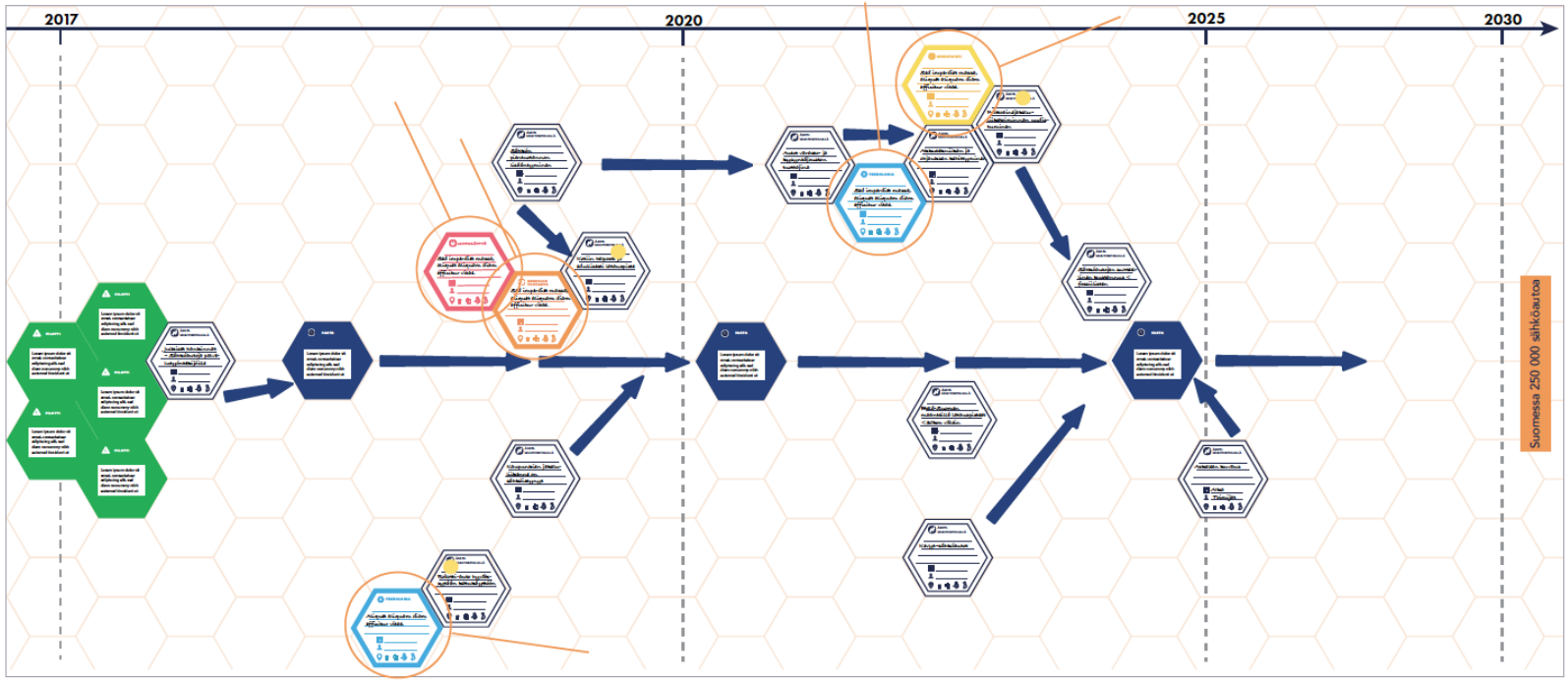


Figure 30: Formation of the first pathway during pilot 2. It was noticed, that there would possibly be a lot more pathway steps on an individual path, than was presumed originally.



Esimerkki muutostekijöiden asettamisesta: yhdistäminen keltaisella tarralla merkittyyn kriittiseen askeleeseen.

Figure 31: An example picture from the final instructions describing how to create clusters around the prioritized pathway steps.

After the participants had read through the memo, the facilitator introduced them to the vision persona (family Nieminen), whom they should keep in mind, while constructing the pathways. The participants read through it, and the assumptions of the envisioned future in the persona profile were discussed. Some changes to the assumptions were also recommended, to enable better comparisons of the current and predicted future.

The pilot also showed that the rules/instructions for pathway creation still lacked some descriptions. For example, the instructions for how to use the pre-filled pilot cards were missing, and the participants did not know what they were supposed to do with them: whether they could move them, or remove altogether from the board for example.

Also, questions were raised about how to place the cards on the board. Should they be close to each other or not? Did there have to be space around so that card clusters could be formed. Also the testing participants wondered whether they should try to form one or several competing pathways on one board. To prevent these kinds of questions in the actual workshop/game session, it was decided that the instructions should have a model picture (see figure 31) describing each part of each phase.

Next, the participants started to fill in the pathway step cards. They kept discussing a lot together while writing the cards. The participants were quick to fill in cards, and they made a lot of them. After about twenty minutes, the participants started to also arrange the cards on the board accordingly to their mutual decisions. Some difficulties in the usability became visible over this phase: the game board appeared to be too big. It was inconvenient to reach over the table, the timeline was too far and easily forgotten by the players, and seeing the big picture was difficult. Usage of the cards and arrows seemed to come naturally for the participants. One fault that was noticed though was that the participants sometimes had difficulties reaching for the new cards.

When the first phase was finished, the organizers of the pilot took pictures of the whole pathway, to simulate an actual workshop documentation situation. After that, the participants moved on to the second phase, this was when they had played for 45 minutes. During this phase the participants did not appear as energetic as in the first phase. In the first phase the facilitators role had been reasonably small, but in the second phase most of the clusters were created with the help of the facilitator. In the end, the whole pathway creation session lasted for 1 hour 15minutes.

After the session, the organizers held a feedback discussion with the testing participants. Some modifications to improve the usability of the tool were decided:

- To mark the significant years on the timeline with a tape
- The pathway board could be 20cm narrower
- The pathway board should be placed on the wall, in a same kind of manner as whiteboards
- There would be a need for 6-7 pathway boards
- The pathway board should be magnetic

- Cards for "pre-known" facts would be needed: the skeleton of the pathway would be formed from those
- The timeline must remain the same for each pathway board, to enable easier analysis of the results, particularly cross-cutting pathway steps
- The size and colours of each pathway building element should be examined and made sure that they would be visible to everyone
- A mock-up of a finished pathway should be included in the guide/instructions

Some other practical questions also appeared

- How can we easily document the final pathway? Three note takers having difficulties in note taking proved that taking conversation notes would be too difficult
- Do the vision personas work? Is there some changes to be made?
- What is the facilitators role like? If a question of too many ideas that are too shallow appeared, how could we control it? A) should we define a maximum number of cards for each board? B) should the facilitator be extremely strict and cut the discussion if it got too long? C) a combination of A and B?
- How does the transition from phase to another work smoothly? And should there be some kind of wow-factor for the ending the pathway creation session? Some conclusion? Should it be visualised somehow differently?
- Should the pathway board include also a positive/negative factor in addition to the timeline?

Description of the analysis discussion based on Pilot 2

The core planning team held an analysis discussion after pilot 2. It was based on the initial thoughts and memos from the pilot. During the piloting session it became clear, that the results of different phases would have to be somehow crystallized by the participants and a quick way to do that would be that the crystallizations would be videotaped, which would also enable better documentation and authenticity for the analyses of the pathways. The documentation would have to happen through the videotapes and recordings anyway, since the research group noticed that it was impossible for the note takers to follow the rapid conversation and try to write down everything that was discussed over the pilot 2. Also the discussion was mostly focused on what to write as a description on an individual pathway step, or how to arrange the pathway on the board. This kind of speech was in many parts denotative and was next to impossible for the note takers to follow. These considerations ended in a decision that the whole pathway creation process would be recorded, and after each phase there would be a videotaping session, where the participants would explain the condition of the pathway, how they came up with the solutions, and what were the most important findings.

It also became clear that the participants should have to be able to decide fully the transition goals for the pathways by themselves. One of the main goals in pathway creation ses-

sions was to create ownership over the topic. The discussion needed to be concrete enough in order to enable participation and decision making. Regarding the question of ownership, the facilitators should be well informed about certain things concerning the participants' variations in knowledge about specific topics. Each of the pathway creation groups would consist of several people coming from different sectors of society, although connected by an interest in the mutual theme: climate and energy issues. Some of the participants would be the foremost experts in the pathway topical area in the country, and whilst their expertize would need to be given room to and utilized in the process, the facilitator should hold a variety of techniques for enabling a meaningful and somewhat even and democratic conversation among the participants and avoid any one expert dominating, particularly the search for change drivers for the pathway steps. These factors were decided to include in the guidance manuals for participants and facilitators.

In general, it was noticed that the stickers for marking prioritizations, enablers and hinders worked well. When using the magnets, there should be good thick enough pens (2-3mm) for writing. When filling the cards, the time, actor and scale were forgotten about in all of the filled steps. The facilitators role would be to remind the participants to go far enough in planning: it would be not enough to define the steps, but also the important qualifying factors should be considered and decided in order to have concreteness in the pathway.

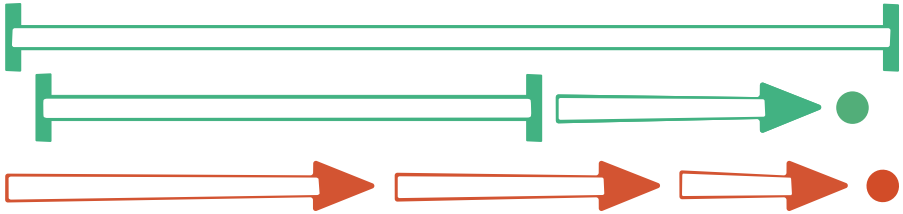
The aimed amount of the pathways was also discussed over the meeting as it became evident that the pathway elaboration took considerably longer than expected if done thoroughly. Thus in the rules for creating the pathways, it might be good to have a few different scenarios as examples for the participants to choose from for their sessions. Three different playing modes were created for consideration:

Timing of key events – mode
The idea is to decide what has to happen and when, to make the goals attainable. This mode allows to create full pathways, that don't go too deep into the substance of individual steps. It may be that only little new information that the participants hadn't already thought of, would be born. An advantage is, though, that the participants can create several pathways concerning different topics. The goal is to create 12 pathways, and scrutinize their mutual relationships, and to examine merely a handful of most important steps in detail.

Deepening – mode
This mode was planned for approximately 6 paths, when the chance to create more in depth paths is possible. In this mode, also the requirements and possibilities for non-prioritized steps can be deciphered thoroughly.

Possibilities – mode
In this mode, two groups work on the same topic on their own pathway boards. After finishing the paths, they will be compared to each other. This comparison would allow for production of entirely new ideas and more in depth discussion about the paths. Downside for this would be that not many topics could be handled. The mode would mean the creation of approximately three paths. On the other hand, this way the

Figure 32: Red arrows and sticker (top) for marking and creation of alternative paths on the pathway. Green lines, arrow and sticker (bottom) represent the uncertainties. Green uncertainty lines are placed on the pathway to mark a certain time span, green sticker is attached to a pathway step that works as a starting point for an uncertainty path, and green arrow is used to link steps from one to another, on an uncertainty path.



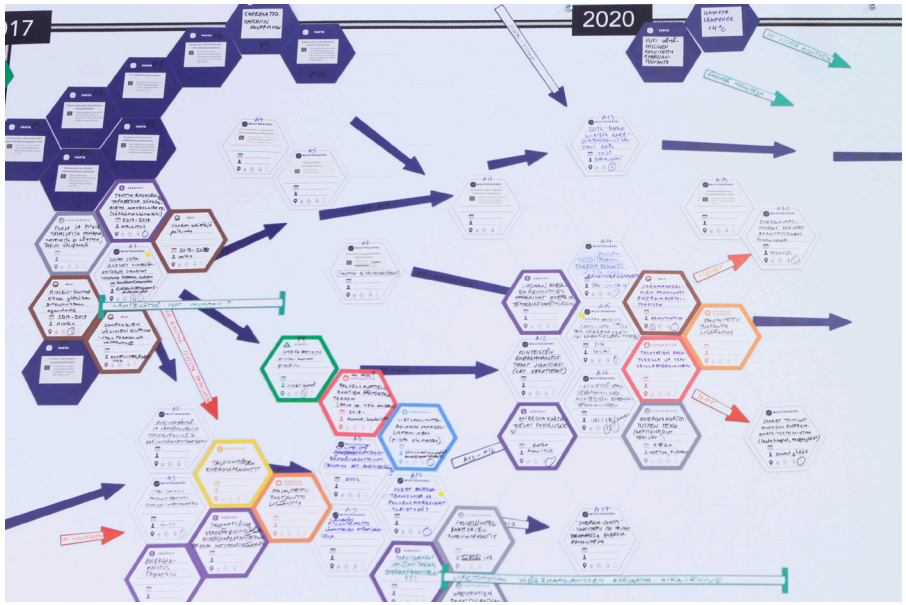


Figure 33: A detail from a completed transition pathway during the TA workshops, where two uncertainty lines and arrows have been used, as well as four red arrows to mark alternative progressions of the pathway.

participants would gain deeper understanding of a transition process itself.

The idea for the modes was that after the workshop where the participants had decided the transition goals they would like to work on, they could choose the mode that best suits their ideals for the goals. The final discussion about the different modes of pathway creation raised some questions among the planning team, such as: how is the ownership of the topic born over such long workshop series? How will the tool create the structure for making? How does the tool help peoples' different opinions to be heard? What is the legitimacy of a deliberative process? Does the tool support a democratic way of opinions to be heard? To these questions, the core planning team tried to answer with a careful planning of the Pathway Creation Tool, and by asking for feedback and making iterations in each phase of the design process.

4.5 Step 4: Pilot 3 with the facilitators and note takers

Planning of the 3rd pilot and extending the game

In April, before the 3rd pilot, the TA core planning team decided to extend the game from two to four phases, and plan and update these changes in the game guide. Since the usage of the tool had been divided in two workshops, the latter phases were thought to be initially implemented in the second pathway creation workshop.

In phase three, participants would use the green arrows and uncertainty markers (Figure 32) that could mark how much uncertainty there was for an individual step to actualize, and when and why a step was likely to come into being. With the lines, the participants should mark a time frame, during which a certain chosen uncertainty might take place. These possible uncertainties could be listed in the info material handed out to the participants before the workshop. By using the green arrows, the participants could form uncertainty paths starting from the steps affected by an uncertainty, marked with a line. The selected uncertainty and its focus could be written on the line and in the arrows that mark the path between individual steps (Figure 33). The uncertainty lines were decided to cover approximately 3 or 5 years by length. Shorter or longer might turn out to be unnecessary on a 13-year time line as two lines could be combined as well. A reasonably expected maximum number (given the time frame) of alternative and contingency paths would be 3 to four of each, and they should be selected by their thought relevance.

Phase four would consist of creating alternative paths after defining the uncertainties. The participants would have to reconstruct the pathway by considering probable alternative pathways to achieve the same big goal. The idea of the alternative pathways was, that unlike considering all the possible alternatives, the participants would have to come up with noteworthy evolutions, highlighting a change that concerns a selected step, or several steps on a path. The red arrows and stickers would help in forming and notifying these alternatives. In the end of this phase, a similar documentation should be done as in phases 1 and 2.

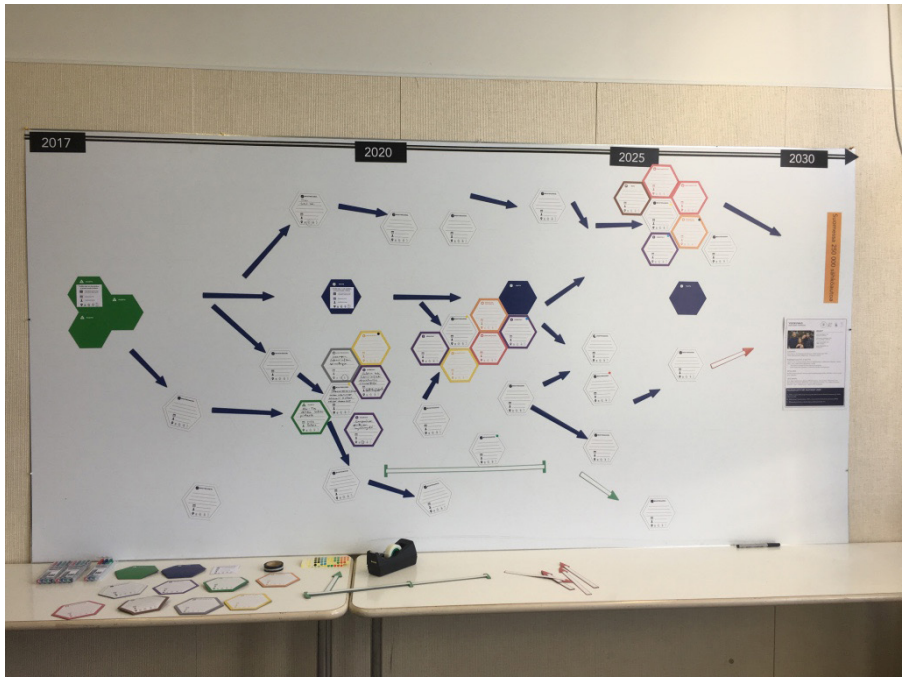


Figure 34: In the 3rd, and last, pilot all the final pathway elements were ready. Most of the focus was on the instructions: how to get the best out of these elements?

In order to separate the steps on alternative and contingency paths from the steps on the main pathway, the TA core planning team decided to also revise the usage of colored stickers. Alert red color would be reserved only for the alternative paths so, that a red dot sticker could be put on top of each alternative step in order to make it more easily recognizable. Also, the green color would be reserved for the contingencies, and for example the green in pilot magnets should look different enough so that they wouldn't be confused with the contingencies. Also, the team decided that the steps that might be lost from the original pathway because of the alternatives or contingencies, shouldn't be erased from the game board, but marked with a white sticker to mark that if a certain contingency actualizes, then the step in question will not happen. For the facilitators guide, it should be written that after the last phases, reconstructions could be done to the pathways, although it would be important to be able to keep as much of the original info on the boards as possible.

These new phases and also the timing of the workshops were planned to be in the focus of the 3rd pilot. It was already known at the time, that many facilitators might not be able to attend the last pilot and thus not be able to playtest the tool at all before the first actual pathway creation workshop. Thus, it was decided that extra effort would be put to make the facilitator's guide as thorough as possible, to enable the facilitators to self-study the passage of the pathway creation.

Description of the Pilot 3

The third, and last, pilot was arranged approximately one month prior to the first pathway creation workshop in May 2017. All the pieces for the game were ready and the metallic board as well, so it was possible to move them around like in an actual situation. Perikangas and Hyysalo introduced the walk through of the tool step by step, and the participants of the pilot (Rask, Hakkarainen, Pyhälammi, Kiviniemi, Lukkarinen) commented on it.

Over the pilot, the team found out a few things that would have to be changed in order to make the game more approach-

able to the participants. Explanations of the meaning of different game pieces should be included as part of each phase in the game guide. Thus far, they had been explained only in a directory at the end of the guidance manual. The workflow of using the step action magnets should be made clearer in the instructions. Also the definitions of the new elements that were included in pathway creation, the uncertainty paths and alternative paths, should be described clearly, so that the participants would not confuse them with each other.

After the pilot, the team also decided to change the time line to work in such way, that it would become a changeable element on the game board. The idea was that four key years would be marked as magnets at a certain point of the timeline. But according to the participants' style of play, the positions of individual years could be changed. Some attention was also paid on the graphic design of the game guide, and suggestions for how to make it more readable, were presented.

Before the actual piloting the test players got to read both the participants instructions and the facilitators' instructions. It was notified that the facilitators' instructions would need a more precise description of how to document the game session. The video recording was discussed further: should there be an "outsider" person to use the camera, or should each group have a continuous video recording over the game session? These scenarios would require more people and equipment though, so in the end it was decided to try to keep the sessions as smooth as possible, and let organizers in SET team take care of interviewing participants, and recordings and video.

For the guides and tool in general, it was discussed that some of the terminology used in the tool should be reconsidered, in order to make it appear equivalent. Also some of the steps on the pathway would be prefilled by the SET team, and thus that should be mentioned in the game guide as well. Over all the piloting sessions, it became clear that quite a big amount of game elements, hexagons and arrows, would have to be reserved for use with each pathway.

In the 3rd pilot, the pathway board had been put up to the wall for the first time for play testing. The stands for the boards were not ready at the time, so the board was placed on top of tables in the classroom where it was piloted. The game boards were designed and built by Marttila and Perikangas after the last pilot (Figures 35&36), and worked as a finishing touch for the whole tool, making it usable in many kinds of environments. The finished pathway boards were considerably big: approx. 200x250cm by proportions, and weighed approx. 12kg. For transportation, the board could be detached from the stand, so that they fit in a van.

Drawing conclusions from all realized pilots

The pilots worked as testing and co-design events for the whole TA planning team. In each phase, new iterations were done based on play testing and analysis discussions. The pilots raised two important questions: Were the uncertainties and the degrees of them, that were added after step 3, visible enough, and was the tool in any way valid from the futures studies point of view? The consideration of uncertainties had been elaborated by the student group C on the Strategic Co-design course as part of a tool for considering resiliencies, and as good as their solution had been, it had become clear that proper resilience considerations at each step would take 2-3

SET murrosareena polkutyöpajat - pelilautojen telineiden rakentaminen

Pelilautojen rakentaminen/tukeminen:
- Pelilauta (250cm * 120cm) pultataan kiinni kiskoihin ylä- ja alareunasta etukäteen, ja puujalkoihin paikan päällä.
- Alumiinikiskot kiinni pelilautoihin etukäteen (8/12 pulttia kiinni)
- Puufreimit kootaan valmiiksi, kiinnitetään/pultataan lautoihin paikan päällä, (4/12 pulttia)
- Kokoon laitettuna laudan voi säilöä seinään nojaten, paksuus noin 5cm, eli kuusi stäkättynä yht. 30cm
- Riittävä tukevuus, seisoo tarvittaessa jopa itsenään...
- Lopuksi voidaan purkaa levyiksi ja pätkiksi suht. helposti

Sivusta: **Edestä/takaa:** **Pulttaus:**

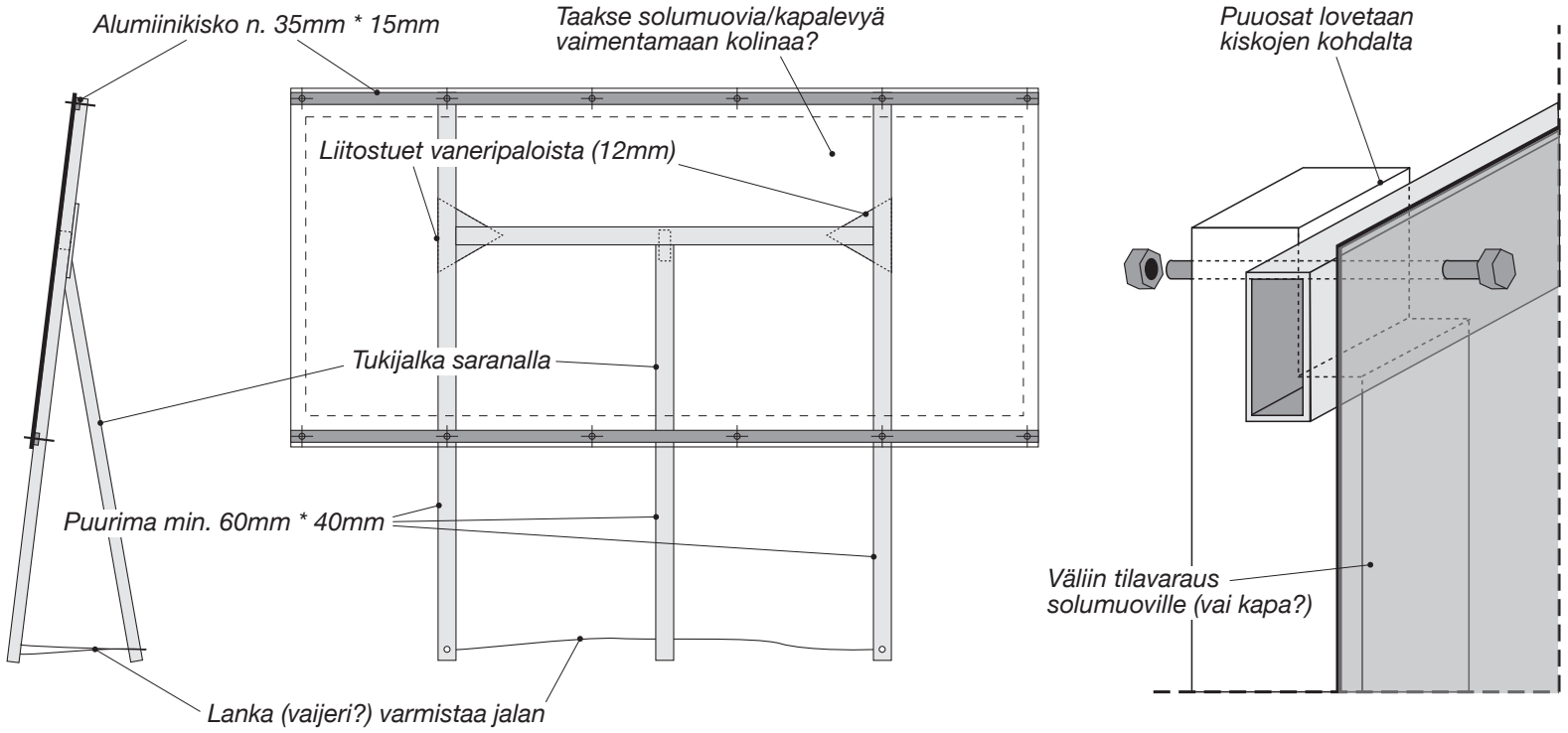
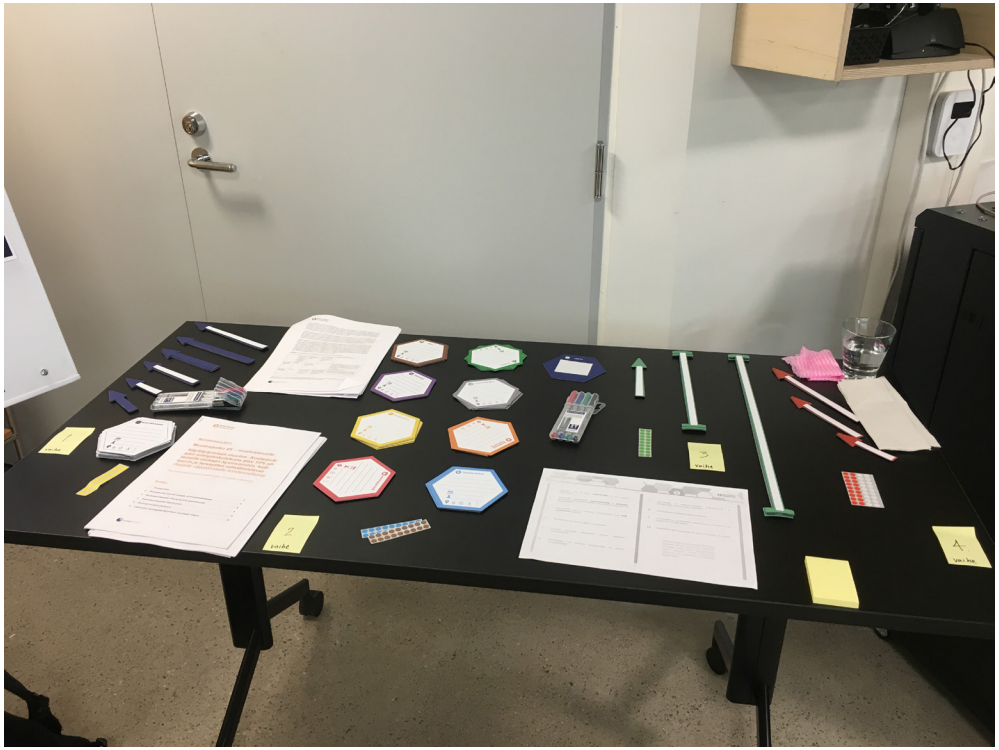


Figure 35: Marttila's design for the pathway board stands.

Figure 36: In the front, aluminium pipes are to be attached to the back of a pathway board. In the back of the picture is a finished board on a stand.

Figure 37: A set-up of all the needed elements of the Pathway Creation Tool in the first workshop before the beginning.



hours, i.e. much longer than the current time frame permitted. In the beginning of the designing of Pathway Creation Tool, the uncertainties were not considered at all, but through playtesting in pilots it was realized that they just couldn't be left out.

The second main question that followed through the design process was, whether the pathway creation process supported deliberative thinking, which had been one of the main aims for the design of the tool in the first place? One factor was, how much would the participants have time for reflection. The deed for an extended timeframe was realised after each playtesting pilot. In the first workshop, 20 minutes were reserved for each pathway but in the end the time allowed for creation of one pathway was 4 hours, and even after that some groups had to continue working on their pathways. In the end, the actual pathway creation workshops were a lot more conversational than expected in the beginning.

Another topic handling deliberation is how much can the participants modify the agenda, and what kinds of dynamics is born from super experts' vs. "normal" experts' working together. The idea in the facilitation of pathway creation is not necessarily to give time evenly to all participants, but try to stabilize the situation and keep both participant types in by allowing the super experts to bring their substance knowledge in without dominating the whole process, so that the others' knowledge would get included too. The design of the game guide and facilitators guide spoke out for this, and a great help for their design came from applying a game structure in the planning process.

4.6 The pathway creation workshops

The Pathway Creation Tool was used in three workshops over the Transition Arena process, and was given most attention to in the whole process. The workshops were held in May, June and August 2017, from which May and June focused on creating the pathways, and the August workshop focused first on finalizing the pathways and then on collecting immediate actions for change from them, and discussing them.

The first May workshop focused on six transition goals, which the players had created in the previous workshop, and which had been iterated to concrete goals through collective feedback system. In June workshop, two additional pathways were created whilst finishing of the first ones. Between the pathways, there were considerably big differences in some of the transition goals considering the concreteness vs. abstractness of the goal. This seemed to form the first problem with the construction of pathways: the transition goal should be narrow enough in order for the participants to be able to specify each step as a concrete event that should happen at a certain time. It would have to have known actors to execute it and it should have to be contextualized by defining certain scale(s) to it. Too much abstraction would distract the players easily to envision all kinds of events, that would not have realization potential in the end, since connecting them into other vaguely constructed events would prove impossible. The pathways in which topics corresponded with the Finnish Energy and Climate Strategy or were widely known to the participants, were the ones that the players were able to take furthest and analyse best.

The ways of constructing the pathways varied in each group. Since individual facilitators had a lot of independence in guiding the players through construction process, the pathways were build up at very different paces. At the end of the last pathway creation workshop in August, the facilitators and note takers of the game were also asked to answer a questionnaire (see Appendix 3) regarding the work with the Pathway Creation Tool. In their feedback, the main finding was that the structure and order of working, which had been defined in the player's and facilitator's guides, fluctuated a lot in the real-life situation making each group's process unique. On the other hand, the facilitators felt that having the pathway creation guide was a very important and useful starting point for them.

The total eight transition pathways that were created over the process had one of the following goals each:

1. Renouncing black coal usage
2. 2000MW of demand response of the electricity usage of end-consumers
3. 2000MW of demand response of the consuming of district heating
4. Halving of the net energy consumption of buildings
5. Reducing household energy consumption by change in behavior by 15%
6. 750 000 vehicles of alternate motive powers
7. Servitization of transport
8. Multiplying the export of clean and smart energy technology and services

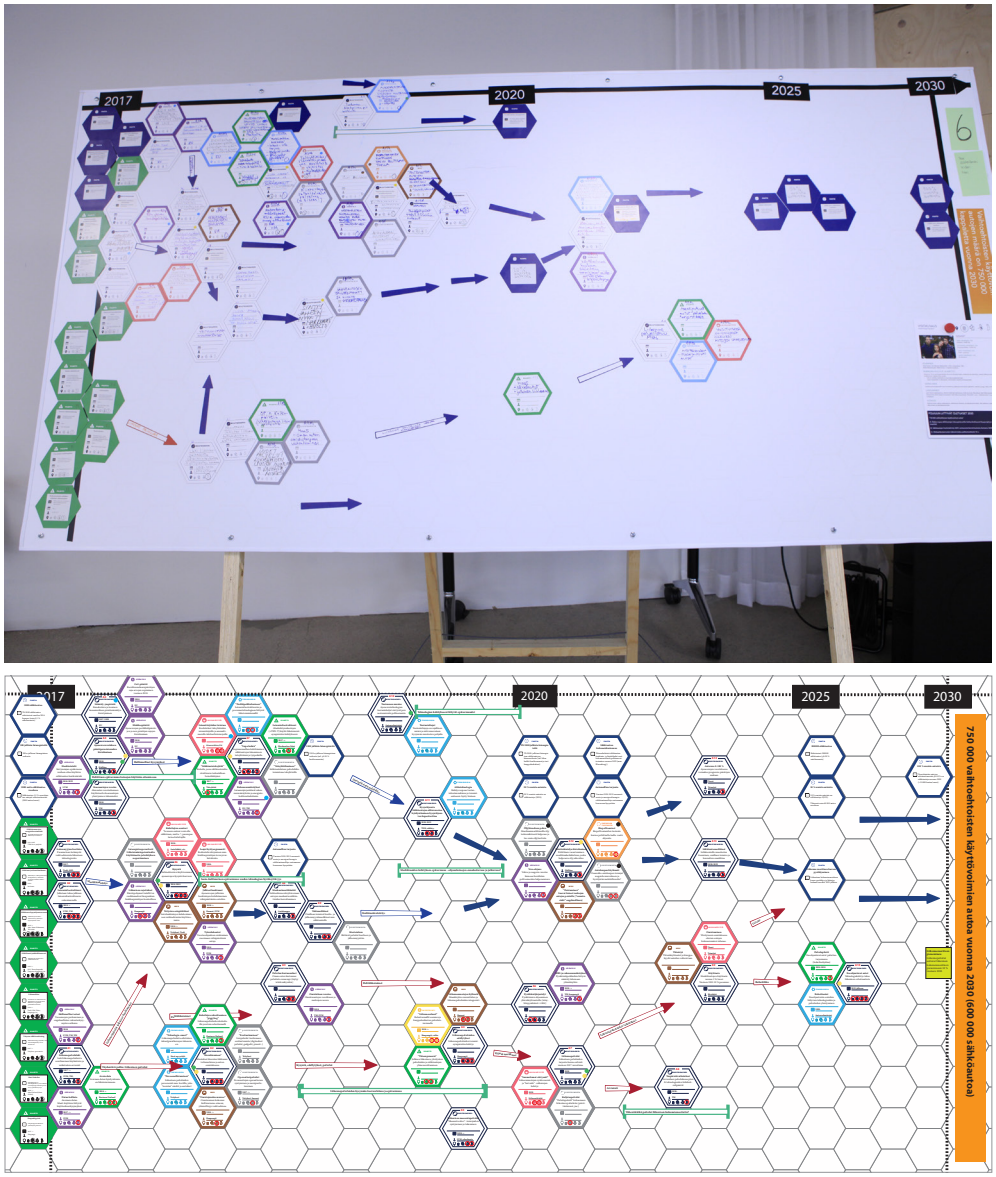


Figure 38: Group 6 worked effectively and had almost finished their pathway after the first workshop (top). This pathway had been practiced beforehand, and one participant and both facilitators had been playtesting it during Pilot 2. Many details, as well as contingencies, were still added for the pathway that was visualized in final report (below).

Reflection on the pathway creation workshops

Using the tool in the workshops relied very much on the abilities of the facilitator. Firstly, in order to succeed in starting the creation of the pathways the facilitator had to prepare materials in advance, to be placed on the game board as a skeleton for the pathway. Also, she should have an idea of a plan for how to create the specific pathway. In this case it requires at least some expertise of the topic from the facilitator. Secondly, the facilitator should be trained not only to the ways of passaging the pathway creation, but to hold competence in the domain area and have command of facilitation methods in general, to retain flexibility over the facilitation process.

Even though the participants were given instructions beforehand, they did not have a chance to fully adopt the method nor the different phases and tasks of the tool before starting the creation of pathways. Thus, the facilitator was responsible of guiding, tracking and leading the process in the right direction, with the limitations presented in the facilitator's guide. A strict attitude towards creating very concrete steps on the pathway served the purpose of the pathway creation well: hopeful ideas had to be reconsidered if the participants were not able to build concrete actions to support them. Pathway construction seems to work as an effective test platform for vision statements. The visions can be put into consideration by splitting them in pieces and examining the effects and scale of each action.

Working on the pathways in real workshop was still about one hour slower than what had been expected based on pilots, but due to the initial goal that was to create concrete and plausible pathways, the TA planning team decided that no strict time limitations would be given for each phase, but the participants could take their time and focus on creating knowledge that would be new and matter to them, not just repeat the known information. For the second pathway creation workshop, the timetable was adjusted so that the teams could finish up and introduce their pathways from the first workshop. After that they could continue with either a new transition goal or finish up the one they were still working on. The finalized pathways would be presented to the camera at the end of the June workshop, and the listings of immediate actions and presentations of the pathways for the whole Transition Arena would happen in the following workshop in August. The amount of the pathways created had to be dropped from the original number of 12, and the final 8 chosen ones were selected between the TA planning team and the participants.

Moving to pathway creation after two preceding TA workshops seemed to work well: the participants had already gained some mutual trust and motivation for creating the pathways. Also the interaction between participants had turned out to be quite natural. The chosen transition goals affected the facilitation of the workshops greatly. Regarding the transition goal "Reducing household energy consumption by change in behavior by 15%", the participants had wanted to choose an ambitious but abstract goal to work with. This showed to be partly hard, since no previous studies or definitive information was available regarding how the goal could, in principle, be reached as pointed out by the two background memos that SET provided. Although, the participants were able to imagine possible steps on the pathway, lack of certain benchmarks caused a danger of creating too vague steps. The facilitator had

to guide the work a lot in this case, and the formation of this pathway was considerably slower process than with the others. Similarly the transition goal of "Multiplying the export of clean and smart energy technology and services " did not have clear causal steps that could be delineated as most measures would be capacitating by nature and depend on market success of products and services to come.

The more practice the facilitators and players had had in how to construct the pathways with the tool beforehand, the more defined visualizations they were able to formulate during the pathway creation. For one team (who worked on goals "750 000 vehicles of alternative motive powers" and "Servitization of transport"), creation of the pathway was a way to proof a hypothesis rather than create new knowledge. Although, some members from this group were still able to get new ideas and inspiration from the process, and as a whole, the pathway creation in this group concretized the initial idea nevertheless.

From the process and results handling point of view, it can be said that in Transition Arena context, a tool with its passage and topics practiced beforehand would be most suitable. Thus, this allowed for the group to focus on polishing the pathway, communicate it in a coherent manner and plan for a relevant, transitional alternative for the whole pathway. The group was able to also produce this other pathway, that managed to consider the chosen topic from a totally different point of view. On the other hand, another group (who worked with the transition goal "Reducing household energy consumption by change in behavior by 15%), that had trouble in formation and facilitation of the pathway, was able to create several new insights related to the achievement of the transition goal. They realized that no existing way to guide the transition in selected topic existed, and found ways for how it could be possibly done.

The facilitation styles over the formation of pathways varied. In the original plan the TA planning team was guided to use one facilitator and one note keeper combination, but in the case of one pathway ("2000MW of demand response of the consuming of district heating"), the vvteam decided to use two facilitators and employ the participants actively in the documentation process on the magnets. The group who worked with transition goal "2000MW of demand response of the electricity usage of end-consumers" gained from the clear structured manner of forming the pathways of the facilitator, and the group working with goal "Renouncing black coal usage" also employed the facilitator and note taker to work more closely as a team, blurring the line between two specific roles. The group that worked with the goal "Halving of the net energy consumption of buildings" was able to produce a lot of fruitful discussion with lots of personal ideas, but they didn't much manage to concretize the work to the pathway tool, making it hard to understand from an outsider point-of-view. Thus it required a lot of refinement by the TA planning team afterwards, in order to visualize and make communicable the information.

Figure 39: Facilitator instructing a participant to place a filled pathway step on the path.

Figure 40: Participants, facilitator and note taker working on Pathway 4.

Some conclusions from the facilitation of pathway creation with the tool can be suggested:

- The more structured the process, the easier it will be to form pathways
- The more structured the process, the more it has to be taught and practiced beforehand
- The more practiced the pathway steps were from previous forecasting and strategy exercises, the more defined and communicable the pathway could be

The usage of the private/closed webpage as a digital tool for commenting and gaining information of the workshops and handled topics did not work very well. The participants were motivated to take part in the workshops, but did not much contribute to the sent assignments and materials between them. Thus I haven't handled the interactions linked to it in this study.

Description on the varying ways of working with the Pathway Creation Tool

One of the main design challenges from the beginning, and a question that was raised regularly between the iterations of the Pathway Creation Tool, was whether the tool could support a deliberative attitude towards the creation of pathways. The ways with which the TA core planning team tried to support this, was by creating the guidance of the tool in such way that it allowed free discussion and negotiations without time limitations. Also, during the phases, it was always possible to go back to the previous phase(s) and readjust the pathway accordingly.

The power relations and deeper expertise of some participants over the others were handled so, that instead of assuming a person with more knowledge as a dominant character, the facilitator could ask this person to "teach" the others by allowing her to present her views to others, and on the other hand left space for personal opinions from the others by documenting separate video commentaries from each participant. The main aim was to create as much useful knowledge as possible, and by allowing differing point-of-views, the pathways could be built pervasively, including alternative paths besides the main branch of the transition pathway.

All the groups were allowed to move in their own phase, and it was informed that working with the same pathway could continue in the next workshop too if needed. The group with goal "Renouncing black coal usage" started their working by altering the original transition goal to a more ambitious one, in their opinion. The way they started, was by looking at the pre filled steps on the board, and building up the pathway from those starting points. The pathway worked as a visualization tool. When explaining the steps, the participants referred to and showed on a certain point on the board. The time line worked as a means to put things in context.

The predefined years between beginning and end: 2020 and 2025, worked as reference points for making causal connections. Instead, the group working with goal "2000MW of demand response of the electricity usage of end-consumers" took a more user-centered approach to building the pathways from the beginning. Instead of settling to the existing vision persona, the group created four new different kinds of user types, which they used as starting points for four separate paths on the board towards the transition goal. Along with the user-centered paths, they created one more, a technology centered path.

The group working on the goal "2000MW of demand response of the consuming of district heating" focused strongly on working with selected clusters, based on the prioritizations made in phase 1 of pathway creation. They used all the provided game material, such as contingency lines for marking unsure events over the timeline. This group also created two alternative paths for the original pathway. The big pathway was divided in several branches, depending on their theme (ie. healthcare).

Although, some disagreement and conversation was born when the participants remembered differently, what some steps on the pathway represented. The big transition goal was kept in mind all the time, by referring to it at several points. In comparison, the group that worked with goal "Halving of the net energy consumption of buildings" was focused on the individual steps and more abstract thinking of, "what should happen". The group working on the goal "Reducing household energy consumption by change in behavior by 15%" started working on the pathway by dividing the viewing of pathway into three scales. They also focused by selecting few main steps, and then the big picture to be explained.

The working groups made also some other alterations in the pre-defined materials. The group working with "750 000 vehicles of alternative motive powers" focused on inspecting the pre-existing fact magnets' and changing their content with knowledge by one of the participants. They worked quite fast, and managed to handle two separate pathways over the same

Figure 41: Filling of a step action magnet on a pathway.

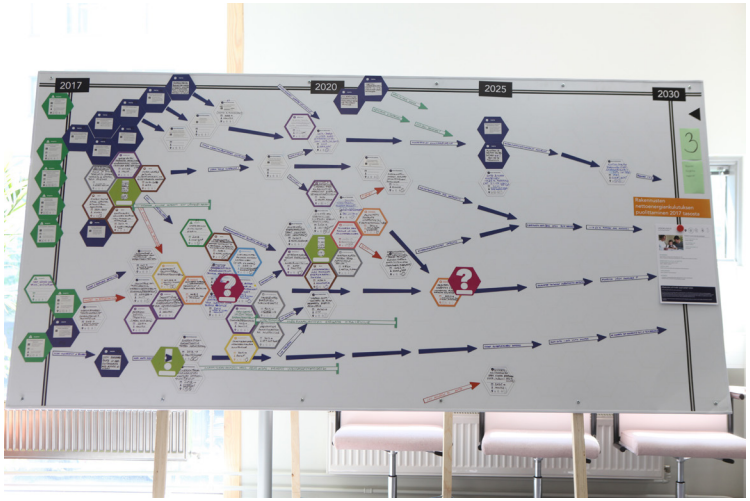


Figure 42: A finished pathway in the third pathway creation workshop, that mainly focused on realizing immediate actions on the pathways, not building them anymore. In this pathway, the transition goal was "2000MW of demand response of the consuming of district heating".

game session. The same group put a lot of focus on the enablers and hinders/threats of the change factors. The critical steps were not viewed necessarily as positive ones, but predictable ones that would have to be averted by planning actions in relation to them. The insights they and other groups got over the process, were documented and refined for the final report that was published as the result of the transition arena process (Hyysalo et al. 2017).

When the group decided to make an alternative pathway for the existing one, they also changed the description of the persona to fit the new viewpoint. In their own analysis after the workshop session, the group described the tool as an exercise of creative destruction, but still thought of the tool as positive, not negative, by nature. The biggest focus was on "what kinds of things could happen". During the first pathway creation workshop, the group realized a need for creating a separate pathway. They took the "Servitization of transport" as a new goal, since they realized that the transition in transport needed a change in whole industry: the whole infrastructure was considered to change.

In later phases of the game, a lot of deeper conversation on specific themes was born. In group working with goal "Halving of the net energy consumption of buildings ", facilitator was able to ask more specifications concerning individual topic by referring to certain, defined steps on the pathway and asking whether the information around them was complete enough. In one case, the facilitator had to ask the participant to redefine the actors concerning a specific step, since it had been defined too vaguely. This encouraged the participant to start discuss deeper the actor(s) who should be involved in the implemen-

tation of the step. The participant settled on naming the most important actor connected to the step, but had still helped the participants in the group in understanding the whole context around the topic in question.

The videotaped stories were very valuable considering the results: the players managed to encapsulate the scheme and central learnings into them. Although, also these required a lot of guidance from the facilitators. Handling and presenting the steps on a pathway was challenging as part of the videos. The discussions around the pathway included also more speculative innovating, but a lot of this material did not end up written on the pathway, since its probability would have been too small. In these cases, the facilitator was able to bring the conversation to a more concrete level quite quickly by asking, what should be actually done before, so that these kinds of speculations could be realized.

This raises a question though, if the tool should contain an extra element, with which bolder ideas could be documented as some kinds of stars to a possible future? It could be presented as some kind of "imaginative future" element on the timeline, after the actual goal. Later, in the final feedback discussion of Transition Arena, several participants raised this kind of question: "How could we be even more ambitious and radical, and how could we have altered the goals over the process while our level of ambition raised?"

4.7 Feedback from the pathway creation workshops

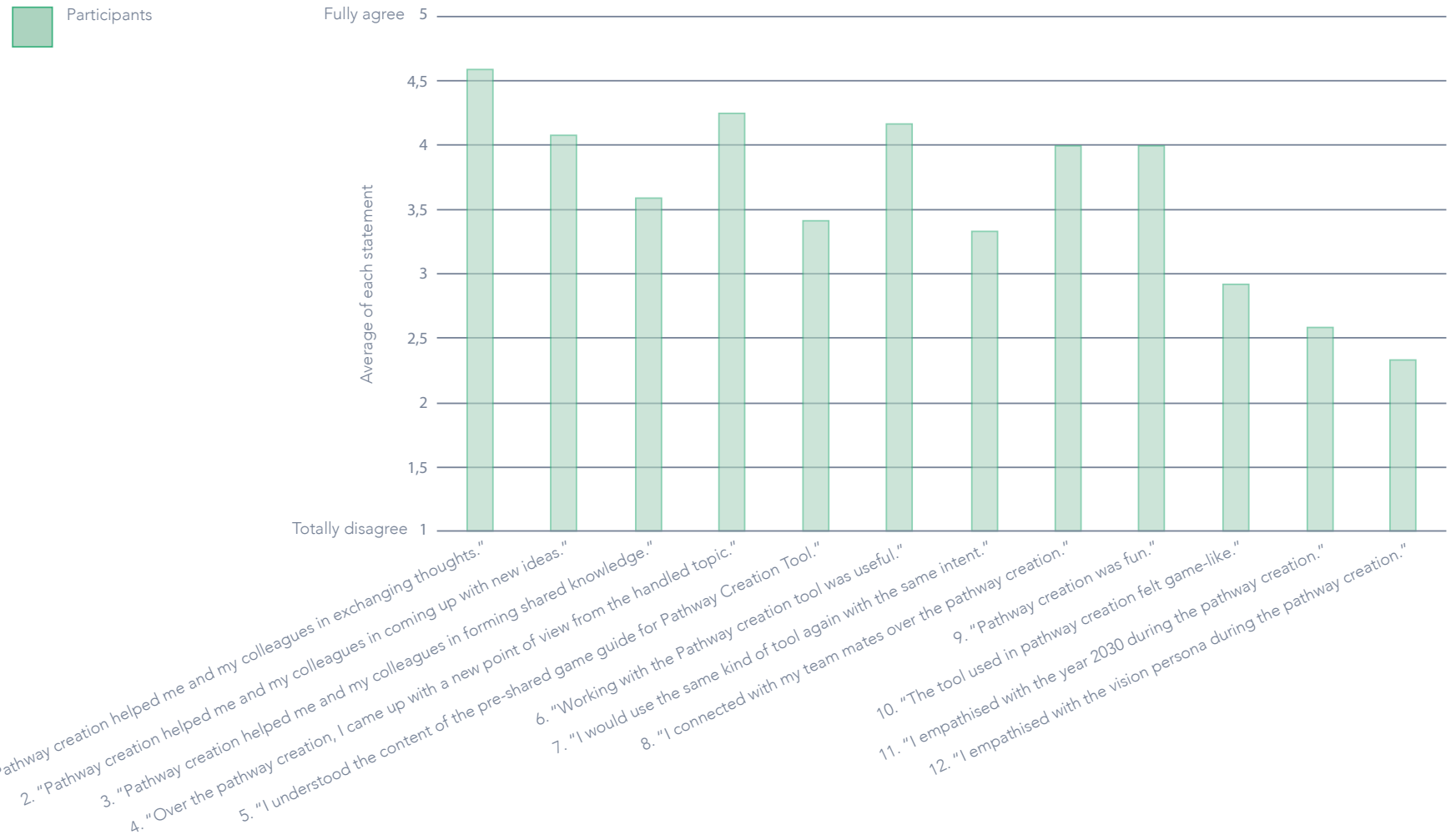
Feedback was collected via various forms over the workshops. The participants' feedback on the pathway creation sessions was collected at the end of August workshop, when working with the pathways had been completed. Participants as well as the facilitators and note takers were asked to fill in forms with statements concerning their experience of the pathway creation process (see Appendix 2 & 3). Twelve participants and nine facilitators or note takers answered in the questionnaires.

Additionally, spoken feedback was given during the last TA workshop session, over a panel discussion where the participants got to express their thoughts on the process. Participants were positive about the process and results in general, stating that the process itself was valuable. One participant envisioned that the process could be applied in several other situations, if the viewpoint was tailored.

Some of the feedback can be compared to the thoughts and first expectations that were collected from the participants over a general discussion in the Transition Arena Kick off meeting in February. The expectations for the process included the following, that I will handle:

- How can the results really be applied?
- What concrete, visible and approachable ideas can people get out from the results of Transition Arena?

Graph 2: This diagram presents how much the participants agreed with each statement. X-axis presents the twelve statements, and y-axis presents the average grade for each statement.



- How can we assure people that change is inevitable, but can be overtaken in a positive manner?
- How can we get from visionary talk to real practice and peak of change?
- How can we make the viewpoint of an end-user visible?
- How can we create transition paths instead of creating threat paths?
- The communication of the message must be put top priority.

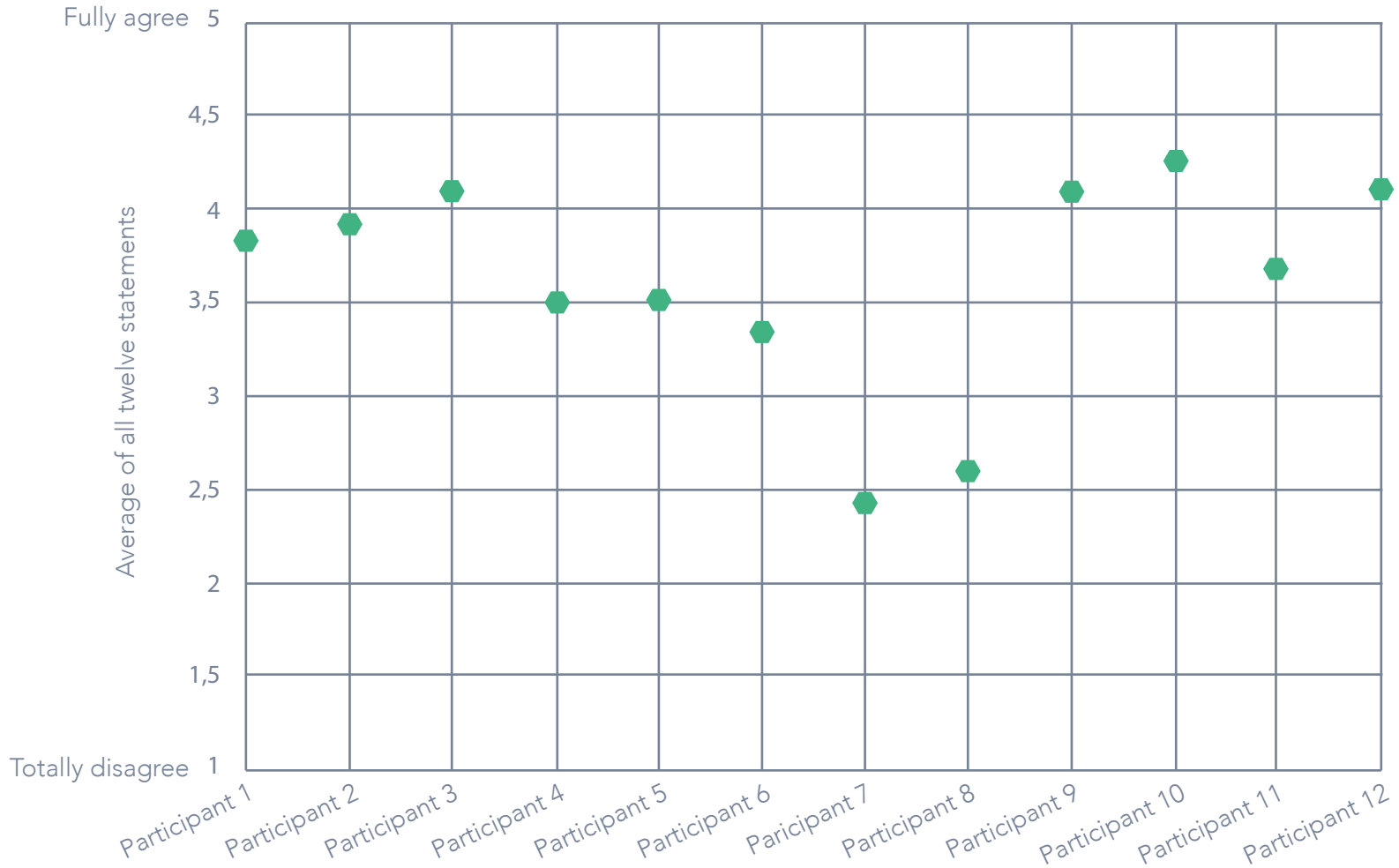
Compared to these expectations, the feedback and discussion at the end of the process contained a lot of similar topics, in a positive light. The TA planning team held a feedback panel discussion in the last meeting of Transition Arena in October. The participants commented on the whole TA process and were asked to freely express their uppermost thoughts. One participant felt that it was a real innovation that they were forced to create concrete pathways. Thus they were able to notice, how difficult it is to carry out such a process and prioritize single, truly relevant steps.

She hoped though, that more challenge could have been put in between each workshop. Sharpening the process, a little bit more was a wish that also came up in the conversation. The participants were happy about motivating and professional facilitation over the process. They thought that the pathway creation tool was a good facilitation technique. Especially the facilitators' challenging manner for coming up with documentation instead of just talking, and creation of concrete solutions was seen valuable, as well as identifying causal connections and complexity.

One participant thought that the process didn't feel like traditional "workshopping". Although, also an opinion that the process still remained on a too superficial level, was exposed. Setting out transition steps to build a path was seen as a good means. In the beginning, it was hard for this participant to understand, what should be done and of what kinds of steps the pathway should be formed, though. She hoped that more guidance on how to build the pathway would have been given. Also setting of the transition goals could have been more exact, and evaluating and prioritizing the different actions could have been emphasised more.

The ownership of the pathways was also discussed. One participant was worried that since the working groups remained quite the same over the pathway creation, the ownership in other pathways did not have a chance to form. Towards the end of the conversation, the participants suggested that more conflict could have been built in the process. They felt that as such, the people and opinions were quite like minded, and they wished for opposite viewpoints. In the end, it was pointed out, that the ambition level of the participants had increased towards the end of the process, and the participants planned that they should start meeting regularly, to check on the condition of the pathways they had created and possibly create new ones.

Graph 3: This diagram presents how much each participant individually agreed with the statements. X-axis presents the twelve participants, and y-axis presents what was the average grade that each participant gave to all twelve statements.



Participants' feedback questionnaire

The players were asked to answer a questionnaire at the end of the August workshop when working with the Pathway Creation Tool was over. They had to answer twelve statements, evaluating how well they thought that those described their experience from the pathway creation. In addition, they were asked one question to which they could answer freely: "What was the main thing that was left in your mind from the pathway creation?". Twelve participants answered the questionnaire. They filled them in place before leaving home after the workshop.

Most of the participants fully agreed with the first statement, as well as with the third one, so they felt that pathway creation helped them in exchanging thoughts and forming shared knowledge. The second statement got more divided opinions, but most of the participants still somewhat felt that pathway creation helped them to come up with new ideas. Half of the participants fully agreed with statement 4. Meaning that they came up with a new point of view over the pathway creation. With statement 5. most of the participants were neutral, or agreed. Most of the participants fully or somewhat agreed with statement 6., whether working with pathway creation tool was useful, no one disagreed.

Statement 7. got also disagreement. The variation in answers was big. Since the general feedback had been very positive, it could be assumed that this statement was expressed misleadingly by the author. Statement 8., feeling of connecting with team mates, got mainly positive feedback. Majority of the participants somewhat or fully agreed with it. Most of the participants agreed with statement 9, that pathway creation was fun. Statement 10. divided opinions. Half of the participants felt neutral about it, and no one fully agreed with it. With this statement, I also think as an author, that the statement was poorly formulated, causing confusion amongst the participants. Most participants disagreed or were neutral about statement 11. One participant fully agreed with statement 12., half of the participants somewhat disagreed.

The most memorable thing for the participants from pathway creation sessions was the good conversations they had had. They felt the multidisciplinary working groups especially beneficial for their personal learning. The participants felt that the pathway creation process was well facilitated in general. Although, for one participant it was hard to understand the differences between the individual means, such as "pathway step" and "step action" in the beginning. The tool was considered as a visually neat tool, on which the progression of ideation came visible in a motivating way. Also the usefulness in helping to construe a complex entity, was a remarkable factor for the participants.

One participant phrased her opinions: "Illustrated the complexity of issues outstandingly, as well as the need for a concrete operation path along with a long term vision in order to take things to a wanted direction. Pathway creation tool could/should be utilized also in policy and strategy planning. I hope you will take notes and make a "report" on the learnings of the pathway creation, so that also the others could more easily benefit from this method."

Although, also some doubtful opinions were addressed. One participant felt that creating the pathways was a little bit slow, and another one felt like the goals, means, immediate

changes and measures were quite disorganized with respect to each other, although stating that working was also a lot of fun. One participant assumed, that free conversation and short insightful presentations from the participants might have worked better. Yet overall, the participants had a positive experience about the pathway creation (Graph 3), and comparing their experiences of the pathway creation to the design challenges that we set to the design of the tool, it can be said that we managed well in creation of a deliberative planning tool for the implementation of a systemic change.

The facilitators' feedback

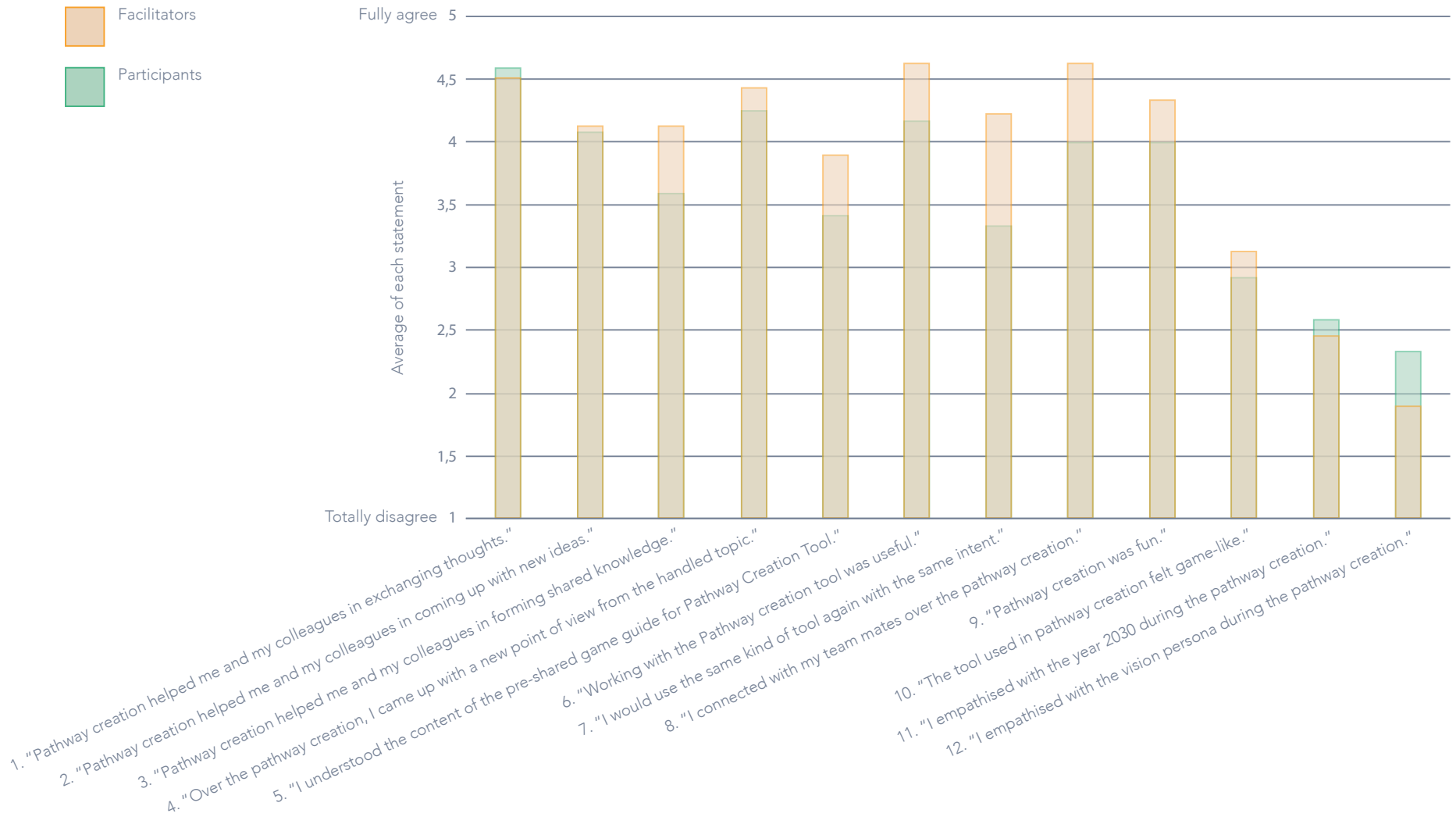
The facilitators and note takers were given a questionnaire in the last pathway creation workshop as well. Nine facilitators answered in the questionnaire. In this section, I will use the word the "facilitator" to describe either a facilitator or a note taker, since I did not separate their roles in the questionnaire. Although, two note takers felt that they did not always have the capacity to answer the statements or questions, but this was also due to the fact that they did not work in the field. The first twelve statements were the same as with the participants, as well as the first essay question "Tell, what are your uppermost thoughts of the pathway creation?". After that, they had five more essay questions as follows:

1. Describe shortly the passage of pathway creation step by step.
2. How did you follow the rules of the Pathway Creation Tool, in your own opinion?
3. Did you know the rules of the Pathway Creation Tool?
4. Were the rules useful to you?
5. What was the end-result of the Pathway Creation Tool, in your opinion?

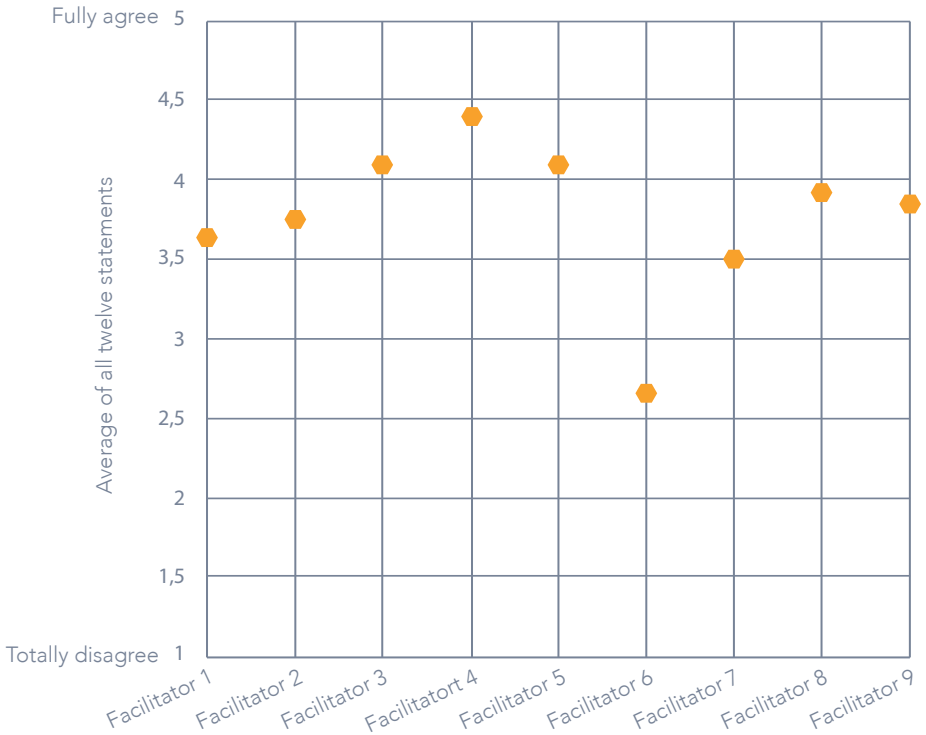
The purpose of the questions was to find out how deeply the facilitators had embraced the usage of the Pathway Creation Tool. One facilitator described her uppermost thoughts: "Worked well in building up and structuring conversation. Visualizing the pathways worked well, although it was important that the structure supported iterations, since some had to be made. Often success was thanks to the good facilitators and well selected participants." – *Freely translated from feedback by a note taker*

The tool was described with for example following words: Logical, visually ambitious, pleasant. One facilitator thought, that possibly the biggevst "end results" for pathway creation were the new way of working, game-qualities and visuality. Another facilitator described, that the creation of pathways was hard: they had to go through a lot of iterations, and the whole structure of the pathway changed several times. Also it was sometimes difficult to distinguish, which actions were supposed to be categorized as pathway steps, and which as step actions. Some facilitators were concerned that maybe "extra-innovations" were not born over the pathway creation, but felt that the new style of working was pleasant. Also as an end result, the pathways could have been even more defined, and facilitators thought that some ideas needed more refinement for the final report. Also a willingness to go deeper into the topics was visible in several answers.

Graph 4: This diagram presents how much the facilitators agreed with each statement (orange), compared to the participants (green). X-axis presents the twelve statements, and y-axis presents the average grade for each statement. Facilitators' feedback was slightly more positive than the participants' in general.



Graph 5: This diagram presents how much each facilitator individually agreed with the statements. X-axis presents the nine facilitators, and Y-axis presents what was the average grade that each facilitator gave to all twelve statements.



Concerning the rules, facilitators all thought that they were important, even though some told that they hadn't strictly followed them. Most facilitators and note takers mentioned that it was important that the rules had been gone through together beforehand, even though, one interviewee felt that they could have been a bit more simplified. The facilitators' experience of the workshops was positive in general, although, emphatizing with the future and vision persona had not been strong among them.

According to the Graph 4, the most positive feedback among all the attendees of pathway creation workshops concerned statements 1, 4, 6, 8 and 9. With these, everyone either somewhat or fully agreed.

> Statement 1: "Pathway creation helped me and my colleagues in exchanging thoughts",
>
> Statement 4: "Over the pathway creation, I came up with a new point of view from the handled topic",
>
> Statement 6: "Working with the Pathway creation tool was useful",
>
> Statement 8: "I connected with my team mates over the pathway creation",
>
> Statement 9: "Pathway creation was fun".

The results of these statements resonate well with the goals we had set for ourselves over the design process. I am positively surprised that even though the topic handled in the workshops was serious, all the participants still felt that creating the pathways was fun. This was not part of our design challenge, nor a defined goal, but for me personally, designing

a tool that would be fun to play was a guiding principle in my ways of working.

5. Conclusions

As the result of this study, I have presented the Pathway Creation Tool as a way to visualize and deliberate transition pathways during transition implementation arena. I have discussed it through relevant literature and a thorough description of the design process of the tool. As I mentioned in chapter 1 of this study, distinctive to usage of the TM method is the probing of transition pathway. The general approach is nurturing and growing, not planning or controlling long-term societal change.

Although, as uncertainty is an inevitable aspect of transitional concepts and some critique has already been raised towards the concreteness of such supposedly adaptive concepts, one of our main goals was to find a way to both recognize and implicate these probabilities. This was to be done through planning for a process that enables deliberative conversation, democracy amongst the participants and a tool that visualizes transitions pathways to such concrete level, that instant implementations may come to question if decided so. Voß et al. (2009) emphasized a learning-oriented approach in politics and policy design as process, including societal interaction within the planning process. As for the requirements for such approaches to happen, both Voß et al. (2009) and Heiskanen (2009) have presented three important factors:

- Creation of safe space
- Empathy towards other peoples' opinions
- Inclusivity and fair deliberation

In our design process, these requirements were included, and considered as important starting points for design. As I have shown in chapter 2, game structure, critical game design method and the main principles of designing co-creation tools can support the above requirements by Voß and Heiskanen. Thus I recommend implementing game structure also for future iterations of the tool.

The support that our tool can offer for deliberative working happens in many ways. The eventual pathway creation tool and process allows the participants a flexible and relatively lengthy timeframe for creation of pathways. The dynamics and knowledge power relations during the pathway creation are overseen by a trained facilitator: she has been given training and instructions for guiding her own group firmly but compassionately through the process. Each participant can gain ownership over the process via creation of certain pathway(s), and contributing to them persistently over several months.

A structured and safe pathway creation process is enabled by thorough guides for both the participants and facilitators, as well as enough relevant information is provided, to give a somewhat even informational access to every participant concerning a certain topic. Game structure, and critical play method have worked as attributes, that have enabled a smooth and structured design process for the Pathway Creation Tool. The visual and tangible materials, such as pathway board, movable

magnets and other material elements, as well as rules and instructions for pathway creation have worked as motivational and structuring elements, and eventually shaped the whole transition arena process. For such future TA implementation processes, it is hard to envision pathway creation workshops that would not benefit from utilizing a concrete visualization tool, for making sense of the complex transition pathways. The literature concerning design game and game design, addresses several ways to tackle demands and requirements that are expected from a tool handling transitions. Thus, game structure in the center of such design process may prove valuable in order for it to succeed.

Further developments

Several participants of the transition arena in Helsinki were interested in the methodology behind the game, and wondered if they could implement it in their own strategy processes. Indeed, the Pathway Creation Tool could be possibly utilized also in other kinds of projects that examine transition pathways or in strategy processes of municipalities, universities and companies, also in setting personal goals.

According to the analysis of the TA team, the best place for working with the transition paths would be feeding into an ongoing or soon to begin strategy process. The visions and transition goals could be determined beforehand, and the players' task would be simply to build the pathways by coming up with concrete actions for the goals, and after that specify the goals and vision further. This would allow for eliminating too ambitious or unrealistic goals, define holes between now and the future, that still lack any plan for solving.

Also the material components of the Pathway Creation Tool could be modified and expanded, by bringing in new approaches, such as citizen point-of-view or refining the instructions, or possibly by digitizing more of the materials to enable a lighter production process of the pathways, and thus making the pathway creation process more accessible. As such, the transition arena process that I have described in this study, and especially the pathway creation, is already a redesign of the transition arena methodology. In order to evaluate, whether this redesign is translatable and brings added value to the study of transitions, more arenas need to be established with pathway creation processes that utilize the Pathway Creation Tool.

A need for further studies of applying tools with game structure in co-design processes that aim, not in development of a product or service, but at policy (re)design is also addressed in this study. I have shown that the game structure can be utilized in similar manner to more traditional service design projects, but the lack of data and other proven results leaves open a question, whether there can truly be added value in designing such process for advancing systemic change. The best way to know if the tool works though, may be by just looking at any participating actor's face after the process, and try to spot whether a spark of excitement can be seen.

May this study work as a source of inspiration for practitioners and researchers, who struggle with the problem of how to design effective tools for strategic planning processes that require a multitude of factors to be considered at the same time, and which do not have a definitive end product or service as the final result. It also adds another layer to the Transition Arena method, suggesting a concrete way for shift of focus in the utilization of the method.

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www.energiakokeilut.fi

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Figures 16, 17 & 20 by Daniel Gustafsson

Figure 21 by Miika Ruissalo

APPENDIX

Appendix 1

VISIOKUVAUS
Smart Energy Transition

PERHE KUKKONEN&JOKINEN

SOFIA KUKKONEN: 48V
Opettaja, 3600€/kk

ARI JOKINEN: 46V
Opettaja, 3500€/kk

LINDA KUKKONEN: 8V
Koululainen

ASUMINEN
Oulun keskusta, Torikatu, 82m2 kerrostalo, rak. 1972.
Sofia on taloyhtiön hallituksessa yhdessä Erkin 74v, Markun 78v ja Lassen 55v kanssa.

ENERGIAN KULUTUS JA KÄYTTÖ
Lämpö: Kaukolämmitys, sisäilma 22-24C
Sähkö: 2400kW vuodessa

VAPAA-AIKA
Kullakin perheenjäsenellä omat harrasteensa Oulun keskustassa.

LIIKKUMINEN
Auto ja julkisilla Oulun keskustassa.

INTRESSI
– Kiinteistön energiatehokkuuden parantaminen kustannustehokkaasti.
– Säästää kuluissa, edistää ilmastoystävällistä energiaa.

POLKUUN LIITTYVÄT OLETUKSET 2030
"Käyttäytymismuutos: 15% energiankulutusta alas"

A) Taloon PTS:ssä suunnitteilla putki- ja kattoremontit, 10v jänteellä ikkunaremontti. Sofia on esittänyt kaikkien tekemistä kerralla ja lisäksi 20m2 aurinkopaneeleita, 30m2 aurinkolämpökeräimiä, lisäeristystä, koneellista ilmanvaihtoa sekä talon liittämistä etäohjattuun lämmön kysyntäjoustojärjestelmään. Muu hallitus on epäileväinen, miten asukkaat rahoittavat mittavat remontit. Talon asukkaiden keski-ikä on 63v.

B) Sofia on tilannut alustavan katselmoinnin ESCO yhtiöltä, mutta sen toimien rooli muiden remonttien keskellä epäselvä.

Appendix 2

Kyselylomake
Muutospolku-pelin osallistujat
24.8.2017

SMART ENERGY TRANSITION

Vastaa alla esitettyihin väitteisiin sen mukaan, kuin koet että ne parhaiten kuvaavat kesän työpajojen muutospolkutyöskentelyn kokemustasi. Voit selittää lyhyesti vastauksiasi jokaisen väitteen alle varattuun tilaan.

1 (täysin eri mieltä) – 5 (täysin samaa mieltä)

Muutospolkutyöskentely auttoi minua ja kollegoitani…

…Ajatusten vaihtamisessa.

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

…Uusien ideoiden keksimisessä

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

…Yhteisen ymmärryksen muodostamisessa

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

Keksin polkutyöskentelyn aikana jotakin uutta aiheesta, jota käsittelimme.

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

Ymmärsin muutospolku-pelin ohjeet, jotka jaettiin osallistujille etukäteen.

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

Työskentely muutospolku-pelin avulla oli mielestäni hyödyllistä.

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

1

Appendix 3

Kyselylomake
Muutospolku-pelin osallistujat
24.8.2017

Vastaa alla esitettyihin väitteisiin sen mukaan, kuin koet että ne parhaiten kuvaavat kesän työpajojen muutospolkutyöskentelyn kokemustasi. Voit selittää lyhyesti vastauksiasi jokaisen väitteen alle varattuun tilaan.

1 (täysin eri mieltä) – 5 (täysin samaa mieltä)

Muutospolkutyöskentely auttoi minua ja kollegoitani…

…Ajatusten vaihtamisessa.

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

…Uusien ideoiden keksimisessä

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

…Yhteisen ymmärryksen muodostamisessa

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

Keksin polkutyöskentelyn aikana jotakin uutta aiheesta, jota käsittelimme.

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

Ymmärsin muutospolku-pelin ohjeet, jotka jaettiin osallistujille etukäteen.

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

Työskentely muutospolku-pelin avulla oli mielestäni hyödyllistä.

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

Käyttäisin samanlaista työkalua uudelleen samassa tarkoituksessa.

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

Sain polkutyöskentelyn aikana yhteyden kanssapelaajiini.

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

Muutospolkutyöskentely oli hauskaa.

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

Mielestäni polkutyöskentelyssä käytetty työkalu tuntui pelilliseltä.

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

Eläydyin polkutyöskentelyn aikana vuoteen 2030.

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

Eläydyin polkutyöskentelyn aikana visiopersoonaan.

Täysin eri mieltä ○1 ○2 ○3 ○4 ○5 Täysin samaa mieltä

Kerro, mitä muutospolkutyöskentelystä jäi päällimmäisenä mieleesi?

Kiitos vastauksistasi!

Käyttäisin samanlaista työkalua uudelleen samassa tarkoituksessa.

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

Sain polkutyöskentelyn aikana yhteyden kanssapelaajiini.

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

Muutospolkutyöskentely oli hauskaa.

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

Mielestäni polkutyöskentelyssä käytetty työkalu tuntui pelilliseltä.

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

Eläydyin polkutyöskentelyn aikana vuoteen 2030.

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

Eläydyin polkutyöskentelyn aikana visiopersoonaan.

Täysin eri mieltä	1	2	3	4	5	Täysin samaa mieltä

Avoimet kysymykset. Kirjoita varattuun tilaan lyhyt vastaus, joka parhaiten kuvaa kokemustasi.

Kerro, mitä muutospolkutyöskentelystä jäi päällimmäisenä mieleesi?

Kuvaile lyhyesti polkutyöskentelyn kulku vaihe vaiheelta.

Miten noudatit mielestäsi muutospolku-pelin ohjeita?

Osasitko mielestäsi muutospolku-pelin ohjeet?

Oliko ohjeista sinulle hyötyä?

Mikä oli mielestäsi muutospolku-pelin lopputulos?

Kiitos vastauksistasi!