Nicolas A. Balcom Raleigh, Laura Pouru, Ellinoora Leino-Richert,
Marjukka Parkkinen & Markku Wilenius

FUTURES LITERACY LAB FOR EDUCATION

**Imagining Complex Futures of Human Settlements at
Finland Futures Academy Summer School 2017**

UNESCO
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uniTwin
UNESCO Chair in Learning Society
and Futures of Education
University of Turku, Finland

Turun yliopisto
University of Turku

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This book is published as part the research and education agenda of the UNESCO Chair in Learning Society and Futures of Education (LSFE) held by Professor Markku Wilenius at Finland Futures Research Centre, University of Turku. The aim of the UNESCO Chair in LSFE is to utilize the tools of futures research to increase global futures thinking and well-being. The Futures Literacy Lab for Finland Futures Academy Summer School 2017 was co-organized by the UNESCO Chair in LSFE research team, the Futures of Cities and Communities research team, and the UNESCO Management of Social Transformations Programme.

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FOREWORD

Many people are convinced that we are living in a time of exceptional innovations. In many domains human ingenuity is breaking past old barriers to invent new cures for disease, new means of communication, and new ways of organizing business and life. We see innovations occur when people face both terrible challenges and inspirational opportunities. But we also know that from the vantage point of the present we cannot always know if what seems innovative today will be deemed innovative in the future.

For example, the inventor of the telephone thought that it would be used to broadcast symphony concerts to people listening far away. Imagining today's ubiquitous cell phone when radio had yet to be invented was impossible. This means that a certain modesty and reflective distance are required in order to detect and make-sense of current innovations. Our greatest contribution to the future may be invisible to us today.

Futures Literacy Laboratories (FLL), like the one described in this publication, are at once modest, fully cognizant that the future is unknowable, and ambitious, aspiring to discover and invent novelty. These Labs really are designed as 'laboratories' where experiments take place and hypotheses are tested. Only instead of chemicals and solutions or cell samples and molecules, FLL use discursive and performative processes that reveal and invent knowledge about the world around us. Think of FLL as 'microscopes of the 21st Century', a clever tool that makes the invisible visible. FLL are carefully co-designed 'collective intelligence knowledge creation' processes that 'use-the-future' in analytically precise ways in order to test hypotheses and foster learning.

The invention of FLL, which is just one amongst many tools that can be used to try to understand our emergent universe a bit better, is part of a broader change in why and how the future is being used (Miller 2018). This change is driven by a fundamental tension between, on the one hand, the way humanity tries to "make a difference" and, on the other, the non-deterministic and open reality of a complex emergent universe. FLL are part of the response to the disappointments, dashed hopes and crises of identity that arise when 'futures illiterate' conceptions of human agency clash with the reality of complexity. FLL can help to move our thinking beyond pre-occupations with colonizing the future, an exclusive, even obsessive desire to impose our will on tomorrow as if we were gods capable of doing so.

As Edgar Morin said, humanity will not be truly civilized until we can integrate complexity into our thinking. I hope that FLL will provide one way for us to make the necessary changes in the conditions of change. A way to both research and cultivate people's Futures Literacy. Working with the team on this FLL, as recounted over the following pages, certainly made me believe that this is what is happening.

Riel Miller
Head of Futures Literacy at UNESCO
Paris, May 2018

EXECUTIVE SUMMARY

This report presents an instance of Futures Literacy Laboratory (FLL) held for the Finland Futures Academy Summer School on the topic of "complex futures of human settlement in 2050" held in June 2017 at University of Turku. The Futures Literacy Laboratory approach was developed by Riel Miller and UNESCO through a series of instances held around the world starting in 2012. In essence, an FLL aims at increasing *futures literacy* by increasing awareness of anticipatory assumptions and 'how the future is used' in the present. This report describes the theoretical background, pedagogical design, practical implementation, and outcomes of this Summer 2017 FLL. It concludes with lessons learns and suggestions for future applications of FLL.

In general, an FLL has three phases: 1) Revealing, 2) Reframing and 3) Rethinking. In the first phase, students made their existing anticipatory assumptions explicit by discussing their hopes and predictions concerning futures of human settlements. In the second phase, students were asked to reframe the future using unfamiliar anticipatory assumptions. This reframed future served as a 'sandbox' in which to rigorously imagine new future human settlements. Groups played the new Metaphor Molecule futuring game to create their own future human settlements and populate it with inhabitants. In the third phase, students were asked to compare their anticipatory assumptions from the previous two phases and identify insights and ways of seeing potential futures in the present. For the final phase, students produced messages for city leaders and specific ideas for the city of Turku.

The organizers found three key design principles to be of particular importance to an FLL:

1) *Keeping the future open* – By not overemphasizing the organizers' views of the future, the students can come to the process from their own starting points.

2) *Students steer their own learning* –The structure should de-emphasize lecturing in favor of conversation, discussion and student-led inquiry. Students should be given avenues to shape the process before it occurs.

3) *Boosting and combining creativity and criticality* – When students are supported in being creative and critical at the same time, they are better able to immerse themselves in rich futures.

The report concludes that FLL is particularly suitable method to be used in the beginning of a futures studies course or program in tertiary education. One of FLL's strengths is in supporting individuals in developing personal understanding of how the future can be used, what the future personally means to them and comparing these to perspectives of their classmates. With simplification and pedagogic modifications FLL can also be used in secondary and maybe even in primary education. FLL can also support learning outside of formal education, such as in organizational development or policymaking as these processes usually require participants to take a futures perspective.

1.   INTRODUCTION

This book introduces Futures Literacy Laboratory (FLL) as an educational method for teaching and learning futures thinking. It describes the implementation of the FLL method in the context of a Finland Futures Academy's Summer School, held in Turku in June 14–15, 2017 (Appendix 1).

The Finland Futures Academy (FFA), a national network of 10 universities, facilitates academic educational and research programs in Futures Studies and provides avenues for students, researchers, and universities to participate in international futures research networks. The annual summer school is an example of such activities. In 2017, it was co-organized by the UNESCO Chair in LSFE and Futures of Cities and Communities research teams at University of Turku in cooperation with the UNESCO Management of Social Transformations Program (MOST). Approximately 40 participants from the FFA open university network, master's degree programs, and PhD programs attended.

The goal of an FLL is to give participants a broader understanding of their own assumptions about the future, reframe those assumptions, and use reframed perspectives to pose new questions about the future, new ways of perceiving the present, and new ways of "using the future" in the present. The topic of the FFA FLL was *Complex Futures of Human Settlement 2050*. The summer school's most significant intended impact was to invite students to discover new questions about how people will live together in the future—not just technologically—but in social terms such as nuanced ways of living and the complex material and social networks surrounding individuals. These new questions, in turn, can help people see in the present new possibilities for the future.

The aim of this report is to describe and analyze the experience of planning and delivering an FLL as a University-level course and discuss its potential for educational contexts. The second chapter introduces the concepts of futures literacy and futures literacy laboratory, discusses the theoretical background of supporting creativity and criticality in collective knowledge production, and complexity of cities and communities. The third chapter describes the design principles and processes involved in preparing this FLL. In the fourth chapter, outcomes from the summer school are briefly summarized as a demonstration of the capacity of FLL to support students in applying creativity and critical thinking to invent new ideas and questions about the future. In the fifth chapter, applying an FLL to education contexts is discussed and conclusions are made.

The FLL organizing team, left to right: Markku Wilenius, Laura Pouru, Nicolas Balcom Raleigh, Hanna-Kaisa Aalto, Ellinoora Leino-Richert, and Riel Miller.

2.   FUTURES LITERACY, NOVELTY & COMPLEXITY

2.1   Futures Literacy and Futures Literacy Laboratory

The concept of *futures literacy* refers to an individual's capability to "use the future" in the present (Miller 2007). The future is often used with a narrow planning-oriented focus instead of utilizing the full individual capacity to imagine alternative futures and use the future to create novel futures, or act toward desirable futures. The future is often also used in vague, implicit ways, such as (Gough 1990; Hicks 2008):

- **Tacit, silent futures**: The future is never directly addressed but expected to unfold on its own. Expectations about the future might exist but they are never discussed or brought out into open.

- **Rhetorical, token futures**: The future is addressed through stereotypes and clichés, but these have very little explicit or true meaning. The future might be used as grounds for changes that rise from other motives.

- **Taken-for-granted futures**: The future is addressed as if there existed no alternatives. The future is often just colonized with familiar thought patterns from the past.

In order to be able to use future more creatively one must be aware of her own anticipatory assumptions, thought patterns that affect an individual's ideas regarding why and how to imagine the future, and how these assumptions have an effect on her present-day perceptions and behavior (Miller 2018, 2-6). When you are a futures literate person, you have the capacity to identify, design, target and deploy anticipatory assumptions (Miller 2018, 24). A futures literate person can answer the question: "What is the future and how do I use it?" (Miller 2018b, 6).

To be precise, the future does not exist, as we always live in the present moment. However, it can be argued that the future is continuously instrumentalized by actors in the present as anticipation. (Miller, Poli, Rossel 2018, 54–55.) It can be stated that reality is a continuous interplay of past, present and future (Poli 2017). Wendell Bell (2002) describes the multiple ways that the future influences decision-making in the present through:

- *Images and ideas* that we have about the future
- *Beliefs about what is possible* in the present and in the future
- B*eliefs about what is probable* in the given circumstances
- Capabilities to evaluate what kinds of futures are *desirable*

Through enhancing one's *futures literacy*, a person learns to use the future more consciously. According to Miller (2018, 4; 6) futures literacy is a capacity that can be trained and a skill that can be revealed and obtained through a learning process. Futures Literacy Laboratory is a learning method developed particularly for this purpose by UNESCO's Management of Social Transformation program team.

FLLs involve several learning techniques such as action-learning, collective intelligence, and creativity heuristics. The core of an FLL is to expose what people know and what they can come to know while deepening participants' understanding of 'how they use the future'. (Miller 2018b, 4–5.) From 2012 to 2016 Miller and his team have run more than 30 FLLs around the world (Figure 1).

Figure 1. Map of Futures Literacy Labs held around the world, 2012-2016.

Futures Literacy Laboratories consist of three phases: 1) Reveal 2) Reframe 3) Rethink. The first phase "Reveal" focuses on making participants' implicit anticipatory assumptions explicit. This means bringing forward and making visible the assumptions that guide their ideas about the future. This is done with methods that allows participants to feel safe to express their expectations, hopes and fears regarding future. The ideal goal is that participants' will start realizing that their way of seeing the future depends on their analytical and narrative framing assumptions. In addition to careful selection of heuristic methods to serve as access points or footholds for the overall process, there are two key elements to take into consideration in the Reveal phase: 1) The time horizon must be far enough into the future to encourage participants to imagine freely and be unafraid of being wrong and 2) Exercises and facilitation must support groups in developing a shared narrative of futures they imagine together that is not nec-essarily a consensus but a mixture of their diversity of perspectives. Causal Layered Analysis has proved to be a useful tool for this purpose, as it invites participants to deepen their descriptions of their assumed futures. (Miller 2018a, 92–93.)

The second phase "Reframe" takes the participants out of their comfort zone as they are asked to leave their familiar anticipatory assumptions, often based on extrapolation of the past into the future, to invent and test new ones. Instead, they are asked to imagine the future without probabilistic framings and deterministic purposes such as planning. They are asked to reframe the future with unfamiliar anticipatory assumptions called a Reframing Model. This tool is often some variation of a "Learning Intensive Society" scenario (see Appendix 2) built from radically different assumptions than usually found in the present. The primary goal of the second phase is to help make participants realize their own capacity to use a wider range of anticipatory systems and processes. This awareness can take the can include seeing the limits of using future only for preparation and planning purposes or experiencing how starting from different assumptions allows for new ways of imagining futures. This is the very core of futures literacy. (Miller 2018a, 93-95.)

The third phase "Rethink" focuses on comparing and contrasting the anticipatory assumptions in the first and second phase. The primary goal is to reinforce participants' observations and insights on how the future can be used in different ways for preparation, planning or novelty, and how doing so effects perceptions and action in the present. (Miller 2018a, 95–96.)

FLLs follow the three-phase process, but it is essential to tailor each FLL to suit to the local societal context (Miller 2018c, 7). For instance, the Reframing Model should always be developed from the local context in whatever ways possible. The design and customization process of the Summer School FLL is described in more detail in the chapter 3.

In summary, the purpose of FLL is to "provide a more systematic and coherent approach to sensing and making-sense of the complex emergent present" (Miller 2018a, 97). Therefore, FLL can be considered as an important education tool in our complex world in which we have to learn to live with continuous uncertainty. For these reasons, it was an appropriate approach for delving into the topic of the Summer School, "Complex Futures of Human Settlements."

2.2   Creativity and Criticality in Considering Futures

It is a human tendency to recognize patterns in the present based on past experiences in order to anticipate what will happen next (Poli 2010). A general challenge in any effort to describe futures, especially during participatory processes, is to go beyond these patterns and expectations set by the present and past to imagine futures bold and new. In other words, because we are largely blinded by "the now," it is challenging to imagine new futures that are significantly different from what we already know. Meanwhile, it is precisely the futures which are radically different from the present which can hold the most valuable insights about what futures are desirable or preferable (Dator 1995). These radically different futures can also expose the hidden potentials in the present – obscured by already imagined futures (Miller 2018). For these reasons, it is highly important for participatory futures processes to support

participants in learning why and how to invent alternative futures. Supporting participants in producing novel futures is essential to the effectiveness of Phase 2, Reframe, in an FLL.

In his futures studies master's thesis, Balcom Raleigh (2017) makes a case for the importance of elevating creativity and criticality in participatory processes in order to produce novel futures. He proposes participatory futures processes can better support people in being creative and critical when their participation designs are linked to theoretical models for creativity and criticality. Taking an action research approach Balcom Raleigh develops a game capable of elevating creativity and criticality called Metaphor Molecule, which is used in Phase 2 of the FLL.

Creativity is not mystical. It can be observed as a phenomena and researchers have developed several models for how it functions in organizations and individuals. Picked from a rich treasure trove of such models, three 'creativity classics' are particularly emphasized in Metaphor Molecule: Amabile's (1998) *principle of intrinsic motivations*, Csíkszentmihályi (2014) *state of flow*, and Amabile et al.'s (2005) *organizational cycle of positive affect*. Based on research into what factors support or 'kill' creativity in the workplace, Amabile (ibid.) found people are most creative when they are intrinsically motivated, rather than externally pressured, to accomplish a task. Based on interviews with people who frequently do creative work, Csíkszentmihályi (ibid.) observed how individuals enter what he called a *state of flow*, being so focused on a creative task they are capable of achieving exceptional results. This *state of flow*, for example, is supported by several factors, including c*entering of attention* and *loss of ego*. Amabile et al. (ibid.) offer the *organizational cycle of positive affect* as an explanation for how the overall vibe or mood of a participatory event impacts how creative people feel and the creative outputs they produce. In this model, overall *affect* supports or hinders the creativity of individuals working in groups. Positive affect reinforces itself within a group as individuals produce, share, and appreciate the group's creative outputs. Then when one group presents its creative work to the other groups, its creative outputs can produce positive emotions in others which in turn contributes to a positive vibe for the overall event.

Criticality, when considered from a futures studies perspective, is concerned with the overall improvement of the human condition. In the discipline of futures studies, taking a critical perspective plays an important role in deepening ideas about the future because doing so challenges a person or group's existing mental models, worldviews, and anticipatory assumptions. Criticality refers to asking questions about the implied impacts of a possible future from a wide variety of viewpoints and being reflective about how the futures we perceive, describe or act toward are colonizing or decolonizing the future, as well as opening or closing options for humanity (Inayatullah 2012, 44; Slaughter & Riedy 2009, 37). It also means questioning given futures, actively describing desirable futures, and taking actions to shape good futures (Dator 2002). Criticality is not always in conflict with creativity and can actually support it by producing the cracks in the given future which allow for new ideas to emerge. In this way, mixing criticality with creativity in a participatory process can boost both of these 'forces', helping

people produce a wider range of novel ideas about the future. Many of these novel futures would have high impact on our world if they came to be. By considering differences between these new futures and the present, participants can perceive the present itself differently.

The Metaphor Molecule Game is designed to elevate creativity and criticality in groups as they explore futures. It is a game with a collective goal instead of a competitive one. The game is inspired by an experimentation with Inayatullah's Causal Layered Analysis Game (Heinonen et al. 2017, 103–104; Heinonen et al. 2015). Its name comes from two of its key game elements—*metaphor atoms* and *metaphor molecules*.

In the game, a small group creates or selects a future to develop. The players then populate that future with roles they create, give those roles *metaphor atoms*, build a model of the relationship among the roles buy building *metaphor molecules*, select which relationships are most influential in the network of roles, transform the metaphors of the roles in the influential relationship, and then tell a story about the future based on the roles. Through its many steps, the game builds to the apex of 'transforming metaphors', an act through which the group 'edits' a future they've just invented together. Creativity and criticality are most entangled and elevated during this metaphor transformation task. (Balcom Raleigh 2017.)

Metaphor Molecule Game, as applied in this FLL, is a hands-on way to model the complex and imaginary future human settlements. It also supports students in the difficult work of reframing the assumptions they use to imagine the future. Metaphor Molecule Game was selected for the Reframing phase for its potential to help the summer school students gain analytical and narrative perspective on the assumptions they use to describe the present and imagine futures based on different assumptions.

2.3   Complexity in Human Settlements

Due to inherent complexity, the future is uncertain and unknowable (Tuomi 2012, 737). Meanwhile, human settlements are self-organizing entanglements of many open systems which are active at many scales and layers (Portugali & Benenson 1997, 537). Imagining futures of a complex human settlement requires consideration of how its characteristics change over time through the interactions of these many systems. This challenge aligns well with a core idea of systems thinking—a phenomenon should not be observed as detached or isolated, but rather as a part of multiple systems. Systems thinking also requires some form of 'seeing a system' from outside in order to modify it (Meadows 2008). The summer school organizers relied on the capacities of FLL to help people think outside their usual contexts or 'orders' (see Bohm & Peat 2011 [1987]) regarding futures of human settlements. This outside perspective supports perception of complex systems involved in future human settlements and identification of complexity and uncertainty in assumptions held about the topic.

Meadows states that systems thinking helps us to manage and adapt to the range of choices in the complex world. (Meadows 2008.) Broadly speaking, people tend to approach complexity and uncertainty in two, often simultaneous, ways. Complexity is a permanent and persistent condition of the universe and a source of uniqueness and 'open creativity' (Miller 2007, 520). Yet complexity is also something to be understood and managed to create 'a future where we leave as little to chance as possible' (Wilenius 2017, 27). These 'accept' and 'manage' perspectives are both needed in daily sense making. In the context of future human settlements, both perspectives hold value. For instance, it is important to manage complexity and uncertainty in designing future infrastructure and buildings—these must serve future inhabitants well and not collapse or cause harm, while it is equally important to embrace the emergence of new social phenomena and possibilities that arise as built environments, technologies, and people develop new capacities, characteristics, desires, and ways of being.

Human settlements can be understood as "complex systems of systems of systems" (Johnson 2012). Human settlements are complex and adaptive systems in which individuals interact in different ways through networks (Bettencourt & West 2015). At the core of this complexity are networks of organizations and individuals as well as their interactions, relationships and dynamics. These networks of actors produce many of the distinctive properties of communities and cities. In addition, these organizations and individuals engage in a unique and dynamically changing setting of infrastructural components, such as constructions, streets, pipelines, and digital communications. Although many human settlements possess similar properties, the number and variety of individuals and their organizations—together, within and in relation to the infrastructure—makes them unique. In other words, as the motivations and relations of these networks of actors vary, so do the overall characteristics of their human settlement. Furthermore, it is in those interactions where adaptation and learning happen. As a result, the unique history of each different place is born, giving each community its own particularity. (Bettencourt & West 2015.) In this essentially complex adaptive system of networks, behavior and characteristics of various networks of actors influence the behavior and characteristics of the overall system, and the overall system in turn influences the behavior and characteristics of these networks.

The transformational potential of human settlements stems exactly from individual and collective dynamics; the proximity of others is manifested as sociality (Bettencourt & West 2015). The varying aspirations, expectations and hopes within a settlement are also reflected into unique and alternative futures, as each of the actors and organizations see, define, negotiate and modify their understanding of what is a good human habitat of tomorrow, each in their own way. The multiplicity of the aspirations of different actors is fundamental to the complexity of settlements. These aspirations are simultaneously beyond control leading to uncontrolled interactions among individuals which can serve to generate new value for the community (Bettencourt & West 2015).

Perceiving a human settlement as a complex open system presents challenges for researching and managing it. For example, the scientific worldview is still largely dominated by the legacy of reductionist thinking. This is currently especially innate on the realm of economics, which is based on reductionism and favors the parts over their complex sum. (Orr 2014.)

David Orr gives two examples of sustainable and systemic approach, both related to human settlements; ecological agriculture and buildings. Architecture is a comprehensible and illustrative case of applying systems thinking. Instead of planning and constructing a building in a serial manner, they are designed to function as systems. When farming is seen as a polyculture reliant on complex synergies between different parts such as soil, wildlife, humans and water, it cannot be managed as a factory producing short-term yield. Orr reminds that farms and buildings as systems operate in different ways and tempo, thus telling us different aspects about systems. Farms as natural systems and buildings as human creations are connected with different subsystems. (Orr 2014.) Then again, these characteristics are merely two examples out of the numerous ones influencing the complexity of human settlements. However, they could set a metaphorical as well as a practical example of how to implement complex systems thinking in urban governance.

There is a mismatch between the lived lives in human settlements and how they are governed or handled on administrational and organizational levels. However, studying the 'underlying order' or the similar and shared quantifiable characteristics of human settlements is possible because they can be measured. When diverse quantified characteristics are collected under a complex systems framework, it can be seen that human settlements can share a general topology, a shape of similarities. (Bettencourt & West 2015.) However, the variety of actors, built environments, and networks present in a human settlement generates unique and difficult if not impossible to predict overall characteristics.

The summer school students needed an interactive way to engage with the complexity inherent in present and future human settlements. The game Metaphor Molecule was selected as a playful way for people to construct and imagine a network of actors, their relationships, and the overall characteristics their dynamics produced in the complex system known as human settlements.

3. METHODOLOGICAL DESIGN OF THE FUTURES LITERACY LAB

The design and structure of this Futures Literacy Lab for education resulted from an emergent process in which new opportunities, potentials, and limits intermingled to form a final participatory event. At the beginning, the possibilities for approaches and topics were many, varied and often in conflict. The list of potential guest speakers represented varying perspectives on futures thinking and complex systems. Along the journey, the organizing team articulated, discussed, and reformulated the goals for the summer school, key design principles, and approaches to implementation. Contingencies were also imagined and tested. The organizers agreed the primary goal was to provide a high-quality futures studies educational experience for the Summer School students. A secondary goal was to learn first-hand, with the students, how a Futures Literacy Lab can be used for teaching and learning. A tertiary goal, was generate fresh insights about future human settlements, both in general and for Turku.

3.1 Key Design Principles

The following three key design principles evolved during the process of organizing the Futures Literacy Lab for Finland Futures Academy Summer School 2017.

1. Keep the future open
2. Students engage in their own learning
3. Elevate creativity and criticality to reframe futures

These design principles are described in more detail in the following sections, so they can serve as starting points for others who are organizing a Futures Literacy Lab for education purposes.

3.1.1 Keep the future open

Because a Futures Literacy Lab is intended to support participants in gaining insight into how they themselves use the future, it is important not to "taint the waters" with the organizing team's own assumptions and biases about why we use the future or any specific imaginary future. Even when designing an FLL to arrive at actions or plans, it is an important ontological principle to leave the future open for the participants. (Miller 2018, 24). In the case of the summer school, maintaining the openness needed to be balanced with other teaching interests, for example, providing a focal topic for the program, advertising the program to students, and providing course materials and pre-assignments to help students gain more from the experience.

One way the organizing team kept the future open was to avoid using terms that could potentially limit the range of future possibilities the students would imagine. For instance, the term "human settlements" was used in the lab's title, promotional media, and group materials instead of the more conventionally used "cities". The reason for this choice is because human settlements come in a wide variety of forms and structures, not only the urban ones. Going further, and taking the temporal perspective, it is an anticipatory assumption that any given city will still be a city in the future—we know from history that some cities devolve into other forms or are even abandoned over time. Using the term "human settlement" supported students in being free to think of different configurations of human habitats. For instance, they could consider small villages, nomadic communities, or configurations not bound to planet Earth.

The organizing team also made an effort to limit making predictive or normative statements about the future in the course description and other pre-materials. For example, a draft description of the event championed the concepts of "human-centered" and "sustainable" cities. While these values were very much a part of the research interests of the organizing team, they over emphasized a specific kind of values. The goal of limiting such statements was to leave it to the students to explore their own values and assumptions, not only about possible and preferable futures, but also why they use the future.

Finally, delicate content decisions were required for the Reframing Model, to be used in Phase 2, to support this 'leave the future open' design principle. The first draft of the Reframing Model combined future imaginaries from several contemporary futures scenarios and concepts such as Wilenius's (2017) 6th Wave, Heinonen et al.'s (2018) Neo-Carbon Energy Scenarios, and the Millennium Project's (2015) Futures of Work/Technology 2050 scenarios. While all of these future imaginaries are valuable contributions to futures research, in this context using them came with a risk of inhibiting the students exercising their own imaginations. Therefore, the final version of the Reframing Model was written to leave more details open to the students' invention.

3.1.2   Students engage in their own learning

Many conventional teaching methods can be described by the metaphor of "filling the students' minds with knowledge provided by experts." In contrast, the summer school was designed to engage students directly and collectively in the production of new knowledge about the course structure and topic: Futures Literacy Lab and Complex Futures of Human Settlements. Fulfilling this design principle included asking students to complete assignments before the event to initiate their engagement and emphasizing participation over lecturing during the program.

For one assignment, students were asked to take a photo representing hopeful futures of human settlements and a photo representing fearful futures of human settlements and send them to the organizing team. These photos were then combined into a *futures window*—a presentation set to music—

which was shown at the beginning of the FLL to provoke awareness of anticipatory assumptions, including language and meanings, before the exercises began. (Heinonen & Hiltunen 2012). The educational purpose of this *futures window* exercise was to provide a non-textual way for the students to engage with the subject matter of the summer school before they arrived for the workshop and provide an opportunity to become invested in the event.

The students were also asked to read a mix of news articles, academic articles, and a book chapter before the summer school. These readings were selected to introduce the concepts of complexity in general, complexity of cities, and the origins and purpose of FLL. An added twist to this reading assignment was the task of writing questions, based on what they read, for Miller and Wilenius. These lecturers were provided the questions to use, however they saw fit, to align their talks with the interests of the students. Both speakers went above and beyond being simply informed by the questions in preparing their presentations, deciding instead to write answers for each and every question. These answers were given to the students during the summer school.

Finally, a structural decision was made to keep all guest speaker presentations short, scatter them throughout the program, and prioritize interaction and conversation above lecturing. In other words, a balance was sought between steering students toward new ideas and supporting them in guiding themselves through their own learning journeys.

3.1.3   Elevate creativity and criticality to reframe futures

Novelty and distance from the present are often difficult to produce in futures engagements. In the context of a Futures Literacy Lab, the reframing phase relies heavily on discontinuity and abstraction to help participants see and construct their own assumptions about the future from a new perspective. Therefore, much attention was paid by the organizing team to the development of the reframing phase. This design work included two main parts that needed to function well together: 1) producing a Reframing Model capable of snapping the participants out of their everyday thinking and 2) customizing the Metaphor Molecule Game to fit the objectives of FLL and support creativity and criticality of students and their outputs. Together the Reframing Model and the Metaphor Molecule Game needed to enable students to imagine, explore, describe, modify, and immerse themselves in future human settlements as a way of escaping the trappings of the present. These future images would optimally be detailed and different enough from today's human settlements to support students in challenging their existing anticipatory assumptions and generate new questions.

3.2 Design Process in Practice

3.2.1 Fuzzy and Open Starting Point

The design process started in early Spring 2017, when Markku Wilenius was asked to organize the Summer School together with FFA's coordinator, Hanna-Kaisa Aalto. Professor Wilenius then offered the organizing task to his colleagues and former futures studies master's degree students, Nicolas Balcom Raleigh, Laura Pouru, and Ellinoora Leino-Richert. The three were inspired by the opportunity to share their enthusiasm for futures studies with the summer school students. The organizing group formed a self-organizing team and shared the tasks in a mutual understanding. The team worked with Wilenius in developing the course contents and with Aalto in the more practical matters of running an FFA summer school.

As often is the case with a design process, the beginning was rather fuzzy and there were many twists and turns over time. Looking back on it, the work could be sorted into the following categories of tasks which were frequently interlinked and co-dependent:

- Defining the theme/topic and targets
- Recruiting speakers/lecturers
- Selecting workshop methods and approach
- Deciding on the title, program and agenda of the Summer School
- Recruiting and training group facilitators
- Testing and customizing the Metaphor Molecule Game to fit the FLL
- Creating the material for the FLL and the Metaphor Molecule Game
- Selecting and preparing reading material and pre-assignments for the students
- Additional practical matters, such as reserving lunch places and ordering coffee service

3.2.3 Topic, targets, lecturers, and approach

For this FLL workshop the topic, targets, methods and the lecturers were selected in a cascading process. The FFA Summer School is typically organized in relation to the annual futures conference organized by Finland Futures Research Centre. Because its theme for 2017 was *Futures of a Complex World,* the overall theme for the course was complex systems. The organizing team thought it would be sensible to choose 'futures of cities' as the topic because of the ongoing research by professor Wilenius's Futures of Cities and Communities team. However, Pouru noted in one of the first meetings how so much attention is paid to urban futures while futures of smaller communities or rural areas tend to be ignored. Her observation was a first signal of a potential need for avoiding the word 'city' in the course.

The organizing team asked some key futurists who were planning to attend the futures conference to give a lecture at the summer school. The selection of lecturers was less straightforward as lecturer

availability and fit to the overall content played a large role in who could participate. Keynote speaker Riel Miller expressed interest and the organizing team began working with him.

Some design choices were made quickly after cooperation with Miller started. Miller's interest in participating led to FLL being chosen. The organizing team was aware of the Futures Literacy Lab championed by Miller and were eager to see it in action. The FLL, due to its attention to reframing and challenging assumptions, was considered to be a highly appropriate approach to handle the overall topic of complexity and futures. Based on FLL, a main target of the workshop was to deepen the understanding of the students regarding how they use the future in the present.

The organizing team entered into dialogue with Miller about preparing an FLL for the summer school. In one of the first calls, Miller questioned what is meant by 'human-centered', a term used in the first course description for the event. He also suggested broadening our focal topic from futures of cities to some broader term, emphasizing the importance of not prejudicing the students to any one point of view about the future. In these early conversations, it was also decided to try Balcom Raleigh's new futuring game, Metaphor Molecule, for the Reframe phase of the FLL.

Fitting with the time requirements of the FLL and the design principle of students engaging in their learning process, a panel discussion was chosen as the format for the guest speakers. In addition to Miller and Wilenius, senior research fellow of the Futures of Cities and Communities research group Sari Puustinen was recruited to be part of a panel discussion about complexity and human settlements

3.2.3   Workshop facilitators

One of the success factors for an FLL are well-trained and motivated facilitators. Therefore, the organizing team recruited workshop facilitators through their connections to futures studies master's degree students and doctoral candidates, as well as Finland Futures Research Centre colleagues (see Appendix 7). All in all, five group facilitators were recruited. In addition to those five, Pouru and Leino-Richert from the organizing team agreed to facilitate groups during the FLL workshop. Balcom Raleigh served as a 'floating facilitator' providing overall guidance of the Metaphor Molecule Game. Almost all of the recruited volunteers had some experience of facilitating workshops. However, none had facilitated or participated in an FLL workshop before.

The facilitators were introduced to the Metaphor Molecule game during its second test rounds (see next section). A special training with Miller about the overall purpose and principles of FLL was held a day before the Summer School. During the session, facilitators were introduced to the FLL method, its phases, and goals. They were also given some concrete tips for facilitation. Before the training session, the detailed game instructions and some other Summer School material were emailed to the facilitators to familiarize them with the FLL. After the training session, the facilitators were also invited to suggest edits to the Reframing Model and ask any additional questions they might have.

3.2.4   Piloting and Customizing Metaphor Molecule to fit the FLL

Training the facilitators and piloting the game in order to fit it to the FLL framework and summer school topic was accomplished simultaneously. The organizing team arranged two Metaphor Molecule pilots: the first with only three members of the organizing team participating along with a couple of colleagues from FFRC, and the second with all except one facilitator taking part. After both game sessions, the game and its instructions were modified based on observations, comments and feedback. For example, after the first session a decision was made to rely primarily on the Reframing Model as the starting point of the game and 'role prompts' were created to support students in creating more imaginative and futuristic roles. After the second round, the instructions and the Reframing Model were updated to address key points of confusion found during the testing. In this way, fitting the Metaphor Molecule game to the FLL was an act of co-creation with the organizing team and facilitators.

3.2.5   Creating the workshop material

The material created for the FLL aimed to support the participatory process as smoothly as possible. These consisted of:

- Phase 1: Large Layered Analysis *Predictions* and *Hopes* sheets,
- Phase 2: Reframing Model, Metaphor Molecule Game Rules, Role Cards and Role Prompts, Metaphor Molecule Logsheet, and Illustrations of four kinds of Metaphor Molecules,
- General: Agenda/Guide for Facilitators, Schedule of the day for students, and Feedback Slips.

The Predictions & Hopes sheets were used in the first Phase, "Tacit to Explicit" of the FLL. Balcom Raleigh sketched the original text for the Reframing Model of the FLL (the second Phase, "Reframing") that combined several futures imaginaries being developed at FFRC. Then Miller revised it to fit with the idea of "Learning Intensive Society". Struggling to ensure the Reframing Model both fits as a starting point for the Metaphor Molecule Game, because there was a risk it would be too difficult to understand and take down the 'positive affect' of the group, organizing team made some suggestions to it based on the feedback from facilitators.

The Role Cards and the Logsheet were customized from existing game material created by Balcom Raleigh in his master's thesis. The Role Prompts were created specifically for the game in the Summer School. The organizing team brainstormed the role prompts together and printed them in three different colors based on their type (occupation, life situation, or futuristic detail). In addition to the overall schedule of the Summer School for the students, also the Metaphor Molecule Game rules and an Agenda/Guide for Facilitators were created to give more detailed instructions and some practical tips.

3.2.6   Material for the students

Organizing team compiled material for the students. The material included the following reading assignments:

- Bettencourt, L. M. A. & West, G. B. (2015) A Planet of Cities. *The Christian Science Monitor.*
- Leino-Richert, E. (2017) The making of a vision for Turku 2040.
- Miller, R. (2007) Futures Literacy. A Hybrid Strategic Scenario Method. *Futures*, Vol. 39.
- Miller, R. (2015) Learning, the future, and complexity. An essay on the emergence of futures literacy. *European Journal of Education*, Vol. 50.
- Orr, D. (2014) Systems thinking and the future of cities. *Solutions Journal.*
- Wilenius, M. (2017) Chapter 2: The Pain and the Thrill of Uncertainty. *Patterns of the Future: Understanding the Next Wave of Global Change.*

The organizing team also put together the futures window from the hopeful and fearful pictures of human settlements sent by the students and compiled all the student questions for Miller and Wilenius for the panel discussion.

3.2.7   Practical arrangements

The first morning of the Summer School, the students were given a slip with a number from 1-7 to divide the students randomly into seven groups, each with its own facilitator at its own table. Each table had all of the group materials ready including basic workshop materials, such as post it notes, pens and markers. To make the FLL go as smoothly as possible, the game material (Phase 2) were put in the right order in a separate folder from the rest of the material to be opened later. Also, the small role prompts were put in a closed envelope inside the folder. A large, open lecture hall was chosen for the Summer School for the seven groups with each having 5-8 students. The panel discussion was arranged in the auditorium, next to the large room. To increase a relaxing atmosphere and create a nice workshop experience, the students had an opportunity to have a pause, and get refreshments as needed.

3.2.8   After-work of FLL

At the end of the summer school program, the students were given time to complete anonymous feedback slips. The feedback was compiled by Balcom Raleigh and reviewed together with the organizing team, including Miller and Wilenius. A few days after the program, the group facilitators were also asked to email their feedback, observations, and share their ideas for how to improve the FLL. In addition, the organizing team arranged an afternoon get-together to thank the facilitators and discuss their experiences. A "post-mortem" video call was arranged with Miller and Wilenius and the organizing team. During the call, the feedback from the students and facilitators was further discussed, the organizers reflected upon the outcomes of the FLL, and the organizers committed to writing this report.

3.3 Structure Futures Literacy Lab: Complex Futures of Human Settlement

The resulting structure of the FLL for the FFA Summer School followed the given framework of the FLL and included it's three Phases of 1) Reveal - Making assumptions about the future explicit, 2) Reframe - Unsettling those assumptions, and 3) Rethink, identifying new questions about the future and new ways to 'use the future in the present'. The Phases were localized to the specific context of being an educational program and carrying the contents of complex systems thinking and futures of human settlements. The structure is presented in Table 1 below.

Table 1. Phases and Steps of FLL Turku: Complex Futures of Human Settlements 2050

Phase 1 - Reveal	Phase 2 - Reframe	Phase 3 - Rethink
A. Introductory Presentation. B. Showing the Futures Window made from photos submitted by the students. C. Predictions exercise. D. Hopes exercise. E. Layered Analysis of predictions and hopes. F. Panel Discussion about Complexity and Human Settlements.	A. Presentations about the Reframing process and the game Metaphor Molecule. B. Groups read and discuss implications of Reframing Model. C. Groups develop a seed description of their Future Human Settlement D. Groups play the Metaphor Molecule Game. E. Groups present their roles and human settlements as 'day in the life' skits.	A. Participants reflect, looking for their new thoughts about the future, different ways of seeing the present, new systems, and new questions about their future assumptions. B. Based on these reflections, groups discussed and presented one message they'd like to give Turku.

As the last step, after the three Phases of the Futures Literacy Lab, Wilenius presented the vision for the city center of Turku developed by a vision group appointed by the mayor and the city parliament. The students then developed concrete proposals for things that should be taken into account in the vision work, based on the ideas they had been playing with during the FLL Phases (for the program, see Appendix 1).

3.3.1 Phase 1: Making Assumptions about the Future Explicit

The organizing team saw Phase 1 as both the starting Phase of the Futures Literacy Lab and as a key opportunity to set the overall tone of the event. Attention was paid to making sure group members had time to introduce themselves to each other and see their 'own hand' in the overall experience.

After brief welcome from Wilenius, the group members introduced themselves to each other, saying their name and answering the topically relevant question: What is your favorite place in the world? After a brief presentation from Miller about the Futures Literacy Lab, Pouru introduced and presented the Futures Window made of the photos the students submitted as their pre-assignment, set to music.

Figure 2. Riel Miller introduces futures literacy laboratory

The Futures Window was followed by a pair of exercises designed to reveal and deepen the group's predictions and hopes for the futures. A mix of individual and social creativity was used to accomplish these tasks. Students first worked individually to brainstorm 3-5 predictions for human settlement and share them with the group, then as a group assign them to specific layer as a way to analyze them. The same was done with hopes for the human settlement. After these exercises, the groups gave their hopes and predictions a 'title', and briefly presented their work.

The *Predictions and Hopes* Phase of the FLL accomplished two goals in the Futures Literacy Lab. At a functional level, the Predictions and Hopes exercises guided the participants through the work of Phase 1, revealing their assumptions by writing them down and saying them out loud. The exercise also helped group members to become better acquainted, which supports positive affect by placing emphasis on trust and openness.

After the lunch break, a brief panel discussion was held on the topic of complexity. Wilenius, Miller, and Sari Puustinen, senior fellow for the Futures of Cities and Communities group, shared and discussed their perspectives on complexity with the students. Balcom Raleigh served as panel moderator.

3.3.2   Phase 2: Reframing using Metaphor Molecule Game

The reframing Phase began with two short presentations to inform the participants what was happening next. Miller presented about reframing and Balcom Raleigh presented about the Metaphor Molecule Game. The groups then opened their game kits and took out the Reframing Model. Inside they found a two-sided worksheet introducing five characteristics about a 'radically different 2050', questions to discuss as a group about those five characteristics, and the short steps they should take to create the seed description of their future human settlement (see Appendix 2). This seed description was then used as the key input for the Metaphor Molecule Game.

In the original version of Metaphor Molecule, participants created their roles from a blank slate based on an idea that such extreme open-endedness could lead to wider variation of roles produced, which helps in group creativity, and roles that more closely fit to the participant's own interests, which helps with intrinsic motivation. During the piloting of the game, however, the organizing team observed how a player could unintentionally create a 'boring role' and then feel trapped by it throughout the rest of the game. To address this possibility, 'role prompts' were introduced, leveraging a 'forced combinations' tactic for creative thinking. The participants drew one of each of three color-coded types of role prompts—occupation, life situation, and futuristic detail—and combined them to spark their imaginations. The prompts were created using a mix of common future images discussed by futurists and images from everyday present-day life (see Appendix 3).

Figure 3. A group selecting role prompts and creating roles

The baseline descriptions of future human settlements produced by the groups served as their playing field in the game. In relation to the baseline description, the group members created inhabitants for their future human settlements and shared them with each other. The individual group members worked independently to add detail to their role: the role's name; the role's connections to the future human settlement from five angles: politically, economically, socially, technologically, ecologically, and culturally; other details; and a drawing of the role (see Appendix 4). After creating their roles, the group members presented them to each other.

With knowledge of each other's roles, the group members worked individually to define the relationships their roles had to the others and to the overall future human settlement. This step was done using a Metaphor Atom on the backside of the role. After revealing their Metaphor Atoms, the groups connected their roles into metaphor molecules which depicted weak and strong as well as conflicting or synergetic relationships. These metaphor molecules were then documented in the logsheet (see Appendix 5) and the groups discussed which was the most influential over the dynamics of their human settlement. The group then worked together to transform the metaphors of the selected relationship with a goal of changing the overall characteristics of the human settlement.

To report their work, the groups were asked to put together a skit depicting a typical day in the life of their Future Human Settlement. The groups wrapped up the first day session preparing their skits. Before leaving for the evening Summer School social gathering, Miller suggested the students try seeing the city of Turku from the viewpoint of the roles they had created and to look for something they could bring as a prop or costume element for the skits in the morning.

Phase 2 concluded with all of the groups performing their skits in front of everyone. These skits did not need to be too performative, the main goal for the students was to present their Futures Human Settlement as a narrative about roles and their relationships in a complex, but shared context. The organizing team was unsure if the idea of using drama as a tool and 'performing in a skit' would be a barrier for some individuals, but concluded the risk was worth it as it would make the presentations more vivid and memorable.

3.3.3   Phase 3: New Questions and Nuances

For the third phase, the students were given opportunity to reflect on their FLL experience up to that point, looking for different ways new thoughts and questions about the future as well as of new ways of seeing the present. Based on these reflections, groups discussed and presented one message they'd like to give Turku to help it prepare for the future. Wilenius then gave a presentation about the work of a new vision for the city of Turku that was developed by a mayor-appointed committee he chaired and asked the students to come up with a concrete idea for the City of Turku. In summary, Phase 3 was a combination of reflection and producing potentially actionable outputs for the City of Turku.

4. RIGOROUSLY IMAGINED FUTURE HUMAN SETTLEMENTS

This chapter presents the work of the seven groups participating in the Futures Literacy Lab "Complex Futures of Human Settlements 2050." This chapter tells a story of the groups and their journeys through the FLL Phases: 1) Reveal, 2) Reframe and 3) Rethink based on their outputs and observations of the facilitation team. The goal of this chapter is to provide a sense of what happened during the FLL. Detailed outputs of the groups are presented in Appendix 6.

Figure 4. Groups discuss the reframing model.

4.1   Phase 1 – Reveal

The seven groups quite easily produced predictions and hopes for the future of human settlements in their first exercise. Many of the predictions pointed to and extrapolated future challenges frequently discussed in the present, while some painted darker futures. The hopes generally conveyed sensible optimism and dreams for society. In all cases, the predications and hopes generated by the groups were linked to their individual and collective values and worldviews—in other words, their assumptions.

To aid in seeing their assumptions and frames around those assumptions, the groups then organized the predictions and hopes into a layered analysis. The top three layers were Litany, Systems, and Actors. The bottom layer was Metaphors, the first point in the process introducing it as conceptual tool. After completing the layered analysis, the groups were asked to give titles to their predictions and hopes. This step was a second application of metaphors, as giving titles also highlights some meanings while deemphasizing others in a highly focused way.

The groups presented their work to each other, then took a lunch break. When the students returned they partook in an interactive panel discussion about complexity and were ready to move into the reframing phase.

4.2   Phase 2 – Reframe

Working in their groups, the students discussed the Reframing Model and, based on their discussions, worked together to create basic descriptions of a future human settlements in 2050. After creating these descriptions of these human settlements, the groups named them and gave them taglines (e.g. Chicago – "The Windy City"). Naming them and giving them taglines also required metaphorical thinking from the students:
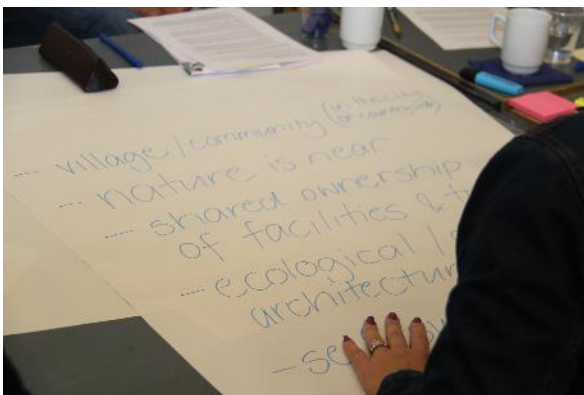
Figure 5. A group documents their 'seed' ideas for a future human settlement after discussing the Reframing Model.

- The Ideasphere – "Learning Pit-Stops – Digital and Physical"
- Snowflake – "a family of petals"
- Water Lilly – "Flourishing Learning, Nourishing Roots"
- Neo-Commune – "Ascetic life, high values"
- Firenze Hub
- Shire – "Creativity, well-being and nature in the same package"
- Emulgo – "Virtuality with Roots"

Students worked independently in each group to create inhabitants for their future human settlement, and followed the games instructions for creating metaphor atoms, metaphor molecules, and transforming metaphors (see Chapter 3.3.3). During this stage, the groups were observed to enjoy sharing and discussing their creative outputs, which supported the group's *positive affect* and therefore their creativity (Amabile et al. 2005). The roles created ranged from an artificially intelligent, hyperconnected cyborg to an anti-electromagnetism activist; and from an enlightened transhuman child mayor to a super-networked elderly flower shop. Across the groups, surprising relationships emerged and became

visible among the created roles based on the metaphor molecule step. Due to the role prompts, several of the groups had one role who was allergic to electricity, which supported criticality in the consideration of how the people who could become outsiders in some futures would interact with their communities. After these relationships were transformed, the groups finished the metaphor molecule game by working together to produce 'day in the life' stories of their future human settlement—stories that conveyed the dynamics among the inhabitants they created as well as some of the overall characteristics of their human settlement.

Figure 6. A participant creates a role for her group's Future Human Settlement.

4.2.1   Presentations of Human Settlements

The groups presented their stories about their future human settlements in a wide variety of ways. For example, the human settlement Snowflake was presented as a 'TV news broadcast' while Emulgo was presented as a community meeting. The following are brief summaries of the future human settlements the students presented.

In a live broadcast, **Snowflake** announces they have developed a new energy producing living plant. They are happy to share the news with other human settlements as they expect the invention would be quite beneficial to humanity. Snowflake consists of network of smaller settlements.

The name **Emulgo** comes from the idea of mixing oil with water, in their case they are mixing the virtual with reality. Some inhabitants introduce themselves to each other at a community meeting before making a decision together. Over the course of the conversation, it became clear that some of the inhabitants live in many places and engage with each other virtually, while others live in the actual place.

Water Lilly has embraced the transhumanist turn and connects entities of all kinds. A cyborg introduces the inhabitants of Water Lilly. He first talks to the ambassador who has just returned from the Mars colony. The ambassador reports that the colony was feeling disconnected from its roots. Another role, who is wearing far out glasses, is hyper connected to VR and communicating with many people at once while she talks with the cyborg and agrees to convey a message.

In the **Ideasphere** you can't know where your idea will go or what they will do. There are no hierarchies or power relationships. It is influential to send messages because communicating effects the dynamics around the networks. The only currency is ideas.

Everyone in **Neo-Commune** is a global citizen. Their human settlement is connected to many other human settlements (they demonstrate this by interacting with two other groups). They no longer use old-fashioned human names because they remind them too much of a negative past. Instead they use names like AV1. One of the elders in the community has kept her human name, Rose. The Neo-Commune prides itself on living through its values. They have, for instance, decided to reduce their ecological footprint by printing their food. Unfortunately, this printed food is rather tasteless. However, there are no penalties for individuals to make tasty food, it just isn't common.

The human settlement **Firenze Hub** is actually a network of cities and towns. To join the network, cities need to comply with hub's the overall governing policies, many of which aimed at achieving sustainability outcomes. The hub is an open settlement. People can come and go, as they please, as long as they do not break the rules of the network. Firenze Hub has a renaissance theme founded in Firenze (Florence) and could be described as Neo-Davinci. The mayor of Firenze Hub is a super intelligent transhuman child.

The **Shire** is a small ecological village in which creativity, well-being and nature are all in the same package. We are introduced to the shire by a retired business man who is moving to the shire. The shire focuses on living more from human values.

After the group presentations of their future human settlements, Phase 2 of the FLL was complete.

4.3   Phase 3 – Rethink

4.3.1   Reflection

After the future human settlements were presented, the groups were asked to reflect on the anticipatory assumptions behind the future human settlements they created. Miller reminded the participants of the journey the groups have taken so far, going through the first two of the three Phases of FLL. The groups 1) Revealed and shared their assumptions about the future and 2) Played with alternative or new assumptions through role playing and creating a future human settlement. He noted how this reframing step was an important yet challenging one. In many cases the new ideas about the future were so new that groups had to come up with new words or new meanings for old words in order to describe them. For the third Phase, Miller instructed the groups to focus on the differences the anticipatory assumptions of Phase 1 and Phase 2 and a, "Did you become clearer on your assumptions and your own relationship to the future? Do you have any new thoughts or different ways for looking at the present? Do you see new systems or patterns? Think about your questions about assumptions and change." The groups were then instructed to think of one message they'd want to tell City of Turku leaders. After reflecting briefly together, the groups presented the following ideas.

4.3.2   Messages for Turku Leaders

Plant Strawberries – The group built on its idea of a network of smaller settlements and offered the metaphor of wild strawberries, which can be found in some of the pockets of nature throughout the city. The core of this idea is to spatially distribute access to the good things of the city, and not raise one part of the city over the others. The city should make it possible to find metaphorical wild strawberries wherever you are in the city.

Having more **Open a Collaborative Spaces** where people can bond over doing things together. This group noted how making friends in the Finnish context is often difficult for outsiders and such a space would help foster more social connections among longstanding locals and newcomers. This idea is like the spaces dedicated to connecting people interested in startups, but open to more people than just entrepreneurs or business concerns. These collaborative spaces would be more open-ended and less goal-oriented. Such spaces would support development of negotiated meaning and support people in managing the evolution of their communities.

Åbox – This group noticed its assumption about a franchised model of cities in their future human settlement. Instead of Turku looking at other cities for new ideas, the group proposed Turku pursue a form of knowledge branding. This form of branding would be accomplished by sharing with other cities the qualitative and quantitative data Turku has produced to address its key challenges. The shared

knowledge would help other cities set their own priorities and address their own challenges. Across human settlements there are many shared values, they are just practiced in different ways.

Franchising Hub – This group built on its ideas for a network of cities that conform to common standards. They encouraged Turku to look beyond its borders and establish a common platform for ideas and solutions for the Baltic Sea region. In this network, information would be shared freely and open standards would be established for common city functions. These standards could include bus cards that work in all Baltic cities, a common platform for booking mobility such as taxis, trains and regional busses, and a virtual reality curriculum and teacher exchange program among schools. The main theme to the franchising hub concept is that it promotes open and free sharing of viable solutions among cities.

The Change Turku app – This group observed how there is so much research data, but it doesn't always result in action. Their proposal was to develop a system to communicate more frequently and in more meaningful ways between the city and its inhabitants. The Change Turku app would ask users for some basic info, then when an issue comes up that concerns a specific group of users, the city can ask inhabitants who would be impacted or have knowledge about the topic instantly. The key benefit would be the empowerment of the people. The platform would help people cross-sort their ideas. Gamification would keep users active. They can check progress on different ideas and see how their data is influencing decisions. It would support decision-making that matches more closely to the metaphor for complexity of murmuration.

Multifunctional Structures – This idea challenges conventional mental models for how new things should look in a city, such as apartment buildings or city gardens. The group proposes challenging these models by thinking in lifecycles. There can be new arrangements, diverse communities—bringing different groups together. Make it easier for refugees to get connected with the fabric of the community and promote life-long social connections.

4.3.3. Concrete Ideas for Turku

Wilenius made the key point in his presentation that city vision-making and city planning require a holistic view of the city that appreciates complexity and is fit for possible futures. He invited students to work in their groups to come up with concrete ideas for the city of Turku, which included:

- Implement **flexible solutions**. "If it does not go as planned, then we change it."
- Continuing with their 'plant strawberries' metaphor, create **more "centers"—or "strawberry patches" around the city.** These distributed hotspots would all feature **food,** as food has always connected people in cities. Where there is easy access to delicious food, people will come.
- **Community-based living requires a holistic team guiding city planning.** This team would navigate the balance between self-organizing communities and open thinking. There would be one team to plan and organize community participation and crowdsourcing.

- Bring **more color** to the city center--including green plants and colorful building facades.
- Create inviting **shared spaces** to attract people to the city center.
- **Communities set their own rules and shape their experiences** in community-level participatory projects. The city sets out guidelines, communities make them happen.
- **Complexity thinking –the app.** Everyone is ready to get involved, but how to get something out of the data we get? This app would encourage city inhabitants to provide more in-depth feed-back. From the data it generates, people would be selected to provide even more detail about selected areas of the city.

The outcomes of the third phase point to the potentials for the FLL approach to support students in generating new ways of seeing the future and new ideas for the present. It also gave a hint of how the highly abstract first two phases can lead to the production of creative, useful, and specific actions.

5.   DISCUSSION & CONCLUSION

The Futures Literacy Laboratory at Finland Futures Academy's Summer School 2017 had a goal of offering students a learning experience that improves their capacities in futures literacy while introducing them to the topic of complex futures of human settlements. As is the case in many educational situations, measuring whether or the program succeeded in its goals is a complicated and nuanced matter. Further-more, measurement instruments become part of the overall learning experience and therefore need to be carefully considered before they're deployed. The organizing team opted to use three tools for gath-ering evaluation materials: 1) asking students to complete brief feedback slips at the close of the session; 2) asking facilitators to write and share their reflections about their experience facilitating the group; and 3) holding post-event discussions, first with the group facilitators and second with the organizing team. In this final chapter we present the received feedback of the FLL, discuss how well the organizers' selected design principles functioned in practice, and how well the Metaphor Molecule Game supported the aims of Phase 2. Finally, we propose future uses of FLL as a learning tool in education.

5.1   Feedback from students

For the purpose of measuring the impacts and success of the FLL and the Metaphor Molecule Game, both the students and the facilitators were requested to give feedback. The students were asked to complete anonymous feedback slips at the end of the Summer School. The slips had four parts:

1. In what new ways, if any, did this Futures Literacy Lab help you think about the future?
2. How might these new ways of thinking of the future be useful to you?
3. How was the balance between theory and practice?
4. Additional comments

All together 30 students returned completed feedback slips. Overall, the students reported ways the FLL helped them think about the future in new ways (Question 1). The following ways were mentioned:

● Thinking of expectations and assumptions more deeply
● Developing critical thinking and enhancing creativity
● Crowdsourcing ideas and discussing them in multi-disciplinary groups
● Taking an actual role (in Metaphor Molecule Game) helped to think differently
● Helping to understand complexity and ways to approach it
● Thinking about the future more holistically

In the question of usefulness of these new ways of thinking about the future in one's life (Question 2), the answers were written from both private- and work-life perspectives, and generally were practical:

- Learning new methodologies and futures vocabulary
- Taking futures thinking to plan life in general
- Using FLL in one's work, e.g. teaching and planning
- FLL as a tool for some anticipation process
- Applying a systematic approach to think about the future

Nearly all of the respondents thought that FLL struck a good balance between theory and practice (Question 3). Of those who didn't think so, the most common answer was 'Too much practice' due to the length of time used for the Metaphor Molecule Game.

The last question was an open one (Question 4), and the answers were separated into three categories for analysis: Students who wrote a "thank you" message (n=9); students who wrote "no additional comment" (n=11); and the students who wrote some other kind of "additional comment" (n=11). The students writing "thank you", gave feedback about the great spirit in their group and the good facilitator. Some of the students who wrote some other "additional comment" gave critical feedback concerning the tight schedule of the FLL and the game, being part of too big a group which hindered participation, the role-playing game taking too much of the time, a wish for more clear instructions for the game, and one even asked for better-trained facilitators. Despite these few criticisms, the students overall seemed to have enjoyed and learned a lot in the Summer School.

In addition to the student feedback slips, the facilitation team heard stories about how a few students took seriously the instruction to try seeing the city of Turku from the view point of their future role. At least some students reported having strong experiences of immersing into the future human settlements their groups created through the roles and relationships they created for those settlements.

5.2   Feedback from Facilitators

In the spirit of action research and reflective self-organization, the organizing team found it to be valuable to gather feedback from the facilitators and to give them a chance to share their experiences and learn from each other. In addition to their freely written feedback an informal get-together event for facilitators was organized, where the facilitators could discuss openly their experiences facilitating the FLL. The feedback from facilitators is presented below under the following five themes: Overall atmosphere and "flow", FLL Phases 1 and 3, Metaphor Molecule Game, Facilitating, and practicalities.

5.2.1   Overall atmosphere and "flow"

All of the facilitators reported that their groups seemed to enjoy the FLL and the game. The students had lively discussions and fun when playing the game. Creativity was supported by a positive atmosphere contributing to the state of flow. However, some said that having "too much fun" might have resulted in

the game placing more concentration on the roles rather than the relationships and the future human settlement. The idea of "opening and closing" was well applied in the design and implementation of the FLL workshop: there was enough structure and planning along with enough room for creativity and criticality to flourish.

Figure 7. One of the groups experience positive affect while engaging with the Reframing Model.

5.2.2   Revealing and Reflecting (Phases 1 and 3)

In the 1st Phase, some students were working actively, for example one group wanted to have at least one idea—Prediction or Hope—on each CLA levels. However, the facilitators gave most critique to the 3rd Phase and questioned how well it supported the goal of questioning assumptions. One commented that Phase 3 could have been better prepared noting how it was unclear what was happening for the facilitators and the students. This in part was because Phase 2 took a little more time than originally planned causing Phase 3 to be rushed and executed differently than the written plan.

Phase 3 ended up going too quickly, and it wasn't clear if the students had time to really consider their new questions to help in understanding the nuances of using the future in the present. Some facilitators suggested more time should have been given for comparing Phase 2, Reframe, to Phase 1, Reveal, during Phase 3, Reflect. For example, the students could have worked independently to develop their own new questions and then share them with the group as a way to formulate their own ideas before discussing together and adding depth to the process. A few comments suggested more emphasis

could have been put on the 'search for new questions' when listening to the other groups present their future human settlements as stories.

One facilitator commented that the messages and concrete ideas for Turku could have been received with more comments aimed at growing them into new questions rather than comments aimed at understanding what they mean. Another comment wondered if the activity following the Turku vision presentation could have invited students to challenge the vision as an 'official future' and counter it with their own ideas.

5.2.3   Reframing Model and the Metaphor Molecule Game (Phase 2)

As was anticipated by the organizing team, the Reframing Model step leading into the game was challenging to facilitate. It was taken too seriously by one group, blocking its creativity. Another group struggled with answering the questions posed by the model. In general, the facilitators observed the students having fun when playing Metaphor Molecule and were excited to create roles for themselves. Some difficulties did occur, however: some students were struggling to come up with metaphors for their roles, felt confused while building the metaphor molecules, found it difficult to select the most influential relationship, and prepare a story to present. To some level, these parts of the game were intentionally challenging, but it is important to balance how challenging game tasks are in relation to the capacities of the participants. Despite these difficulties, the game succeeded in supporting students in imagining future human settlements different from today and immersed students in futures outside their usual frame of reference. This feedback points to a potential usefulness in reducing the number of steps of the game and making it less complicated, or at least being more clear with participants about the value in feeling challenged.

5.2.4   Facilitating

One facilitator wrote that it felt challenging to balance between steering as a facilitator and not interrupting the flow of work. Some reported that the lengthy instructions of the FLL and the Metaphor Molecule Game, along with using their own notes seemed to create too much confusion. It is highly important to offer enough training for the facilitators: they wished for at least two opportunities to play the game. The game has many different phases and some of them are similar to each other creating possible confusion. However, having clear instructions for the facilitators and enough individual preparation helps to remove that threat. Also, some facilitators had more facilitating experience than others, leading to varying needs for training and perceptions of the difficulty of the task.

Many facilitators thought the FLL was well-organized, however the lack of time was noted by some as an issue. Some mentioned that some of their group members were overchallenged and intimidated by the task of performing in front of an audience as their role. One noted there were too many obscure terms and tricky words throughout the FLL, which made it more challenging to communicate meanings and facilitate. Another noted that one participant in the group was too dominant and it was hard to manage the situation so others could participate.

5.3   Recommended Design Principles

The key design principles of the FLL produced for the summer school were 1) leaving the future open, 2) students engage in their own learning, and 3) elevating creativity and criticality in the reframing phase (see chapter 3.1). The first principle of leaving the future open was well achieved, as design choices that removed many of organizing team's own values supported students in finding and moving beyond their own anticipatory assumptions. A question remains however as to what extent the Reframing Model should direct students' thinking to introduce new anticipatory assumptions and to what extent it should leave the future open and support creativity. Many of the future human settlements produced by the students were similar: small communities operating in a wider web of settlements, and this characteristic could be traced back to the reframing model. In the end, while this reduced variation of the settlements, the overall goal of supporting students in seeing the future differently was broadly achieved. The organizing team recommends that others preparing an FLL for education wrestle with balancing keeping the future open with strongly push new anticipatory assumptions while preparing the Reframing Model.

The second principle of engaging students in their own learning was well met. Students were active in the pre-assignments—writing questions to Wilenius and Miller and submitting photos for the Futures Window. They were also generally intrinsically motivated and willing to participate in the FLL. However, at times, the energy level would occasionally drop which pointed to the value of allowing the groups to determine for themselves when they needed breaks. The organizing team observed that the design choice of taking a passive approach to facilitation, leaving it to group members to fill the contents, supports students engaging in their own learning. A more radical approach, however, would be to have no group facilitators and give students full control in directing their own activities. However, this tactic carries the risk of upsetting the third principle of supporting creativity and criticality because facilitators play a key role in keeping things moving smoothly and helping the group members to concentrate and enter the state of "flow".

The third principle of elevating creativity and criticality was also well achieved. This can be seen in how different the outputs produced were from the present and how inventive the groups were in adding detail to their human settlements. Tuning the participatory design and execution based on theories of creativity and criticality was found to be a highly valuable way to make choices regarding how the FLL should go. More can be done in future FLLs to achieve this design principle, such as experimenting with other theoretical models of creativity and criticality.

5.4   Possibilities for Metaphor Molecule game in FLL

The Metaphor Molecule Game proved to be a viable way to guide Futures Literacy Lab participants in reframing their anticipatory assumptions by rigorously imagining possible future human settlements. By creating roles, defining the relationships among them, using metaphors as levers to change the relationship dynamics, and inventing a story of a day in the life of the roles in their human settlement, the students were able to create rich details about their future human settlement. These details helped many of the students immerse themselves in new futures and while being immersed, experience some of what it might feel like to live in the future human settlement they created. Making one's own description of the future and questioning its desirability is a key part of criticality in futures studies.

There are many possibilities for how Metaphor Molecule, or new futuring games that use participant-created roles and multiple metaphors, can be applied in Futures Literacy Lab. One potential use would be to combine it with the 'sculpture depicting the future' exercise from past Futures Literacy Labs to provoke creative thinking via non-textual means. For example, sculpture-making could be used by a group of students to collectively create the seed 'characteristics" of a possible future. Then, using these 'seed characteristics', the Metaphor Molecule Game (or some other role-based game) could be played to add detail to that future. Another option would be to have groups make living sculptures depicting a new future.

Overall, the Metaphor Molecule game worked as intended and supported the students in creating novel future ideas to gain distance from the present. It also adequately supported the students in rigorously reframing their anticipatory assumptions. Despite its detailed instructions and process, the group facilitators were able to move their groups through the steps of gameplay. However, in other contexts, the long timeframe the game required may not be appropriate, which could be addressed by developing a shorter version of the game or using only some of the game elements.

5.5   FLL for Futures Studies education

The main goal of the FFA Summer School Futures Literacy Lab was to serve as a "learning simulation" for students. This was done in the thematic context of complex futures of human settlements. Within this

learning framework, students engaged with the FLL from at least three angles. The first angle was to discover new questions about the complex futures of human settlements, the second was to become more aware of their anticipatory assumptions and how they use the future in the present, and the third was to be active and informed observers of how an FLL works in practice. From any of these three viewpoints, the students could go to varying depths exploring conceptual frameworks comprised of any combination of complexity, futures studies, or human settlements. In other words, it was a highly complex situation supporting "learning by doing".

As an approach for futures education, the organizing team finds FLL particularly suitable to be used in the beginning of a futures studies course or program. This is because its strengths are in supporting students in developing a personal understanding of how the future can be used and what the future personally means to them. It also provides an opportunity to compare their way of approaching the future with the perspectives of their classmates, further opening their awareness to alternative viewpoints. This lays the groundwork for learning both basic concepts such as possible, probable and preferable futures (Amara 1987), to more advanced lessons in alternative futures or taking a more critical perspective on futures (see Slaughter & Riedy 2009; Inayatullah 2012). Another reason to pick Futures Literacy Lab as a first lesson in Futures Studies is that it is highly enjoyable, rewarding, and even fun experience for students. Enjoyability is an important characteristic to futures exercises for students as it can inspire them to go further into futures thinking.

All in all, FLL is suitable to implement at bachelor's degree level, master's degree level and doctorate level of higher education. Modifications and simplifications would be required to use it for younger students. For example, its three phases would still be viable, but only if they are conducted using age-appropriate terminology and tasks (e.g. an elementary school child could understand the idea 'of sure bet predictions' or 'hopes for the future' in task one, while the term 'anticipatory assumption' or 'layered analysis' might be difficult to comprehend). An action research approach could be used to fit FLL with the capacities typical of various grade levels. In addition to opportunities of using FLL in formal education, FLL can also be applied in alternative learning-focused contexts to raise awareness of futures literacy among various groups, for example policymakers, organization leaders, project teams, or civic organizations. Therefore, FLL is also a valuable tool in supporting lifelong learning.

Execution of a successful Futures Literacy Lab for education requires a balance of careful planning and openness to spontaneity during the event. If it is too planned, it may be perceived by the participants as too rigid and forced which can negatively impact the atmosphere (or vibe) and the affect of the participants. If it is too spontaneous, with too many organizational choices happening in the event, it could be perceived by participants as chaotic and unstructured—also negatively impacting atmosphere and

reducing the value of the event for the students. Along these lines, facilitators should be trained to understand the purpose of each phase and each task so that they can make appropriate spontaneous choices along the way while still achieving FLL goals.

In the end, this FLL provided insights into how future people could more consciously make choices about the environment in which they live. It is an example of the "active skills" proposed by Pouru & Wilenius (2018)— skills that people start developing after internally shifting focus from meeting individual basic needs toward engaging in something larger than ourselves. By developing active skills with which we can contribute into the physical and social fabrics around us, we all participate in building a more sustainable future for humanity and other life on our planet. This workshop was essentially an exploration into those realms of human settlements, where futures are not only imagined but actively created. For us who were a part of the session, it gave a glimpse into the potentials when this active imagining is unlocked for students and futures become malleable tools for making sense of potentials emerging in the present. The work of shifting the educational and societal paradigm towards one that supports futures literacy—the capacity to use the future in reflective, ethically whole, and nuanced ways—will require the dedicated work of many educators and researchers. The UNESCO Chair in Learning Society and Futures of Education, in co-operation with UNESCO, Finland Futures Research Centre at the University of Turku, and other partners in Finland as well as around the world, will do its part to steward this transformation.

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APPENDIX 1. FFA SUMMER SCHOOL PROGRAM

Summer School 2017
Futures Literacy Laboratory: Complex Futures of Human Settlement in 2050

14-15th June, 2017 in Turku, Finland

#FLLTurku2017

Welcome to the annual Summer School organized by Finland Futures Research Centre and Finland Futures Academy. The two-day summer school will be organized in the form of **Futures Literacy Laboratory (FLL)**, which is a participatory method developed as part of the UNESCO Management of Social Transformation program. The overall goal of Futures Literacy Lab is to give participants a broader understanding of their own assumptions about the future, reframe those assumptions, and use the reframed perspective to have new questions about the future, new ways of perceiving the present, and new ways of "using the future" in the present. The FLL consists of three phases:

        1) Tacit to Explicit
        2) Reframing/Aha Moments,
        3) Nuances/New Questions

The FLL will be led by Riel Miller, from the Research, Policy and Foresight Section at UNESCO. During the Lab students will play an experimental futuring game Metaphor Molecule developed by Nick Balcom Raleigh from the FFRC. The theme of the FLL is human settlement, which in this context refers to the built environment in which people live, e.g. cities, villages and campgrounds.

Timetable

Day 1- Wednesday - 14.6

10.00   **Summer School Starts**
10.00-10:45   **Introductions**
        10:00-10:10   Welcoming the students (Markku Wilenius)
        10:10-10:25   Group members introduce themselves to each other
        10:25-10:40   Briefly: What is a Futures Literacy Laboratory? (Riel Miller)
10:45-Noon   **FLL Phase 1: Tacit to Explicit**
12.00-13.00   **Lunch @ Assari or Monttu**
13.00-14.00   **Panel Discussion - Complexity & Human Settlement**
        Riel Miller, Sari Puustinen, Markku Wilenius
14.00-17.50   **FLL Phase 2: Reframing & Metaphor Molecule Game**
      [14.30-15.30   Coffee Available, groups can choose on their own when to have a break]
17.50-18.00   **Concluding the day**
18.00 →   **Optional and Informal Refreshments by the Aurajoki riverbanks**

Day 2 – Thursday - 15.6

(Lecture room OP-Pohjola)

9.00-10.45   **FLL Phase 2, continued: Stories about Complex Future Settlements in 2050**
    (Note: lecture room LS16)

10.45-12.00   **FLL Phase 3: New Questions**

12.00-13.00   **Lunch @ Assari or Monttu**

13.00-13.30   **Using the Future in the Present** (Riel Miller)

13.30-15:00   **Applying Futures Literacy to Turku** (Markku Wilenius)
    [Coffee Available]

15:00-16:00   **Concluding the Summer School**

APPENDIX 2. REFRAMING MODEL

Futures Literacy Lab: Complex Futures of Human Settlement 2050
Finland Futures Academy Summer School 2017, 14 & 15 June, Turku School of Economics
Instructions: One player reads this out loud to the others in your group. Then as a group, answer the questions on the back of this sheet.

Welcome to a radically different future!

You are now in 2050. Discontinuous systemic changes have occurred over the last 33 years. A few aspects of the present (2050) jump out – but specific characteristics of any given human settlement are open:

1) **Learning is the focus of human activity.** All people of all ages and life paths are actively engaged in learning and broadening human consciousness. Learning is relative to where people start— it is about meaning in their context. They continually encounter, enhance, generate, and share new insights, understandings, and advances in their own knowledge. This is not genius or technical or general or "for humanity", it is deeply relevant to specific complex situations and is often called *local wisdom*. Sensing and meaning-making is motivated and inspired by people's evolving values and aspirations.

2) **What used to be called the economy is now referred to as the 'noosphere.'** In the noosphere, *unique creation* is highly valued and has largely replaced mass-production and management frameworks used in the past. GDP and other economic growth indicators are no longer significant points-of-reference; what counts most is the relationship between learning and quality-of-life. Self-knowing is at the forefront of 'value creation'. Noosphere activity generally fits local conditions serving needs and hopes of communities. Survival still involves human attention and time but this effort is now articulated around meaning and inter-dependency of people, creating value through developing community purpose.

3) **Unique creation is dominant, based on the value of learning and knowledge.** People and things do flow around the world in interconnected and interdependent ways but most sources of tangible things, from food to transportation to energy are locally produced when needed and in ways that reflect local history and priorities. Ideas flow freely as do intangibles, underpinned by blockchain and peer-to-peer credit/debit systems that give all inhabitants of planet Earth a high level of transactional transparency and trust at low cost.

4) **The climate is different; adaptation has occurred.** There have been profound changes in humanity's relationship to nature. Per capita human activity has a much smaller ecological footprint.

5) **Advanced technology is applied to new purposes.** Humans remain symbiotic with their tools, which now include artificial intelligence, advanced robotics, synthetic biology, genetic developments, high-density and multi-material 3D printing, quantum computing, and more. The confluence of these technologies has brought many new and advanced capabilities, contributing to the societal changes that profoundly altered daily life. However, what is more significant are the fundamental purposes to which our tools are used, which are now on the basis of an entirely different organizational context for action and interaction. Our tools have changed, but what matters most is what we do with them.

Learning is focus of human activity	**The economy is now the *Noosphere***	***Unique Creation* is the dominant form of value creation**
	Climate is different; adaptation has occured	**Integration of symbiosis of humans & tools reframes relationship to "technology"**

Describing Human Settlement in 2050: Questions to consider

These questions are just suggestions for getting a conversation going around descriptions of what human settlement is like in a reframed – so called Learning Intensive Society – of 2050.

1) How is "settlement" defined in 2050 – are the variables used to describe someone or a community as being "settled" still related to the duration and fixedness of "living" in one location?
2) What kinds of boundaries define different location/place configurations of human activity and interaction?
3) What are the attributes of density vs. dispersion, and immobility vs. mobility?
4) How do people relate to their surrounding environment? How does this influence their relationships to other people and to specific places?
5) Are there different perspectives on how humans congregate, interact, attach to specific places, invest, divest, invent, preserve?
6) If there are still relatively fixed places where people live for extended periods of time, what are these places called?

After discussing the above general questions, discuss freely what questions matter most in describing your own human settlement, the human settlement you will *play* in your game.

After discussing the questions, write on a big sheet of paper:

1) 5-7 main defining characteristics of your human settlement
2) A name for your human settlement
3) Give your human settlement a "tagline" (e.g. New York City: the city that never sleeps.)

APPENDIX 3. ROLE PROMPTS (USED IN ALL GROUPS)

The second step of the Metaphor Molecule game for participants to work individually to create roles for their group's future human settlement. The following role prompts were used aid in provoking futuristic and creative thinking while creating roles for future human settlements. The participants drew one of each of the three types—occupation, life situation, and futuristic detail—and then use the prompts in combination to develop their roles. The prompts were created using a mix of common future images discussed by futurists and images from everyday present-day life. The goal in the development of these prompts was to promote surprising combinations of ideas to spark the imagination.

Occupations

CEO of Large Multinational Corp.
Elected Officeholder
Mobility Experience Designer[1]
Synthetic Biologist[2]
Artificial Intelligence Trainer[3]
Property Owner
Property Developer
Entrepreneur
Restaurant Owner
Journalist
Teacher
Medical Doctor
Energy Storage System Engineer[4]
Retail Worker
Tourism Director
Landlord
Cargo Transport Operator[5]
Student
Lawyer
Social Worker
Civil Servant
Police Officer

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1 Trends toward mult¡-modal transit systems in human settlements could contribute to the need for these places to hire people who keep a holistic view of individuals in mobility.

2 The rise of DNA printers (see futuristic details) and DNA editing techniques (e.g. CRISPR) could lead to a new discipline called synthetic biology, focused on customizing life forms or make entirely new ones.

3 In today's AI field, some AI systems require training before they can recognize patterns in a meaningful way.

4 Under scenarios in which Renewable Energy provides a greater share of the energy used by human settlements, energy storage will probably be a crucial component of any dependable Renewable Energy system.

5 Many human settlements have historically had a flow of material goods from outside.

Community Activist
Artist
Musician
Mechanic
Digital Realities Manager[6]
Librarian
Doctor of Cyborg Medicine[7]
Lobbyist
Permanently Unemployed[8]
Nature/Wilderness Guide
Volunteer Specialist
Social Integration Expert[9]
Mayor
Florist[10]
Architect
Engineer
Scientist
City Planner

Life Situations

Young Child
Parent of a Teenager
Elder (70-120 years old)[11]
Young Adult
You are a teenager
Super Elder (more than 120 years old)[12]
Grandmother
Grandfather
Climate Refugee[13]
Humanitarian Volunteer
Married to a robot[14]

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6 Digitalization and virtualization are already contributing to experiences of layered realities. It will likely increase as Virtual Reality, Augmented Reality, and various wearable internet connected devices become available. This occupation addresses challenges and opportunities related to these phenomena.

7 In a future where any part of the population has integrated new technologies into their bodies, new medical doctors would be needed who have special skills in cyborg-related issues.

8 The Millennium Project is running a study on the Future of Work and Technology 2050 in which a slim majority of foresight experts has agreed 25% of working age adults will be permanently unemployed in 2050 due to advances in technology.

9 Climate change, resource wars, and other vectors will probably cause more people to migrate than ever before. Human settlements in 2050 may need to staff experts who continually help people adjust to their new host cultures.

10 A common trope in participatory community development is when neighborhoods say they wish their neighborhood had a local florist.

11 Many population forecasts in European countries, using normal life expectancy criteria, indicate there will be large populations of elders in the future.

12 Technologies, for example telomere extensions, may make it possible for people to live significantly longer lives in 2050.

13 Climate Change is predicted to make some of today's human settlements fully uninhabitable due to extreme temperatures or violent weather by 2050. Inhabitants of those affected settlements will be forced to move to new human settlements.

14 The sex-bot industry has already started in the 2010s and may evolve, along with sophisticated AI, to produce high functioning companions for humans.

Young Adult

Polyamorist[15]

Single-parent of 4 kids

You are married

You are an orphan

"Resource War" Refugee[16]

Disabled

Child of parents in their 50s.

You are less than 2 years old

Adult

Caregiver

You are a guardian to a child born to someone else

You are single

Parent of an infant

Futuristic Detail

Able to communicate with Trees and Plants[17]

A neural Implant connects mind to an

AI Superweb[18]

Allergic to Electricity and Electromagnetic Radiation[19]

100% Cyborg

Nearly always using Virtual Reality & Augmented Reality[20]

Volunteers as a retro 3D printing instructor at a FAB(rication) Lab.[21]

Owns a DNA Printer.

Invested in a successful Mobility as a Service co. long ago.

Has an 'artificial sense' connected to a micro satellite

Has visited planet Mars

Has invested in a successful drone developer

Designs futuristic clothes

---

15 A small percent of couples today choose to be in 'open relationships' often for moralistic reasons. This trend may strengthen or weaken, but none-the-less it is not too difficult to imagine it happening in 2050.

16 Water, food, and energy are fundamental needs. When these resources are scare, military conflict can result. The conflict can be so bad, people flee for more peaceful societies.

17 Peter Wohlleben argues that trees communicate with each other in his book *The Hidden Life of Trees* (2015). What if people learn how to join the conversation?

18 Elon Musk is investing in R&D to develop neural interface technology; meanwhile the Internet could evolve into something we can't quite imagine today.

19 In the Netflix series, Better Call Saul, one of the characters suffers from an electricity allergy. In the show it is never clear whether it is a psychosomatic or physical condition, but for the character it is real enough and he lives his life accordingly.

20 Always-on in-home Internet came to be mainstream around 2005. Ubiquitous Internet accessed through mobile phones and tablets has led to high-frequency daily usage of these devices. If Virtual Reality and Augmented Reality become popular, it is plausible some people will be always using these technologies.

21 At World Future 2013 in Chicago, 3D printing was the talk of the conference. In 2017, the FAB Lab Project, an initiative of the MIT Bits and Atoms program, has a network of approximately 200 Fab Labs in more than 40 countries. By 2050, 3D printing might become "retro cool."

APPENDIX 4. ROLE CARDS

Occupation   Care Relation   Futuristic-ness

_____   _____ _____

Draw a picture of your role.

Ways this role engages in the human settlement...

Political: _____
Economic: _____
Social: _____
Tech: _____
Ecology: _____
Culture: _____

Briefly describe this role:

_____
_____
_____

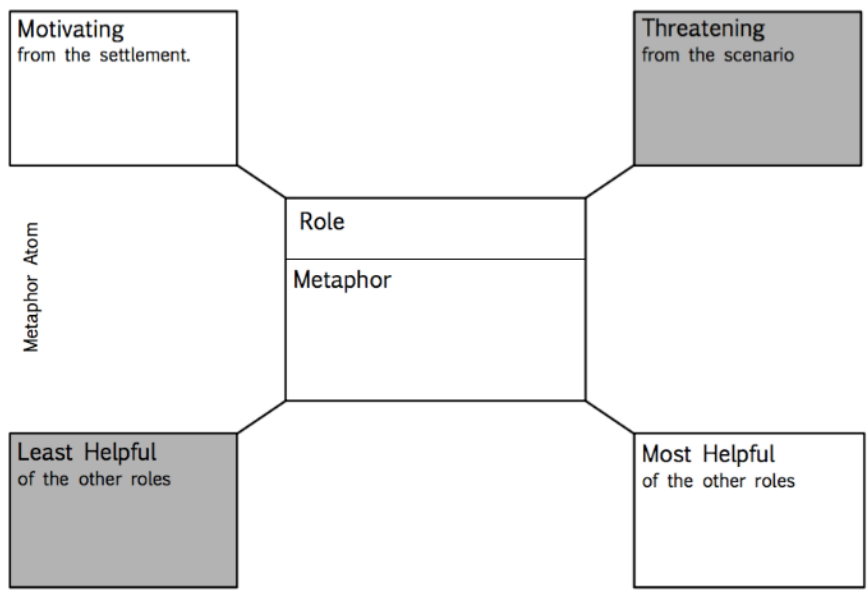*Figure 3. Front of the role card*

Motivating
from the settlement.

Threatening
from the scenario

Metaphor Atom

Role

Metaphor

Least Helpful
of the other roles

Most Helpful
of the other roles

Figure 4. Metaphor Atom (back of Role Card)

APPENDIX 5. METAPHOR MOLECULE LOGSHEET

Strong Bonds - *Most* Helpful

Role A	Role B	Notes about this relationship and how it influences characteristics of the human settlement.

Strong Bonds - *Least* helpful

Role A	Role B	Notes about this relationship and how it influences characteristics of the human settlement.

Weak Bonds - Most Helpful

Role A	Mutually "Most Helpful" Role	Role B	Notes about this relationship and how it influences characteristics of the human settlement.

Weak Bonds - Least Helpful

Role A	Mutually "Least Helpful" Role	Role B	Notes about this relationship and how it influences characteristics of the human settlement.

Figure 5. The Metaphor Molecule log sheet

APPENDIX 6. ARTIFACTS OF FUTURE HUMAN SETTLEMENTS

Group 1: The Ideasphere "Learning Pit-Stops – Digital and Physical"

Predictions and Hopes

Group 1 chose not to use the provided layered analysis structure, instead categorizing the individually brainstormed ideas in into themes. After reviewing the themes, they came up with even broader themes they felt communicated the main ideas of their work. The group's categorized predictions are presented in Table 1.

Table 2. Group 1 Predictions

Housing
- More "village like" ways to live within the boundaries of cities
- Berlin startups have taken over abandoned villages in Saxony. Are we back to communes?
- Massive, futuristic dorm fitting 10,000 students opened up.
- Rents in EU capitals reach level of Hong Kong and Beijing
- Urban areas are getting bigger, more people are living in cities

Social
- Polarization of areas: Social Ghetto-ization
- There will be more: rich vs. poor

Transport
- Public transport in and between cities becomes more effective, comfortable and replaces most of private cars.

Work
- More people working from home in rural areas
- Spread of basic income
- Nomadism: people travel for finding work (gig campers)
- Meaning of work is changed. Not identity.

Geopolitical
- More regional relations and conflicts at the same time
- There are no countries, nationalities = borderless mentality
- Borders are stronger

ICT
- Virtual communication is increased and controlled more

Diet
- People will eat only vegetarian food
- More efficient food
- Cows, pigs, chickens are extinct
- Manmade food meat

Environment
- Below earth surface, radiation, ozone layer
- Isolation, self-supporting communities, light footprint for nature
- Very polluted (air and water)
- Megacities
- Climate change is going to have impact on where we live and how we live
- Big cities: "Blade Runner"

The broad themes for predictions were: Grim/Dirty, Blitz Babies, Over-Designed, and 'we can have nice things'. Grim/Dirty refers to the difficulties future people will face, Blitz Babies refers to a name given to babies born in U.K. bomb shelters in WWII and a future where many people will be forced to live underground, Over-Designed refers to how some parts of daily life will feel more channeled, and "we can have nice things" indicates that in spite of all that has gone wrong, people will persist in trying to live good lives.

Table 3. Group 1 Hopes

Values / Solidarity	**Open**
- The good & responsible outweighs and counteracts the ugly & greedy – "Who do we want to be?" - That we feel that we are European/Global Citizens - Close Communities - Beautiful and Healthy Environment - Good Living Standard & Social Welfare for All **Equality of Opportunity** - Cities where old & young live together have replaced elderly care residences - Abolition of party politics **Love** - Families with close members – extensive families are revived **Respect** - All people are equal with each other - People learn to understand & respect each other	- Human communication - Genuine freedom of movement for all - Non-polluting living - Green transport (you can move as much as you want = 0 pollution) **Sustainability** - Capitalism is collapsed - All conflicts are solved in man to man fights in Sahara - Using efficiently rubbish from past centuries - A socio-environmentally safe way of extracting greenhouse gasses from the atmosphere - Cheap, fast and comfortable transport - Giving more back to nature than taking from it

The group summarized their hopes for the future with the term "Finland-ification". They hoped the good qualities of Finnish society would spread into societies around the world boosting the quality of life of people everywhere.

Highlights of this Future Human Settlement

The Idea Sphere is a community built on the free exchange of ideas and a sharing economy.

The Idea Sphere
Learning Pit-Stops – Digital and Physical   Sharing/Exchange Economy   Matching Skills to Ideas (and V.V.)   Fluid Property   Expertise-driven

The Created Roles

The group created the following five roles for the ideasphere:

Daisy is a nature/wilderness guide and an orphan. She owns a DNA printer. She likes to act more like a consultant concerning political and economic matters, engages with technology primarily through the health system, and she aims to enhance social and cultural connections to nature. Daisy is motivated by the expertise-driven sharing/exchange economy of the Idea Sphere, but feels threatened by its fluidity. Her starting metaphor is "Free Soul."

Old Man Thorn is a florist and grandfather who has a neural implant which connects him to the Artificial Intelligence Superweb (AIS). He is apolitical. His specialty flowers are in demand. He is universally connected socially and technologically. By selling flowers, he aims to preserve nature by keeping it in the

minds of his customers. His flowers are curated from different cultures. He has limited connection to the human settlement physically, but has a wide network of interests, only some of his focus is on flowers. He is motivated by being an expert in flowers and being respected by the community for it. He is afraid of having a lost legacy. His starting metaphor is "Oldie but Goodie."

Designer Granny is a volunteer specialist and an elder (70-120 years old). She designs futuristic clothes. She is active in supporting causes she cares about such as culture and social work. She "sells" her design clothing and design skills. Her social life includes her grandchildren and design circles, and engages in learning from other designers and contributing to social equality. She prefers learning live through live networks over technology. In her clothing, she uses ecological materials. She contributes to the creative sphere through her clothes, design and visual arts. She could be called an active grandma. She is motivated by the possibility to actively learn and share design and help societal problems. She feels threated by losing live, in person, connection to her family. Her starting metaphor is "Style at Any Age."

Standard Father is an engineer and parent of an infant who is always using virtual reality and augmented reality. He does not engage in politics, he works as an employee, his social life is defined by his fatherhood, through his job develops and uses technology, he doesn't engage in nature and ecology, and his cultural life is primarily going to work and attending daycare events. Standard father cares for his job and family life, is interested in learning and using his virtual reality and artificial intelligence. He is motivated by the possibilities of the future generation and his child. He feels threatened by any limits to access to learning and integration for his child. His starting metaphor is rose-tinted glasses.

Doc 4 role card missing.

Group 1 found using the 'metaphor molecule' concept to analyze the relationships among the roles to be too confusing. After attempting to use it, they instead drew the relationships as a network (figure 1).
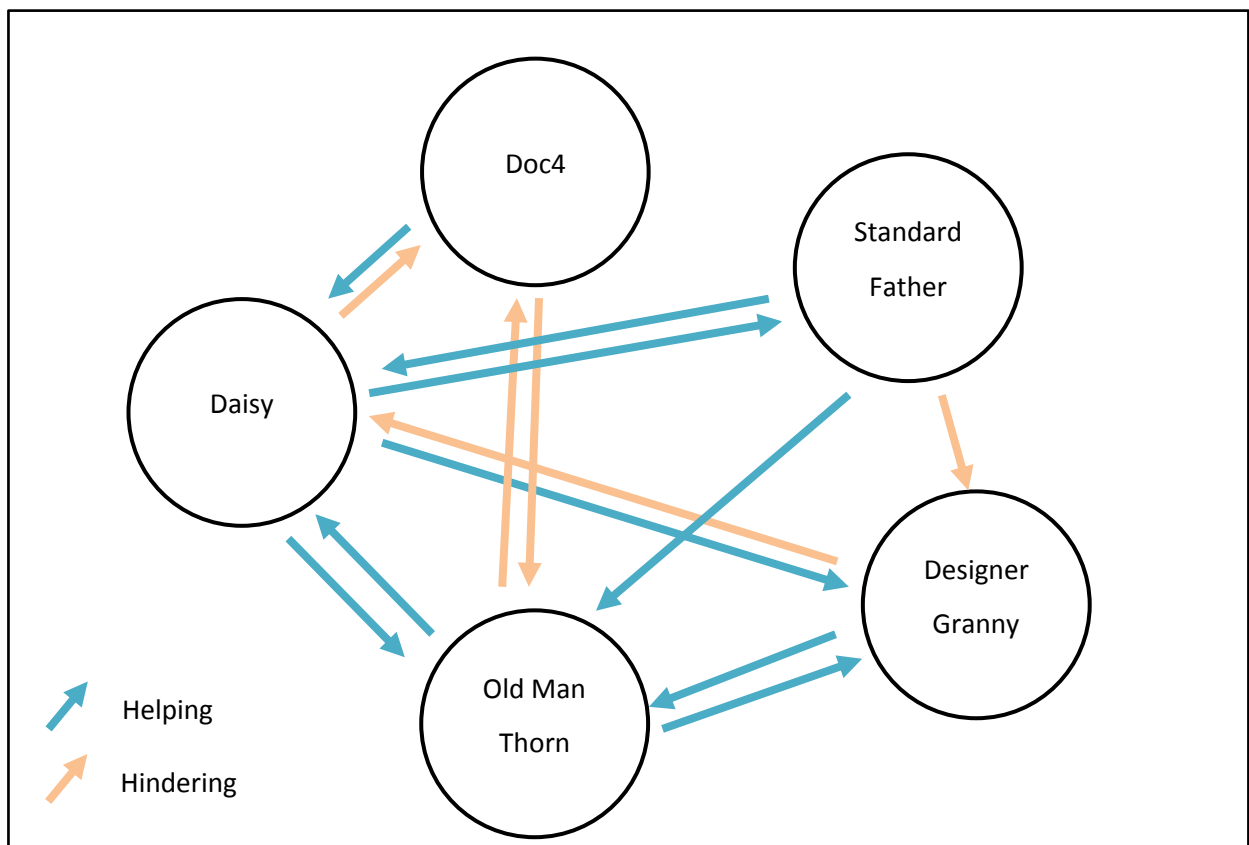

Figure 8. Relationships among Roles formed in Group 1.

Group 2: Water Lilly "Flourishing Learning, Nourishing Roots"

Predictions and Hopes

Table 4. Predictions generated by Group 2

LITANY / HEADLINES							
True space exploration Uncertainty	Trans-humanists debate Pollution	Lack of fresh water	Climate change in Northern countries	Climate has changed significantly	The roads are full of people in the city center	Strong immigration to Western countries	Increasing density of urban population – less space per capita

SYSTEMS							
Urban and nature combined in planning Huge gap in living conditions (rich-poor)	City structures on levels based on social hierarchy Increased regulation	Island eco-system where all services are provided Polarization	Metropolitan areas over city and national boundaries Communities	(Global) segregation between people groups No flights with computers and phone	Moving cars outside of human settlements Buildings are much higher in city area	Bigger cities, sustainable new cities vs. old current cities Digital divide	Clean-tech, green-tech are normal tech, the new Business As Usual

ACTORS			
Self-driving trucks	Robotisation	Drones deliver products	Small communities flourish

METAPHORS / MYTHS				
City reservations for historic areas	Luxury living in rural areas	Fear of robots and AI	Areas outside cities for production (agriculture) not for sparse human settlements	Global population growth; center of gravity shifts (away from Eurocentrism)

Table 5. Hopes generated by Group 2

LITANY / HEADLINES

Stopped / slowed down climate change	Cleaner air and seas	First humans start their journey to Mars

SYSTEMS

Increased global equality (shared resources) Healthy living, nutrition, well-being	Family planning in overpopulated areas & healthcare Living among nature "urban jungles"	Medical food helps the poor to cope with diseases Secure and appealing areas to live	Drinking water made from sea water Healthy living: clean food & clean environment	Sustainable and healthy settlements. Buildings no higher than 3 floors	People share things / Time is the new money Knowledge sharing and open data	Social housing flourishes: Mixed generations and races	Technology complements human capabilities (e.g. robots and cognition)

ACTORS

Global sustainable culture/ habits created	More educated people (and craving of knowledge)	Actively building future of humanity as a whole→ vision	Freedom to choose living area	Movement/ moving is effortless

METAPHORS / MYTHS

Decreased level of materialism Global citizens, local tribes	Increased respect for nature and humanity Global culture	Natural landscape & animals are highly valued Loving feeling	Nature and humans live in balance (including resource consumption)	People live peacefully in communities based on values	Towards common good over individual, city and nation lines	No-stress: space for breathing and silence	Everyman's Right (to access natural areas)

Highlights of this Future Human Settlement

> **Water Lilly "Flourishing Learning, Nourishing Roots"**
>
> Holistic Knowledge
> Thought, sentiment, experience transfer through brain waves (virtual) e.g. through food
> Sub-cultures
> Roots (connected)
> Nomadic
> Global Citizens; Local Tribes
> Original Human Seedbank vs. Transhumans:
> - Preserved ancestry
> - Human conservation areas

Created Roles

The group created the following five roles for Water Lilly:

Max is a teenage property developer who is 100% cyborg. In the political sense, he is liberal and into sustainable nature and habitation. He accesses the different economies of the human settlement as he moves among sub-cultures. Max is interested in the "ancestors" and admires humans, because of his cyborg identity. He wants to maintain the ecology suitable for "humans" as well as the wisdom of the original human species. As a property developer, Max designs the best living habitats for the human ancestry that still remains somewhat unchanged in their "natural habitats", reserves are created to pro-tect the genealogy of the humans (nature protection). Max is motivated by the roots of their human settlement being (flourishing) learning but feels threatened by changes in food production for humans and subcultures and increasing competition among species. The metaphor for Max is "Save the environ-ment – save your human ancestry – learn and evolve better".

Sun-noh Real is a young adult and an energy storage system engineer, who nearly always uses Virtual Reality & Augmented Reality. She is not really interested in other people, values, peace or space. Sun-noh has an average wealth and most of her friends are virtual or virtually connected. She understands technology well and likes to try new things. Sun-noh lives ecologically and is interested in ways to use energy more ecologically. She is trans-human with roots I West-Asia. Sun-noh likes to travel virtually in space. She also has a virtual partner, who she takes with her everywhere. Sun-noh lives in a small nearly empty transportable room. She has robot legs, because she was born without legs. Sun-noh is motivated by experience transfer through the brain, but threatened by other people, who want more concreate connection with her, like the locals. Her metaphor is "Our imagination is the greatest place to travel".

Bob is a police officer and a single-parent of four kids. He is allergic to electricity and electromagnetic radiation. Bob supports all the decisions made and has no political agenda. Bob is not engaged in econ-omy or ecology. He favors stability and security, lives in a market and likes to spend time at the market places. The main technology Bob uses is his robot-partner, with whom he also works with. He preserves the heritage, his roots. Bob hates electric appliances and spends most of his free-time outside dense settlements, because of allergy. Bob is motivated by nourishing learning for kids, but threatened by mar-ketplace management, security of kids, increasing allergy through exposure of electromagnetic fields and increasing AI replacing his work. His metaphor is "Protector of past and present".

Ty H.D. Man is a polyamorist lawyer, who has visited planet Mars. He works as a diplomat, and is wealthy, "upper class" type. Ty is well-liked by others, easy approachable and diplomatic, who loves everyone equally. He believes in human-tech-symbiosis. For him "green is the new normal". Ty has strong ties to the roots, but advocates change. Ty is a great people-person, builds bridges and has strong ties to others. He likes luxurious vacations in hedonistic resorts. Ty is motivated by knowledge exchange but threatened by roots. His metaphor is "Connecting entities".

Wise Lily is a more then 120 years-old super-elder and a civil servant. She is able to communicate with trees and plants. Wise Lily believes in broadening human consciousness, peer-to-peer credit, and hu-manity relationship. She is into genetic development and has smaller ecological footprint. Wise Lily works as a wise adviser between human and nature. She is motivated by holistic knowledge but threat-ened by human conservation and electrons. Her metaphor is "Adviser between human and nature".

Ms. Pepper is a teacher in University and humanitarian volunteer, who owns a DNA printer. Politically, she is into sustainable direction, and likes to save money. Ms. Pepper focuses on equal humanity and is enthusiastic about technology. Ecology is her driving force, but she is not that keen on culture. Ms. Pep-per's mind is filled with technological possibilities and the ways those can make living easier. Ms. Pepper is motivated by holistic knowledge but threatened by preserved ancestry. Her metaphor is "You can learn to swim by reading, but by going into the water".

Group 3: Emulgo "Virtuality with roots"

Predictions and Hopes

Overall name: Bubble & conflict

LITANY / HEADLINES

More migration directly or indirectly caused by climate change	Biodiversity is endangered and "artificially created"	Unpredictable & more extreme weather events	Home **security** systems are essential	Basic values integrate	Security issues	Resource scarcity	Conflict

SYSTEMS

Good future found UK conflict (zero sum) not win-win	New types of work, no 9-15 work no more	Large (and extra large) cities	Major migration movements	Super bacteria! Nano-technology!	More food produced locally in the cities	Lack of continuity (= uncertainty)

ACTORS

New "time zones" are created based on **communities**/areas (rural vs. urban) Strong division between wealth vs. poor	Communities: **Communities** move after "no-surveillance" areas Cultural mix, worlds united – worlds divided	Now inhabited areas or scarcely inhabited areas are more populated Transhumanists debate	**Relationships**: Communal living (extended family, friends) is standard Cultural bubbles & gaps/divides	Knowledge is shared rapidly and globally. Education is generally more available even in poorer areas	People tend to eat less meat (Meat price is high and production methods unsustainable and unhealthy)	Circular/sharing economy mind-set → resources being used more efficiently	Stronger grass-root movements for the environment and democracy (citizens)

METAPHORS / MYTHS

Nothing was written in this section.

Table 7. Hopes from Group 1

Overall theme: Sustainable empathy

LITANY / HEADLINES

Empathy	Citizen activity	Sense of purpose, meaning in lives	Privacy respected (no surveillance etc.)	Respect for diversity (also non-humans)	Global citizenship mindset enhances the understanding of each other

SYSTEMS

People reclaim their lives & cities → action via empowerment	Close environment cared for (shared sense of responsibility)	Relaxing moments and spaces are mandatory. Virtual or real	Investment for very long term (or knowingly very short term): investment in dynamically changing, agile system	Urban space is better utilized (urban agriculture, vertical space, rooftops etc.) → green cities	Innovation in technology makes green production cost-efficient and therefore attractive and widely used	Education in all levels teach skills and methods needed in order to act and "create" future	Sustainable behavior is supported through incentives & pear support
Trustworthiness can be proved on the moment/at the spot	Resource efficiency: renewables, cleantech, circular systems	Sustainable food systems					

ACTORS

Bacteria used to clean water/soil to benefit health	Method or forum for finding common opinion	New (and ecological) solutions for moving around in the city	Tolerance grows when people are "forced" to connect and live together → do not need to fear the neighbor	Global mindset (on all levels) → respecting other cultures "us", not "us vs. them"	The role of communities in peoples' lives: "sharing & caring", strong democracy	Majority of individuals want to collaborate and work for common goals Greater responsibility for others (because also you depend on that)
New sustainable business models → innovations→services	Clean food, air + a lot of green stuff in the cities	Caring of communal spaces				

METAPHORS / MYTHS

Nothing was written in this section.

Highlights of this Future Human Settlement

> **Emulgo – "virtuality with roots"**
>
> Flexibility of environment (man-made)
> - e.g. housing
>
> Adaptability of people "complexity" is the norm"
> - Work, education, relationships, identity, empathy
>
> Multi-layered "reality"
> - Virtual reality, or reality and "the bubbles"
>
> Intense interaction – push to interaction
> - Learning requires interaction and diversity
>
> "A Zen place" for everyone
> - Meaningfulness of life, purpose, privacy
>
> Sustainable lifestyles and responsibility (of others)

Created Roles

The group created the following five roles for the ideasphere:

Bitty is less than 2-year-old mobility experience designer interested in a successful Mobility as a Service (MaaS) long time ago. She is allowed to vote when 10 years and to own a company since birth. Bitty lives with a family, where young generations are accepted "as they are". Wisdom of youth and younger generations is used. Bitty can translate one's thoughts to others. Sustainability is the norm for her. Bitty is part of a "study group" of advanced DNA moulding. She has an IQ level of Mensa. Bitty has also inherited a company and will become a CEO at the age of 6. Bitty is motivated by flexibility of environment (man-made), but threatened by multi-layered reality, especially "bubble". Her metaphor is "By understanding the complexity bit by bit we realize we can be free not chained to patterns".

Lemonot Justice is a mayor and she is married to a robot. Lemonot volunteers as a retro 3D printing instructor at a FAB(rication) Lab. She chooses her political orientation case by case in VR. She is self-sufficient in food farming: husband and production robot do the farming. Lemonot is a great figure in the community, and she governs or rules only in VR. She is also self-sufficient in energy and generates her own electricity. Lemonot is a "historyphile" especially in year 2017. Lemonot is motivated by Meta Language reality, but threatened by flexibility of environment. Her metaphor is "Everything was better in 2017", due to former U.S. President Donald Trump.

Luanne Loveyou is a social integration expert and a polyamorist. She has an artificial sense connected to a micro satellite. The saying "Make love not war" describes Luanne very well, and she sees love as a political tool. Luanne thinks that money does not make a man, but instead love does. She believes that love creates integration and that social ties are flexible. She has an enhanced sense of feeling due to microchip. Luanne sees that love is the new green. She loves performances that create integration. Luanne is very engaging, empathetic and emancipated. She is motivated by intense interaction, but threatened by multi-layered reality. Her metaphor is "All you need is love".

CM-Tailor is a doctor of cubaro medicine, single and a designer of futuristic clothes. He is liberal, but in favor of capitalism and no-sharing. He has high society circuit. CM-Tailor is a front-runner in technology, and in ecology he favors high-tech and participatory ways. From the cultural point of view, he is urban and popular. CM-Tailor is fashionable, visible celebrity that leads the tech/fashion scene and gets press. He's style is very minimalistic, and the tech solutions are hidden in the clothes. CM-Tailor is motivated by multi-layered reality but threatened by adaptability of people. He's metaphor is "Clark Kent" from the Batman – a public figure with extra capabilities.

Edna is an elder – 120 years old – architect, who owns a DNA printer. She is active in politics, and economically well-off. For her community is important. Edna is a tech-pro, and environmentalist with an own garden. She loves VR events. Edna is single, has never been married, and has no kids, but she is very social, has a large circle of friends and likes to help others. Edna is motivated by sustainable lifestyles and responsibility but threatened by multi-layered reality if VR is misused. Her metaphor is "Everyone's community granny caring and sharing".

Group 4: Neo-Commune "Ascetic life, high values"

Predictions and Hopes

Table 8. Predictions for Group 4

LITANY / HEADLINES

Uninhabitable living areas (e.g. sub-Saharan Africa, coastal areas)	Fighting resources (including water)	Water

SYSTEMS

Urban growth and congestion Resource efficiency	Residential condensation Ownership decreases	Mix of virtual reality and "real" life	Urbanization continues and strengthens	Technically advanced, some systems have been abandoned	Public transport has been re-designed (new modes/habits, new vehicles)	The fragmentation of working life, the different forms of entrepreneurship are increasing

ACTORS

"Opposite movement", organic communities in rural peace	Diversification/individualization of residential areas	Stretching smaller homes, more comfortable housing	Selfish / personal / own-looking	Mix of peoples and ethnic → "global citizen"	Hurricanes and other extreme weather phenomena	Distinguished e.g. in terms of know-how, simultaneously well-differentiated competences and extensive "metaskills", e.g. arts & crafts

METAPHORS / MYTHS

Diversification of urban culture	Changing family communities	Complex (diverse, complicated, offering multiple choices)	Increasing diversity: income differences, cultures, jobs, lifestyles, hopes

Table 9. Hopes from Group 1

LITANY / HEADLINES

Population growth has stopped Responded to climate change	Permanent peace at global and national levels	Photosynthesis giving energy to households	The connection between nature and urban living	Security, technology, traffic, choices, housing, community	Space to breath despite dense living. Public/shared spaces are the most important, a lot of versatile spaces	Sustainable development, using less, renewable energy, local food, pollution, fair sharing (resources), car-free living

SYSTEMS

All have genuine self-realization opportunity Providing basic security, politically stable	New forms of participation/involvement in use Globally more resource sharing	Equality, harmony between the sexes, ethnicities etc. Circular economy is working	Agenda 2030 has been implemented, ambitious new goals Systems are flexible	Systems and complexity thinking as part of teaching → identifying the entities	Disadvantages for polluters → investments in the environment and social development	Improving meaning and value of work instead of livelihood (basic income) – "doing good"

ACTORS

The facts win the opinions Genuine skill of presence	Responsibility is more prevalent	Encouraging, mutually supportive	Caring and communality become more common	Sharing and caring, human-based (not automating empathy)	The eating habits of the world's population have become more sustainable	From individualism to collective, seeing itself primarily as a part of the community

METAPHORS / MYTHS

Hopeful, enabling	A global value foundation for decision making	The development of the third countries has improved the world (women's position, consumption, economy)

Highlights of this Future Human Settlement

> **Neo-commune – "Ascetic life, high values"**
>
> Shared multifunctional space(s) + privacy - Meeting people, sharing thoughts and services; includes
> also private spaces
> Life-long learning (LLL) based on sharing economy besides the formal
> Flexible mobility - Possibility to change place easily
> Energy self-sufficiency - Structures are supporting energy-efficiency
> Printed food - Food is consumed only to survive
> Smart technology

Created Roles

The grandpa is more than 120 years-old super elder and a volunteer specialist, who has visited planet Mars. Grandpa is a millionaire who works in NASA. He is a conservative but opposes consumption society. Grandpa is connected to others via tech and loves the opportunities that tech provides. He is very environmentally conscious. He also hates the food pills and misses the taste of food. Grandpa moves and lives thanks to technology and is very into space and aliens, with whom he thinks he can communicate with. He is motivated by green energy but threatened by food pills. His metaphor is "Grandbot… who speaks with aliens".

Lisa is a doctor of cyborg medicine and a grandmother, who has successfully invested in a Mobility as a Service. She is liberal, wealthy and quite social. She is technically orientated, lives by green values and is an aboriginal. Lisa has an extra sense to feel the feelings of other's. She is a crazy cat-lady, who loves to take care of flowers. She usually sits at the multifunctional space talking with others. Lisa has made experiments with herself and nowadays. Lisa is motivated by believing that she helps others but doesn't notice that she is irritating others. She is threatened by missing real food. Her metaphor is "Improve your senses – or maybe a new sense".

A.V.1. is a 60-year-old city planner and a care giver, who is a volunteer at a retro 3D printing lab. In the previous life, she was a community pedagog. She is a member at a communal management board, supporter of enhanced coordination of commuters. She does freelance online mapping and planning of undiscovered locations outside the earth. A.V.1. has a spouse and she fosters children. She is a conservative tech user, who embraces 3D and other 2020's tech. Her hobbies include picking highland flowers of the Himalaya as arctic species (non-existent). A.V.1. is a "mother-of-all" and she cares too much about other people's issues. She is motivated by helping others, satisfying the need of being of help to others, ability to manifest own skills. She is threatened by segregation enhanced by high-tech. Her metaphor is "90's kid".

Red Head Rose is a disabled landlord, who has invested in a successful drone developer. She is not active in politics, but open-minded conservative. She is into sharing, circular economy and hidden assets. Rose likes to spend time at the center of social life in communal space. She thinks that technology enables mental mobility. She has a simple lifestyle, and small range physically. Rose likes communal life, locality and tolerance. She takes care of good living conditions and helps people, is always there and gets much in return. She knows much of community's things but does not gossip. Rose is motivated by communal space but threatened by possibility to change place or (lack of) food. Her metaphor is "Telephone exchange manager" or "Central hub of human communities" or "Rose knows".

Ja phan Virtanen -> no role card
5793 -> no role card

Group 5: Snowflake "Family of Petals"

Predictions and Hopes

Table 10. Predictions from Group 5

LITANY / HEADLINES

Stronger borders	Ordinary settlements (diversity down)	Flooding in big cities next to shore	Sharing beats owning in many areas	More green environmental areas	Environmental situation is worse than 2017	More ecological buildings and materials	More possibilities to live outside of big cities (urbanization counter-trend)

SYSTEMS

Efficiently shared apartments/ spaces	Sporadic diffused settlements	Self-sufficiency starts to be the norm	Floating cities are built in several areas	World will be divided into rural areas/ groups	Some kind of virtual reality is a commodity	Countryside starts to attract the people that can choose

ACTORS

Individuals through their demand	Asian cities have buildings with filtered air	"Idea-settlements" (based on ideology, religion, interests, key values)	Global citizenship identity increases or can co-exist with local identities in harmony

METAPHORS / MYTHS

Life outside cities is better	Small kingdoms	Community oriented

Table 11. Hopes from Group 5

LITANY / HEADLINES							
Everyday life does not have long distances Cheap and affordable	Everyone will get basic (at least) education, Place for living, leisure and work	There will be abundant green energy	Well being is more equally distributed than in 2017	There is a way to bring water to areas of low water supply	Access to basic needs is made easier, not restricted (water, air, food, etc.)	People are able to live where they want to, not forced to some place	More global world, diversity and encounters between people

SYSTEMS					
Small moral villages	Multi-cultural settlements	More sustainable settlement and buildings	Better connection with nature (possibilities of biomimicry)	Green solutions are not premium, but are the standard solutions	Movable homes (fluid settlement combined with excellent transport.)

ACTORS

People who accept the differences and live together

METAPHORS / MYTHS			
Moral comes first	No-one thinks that war is the answer	Sustaining the energy and dynamicity of cities	Nature is part of everyday life, not a hobby

Highlights of this Future Human Settlement

> **Snowflake – "Family of petals"**
>
> Hybrid
> Non-commuting
> Local thinking
> "Introvert"
> Small
> Flexible/agile
> Connected
> Get-together rooms

Created Roles

Woody is a super elder (more than 120 years old). He is an artist. He is allergic to electricity and electromagnetic radiation. Regarding Shire politics, he is critical and sarcastic. He contributes to the local economy by producing shows which attract tourists. People think he's fun, humorous, and amusing. Because of his allergy and the many techno dumps found in 2050, he is resisting technology. He is against more electrification. By making shows and plays, he engages with and produces culture. People in the community find him to be funny but a bit rude. He is a person from the last generation who doesn't like new styles. He is motivated by people getting bored and needing his art. He is threatened by how technology is dominating. His metaphor is "talk dirty, be simple."

Eric is a nature/wilderness guide and a grandfather. He has visited the planet Mars. He champions ecological values, is concerned about security, and encourages an interplanetary perspective while being both visionary and nostalgic. He prefers a decent income but gets along with very few material goods.

While he himself is a bit of a hermit, he values the Shire community. He understands the potential of technology, but still prefers nature. He promotes nature conservation. He likes science and values nature more than human art. He likes to explore the world and travel a lot but is still attached to his local environment. He encourages the idea that Mars would be inhabited for ecological reasons connected to conserving Earth's nature. He is motivated by the hybrid characteristic of The Shire, meaning you can both stay and go. He is threatened by how the Shire community can feel a bit suffocating. His metaphor is "Space Gandalf", in reference to the character from *Lord of the Rings*.

Media Manager (also Journalist) is an entrepreneur and has an artificial sense connected to a micro-satellite. He is also a caregiver. In the shire, he is liberal and an active influencer. Through his entrepreneurship he is a bread earner for himself and the community. He is social through institutions. He promotes the early adoption of tech and the learning of STEM. He maintains the ecology, maybe through its business. He welcomes change and diversity, but also brightness and traditions. He works in the education-media business, lives in a bit of a weird way, brings new waves to the Shire, is a gardener, and loves kids. He is motivated by how there is a desire to move forward in the Shire and how it is a flexible/agile community. He is threated by the small community's local thinking and 'introversion.' His metaphor is "New is True."

Tourboss (Tourbó) is the tourism director for The Shire. He is married to a robot. Because he had invested in a successful drone developer company, he now has a surplus of wealth, which he continues to invest. His politics are "pan-settlementary". He says, "sociality is his profession." He thinks technology is good if it helps tourism. Despite any environmental benefits of people using VR to visit new places, he believes virtual travel Is not the real thing. He is very interested in experiencing new cultures—there is so much to see in the world. He organizes inter-settlementary touristic travel and plans to have a flock of personal drones to take people to other places. He tells others he is motivated by how many settlements there are to visit and learn from while he is also motivated by money. He is threatened by restrictions of mobility turning to itself. His first metaphor is "If it helps my business, I like it!"
Young Will ➔ (Artifact missing.)

Metaphor Molecules

The group found three Least Helpful metaphor molecules—two weak bonds, one strong bond.

Weak Bonds – Least Helpful
Journalist –> Woody <- Young Will
The Journalist and Young Will identified Woody as the least helpful to their interests. Their shared feelings toward Woody makes them reflect on their relationship to each other. Young Will learns from the Journalist. The Journalist supports his involvement and creates a fun base for the news. The journalist brings corresponding news, connects kids with other communities and creates link.

Tourbo –> Journalist <– Woody
While Tourbo and Woody both identify the Journalist as least helpful to their interests, the two roles at first see no relationship between themselves. Woody wants tech to go away, for there to be less news, and no change. He is outspokenly against journalism. Tourbo supports Woody's business by attracting tourists to The Shire

Strong Bond – Least Helpful
Journalist <-> Woody
There is a divide between the Journalist and Woody, however it is a love-hate relationship. They both foster value-focused discussions and are communicative through art and media.

Group 6: Shire - "Creativity, well-being and nature in the same package"

Predictions and Hopes

LITANY / HEADLINES

World citizenship *Maailmankansalaisuus*	Uncertainty Multilocal residency *Monipaikkaisuus*	The trend of urbanisation continues → 2050 *Kaupungistumistrendi jatkuu → 2050*	High-density housing (density) *Tiheä asuminen (density)*	Residential areas becoming more unequal *Eriarvoistuvat asuinalueet*

SYSTEMS

Apartments come return to city centres → services become more versatile *Asunnot palaavat kaupunkien keskustoihin → Palvelut monipuolistuvat*	Many small apartments/residences are available *Pieniä asuntoja/asumuksia on tarjolla paljon*	Ownership of apartment decreases *Omistusasuminen vähenee* Different forms of ownership in Finland *Suomessa erilaisia omistusmuotoja*	Differentiation increases, good and bad neighborhoods *Eriytyminen kärjistyy, hyvät ja huonot alueet* Urban gardens, parks increase *Kaupunkipuutarhat, puistot lisääntyvät*	Houses and apartments become different, very small ones, very big ones, different buildup *Talot ja asunnot erilaistuvat, hyvin pieniä, hyvin suuria, erilainen varustelu*	Living quarters are built in a way that they are easily modified *Asumistilat rakennetaan helposti muokattaviksi*

ACTORS

Migration for work. *Muutetaan työtehtävien perässä*	Communal housing increases. *Yhteisöllinen asuminen lisääntyy.*	Different communities (separation from others) *Erilaiset yhteisöt (erillisyys muista)*	Communal housing increases → assisted living buildings Finnish housing cooperatives *Yhteisöllinen asuminen kasvaa → palvelutalot suomalaiset as oy:t*	Part of people moves to the country for peace and quiet *Osa ihmisistä muuttaa maalle hakemaan rauhaa*

METAPHORS / MYTHS

(None)

Table 13. Hopes from Group 6 (original Finnish in italics)

LITANY / HEADLINES

Countryside is lively *Maaseutu on elävä* Working home and close to home enabled *Kotona ja kodin läheisyydessä työskentely mahdollistettu*	Parks, green corridors, nature conserved and built in cities. Animals? *Puistoja, viher-käytäviä, luon-toa säilytetty ja rakennettu kau-punkeihin. Eläimiä?*	Green areas, ac-tive spaces, common → li-ving room of ci-ties *Viheralueet, ak-tiiviset tilat, ylei-siä → kaupun-kien olohuone*	Respecting diffe-rence (← age, race, education, status, wealth), decrease of inequality *Erilaisuuden (← ikä, rotu, koulu-tus, asema, va-rallisuus) kun-nioitus, eriarvoi-suuden vähene-minen*	Lots of different com-mon spaces available, majo-rity of which have free ent-rance (parks & forests, mu-seums etc) *Tarjolla on run-saasti erilaisia yhteisiä tiloja, joista suurim-paan osaan on vapaa pääsy (puistot & met-sät, museot jne)*	Merging of work and leisure, in-crease of distant work (at last!) *Työn ja vapaa-ajan yhdistymi-nen, etätyön kasvu (vihdoin!)* Less money is spent on living *Asumiseen ei kulu niin paljon rahaa*

SYSTEMS

Neighborhood services! *Lähipalvelut!* Settlement distributes to wider areas *Asutus jakautuu tasaisemmin eri alueille*	Urbanization has not caused problems *Kaupungistumi-nen ei ole tuotta-nut ongelmia* Residential experiments are common and approved *Asumiskokeilut tavallisia ja hy-väksyttyjä*	Transport is fast and affordable, which makes ser-vices & jobs ac-cessible. *Liikennöinti on nopeaa ja hal-paa, jolloin pal-velut & työ ovat hyvin saavutetta-vissa*	Everyone has a weatherproof apartment and an access to clean water, sanitation in or-der *Jokaisella turval-linen säänkes-tävä asunto ja pääsy puhtaa-seen veteen, sanitaatio kunnossa*	Air, water and noise pollution are in control, do not disturb settlement *Ilman ja veden sekä melusaas-teet hallinnassa, eivät häiritse asutusta* Joint operation of business world *Liike-elämän yh-teistoiminnalli-suus*	As many as pos-sible has an op-portunity to choose their dwelling place and the mode of living *Mahdollisimman monella on mah-dollisuus valita asuinpaikkansa ja asumismuo-tonsa*

ACTORS

Communal living increases, sepa-ration decreases *Yhteisöllinen asu-minen lisääntyy, eriytyminen vä-henee* Arts and humani-ties return to schools *Taide- ja sivistys-aineiden paluu kouluihin*	Public transpor-tation is an easy, fast and reliable option *Julkinen liikenne on helppo, nopea ja luotettava vaihtoehto kaik-kialla*	Education paths at the core of in-dividuals' life cy-cle (LLL) *Koulutuspolut yksilön elinkaaren keskiössä (LLL)* Flexible settlements that adapt according to life situations *Joustavat, elä-mäntilanteiden mukaan muuttu-vat asumukset*	Apartments are customized ac-cording to life-styles and hob-bies *Asunnot räätälöityy elämäntyylin ja harrastusten mukaan*	Cyclists and pets are catered even better when planning settle-ments and resi-dence. *Pyöräilijät ja lemmikkieläimet huomioidaan en-tistä paremmin asutuksen ja asu-musten suunnit-telussa.*	Genuine dialogue = interest in human being *Aito vuoropuhelu = kiinnostus ih-miseen* Different genera-tions interact with each other *Eri sukupolvet ovat kanssa-käymisissä kes-kenään*

METAPHORS / MYTHS

(None)

Highlights of this Future Human Settlement

Shire "Creativity, well-being and nature in the same package"

village/community (in the city or countryside)
nature is near
shared ownership of facilities & tools
ecological/green architecture (emerges with nature)
self-sufficiency (energy, food)

Created Roles

TAM is a young adult who works as an energy storage system engineer. She is also a cyborg, and naturally a technocrat and pro-cyborgs. TAM could be described as a helper and supportive member of the community, partly because she is part of everything and thus, everyone. Financially she does not need much. Culturally she describes herself as part of her inter voice. TAM is very motivated by the possibility to learn more about the relations of nature and technology in the Shire. However, the role and future of cyborgs and augmented human bodies are somewhat threatening to her, as the ecological aspect is embedded in everything, over the technological one. TAM's metaphor is "Nikolai Tesla" or "Community supporter".

Other roles for this group were named **Lucky Bastard, Hippie Official, Fama,** and **Police.** (Their role cards were not left behind by the group participants.)

Metaphor molecules

Strong Bonds – Most Helpful

Lucky Bastard ← → Hippie Officer

Lucky Bastard ← → Creative Connector

Strong bonds - Least helpful

Fama ← → Lucky Bastard

Fama and Lucky Bastard have no need for shared resources.

Weak bonds - Most Helpful

Lucky Bastards, TAM, Hippie Official ← Fama →

No shared interests

Police ← Lucky Bastards → Fama

No shared interests

Group 7: The Firenze Hub

Predictions and Hopes

Table 14. Predictions of Group 7

LITANY / HEADLINES

Floating compound for additional living space …circular economy and resource related issues to become a key driver → self =sufficiency flow	Climate refugee camps across the world Off the grid eco villages and towns Possibility of immigrant to other planets by choice/colonizing other planets.	Growing trend towards urbanisation at first… Climate change, scarcity needs and environmental challenges will force to update the idea of settlements…	Extremely crowded cities Guarded secure luxury villages for the elite Many settlement suffer from floods, due to increasing sea level	Ad hoc Scenario for 2050, India: Rise in mean temp by 2 degrees Rise in sea levels by 1 cm Lower agri production in rice + wheat in India More hunger + more poverty.	Climate change make lack of food → people move to other countries. Nationalism increases The world is run by big companies, people settle according to jobs	Most people live in large cities. Actual cities don't exist, people settle geographically based on their online profile/background - self-organizing communities

SYSTEMS

Climate change Border control Failed crops Changed weather systems Mass immigration due to Climate Change. Uneven distribution of wealth	Cities become bigger and bigger and their structures to solve problems become more complicated. Then you have to think everything in a new way Urban farming, (vertical farms, "food factories")	Rural areas are inhabited by isolated "tribes" (Survivalists, etc.) Terrorism makes (some, maybe rich) people to move away from cities.	If digitalisation goes on and makes it really possible to work anywhere, many (at least some) people move to countryside, by lake, near nature… farming etc.	More and more people live as "urban nomads" Unseasonal rains Unpredictable Cyclones Unpredictable Droughts and Floods	Big companies, platform economy [alustatalous], changes economy of the world. Wooden fibers make it possible to produce/raise food in areas where cotton is now formed → rise in farming

ACTORS

Research institutions, governments, environmental laws, politicians, voters, refugees.	Global institutions and organizations Government Research institutes Global security apparatus; elite police	Big digital companies (Platform economy business [alustatalouden bisness]) Autonomous cities (not under national government control)	Research center VTT & JKL wooden companies have new technology to make cotton from wood	The earth becomes overpopulated. Due to climate change & other reasons, governments and big technology companies carry out initiatives for colony in other planets. Actors: governments, real estate, outer space developers.

METAPHORS / MYTHS

Exodus	Paris accord!?! Paris accord	King in his castle

Table 15. Hopes from Group 7

LITANY / HEADLINES

Sustainable countries/cities/communities. Cities: preparedness for natural disasters	People take care of each other, help, feel empathy.	Interconnected Nomadism Borderless world	Everybody has food, safety, work and good friends.	Smart living solutions, with urban farming

SYSTEMS

Clean water and efficient sanitation available for everyone. Clean air for everyone, also in big Cities.	Better prediction tools. Heat resistant variety of crops/salinity resist. Crops More + more innovation involved in helping settlements	Participatory/sharing economy everyone is an entrepreneur; settlement is not restricted by geographical locations	Digitalization makes it possible to work everywhere. People live near nature, enjoy silence and have small communities	Self-sufficient move Human networks True off the grip connectedness. Satellite/global 5g solar solutions	Eco education and learning! Living solutions that require less space. Smart food stocking apps. Vertical gardening/Distribution of surplus

ACTORS

Governments carry out initiative to encourage sustainable communities raise awareness of individual participation.	Four systems news. Reduce population growth.	Institutions & Governments Rebrand institutions	Due to efficient communication tool and VR technologies people can select freely where to live	Big companies don't take all the economic power. Nations have responsibility for the welfare of citizens.	Better equipped political planners and forces in terms of climate and environment	Nomads Governments that allow nomadism Tech companies work that allows true working from afar	Private people; Developers; Contractors; Building companies; Politicians

METAPHORS / MYTHS

Think big but do/prepare to the future locally.	Own nest in a big tree	"Home by the lake, work at home"	Garden of Eden	On the road again	"Granny's cottage"	"Global home"	Urban utopia

Highlights of this Future Human Settlement

The Firenze Hub

- Open
- Franchising
- Fully circular noosphere
- Firenze Council
- Network of settlements that share all information and innovations

Created Roles

Recoman the Green Hulk

EcoMan is an entrepreneur in the field of Mobility as a Service (MAAS). He is also a parent of a teenager. EcoMan is a firm believer in green technology, and he has a deep green ecological ideology. Overall,

values are present in everything EcoMan does. Economically he could be described as "Firenze middle class", and he is part of so-called elite entrepreneurs. The Firenze Hub embraces so-called nestlogical or nestwork-based culture, and EcoMan is indeed a nestwork creator within the community. Information sharing and the noosphere in general are motivating for EcoMan. The Florence Council, which may put possible limitations for operations, is a threat to him. EcoMan's metaphor is "More Green (info sharing) is Good!"

The Child Prodigy is the young child mayor of the community. This genius child was found and put in charge of Firenze in a very early age. The Child is always in contact with settlement inhabitants through virtual or augmented reality in a transhuman way. There is no need for wealth and his/her consumption is indeed minimal. The Child is both a political and a cultural leader of Firenze. The Child finds the network of settlements, which share all their information and innovations motivating. Firenze Council is threatening to him/her. The metaphor of the Child is "Dalai Lama".

Skyhead 2.0 is threatened by the Firenze Council, and motivated by franchising. His/her metaphor is "Eye in the sky".

Grandpa is a 100-year-old grandfather and a volunteer specialist, who is allergic to electricity and electromagnetic radiation. He moved to Firenze Hub 5 years ago and the allergy began. He is now forced to limit his technology use to minimum. Economically he survives by collecting points from volunteer work. Socially he is well off and has a good position. Grandpa promotes even stricter ecological laws to the Hub. He is motivated by the fully ecological noosphere prevailing in the community. In his free time, he enjoys singing. Grandpa's metaphor is "Wise old man".

Metaphor molecules

Strong Bonds – Most Helpful
Skyhead ← → EcoMan

Skyhead and EcoMan form a strong bond, as they have common business affiliations. EcoMan presents the workers and the middle class of the Firenze hub. He is futures oriented and leans towards intensive ecological thinking. Skyhead represents experience and is very active despite her/his old age.

Strong bonds - Least Helpful
Grandpa ← → Electra

Weak bonds - Most Helpful
Skyhead, Electra ← EcoMan → Grandpa

Weak bonds - Least helpful
Electra, Skyhead ← Grandpa → The Child

APPENDIX 7. KEY PEOPLE IN SUMMER SCHOOL 2017

Organizing team

FFA Summer School 2018 was co-organized by Laura Pouru, Ellinoora Leino-Richert and Nick Balcom Raleigh with guidance from Markku Wilenius, Riel Miller and Hanna-Kaisa Aalto.

Facilitators

The facilitation team was recruited primarily from the Master's Program in Futures Studies at Turku School of Economics and the FFRC.

Nick Balcom Raleigh served as a free-floating facilitator, answering questions of group facilitators, during the Futures Literacy Lab. He holds a M.A. in Futures Studies from TSE - University of Turku and developed the Metaphor Molecule futuring game as part of his master's thesis. He is a Project Researcher at FFRC. At the time of the Summer School, he was part of the Futures of Cities and Communities team led by Markku Wilenius.

Ellinoora Leino-Richert holds a M.A. in Futures Studies from TSE - University of Turku and works as a project researcher at FFRC. At the time of the Summer School, she was part of the Futures of Cities and Communities team led by Markku Wilenius.

Elina Nikula holds a M.Ed. degree and works as special education teacher. She is also a M.A. degree student in Futures Studies and a PhD student in faculty of education at University of Turku. The theme of her research is future of education.

Laura Matero Parraga was a Bachelor's Degree student at TSE and intern for the Finland Futures Academy during the Summer School. Since then, she has finished her bachelor's thesis and is preparing to continue her education to obtain a master's degree.

Marjukka Parkkinen is a PhD candidate in Futures Studies at TSE - University of Turku. She is also a project researcher at FFRC. Together with different teams Marjukka has designed, organized and facilitated several participatory workshops addressing diverse futures topics.

Laura Pouru holds an M.Soc.Sc in Human Geography and M.A. in Futures Studies. She manages the research, development and education activities of the UNESCO Chair in Learning Society & Futures of Education held by Markku Wilenius.

Yuan Qi holds her MA in Futures Studies from TSE and is a PhD candidate in Futures Studies. She is interested in the future effects of business digitalization on social systems.

Philip Roy is a program manager at a research institute whose work focuses on developing novel solutions to global problems, based on complex network theory.

RECENT FFRC eBOOKS

Nicolas A. Balcom Raleigh, Laura Pouru, Ellinoora Leino-Richert, Marjukka Parkkinen
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