Sirkka Heinonen, Nicolas Balcom Raleigh, Joni Karjalainen,
Matti Minkkinen, Marjukka Parkkinen & Juho Ruotsalainen

CLA GAME REPORT

Causal Layered Analysis Game on Neo-Carbon Energy Scenarios

NEO CARBON ENERGY

FINLAND FUTURES RESEARCH CENTRE

Turun yliopisto
University of Turku

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Cover photo

Detail of Kuru by Kimmo Schroderus (2006), Helsinki, Finland. Photo by Sirkka Heinonen.

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Finland Futures Research Centre

Turku School of Economics

FI-20014 University of Turku

Visiting address: Rehtorinpellonkatu 3, 20500 Turku

Korkeavuorenkatu 25 A 2, FI-00130 Helsinki

Yliopistonkatu 58 D, FI-33100 Tampere

Tel. +358 2 333 9530

utu.fi/ffrc

tutu-info@utu.fi, firstname.lastname@utu.fi

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PREFACE

The World Conference of Futures Research 2015 offered a special opportunity for the continued experimental development of the CLA game – an interactive role playing method that not only searches for deeper causation of particular issues but tests the robustness of strategies.

Nearly 50 futures-oriented participants engaged in a modified CLA game process, developed and facilitated by a Finland Futures Research Centre team. The aim of the game was to elaborate and deepen four transformational scenarios of a project called Neo-Carbon Energy. The scenarios anticipate possible societal and economic outcomes of the transition to renewable energy system.

Causal Layered Analysis supports the aim of studying socio-economic futures from the perspective of multiple stakeholders including the critical citizen-perspective, and the CLA game was useful in scenario development by deconstructing and reconstructing the scenarios through CLA layers.

The session set the stage for further modification of the CLA game, an effort in which I am also engaged and look forward to further collaboration with the FFRC.

Mooloolaba, Australia, December 18, 2015

Sohail Inayatullah
Unesco Chair of Futures Studies
Professor, Tamkang University and the University of the Sunshine Coast

ABSTRACT

This report describes the process and results of Causal Layered Analysis (CLA) game session held on 11 June 2015 in the International Conference of "Futures Studies Tackling Wicked Problems", organized by Finland Futures Research Centre in Turku. CLA is a qualitative method developed by Sohail Inayatullah. It enables a deeper investigation of alternative futures through an analysis done through four different layers; litany, system, worldview and myth/metaphor. The method functioned as the theoretical framework for the experimental game session conducted during the conference. The aim of the CLA game was to elaborate on and experiment with four transformational scenarios being developed by Finland Futures Research Centre for an ongoing Neo-Carbon Energy project. The tentative scenarios were constructed in the futures-orientated part of the project "Neo-Carbon Enabling Neo-Growth Society – Transformative Scenarios 2050". The research project proposes a new emission-free energy solution based on renewables, mainly solar and wind. In the Neo-Carbon Energy system, solar and wind technologies produce energy that is stored in synthetic methane or other synthetic hydrocarbons. Carbon dioxide and hydrogen can also be used as feedstock for chemicals and materials. The society as a whole is expected to be affected by this new mainly distributed production of energy and materials. The foresight focus is on the economic, political, cultural and social changes. Potential socio-economic consequences and prerequisites of the Neo-Carbon Energy system are anticipated. The scenarios depict a transformed world of renewable distributed energy and peer-to-peer organizations in the year 2050. The session started with a presentation by Sohail Inayatullah about Causal Layered Analysis, and with an introduction to the CLA game and Neo-Carbon Energy scenarios by Sirkka Heinonen. This was followed by an action-orientated workshop where the CLA game was conducted in five moderated break-out groups. At the end of the session the results of the game were presented and debated. The total count of the participants was 40 from next to 20 countries plus 6 moderators and 2 supervisors. The results and analysis of the CLA game are presented in this report followed with conclusions and a discussion. This modified form of a CLA game is to be further developed and experimented with.

1. INTRODUCTION

This report describes the process and results of Causal Layered Analysis (CLA) game session held on 11 June 2015 in the International Conference of "Futures Studies Tackling Wicked Problems" and organized by Finland Futures Research Centre in Turku. The CLA game workshop consisted of a presentation by Sohail Inayatullah about his Causal Layered Analysis method and of an introduction to the scenarios and the game by Sirkka Heinonen. Causal Layered Analysis—the framework method for the game pioneered by Sohail Inayatullah – is explained in chapter 2, followed by the description of the application of the method in the session. The introduction in the workshop was followed by group break-out sessions and then by shared time for the groups to present their work to each other.

The inputs for this CLA game were the four transformational scenarios being developed by Finland Futures Research Centre for the Neo-Carbon Energy project.[1] There were five groups, two of which worked on "New Consciousness" the other three each working on the following three scenarios – i.e. "Radical Startups", "Value-Driven Techemoths", and "Green DIY Engineers". Each group was given a Litany for their scenario in the form of a front page of a future newspaper, a large sheet of paper with a PESTEC (Political, Economic, Technological, Ecological, Cultural/Customer) table featuring one item already added for each row representing a Systemic cause layer, and a stack of role cards each depicting a different type of person who might exist in the scenario, representing the Worldview and the Metaphor layers.

The results of the work made by the five groups are illustrated in chapter 3. In chapter 4 conclusions and some discussion are presented. As the game session was planned to elaborate four tentative Neo-Carbon Energy project scenarios, the report proceeds by first describing the outlines and goals of the project in chapter 1.1. The chapter 1.2 describes the framework of experimental futuring and serious gaming in order to link the game experimentation into this specific niche within futures studies.

[1] The tentative transformational scenarios were produced to be tested by various approaches, such as through a Futures Clinique process within the project (Heinonen et al 2015) and within academic programmes at University of Turku and Aalto University (Heinonen & Balcom Raleigh 2015), from different country perspectives, as well as through even more experimental approaches such as this game process.

1.1 About the Neo-Carbon Energy Project

The Neo-Carbon Energy project was launched in 2014. This joint project is one of the Tekes strategic research openings and is carried out in cooperation with Technical Research Centre of Finland VTT Ltd (coordinator), Lappeenranta University of Technology (LUT), and University of Turku, Finland Futures Research Centre (FFRC). The technological aim of the Neo-Carbon Energy project is to study and develop synthetic methane energy storage systems for wind and solar. The system is carbon neutral, as carbon dioxide is captured from the air to produce synthetic methane. In addition to energy storage, such a technological combination can also contribute to other types of applications and new products as liquids and chemicals.[2]

Energy production is not solely a technological issue. How energy is produced and consumed affects the whole society. An energy system of wind, solar and their storage is a distributed way of energy production. The Neo-Carbon Energy system provides the material base for a distributed society and enables a peer-to-peer society where individual citizens and communities can become energy producers. This, in turn, enables them to become producers of material goods as well using 3D printers and other digital manufacturing technologies. In contrast, a non-renewable economy was built on highly centralized systems. If production shifts from large organisations to energy-independent local communities and peer-to-peer networks, the entire social and power structure of society could change, and increasingly stem from the grassroots. This kind of transformation represents the Third Industrial Revolution as described by Rifkin (2011).

The solution of the Neo-Carbon Energy system is an entirely new energy system that is emission-free, cost-effective and independent. This system will be based solely on solar and wind, alongside hydropower and biomass. The main problem that has prevented moving from a fossil fuel based energy system to a system based on solar and wind is the intermittent nature of solar power and the highly variable nature of wind power. Neo-Carbon system provides a solution to this problem. Solar and wind are currently the only sufficient and infinite energy sources. Furthermore, they are also expected to be the most cost-effective production methods in the largest energy markets by 2020.

Studying energy futures with radical transformative scenarios lies in the core of the foresight part of the Neo-Carbon Energy project. This foresight part is conducted at the Finland Futures Research Centre (FFRC) at the University of Turku.[3]

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[2] Information about the project and its objectives can be accessed online at: http://www.neocarbonenergy.fi as well as through social media: http://facebook.com/neocarbonenergy and https://twitter.com/neocarbonenergy

[3] For more information about the project, see https://www.utu.fi/fi/yksikot/ffrc/tutkimus/hankkeet/Documents/NEO-CARBON_NEO-FORE_Brochure.pdf See also Heinonen & Ruotsalainen 2013a.

The foresight research studies the societal implications of the Neo-Carbon Energy system and focuses on the related economic, political, cultural and social changes. Equally, the future energy system and landscape is affected by socio-cultural changes such as changes in value systems and people's lifestyles. A possibly distributed energy production system is driven by low-carbon technologies and emerging issues such as prosumerism. As a result of technological and social change, radically new innovations, services and practices could emerge. What kinds of business opportunities, organization models and lifestyles does the peer-to-peer neo-carbon society enable to companies, citizens and the society? Could such growth be environmentally sustainable and serve the overall well-being of citizens instead of conventional economic goals?

The futures research part of the study is based on horizon scanning of the changing world and energy landscape. These phases are feeding into the construction of four transformational scenarios on the Neo-Carbon world and Neo-Carbon societies until 2050. This project has intentionally chosen to focus on transformational scenarios. Accordingly, four transformative scenario sketches of Neo-Carbon futures 2050 have been constructed, and they are analysed in Futures Cliniques as distinctive futures workshops, as well as with the use of other innovative foresight tools and processes. These scenarios are then tested and complemented in a cross-fertilization process and with feedback from stakeholders such as business, government and non-governmental organisations (NGOs) representatives. The futures research is stimulated with international perspectives from innovative case studies around the world (China, Africa, Latin America and Australia).[4] The potential of Neo-Carbon Energy solutions is also tentatively probed in these case studies.

The choice to develop only transformational scenarios is because conventional approaches to energy scenarios frequently miss the most exciting and arguably necessary energy futures. Instead of one linear pathway to the future, there are many possible, alternative futures influenced by our present choices. A case for 100% renewable energy and required shifts is increasingly on the table (Lund 2014). Curiously enough, many past energy scenarios have failed to foresee unprecedented events or the pace of technological change (Karjalainen et al. 2014). Such changes could transform the economy in significant ways. While the necessity of an energy transition seems inevitable; numerous questions on how these energy investments are financed, what policy choices are appropriate, what kind of research and development (R&D) is needed and how the rights of citizens are protected amidst such potentially large societal changes, are arising. Frequently, scenarios are cautiously paying attention to what is probable instead of what is possible. Such approach fails to catch opportunities that are hidden in new emerging issues or whole societal transitions. Therefore the approach of transformative scenarios was chosen in order to open up possible futures in a bolder way than usual.

[4] Specific case country reports are forthcoming.

1.2 Experimental Futuring through Serious Gaming

Experimental futuring[5] is a niche in futures studies that is increasingly gaining attention. Experimental futuring denotes futures studies with an accentuated characteristic of including experimental elements. Such experimenting can be manifold. Futures studies can experiment with various approaches, one of which is applying methods that are not frequently used. Various combinations of different methods, both qualitative and quantitative, can also be tested. Experimental futuring can also cover invention of a totally new tool, method or concept.[6] Next to connections with testing novel approaches, we define experimental futuring associated with observing through participation and experience. Within futures studies, there is also an area, which can be called "immersive futuring". It means exploring or studying futures in a way that allows multi-sensorial immersion in the depicted future. It is a strong way of "experiencing" the future(s). The analogy goes to virtual reality where immersive techniques are used to create impressions of real life. For experiencing the future, various immersive tools can be used to create the impression of being in the future. This may happen through several ways – through films, narratives, physical or digital space etc. Our definition places immersive futuring inside experimental futuring (see Figure 1).

Moreover, a certain type of experimenting the future(s) can also be achieved through serious gaming. Serious gaming in futures studies means playing a game that has a societally important goal – challenge to be tackled from the futures orientated point of view. Gamification in futures studies constitutes a niche in futures studies that is gaining increasing interest. It can also be called game-based futuring. According to our conceptualization, most game-based futuring is also immersive and experimental.

The Institute for the Future (IFTF) is a pioneer in serious gaming in our field. In 2013 they launched a game "Catalysts for Change" where the goal was no less than "finding the ways out of poverty". From Finland Futures Research Centre (FFRC) there was a contribution to the game in the form of moderator and participants.[7] Director of Game R&D at IFTF, Jane McGonical applauds a gameful mindset. She claims that gaming channels positive attitude and collaboration in a real world context. McGonigal has designed *alternate reality games* designed to solve huge real life problems such as hunger or climate

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[5] Edward Cornish states that the goal of futuring is to improve the future by anticipating possible or likely futures states. He introduces various futuring methods next to gaming, i.e. polling, modeling, simulation, and visioning. (Cornish 2004). In this study, the concept of futuring is used to refer to the applied paradigm of futures studies.

[6] The concept of "Creative Foresight Space" is an example of experimental futuring, where a new concept was introduced and tested in pilots in VIDICO Project at Finland Futures Research Centre (FFRC) Heinonen & Hiltunen 2012. In a sense, the concept of Creative Foresight Space involved game-based futuring as well, since sometimes the six hats' technique by de Bono was used in a role game in order to generate innovations.

[7] The students in Master's Programme in Futures Studies at University of Turku were also notified of this possibility to serious futures gaming as part of their methodological courses.

change. Some games aim to improve the everyday life of players or have positive health impacts. For example, a game she designed called *Superbetter* builds the self-resilience of the player. Some of the games are live and event or season based and are archived online for future inspiration or gaming.[8] Games are increasingly adapted as tools in the corporate sector as well. They are used in organizations i.e. to improve leadership skills, test key strategies and enhance the ability to adapt to change.[9] One key benefit of gaming for workplaces is stated to be the teaching of complex systems through cause-and-effect realizations[10]. *Homo Ludens* (Man the Player) is a concept originally coined by Dutch historian Johan Huizinga, who suggested that play is a meaningful activity, free from practical life and its requirements. The concept has been widely adapted in game designing.[11] *Homo ludens* wants to play games – it adds to his or her wellbeing.[12] If these games have a serious goal concerned with improving the state of humankind, it is not a minor activity.

A concrete first step for launching CLA game development at Finland Futures Research Centre (FFRC) was taken at FFRC Conference "Future Infinite" in Helsinki in June 2014, especially based on the interest of the Future of Media and Communications Group (FMC)[13]. An ad hoc CLA game took place in the Future Infinite Conference in 2014, where Sohail Inayatullah conducted a demonstrative game as an offer to familiarize Sirkka Heinonen's Master's students with the CLA method and especially the game approach. The game provided an opportunity for Futures Studies Master's Programme students and some of the FFRC staff to try experimental serious gaming in practice. Inayatullah has been working with CLA game before on several instances (Inayatullah 2015a).

Another year passed. For the 2015 FFRC conference "Futures Studies Tackling Wicked Problems" the aim was to develop a systematic version based on the previous experiment and modified from the Inayatullah's original game. A pilot session was organized among the developers at FFRC Helsinki Office in good time before the actual conference.[14] The actual experimenting with CLA game took place

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[8] Games | you found me. http://janemcgonigal.com/play-me/ Accessed 1 July 2015.

[9] Serious Games Go Offline: Bringing the Board Game to the Board Room | Wired.
http://www.wired.com/2014/12/board-game-to-board-room/ Accessed 17 July 2015.

[10] Serious Games: Using Game-based learning for corporate training – The Silicon Cape Initiative.
http://www.siliconcape.com/profiles/blogs/serious-games-using-game-based-learning-for-corporate-training Accessed 17 July 2015.

[11] Game Studies – The Playful and the Serious: An Approximation to Huizinga's Homo Ludens
http://gamestudies.org/0601/articles/rodriges Accessed 27 July 2015.

[12] Of course, playing games may become an addiction when it will instead start eroding the wellbeing of the player.

[13] For more information see the interview of Sohail Inayatullah by Sirkka Heinonen on Futures Studies and CLA method in Helsinki, Finland 12 June 2015. Accessed 18 December 2015 in
https://www.youtube.com/watch?v=sic1tZHItss

[14] Sirkka Heinonen is Director of FFRC Helsinki Office and the Futures-oriented part of the Neo-Carbon Energy Project and she appointed a group of project researchers and Master's programme students to pilot the game.

on a Thursday afternoon 11 June 2015 as part of International FFRC Conference of "Futures Studies Tackling Wicked Problems" in Turku. The possibility for participating in the CLA game was expressed on the conference website in the programme and via a blogpost as an invitation.[15] The aim was to elaborate on Four Transformative Energy Scenarios of an ongoing Neo-Carbon Energy Project (see project description in chapter 1.1). Discussing the reduction of energy-related greenhouse gas emissions functioned as the societally important goal characteristic to serious gaming processes. Furthermore, the reason to include the Neo-Carbon Energy scenarios as a part of the CLA game was to answer the question, if the game process has the potential to raise novel and transformational viewpoints on the topic and add to the project some aspects that otherwise would have gone unnoticed. According to Sohail Inayatullah, one of the functions of CLA method is the ability to deconstruct the alternative and preferred (ibid. 2015a). This can be seen as an important function in the CLA game, as the participants were describing alternative perspectives on the scenarios according to their different roles. An ambitious aim was to experiment with combining gamification and ongoing research project with tentative scenarios existing, and with developing a CLA game in a modified form.[16] The CLA game process reflects the CLA framework and processing of different layers (see chapter 2.1) and is reported in detail in chapter 2.2.

[15] The invitation read: "If you have an open gameful mindset and interest in this topic, please register for this experimental game session. We will work in small groups on scenarios that depict a world of renewable distributed energy and peer-to-peer organisations in the year 2050. The developer of the method, Professor Sohail Inayatullah, will give an introductory talk, moderate the groups and comment on the results. We will have a group for each of the scenarios, going through the four CLA layers: litany, systemic cause, worldview and metaphor, and you can choose a role for yourself." A potential participant could also read the four scenario descriptions in a nutshell well before entering the game.

[16] Within futures research, it is interesting to combine various methods together. A good description of available futures research methods is given by Glenn & Gordon 2009 in the Millennium Project. CLA can be used to make scenarios or it can be used to analyse and deconstruct scenarios. Here the latter option is adopted. However, the scenarios used are not completed ones but preliminary which leaves room for elaborating the scenarios further after the CLA game.

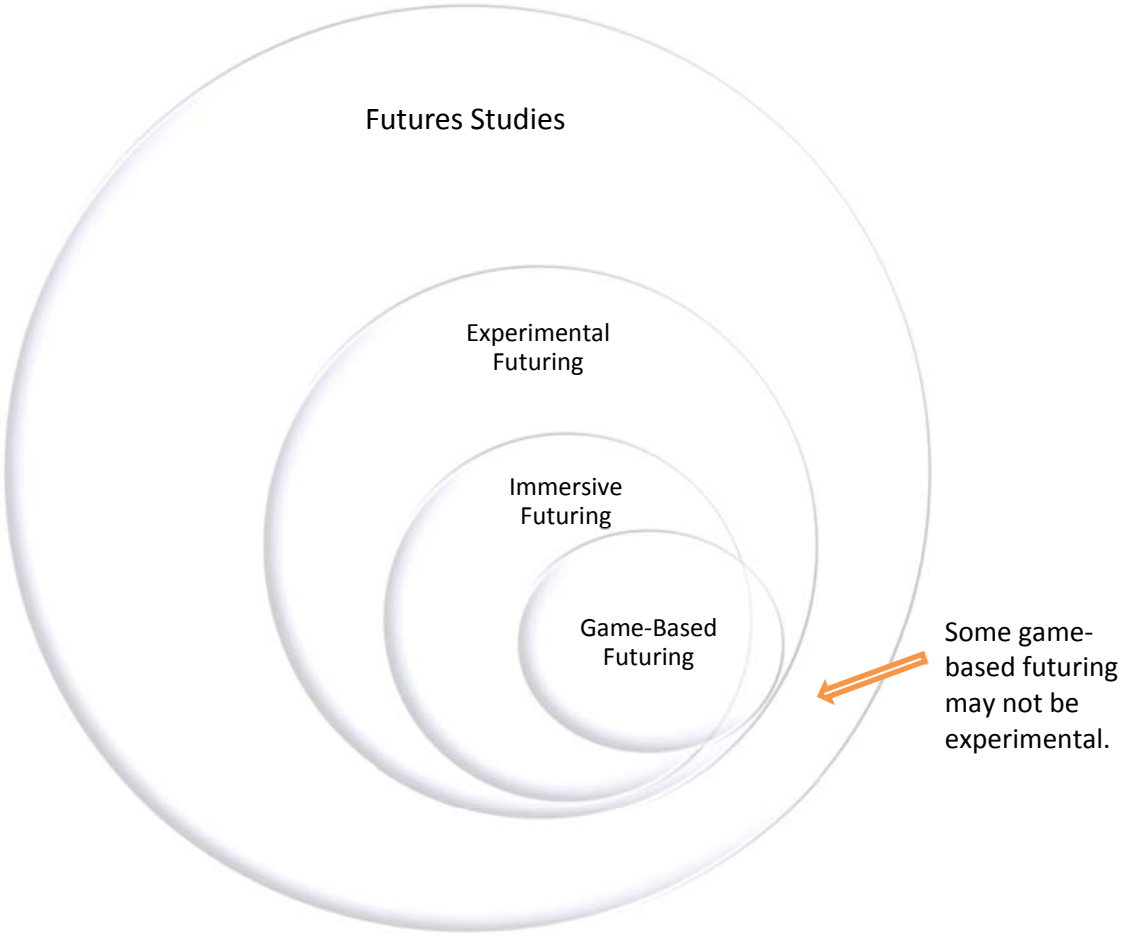

Figure 1. Conceptual and interrelational context of experimental futuring, immersive futuring and game-based futuring within futures studies.

Within futures studies, there is a subset of futuring that can be called experimental. Approaches that belong to experimental futuring share features of newness and riskiness as well as capability to test either hypotheses, via inductive or deductive means, or methodologies. Within experimental futuring is immersive futuring, which invites participants to imagine being in a possible future through scripts, props, virtual or physical environments, or live participatory performance. Overlapping with immersive futuring is game-based futuring. Most often game-based futuring will ask players to imagine themselves being in a possible future, either as themselves or as some other role. Some of game-based futuring falls outside of the circle for experimental futuring (see arrow) because, hypothetically, there could be a manifestation of game-based futuring that has reached the limits of its development and is no longer experimental. It could be argued, however, that such a game cannot exist because games can always be manipulated and tried in different ways.

2. CAUSAL LAYERED ANALYSIS (CLA) GAME

2.1 Introduction to Causal Layered Analysis (CLA)

In order to fully grasp the Causal Layered Analysis (CLA) game mode and its modifications such as the one presented in this report, it is important to know the CLA method itself. Causal Layered Analysis (CLA) is a method developed by Sohail Inayatullah (Inayatullah & Milojevic 2015; Inayatullah 2015a; 2015b; 2008; 2004). It is a method of studying understandings of the future by layering them into four layers: litany, system, worldview and myth/metaphor (Inayatullah, 1998, 2004a, 11–15). The CLA method enables a deeper investigation of alternative futures by studying individuals' socially and culturally influenced beliefs and assumptions (see also Leponiemi at al. 2014).

In Causal Layered Analysis, the studied images of the future are divided into four layers: litany, system/social causes, discourse/worldview and myth/metaphor (see Figure 2). The **litany level** is the surface-level understanding, which takes an issue as given and does not examine its connections with other issues. The **system level** explores the social, technological, economic and other causes related to the phenomenon. Systemic connections are examined but the larger paradigm is not questioned. On the **worldview level**, the deeper ideologies and paradigms are examined. On this level, there is also horizontal breadth: various ideologies and stakeholder positions. The final **myth level** includes the shared stories and metaphors to which individuals are emotionally committed. Myths are the stories which give meaning to disconnected events and structure them into a larger whole. The layers should not be simply analysed separately, but movement back and forth between the layers is crucial in CLA (Inayatullah 2004a, 11–15; Schwartz 1996, 39–43).

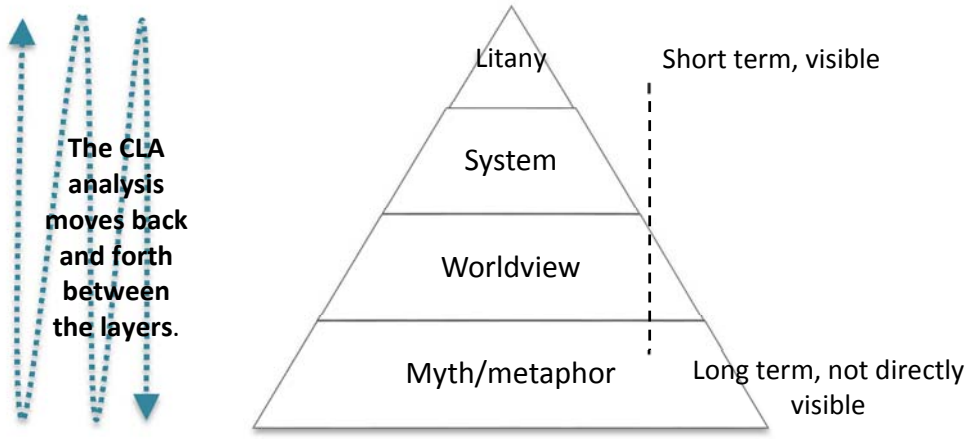

Figure 2. The Causal Layered Analysis pyramid (modified from Inayatullah 2004b).

The figure is shaped as a pyramid to suggest that the bottom layers are more comprehensive and actors are less conscious of them. Therefore, changing them is more difficult and requires more time compared to the upper layers. According to the CLA framework, the deeper layers (myth, worldview and system) frame and construct problems as they are seen on the litany level (Inayatullah 2004a, 3). The pyramid form (Figure 2) symbolizes the totality of layers. It could also be illustrated by an iceberg metaphor.[17] There the tip of the iceberg would represent the visible litany level, whereas other layers remain more or less deeper in the dark sea.

Problems are situated and seen as problems within a context that includes social interests, power relations and definitional power (Slaughter 2004, 158). This means that changes on the lower levels are reflected on the upper ones: changing the metaphor leads to changes in the worldview, system and litany.

Causal Layered Analysis has been described as a meta-method rather than a method because it is compatible with many different futures research methods (Wright 2002, 534). In academic research, CLA is rooted in the notion that language and ways of speaking constitute social reality rather than simply reflecting reality (Inayatullah 2004a, 7). CLA uses the conceptual tools of deconstruction, genealogy, distance, alternative pasts and futures, and reordering knowledge. In particular, deconstruction is a central tool. It is a method of 'unpacking' a way of thinking and studying its internal logic, contradictions and assumptions (Derrida 1997; Foucault 2002; Inayatullah 2004a, 14)[18]. In Inayatullah's view, CLA does not privilege certain ways of knowing such as scientific knowledge (Inayatullah 2004a, 14). Instead, many different perspectives are taken into account in discussing plans or images of the future (Minkkinen, 2013).

CLA is not only an academic research method but also a workshop method, which aims at promoting collective learning through investigating issues in depth. According to Inayatullah (2004a, 6), the CLA process "must be communicative: the categories need to be derived through doing in interaction with the real world of others – how they see, think, and create the future". What they say about the future is the litany layer connected to the other three, providing fertile soil for constant questioning (= critical thinking). CLA should thus be used in a context where participants can interact and contribute their insights regarding the layers of an issue. Interaction with the real world requires attempts to dig deeper into the issues, structures and decision-making.

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[17] Besides these metaphors Inayatullah uses even a cake with several layers of whipped cream, fruit etc. as a metaphor for the layered structure of CLA.

[18] Deconstruction à la Derrida is well applicable to rethinking (after deconstructing) core concepts in the history of ideas such as the concepts of progress, growth etc (see Heinonen 2000, 30–33; Malaska 2010).

CLA is compatible with the dominant idea or principle in futures studies of "alternative futures".[19] There is not just one future, but many alternative ones. CLA can be seen as belonging to the "critical futures" tradition, and it is also shares many traits with the "integral futures" approach. Both traditions are often used in Australia[20]. The CLA game is one application of CLA in a workshop context, and it will be discussed in the next chapter.

2.2 CLA Game on Neo-Carbon Energy Scenarios

A Causal Layered Analysis (CLA) game was conducted to elaborate and deepen the Neo-Carbon scenarios generated within the Neo-Carbon Energy Project. Inayatullah states that the CLA game can be used to illustrate the method, to immerse participants in the process and to spread knowledge about CLA to a wide audience (Inayatullah 2015a, 19). In the case of the Neo-Carbon CLA game, the main objective was to test the scenarios and to gain insights from participants in order to add depth to the already drafted Neo-Carbon scenarios.

In the form of the CLA game documented by Inayatullah (2015a, 19), participants are divided into four groups according to the CLA layers: litany, system, worldview and metaphor. Each group represents the point of view of a specific layer or way of knowing. The game begins with the litany group who present a headline, and it continues with back-and-forth interaction between the groups. The system group reacts to the litany, the worldview group considers the litany and system from different stakeholder viewpoints and the metaphor group offers a concise description of the issue. Finally a new litany is offered based on the discussion (Inayatullah 2015a, 19).

In the Neo-Carbon CLA game, this format was modified to suit the needs of the Neo-Carbon project, particularly the objective of testing and elaborating existing scenario drafts. Instead of dividing the participants into categories according to the four CLA layers, they were divided into five groups according to the four scenarios. Owing to the high number of participants, two groups were formed for the "New Consciousness" scenario and one group for each of the other three scenarios "Radical Startups", "Value-Driven Techemoths", and "Green DIY Engineers". Figure 3 shows the brief descriptions of each scenario around which the CLA game was constructed. The figure also illustrates the positioning of the four scenarios on a matrix with the two axes chosen for the scenarios; ecological awareness and peer-to-peer approaches.

[19] For key ideas in futures thinking and futures studies see Table 1 in Heinonen & Balcom Raleigh 2015, 14.

[20] For integral futures see Slaughter 2008. For critical futures, see Slaughter 2002.

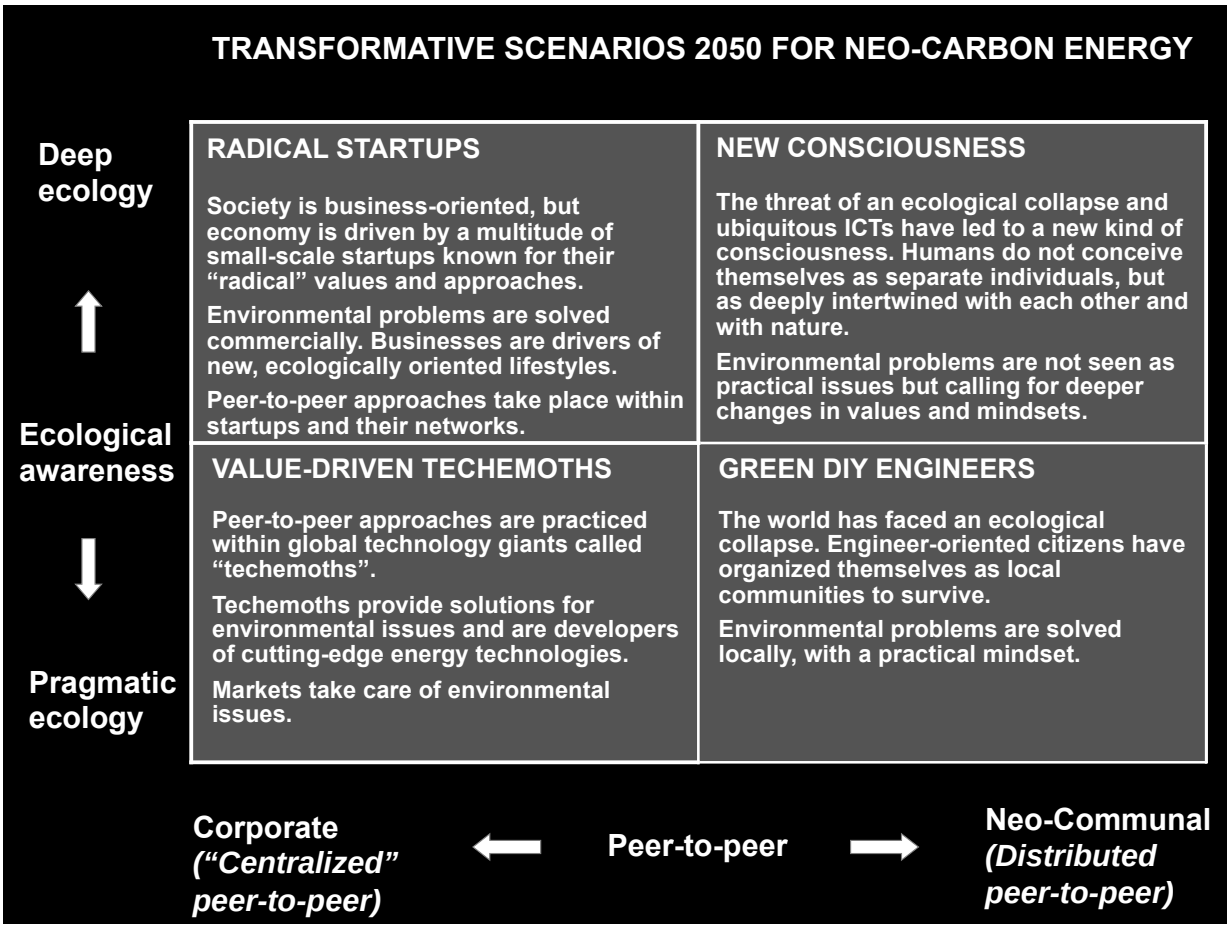

Figure 3. The four Neo-Carbon Energy Scenarios were given as material for the CLA game.

The strength of this CLA game is that participants enter a state of play to find insights into what is occurring at deeper levels of a foresight effort. Their findings may reveal, for instance, if strategy contradicts the underlying metaphor or if some stakeholders resist a particular image of the future (Inayatullah 2015b, 232). Borrowing a common feature of many games, the CLA game invites players to take on roles as the starting point, an action that serves as a starting point to entering a state of play. Examples of taking on a role to play a game include choosing to be the Shoe or Rolls Royce while setting up to play Monopoly or players choosing to be Col. Mustard or Mrs. Peacock before solving the murder mystery in the game of Clue. In games with roles, players may choose the one most similar to themselves or a role very different from who they are in real life. The CLA game offered participants a similar opportunity. The participants in each group were able to choose from a set of pre-defined roles or invent a role they preferred to play instead. Playing as these roles, participants investigate latent conflicts between their roles and the overall scenario as well as between their roles and the other roles of the group members. The pre-defined roles were designed to include actors that at first glance are likely to view the Neo-Carbon scenarios either positively or negatively, but participants are ultimately free to choose how they enact those roles based on their own imaginings of what the overall scenario is like and how their role would interact with it. The role cards of the CLA game serve as a key element through

which participants become investigators of the underlying dynamics and metaphors of the given scenarios.

CLA Game Process

About one week before the CLA game, the participants were given short scenario descriptions and they could choose which scenario group to join. This allowed participants to feel committed to their chosen group. The Neo-Carbon CLA game was held in the course of two joint CLA workshop sessions at the "Futures Studies Tackling Wicked Problems" conference on 11 June 2015 in Turku. There were 40 participants plus six moderators, and the overall duration of the game was three hours.

The participants were speakers and participants at a futures studies conference. At the game session, there was an introductory presentation by Professor Sohail Inayatullah, the creator of CLA. The participants were thus familiar with futures studies in general, and many of them with CLA in particular, and this was likely to affect the course of the game. This differs from Debbie Terranova's (2015, 374) application of CLA where participants were not informed of the CLA methodology. On the one hand, the fact that participants were familiar with futures methods was beneficial because they could start the process quicker without having to learn the basics. On the other hand, participants may have strong views and even prejudices about different futures methodologies. After the introduction by Professor Inayatullah, Professor Sirkka Heinonen presented the scenarios and introduced the game to the participants before the actual start. Participants represented diverse age groups, nationalities, cultures and organizations. This means that the diverse perspectives are likely to be presented. Furthermore, there was no given organisational focus and the CLA game was wide in scope, considering all of society in the Neo-Carbon scenarios.

The game consisted of three distinct phases: 1) joint introduction and practical briefing, 2) working in small groups and 3) "debriefing" again as one large group. This structure resembled the one used in the Futures Clinique process (Heinonen & Ruotsalainen 2013).

Working in Groups

In the first phase, the participants were divided into different groups according to the scenarios. The game started and was divided into sub-phases according to the four CLA layers: litany, system, worldview and metaphor. The course of the game was thus considerably more consecutive than Inayatullah's model with continuous moving back and forth between the layers (Inayatullah 2015a). The feedback reflections were left to the back office work after the game session. In the beginning of the game, participants were given the litany of their scenario as concise newspaper articles from the future (the situation in scenarios were of course located in the future, so the participants were as well). For example, the journal headline for the Green DIY Engineers group was "DIY Engineers Fix It" (see Figure 12), and the one for New Consciousness group was "We the Post-Humans" (see Figure 16).

The second phase was concerned with the CLA **system layer**. It was covered using a PESTEC table and generating elements on Post-it notes. Participants were as a starter presented with one social cause or characteristic of the scenario for each PESTEC dimension as given examples. The participants were then asked to individually create new systemic causes on all the PESTEC dimensions (for a similar approach, see Terranova, 2015, 375).

In the CLA **worldview phase**, participants chose a role from pre-given set of role cards, or they could invent a new role. The roles were designed to depict actors that would reflect different sides of the scenarios, both positive and negative. Different age groups, professions and positions were represented in the roles. The participants were also asked to identify on one hand allies and on the other hand enemies within their group among their fellow players. This task was constructed with the purpose to relate to social networking theory (Wangel 2011) and systems thinking (Meadows 2008). According to Donella Meadows (ibid.), leverage points are "*places in a system where a small change could lead to a large shift in behavior*", in other words, they are places where to intervene in the system. This is, however, not a simple task. Even if one would understand the system and be able to detect these points, they may often be pushed to change in the wrong direction because of the complexity and surprising factors of systems. According to Meadows leverage points, and complex systems, are counter-intuitive which means they can be difficult to correctly identify. Furthermore, the higher the leverage point, the more the system will resist the change. In her list of possible leverage points, Meadows states that the paradigm of a society – in other words the shared social agreements and the deepest set of beliefs – are the sources of systems. Thus paradigms and their changes are also important leverage points. (Meadows 2008, 145–165.) Considering this, the identification of enemies and allies within the scenarios firstly reveals hierarchies in the social structures and secondly allows the observation of leverage points through prevailing and alternative paradigms. The identified enemy of a person in power points out an anomaly for the prevailing system, which may be considered as a possible leverage point within the scenario.

A deeper and more consistent observation of the role positions and their implications on the possible futures could happen by applying game theory into the analysis of the roles. According to Thomas Lombardo, game theory is one method used in futures studies (Lombardo 2008, 113). Game theory means the *"theory of independent and interdependent decision making*", studying situations where the outcome of a decision depends on two or more people instead of a single person having the full control of the situation (Kelly 2003, 1). It is the study of conflict and cooperation happening between different rational and intelligent decision-makers, done through mathematical modeling. *Game* means a social situation, and *player* is a person involved in it. *Rationality* of an individual means that their own objectives are the basis of their decision. *Intelligent* means that the player has the same information about the game than the ones studying it. Studying hypothetical examples and quantitative models with mathematical techniques, game theory aims to analyse situations of conflict and cooperation as well

as the behavior of players, when two or more persons make decisions influencing one another's welfare. (Myerson 1991, 1–2.) As many kinds of decision-making processes exist, so do different kinds of games as well; in *cooperative games* the interests of players correspond, and it is of mutual interest to communicate the intentions to each other. In *zero-sum non-cooperative games* the interests are opposite, and thus players need to conceal their intentions from each other. The category of *mixed-motive games* addresses games, where interests partly oppose and partly coincide. The CLA game could be defined as *mixed-motive multi-person game* (Kelly 2003, 1–2; 151), since the mutuality of the interests between different pairings of participants/ players vary a lot according to the identified enemies and allies. Through the observation of these positions and relationships, the balance of power and the dynamics of decision-making as a factor defining the alternative futures could be employed.

The fourth CLA layer of metaphors was visited by participants reflecting upon their chosen roles and coming up with illustrative metaphors describing how the role would perceive the scenario. This step was taken after reflections and discussions on what is motivating or threatening to their roles and who in the scenario is best ally or worst enemy. Groups were also asked to work together to select or create a metaphor that best described the entire scenario. Through these two processes, both a plurality of differing perspectives and a dominant metaphor were generated by the participants for their assigned scenarios.

Debriefing as Cross-Fertilisation

The final cross-fertilizing phase of the game was highly interactive as participants commented on each other's scenarios. Each group presented their scenario as vividly as possible, describing their future from their character's point of view. The groups were encouraged to 'sell' their scenarios to the other groups. Then other groups commented on the presentation, often staying in their chosen characters. This led to a back-and-forth discussion between the scenarios, which revealed additional insights.

3. RESULTS OF THE CLA GAME ON NEO-CARBON

In this chapter the results of the Causal Layered Analysis (CLA) game and group work are presented. Each scenario and its results are reported and analysed in an own section. As two different groups were working with New Consciousness scenario, the results for this scenario are presented in two separate sections. Results are reported in an order that follows the workflow of the game process. Each report begins with the newspaper article from "Neo-Carbon Times" that depicted the litany level for each of the scenarios. The workshop started with the members of the group reading the article, which was written by the moderators before the workshop. The newspaper article is followed by a brief summary of the scenario made in advance and a list of the group members.

The following parts of the report are the actual results of the game process. PESTEC table demonstrates the social/systemic causes identified by the group. Included are also the six predetermined causes that were written in advance by the moderators in the first column for all six PESTEC dimensions to help to the get the work going. Groups were asked to identify the most important or interesting cause from each dimension. These causes are highlighted in tables. After the table there is a brief summary of the systemic causes that were chosen by the whole group collectively.

The following step was choosing the roles and filling in the role cards that are documented next in the results. In the role cards the members wrote down a motivating and a threatening cause from the six most interesting/important systemic causes on the PESTEC table. The participants were asked to present arguments for the motivation and threats posed by the causes. Next, they identified the best ally and the worst enemy among the group according to their chosen roles. These enemies and allies identified are also illustrated as partnership dynamic schemas. This followed with formulating a personal metaphor of the scenario world according to the role. The above descriptions cover the part of the report addressing the work done during the CLA game. Finally, an analysis from the moderator(s) of the group is also presented together with a procedure description and suggestions to improve the process.

3.1 Group 1: Radical Startups

This chapter presents the results of Group 1, who elaborated Radical Startups scenario.

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Radical Startups to Save the World

It has become increasingly clear that the ecosystems of startups are the new engines of economic growth. Not only does the new breed of startups help us prosper, but promises societal and environmental good as well. Startups are the vanguards of deep ecology values, and they often offer the best environment for self-expression and spiritual growth.

Finland is an illuminating case example. The Nordic country, which for long suffered from the demise of Nokia, was never saved by a new Nokia as many Finns hoped. Instead, flocks of small gaming companies emerged to lift Finland from the depths of depression. After these ambitious companies had reached hundreds of millions of happy gamers, they continued to use their influence to gamify the battle against climate change.

This business path proved so lucrative that the whole country followed the example of the gaming industry (as it had followed Nokia before). Finland is now the world's leading peer-to-peer society, organised around grass-roots startup ecosystems.

The Quest for Electromagnetic 'Full Absorption' and the End of Power Lines

"Harvesting the energy of electromagnetic waves" sounds redundant. As energy is a thing at all—in its most reduced, pristine sense—it is just that: electromagnetic waves. These waves, which can be viewed as electric and magnetic waves traveling separately but joined together, are just charged particles accelerated, reflecting changes within electric and magnetic fields. This is how energy freed from mass gets from place to place at the speed of light.

Harvesting these waves is the subject of a paper out this week in the Applied Physics Letters boasting the possibility of "full absorption." This means the conversion of electromagnetic waves within a given range of frequencies with almost 100 percent efficiency. Fully absorbent materials reflect nothing and waste nothing.

Read more at:
http://motherboard.vice.com/read/the-quest-for-electromagnetic-full-absorption

Figure 4. Litany – Group 1 studied the Litany of Radical Startups scenario.

Radical Startups Society is business-oriented, but economy is driven by a multitude of small-scale startups known for their "radical" values and approaches. Their selling point is promising to do societal and environmental good. Environmental problems are solved first and foremost commercially. Businesses are drivers of new, deep-ecologically oriented lifestyles as well as new work practices emphasising bottom-up approaches and self-expression.

Group Members

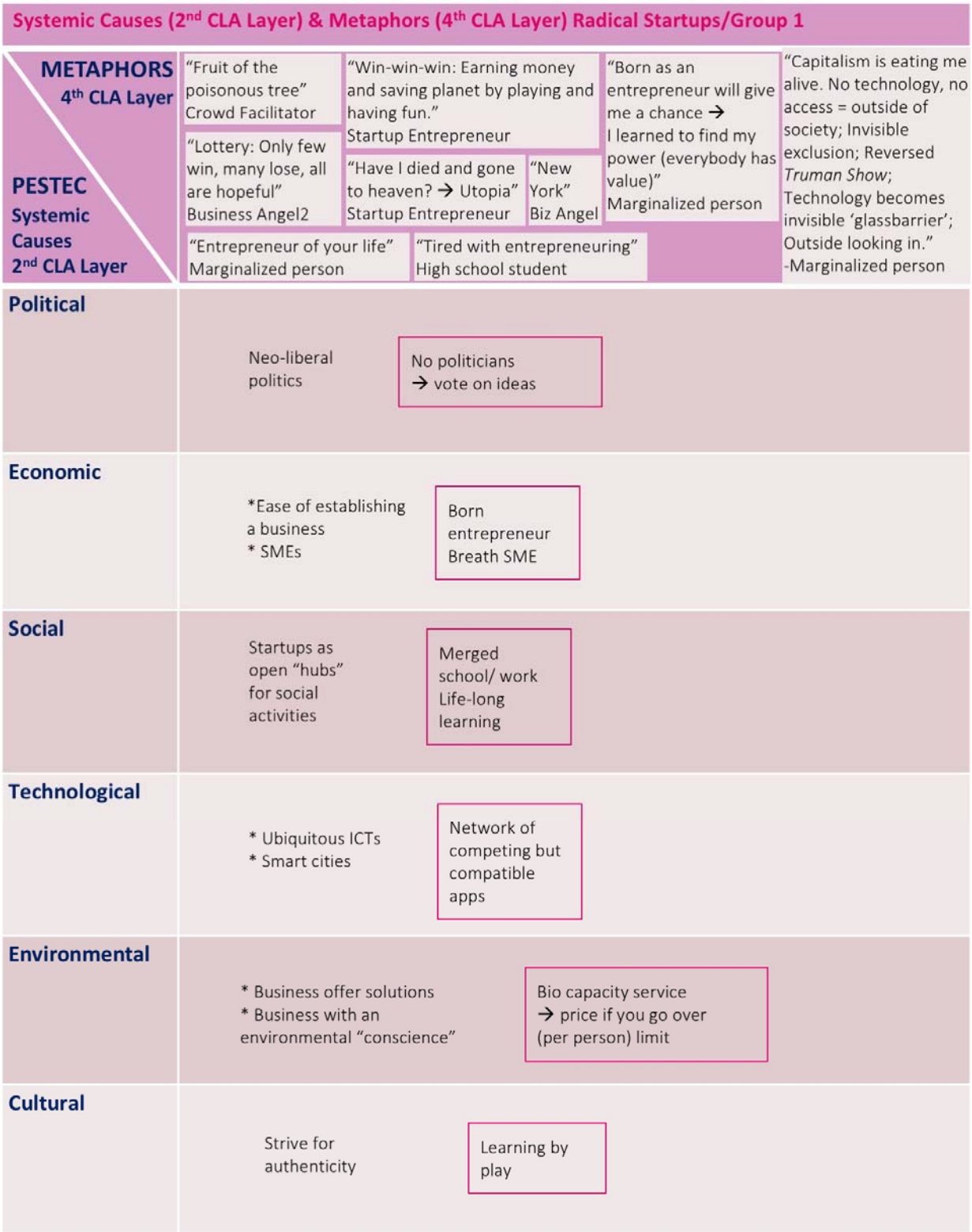
Group 1 consisted of the following participants: Sofi Kurki (moderator), Erica Bol, Cornelia Daheim, Katariina Heikkilä, Niko Herlin, Terhi Kesti, Amos Taylor and Yueqiang Xu.

Figure 5. Group 1 working on their PESTEC table.

PESTEC Table

Group 1 generated a variety of systemic causes driving their scenario using the categories of Political, Economic, Social, Technological, Environmental, and Culture/Citizen/Consumer. They then circled the most significant cause(s) for each row. The group later added metaphors for their selected roles to the top of the table. The metaphors and systemic causes this group generated are presented in Table 1.

Table 1. PESTEC – Group 1.



Entrepreneurship pervades the whole society in this scenario **(Economical)**: the social security number issued to citizens also functions as the VAT identification code of their eventual business(es). Instead of a traditional democratic process, there is a **marketplace of ideas**, where **startups post their ideas** for developing the community, and the **citizens can vote** for the ones that they want to see

implemented **(Political)**. **Schooling is completely intertwined, if not merged, with work and play**, and is constructed on the concept of **lifelong learning (Social & Cultural)**. Smart cities with their ubiquitous ICT's are like the second nature around the people of this scenario, and functions as a **network of competing but compatible apps (Technological)**. This also enables the environmental sustainability, which is based on **digital monitoring the use of natural resources (Environmental)**. Fitting to the general mentality of this scenario, also bio-capacity of the ecosystem is conceived as a service: each individual is allotted their limit, but there is a possibility to pay for additional services.

The Metaphors

The following metaphors (Figure 6) were conjured in this group on "Radical Startups", with the chosen roles as starting points or angles.

Entrepreneur of your life
(Marginalized person)

Fruit of the poisonous tree
(Crowd facilitator)

Tired with entrepreneuring (High school student)

New York
(Biz Angel)

Born as an entrepreneur will give me a chance
→ I learned to find my power, everybody has value.
(Marginalized person)

Lottery
Only few wins, many losses, all are hopeful.
(Business angel)

"Have I died and gone to heaven?"
(Startup Entrepreneur)

Capitalism is eating me alive.
No technology, no access = outside of society
Invisible exclusion
Reversed *Truman Show*
Technology becomes invisible "glass barrier"
Outside looking in
(Marginalized person)

Win-win-win
Earning money and saving planet by playing and having fun
(Startup entrepreneur)

Figure 6. The metaphors generated by Group 1, with one metaphor illustrated. (The Golden Age by Pietro da Cortona. https://en.wikipedia.org/wiki/Golden_Age#/media/File:The_Golden_Age_%28fresco_by_Pietro_da_Cortona%29.jpg, Retrieved 13.10.2015.)

For a startup entrepreneur the metaphor of the world is **"win-win-win"**, as earning money and saving the planet happens by having fun. Another startup entrepreneur asks if s/he has died and gone to heaven, since the world appears to be a **"utopia"** to him/her. Business angel number one considers the world as **"New York"**, and angel number two refers to **"lottery"**, where only few win, many loses and all are hopeful. High school student feels that s/he is **"Tired of entrepreneuring"**. Marginalized person number one uses **"entrepreneur of your life"** as a metaphor. The marginalized person number states that **"everybody has value"**, because being born as an entrepreneur will give him/her a chance, and s/he has learned to find her/his power. Marginalized person number three uses **"Reversed Truman Show"** as a metaphor, as without technology s/he has no access, and s/he remains invisible and excluded, outside looking in. For the crowd facilitator the world is **"fruit of the poisonous tree"**.

Role Card Documentation

The role card documentations of Group 1 are presented in the following.

Marginalized person with low level of education 1	
Motivating	***Threatening***
Merged-school-work	No politicians
Best Ally	***Worst Enemy***
Student	Techemot/CEO

High School Student	
Motivating	***Threatening***
Merge school & work	Born entrepreneur
Best Ally	***Worst Enemy***
Startup entrepreneur	Marginalized person

Startup Entrepreneur	
Motivating	***Threatening***
No politicians	Born entrepreneurs
Best Ally	***Worst Enemy***
Business angel	CEO

Business Angel 1	
Motivating	***Threatening***
No politicians • no taxes, freedom	Born entrepreneur • no ability to do business losses

Best Ally	*Worst Enemy*
Startup entrepreneur	• Other angels – competitors • Marginalized persons – no education

Marginalized person with low level of education 2	
Motivating	*Threatening*
Merged learning	Network of apps
Best Ally	*Worst Enemy*
Business angel	Startup entrepreneur

Business Angel 2	
Motivating	*Threatening*
Born entrepreneur	
Best Ally	*Worst Enemy*
Startup	Techemoth

Crowd Facilitator (i.e. socialist workers) against corrupt funding	
Motivating	*Threatening*
Vote on ideas	Born entrepreneur
Best Ally	*Worst Enemy*
Marginalized person	Business angel

The following figure illustrates the allies and enemies identified by the members of Group 1 i.e. "Radical Startups". Green arrows are pointing towards an ally identified, red arrows pointing towards enemies identified. Grey boxes are used to illustrate allies/enemies identified outside of the group member roles.

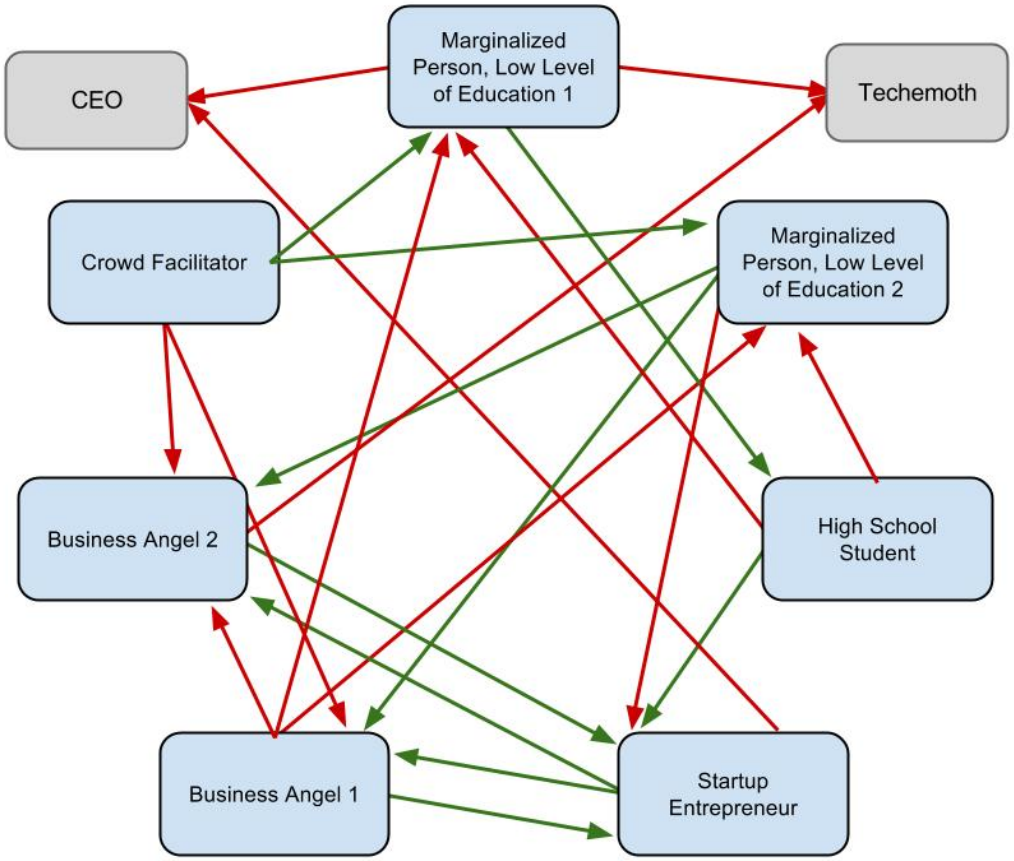


Figure 7. Identified allies and enemies of Group 1. Green arrows pointing toward identified allies, red arrows toward identified enemies.

Analysis

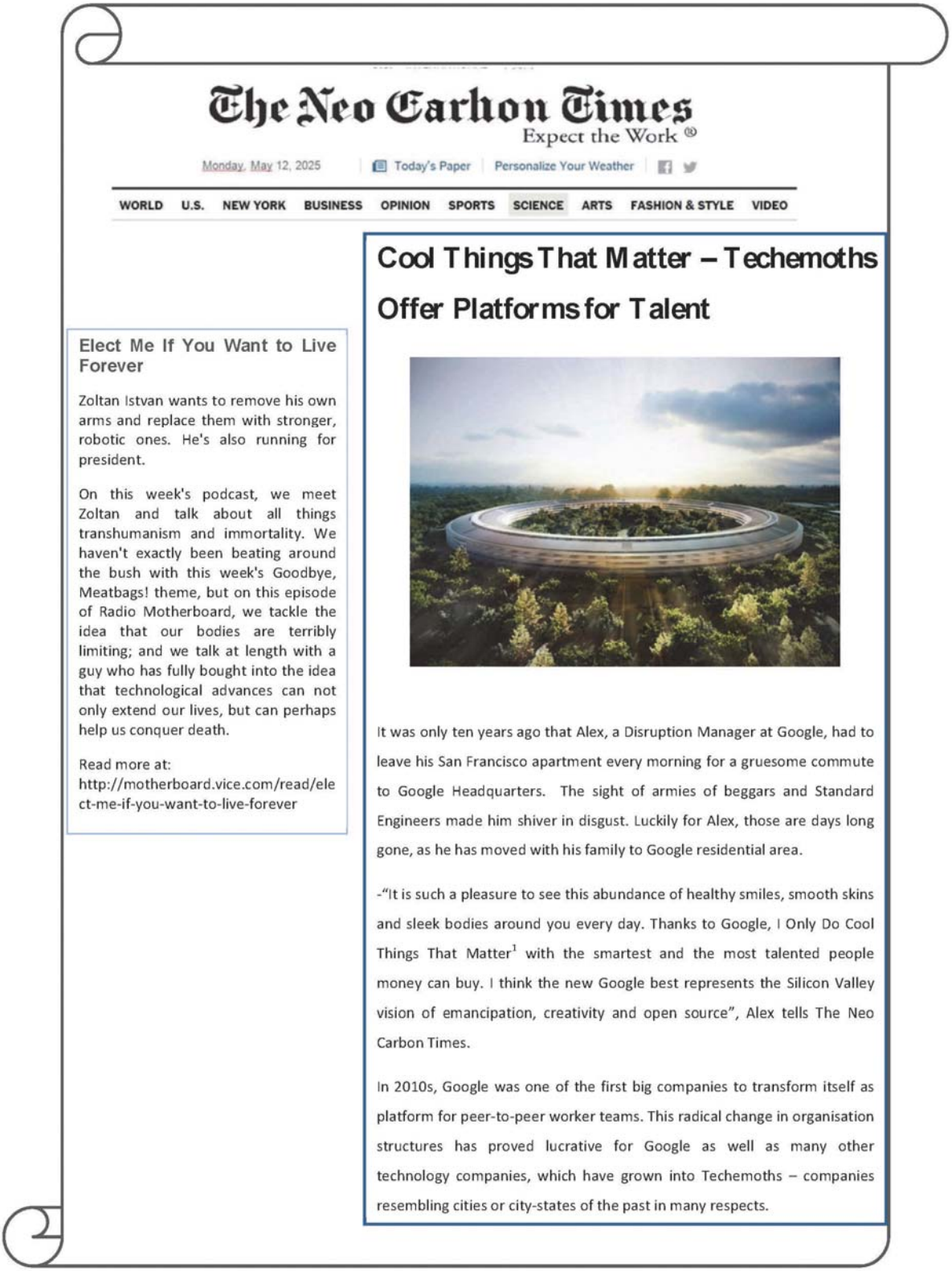
Entrepreneurship pervades the whole society in this scenario: the social security number issued to citizens also functions as the VAT identification code of their eventual business(es). Instead of a traditional democratic process, there is a marketplace of ideas, where startups post their ideas for developing the community, and the citizens can vote for the ones that they want to see implemented. Schooling is completely intertwined, if not merged, with work and play, and is constructed on the concept of lifelong learning. Smart cities with their ubiquitous ICT's are like the second nature around the people of this scenario, and function as a network of competing but compatible apps. This also enables the environmental sustainability, which is based on digital monitoring the use of natural resources. Fitting

to the general mentality of this scenario, also biocapacity of the ecosystem is conceived as a service: each individual is allotted their limit, but there is a possibility to pay for additional services.

For a Neo-Carbon powered future, it is strongly assumed that new innovations and radical ideas are able to solve the energy dilemma of our century. It may be assumed that citizens would benefit from having capabilities that support entrepreneurial activity such as creative skills, business logic, teamwork ability as well as perseverance, combined with deep ecological thinking. Strong innovation ecosystems that connect renewable energy with a number of supportive sectors such as manufacturing and services could enable the establishment of several vertical and horizontal linkages across companies participating in the value chain. Interestingly business angels, who are able to recognize the potential of radical ideas, are identified as one group of gatekeepers that have a strong role in providing necessary support for these revolutionary startups. An investor who is willing to see returns after a certain period of time would enable startups to aspire for these transformative ideas. In their part, policy-makers could assess whether capital to emerging and innovative ideas in their county, country or the wider region is available as well as revise their current institutional mechanisms aimed to support the generation of these innovations.

3.2 Group 2: Value-Driven Techemoths

In this chapter, the results of Group 2 on Value-Driven Techemoths scenario are presented.



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Elect Me If You Want to Live Forever

Zoltan Istvan wants to remove his own arms and replace them with stronger, robotic ones. He's also running for president.

On this week's podcast, we meet Zoltan and talk about all things transhumanism and immortality. We haven't exactly been beating around the bush with this week's Goodbye, Meatbags! theme, but on this episode of Radio Motherboard, we tackle the idea that our bodies are terribly limiting; and we talk at length with a guy who has fully bought into the idea that technological advances can not only extend our lives, but can perhaps help us conquer death.

Read more at:
http://motherboard.vice.com/read/elect-me-if-you-want-to-live-forever

Cool Things That Matter – Techemoths Offer Platforms for Talent

It was only ten years ago that Alex, a Disruption Manager at Google, had to leave his San Francisco apartment every morning for a gruesome commute to Google Headquarters. The sight of armies of beggars and Standard Engineers made him shiver in disgust. Luckily for Alex, those are days long gone, as he has moved with his family to Google residential area.

-"It is such a pleasure to see this abundance of healthy smiles, smooth skins and sleek bodies around you every day. Thanks to Google, I Only Do Cool Things That Matter[1] with the smartest and the most talented people money can buy. I think the new Google best represents the Silicon Valley vision of emancipation, creativity and open source", Alex tells The Neo Carbon Times.

In 2010s, Google was one of the first big companies to transform itself as platform for peer-to-peer worker teams. This radical change in organisation structures has proved lucrative for Google as well as many other technology companies, which have grown into Techemoths – companies resembling cities or city-states of the past in many respects.

Figure 8. Litany – Group 2 studied the Litany of Value-Driven Techemoths scenario.

Peer-to-peer approaches are common, but they are practiced within large corporations. These "techemoths" represent the Silicon Valley vision of emancipation, creativity and open source. The vision is, however, somewhat self-contradictory, at first sight seemingly so, but the setting with a deeper look as intentionally posed. Techemoths cherish the "libertarian" hacker ethos, but at the same time form totalities that confine their employees tightly within corporate walls. Markets take care of environmental issues. Techemoths invest in ambitious energy & technology projects.

Group Members

Group 2 consisted of the following participants: Marjukka Parkkinen (moderator), Ugo Bardi, Peter Bishop, Johannes Koponen, Kirsi Reinola, Åsa Svenfelt, Maya Van Leemput, Rianne van Vuuren, and Monica Veeger.

Figure 9. Group 2 beginning their work.

PESTEC Table

Working together, Group 2 produced the following systemic causes and metaphors in the form of a PESTEC futures table (Table 2).

Table 2. PESTEC – Group 2.

Systemic Causes (2nd CLA Layer) & Metaphors (4th CLA Layer) Value-Driven Techemoths/Group 2						
METAPHORS 4th CLA Layer / **PESTEC** Systemic Causes 2nd CLA Layer	"'The beetle in the anthill': The beetle is a parasite of the anthill, ants believe that the beetle is an ant and they feed it. Small Entrepreneur	"Lottery" Small Entrepreneur	"Luxury Jail" Marginalized Person	"Closed Door" Underground Anti-Corporate Hacker	"Penthouse – sky scraper (luxury isolation)" Employee of Techemoth	
	"The world is my playground and cornucopia of resources" Techemoth CEO	"Dark cave/evening, with a light in the tunnel: This is a dystopian world, in which the elite rule all corporate lives. However, resistance provides hope for the eventual radical change of the society." Underground Anti-Corporate Hacker		"I'm a warrior, willing to sacrifice everything to win. I'm the Don Draper of the 21st century." Transhumanist		
Political	* Eco-liberalism * Large companies with internal "democratic" structures	Hive-ism: Humans are mostly de-sexed and transformed into hierarchically arranged workers	Low gov't regulation of big business	Governments have failed at producing welfare	Companies replace governments	
Economic	Dominated by large companies * inequality	Value is defined in economic terms (profit)	Small companies only exist to make bigger companies	Ecological goods and services are bought and sold on the markets	Competition for talent	Exchange economy is illegal
Social	Techemoths as closed "hubs" for social activities	Inequality becomes systemic	If you are not in the company, you are poor	People outside of techemoths are poor and lack social security	Isolation of groups of people	
Technological	* Ubiquitous ICTs * Technologies integrated as "service packages" offered by techemoths	IoT tech automates individual decision-making	HiTech the core driver of human existence	Investments in technology have been intense (driven by the companies)	Breakthrough in carbon capture and geo-engineering	
Environmental	Environmental decisions "automated" through technology	Earth is mostly paved with silicon solar panels. Humans live below the panels. Projectors project skymaps on the backsides	Environment seen as existential threat to society	You are unable to do bad environmental decisions	Nature is only protected if it has value on the market	
Cultural	Prepared to allow inequality in return for environmental security	Acceptance of unequal society / Corporate monocultures	Resistance to centralised power is appropriated by centralised power itself	Culture hacking: Resistance against the system reflect in struggle culture against system	Corporate autocracy makes individuals not free – almost slaves / Leisure activities * virtual competition * all-one company (philips)	Belonging into larger whole pleases individuals

In this scenario **governments have failed at producing welfare**. Large **companies have replaced governments** in many tasks that have traditionally been considered to belong to the government. **(P)** One of these examples is the protection of economic sustainability. Although **techemoths have taken responsibility to protect the environment,** it is done because environment has market value **(En).** As

cities have been built around the techemoths, **people who are not working for these companies are also excluded from various other aspects of life**. The power status of **techemoths thus creates isolation of groups** of people **(S)**. Among the techemoths there is a **hard competition for talent (Ec)**, and it can be said, that **talent will make you an insider**. Any occurring **resistance against the centralized power is appropriated** by the centralized power itself **(C)**. The Neo-Carbon state of society has been made possible by **breakthroughs in carbon capture and geo-engineering.**

The Metaphors

"The beetle in the anthill": The beetle is a parasite of the anthill, ants believe that the beetle is an ant and they feed it.
(Small entrepreneur)

The world is my playground and cornucopia of resources
(CEO of a Techemoth)

Closed door
(Underground anti-corporate hacker)

I'm a warrior, willing to sacrifice everything to win. I'm the Don Draper of the 21st century
(Transhumanist)

Lottery
(Small entre-preneur)

Penthouse skyscraper, luxury isolation.
(Employee of 'techemoth')

Dark cave/ evening – with a light at the end of the tunnel. This is a dystopian world, in which the elite rule all corporate lives. However, resistance provides hope for the eventual radical change of the society
(Underground anti-corporate hacker)

Luxury jail
(Marginalized person)

Figure 10. The metaphors generated by Group 2, with one metaphor illustrated. Photo: http://www.designeruncovered.com/penthouse-pads-luxury-sky-living/

The difference in positions and emotions resulting from them were present in the metaphors of the group. For the CEO of a techemoth the world appeared as a **"playground and cornucopia of resources"**. The employee of a techemoth stated that the situation reminded her of **"luxury isolation"**, although the world was not the highest positioned **"penthouse"** for her/him, it is at least a **"skyscraper"**. For a marginalized person the world reminded a **"luxury jail"**. For an underground anti-corporate hacker number 1 the metaphor was **"Closed door"**, whereas the second hacker stated the world to be like a **"dark cave/ evening with a light in the end of the tunnel"**. The second hacker stated, that although the world is dystopian and ruled by the elite, resistance provides hope for the eventual radical change in the society. Transhumanist saw himself as a **"warrior"** and Don Draper of the 21st Century, who is willing to sacrifice everything to win. Out of the two small entrepreneurs, the other already felt like winning, as the metaphor was "**lottery"**. Another small entrepreneur also felt like the world was beneficial for him/her, as s/he felt like **"the beetle in the anthill"**. Even though a beetle is a parasite of the anthill, ants believe that the beetle is an ant and they feed it.

Role Card Documentation

The role card documentations of the Group 2 are presented in the following.

Small Entrepreneur 1	
Motivating	***Threatening***
Government appropriation (I am a parasite of big government) I love being that!! I love being evil!	Isolation (You all have to be part of my evil web) Fall into my web!! You are all mine!! Hahahahaha…!
Best Ally	***Worst Enemy***
Transhumanist (Humans have to be enslaved to the superior power of evil)	Small entrepreneur (competitor!!!)

Employee of a "techemoth"	
Motivating	***Threatening***
Economy/ Competition for talent → I'm wanted, I'm competitive	• Social/ Isolation of groups • Afraid of having to leave the group
Best Ally	***Worst Enemy***
CEO	Underground

Underground anti-corporate hacker 1	
Motivating	***Threatening***
(can be the same)	
Culture/ Hacking resistance against the system	Corporate autocracy makes individuals not free –

reflect in struggle against the system	almost slaves
Best Ally	***Worst Enemy***
Marginalized person with low level of education	CEO of techemoths

CEO of a "Techemoth"	
Motivating	***Threatening***
Tech breakthroughs (I am them)	Companies replace governments (too much responsibility)
Best Ally	***Worst Enemy***
Transhumanist (my customer + investor … forever)	Anti-corporate hacker (Tries to hurt me)

Marginalized person with low level of education	
Motivating	***Threatening***
Resistance to centralized power in appropriated… because companies employ poor people to resist	Isolation of groups of people since I depend on other's goodwill
Best Ally	***Worst Enemy***
High school student	• Small entrepreneur • (CEO of)

Small Entrepreneur 2	
Motivating	***Threatening***
Buy-out by TM	• Political – no gov't • Idea stolen by TM
Best Ally	***Worst Enemy***
Customer	• Techemotive • Small entrepreneur

Underground anti-corporate hacker 2	
Motivating	***Threatening***
Isolation of groups of people • The violation of people provide me with opportunity to mobilize resistance against the system	Governments failed at governing • By taking over the functions of government, companies could be more effective in combatting my activities
Best Ally	***Worst Enemy***
Marginalized person	CEO of techemoth

Transhumanist	
Motivating	*Threatening*
Competition for talent I'm willing to hack myself to become better	Companies replace governments • In the end of the game I'm just a slave of the corporate dominance • I need to grow beyond me to survive
Best Ally	*Worst Enemy*
Employee of a techemoth	Employee of a techemoth
Meritocracy & competition class	

In the following figure the allies and enemies identified by the members of Group 2 i.e. "Value-Driven Techemoths" are shown. Green arrows are pointing towards an ally identified, red arrows pointing towards enemies identified. Grey boxes are used to illustrate allies/enemies identified outside of the group member roles.

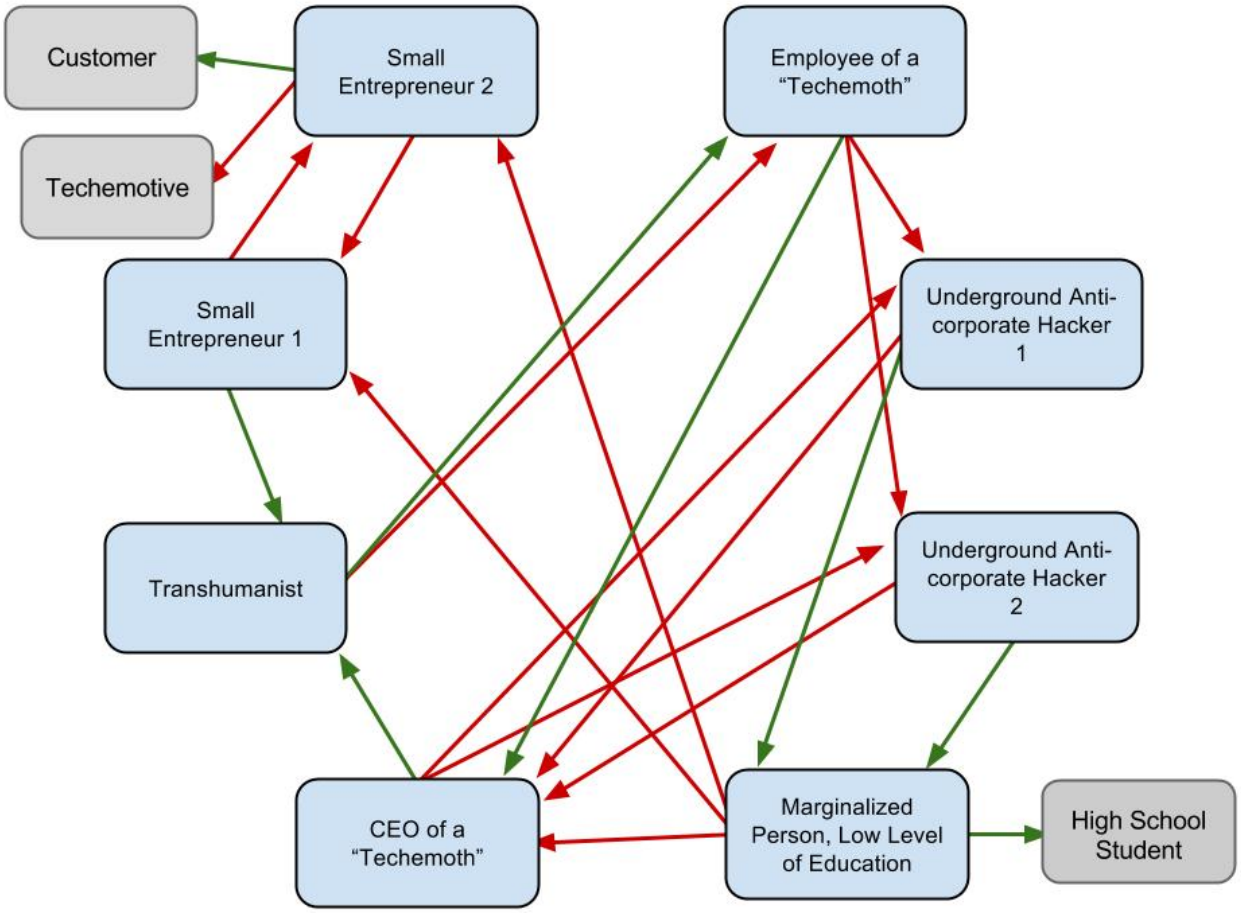


Figure 11. Identified allies and enemies of Group 2. Green arrows pointing toward identified allies, red arrows toward identified enemies.

Analysis

The group concentrated a lot on the **power relations** and **social dimensions** within the scenario. Even before choosing the roles, the discussion revolved around the division of people into **insiders and outcasts** within the techemoth empire. This was also present in the main metaphor chosen for the whole scenario; **"luxury jail"**. After choosing the roles, the division was even more emphasized, highlighting the state of **corporate oligarchy** instead of the communal technological solutions. The CEO of a techemoth and a marginalized person with no education can be seen as extreme positions within the scenario. Interestingly the roles that gave more room when positioning oneself also illustrated the possible variations through the metaphors. Whereas the first hacker saw the techemoth power as exclusive, the second hacker believed that there is a possibility to change the society through resistance. One person could see the same cause having both motivating and threatening aspects. For example, the latter underground anti-corporate hackers noted that although corporate autocracy can be enslaving to people, it simultaneously results in resistance. Allies and enemies were identified according to the person's closeness to the techemoths and power. **Defining the value in economic terms** and **the accepted inequality** in the society can be seen in the ally/ enemy pairings. Thus it can be said that the status of a person is related to his/her talent and whether s/he wishes to use it for the good of the ruler.

This interpretation of the CLA Game group assumes a transformation for a Neo-Carbon future to take place through the R&D efforts of large companies. Looking at the scope of analysis of this group, some of the energy implications refer to technological solutions that today are not only doubted, but even considered risky, namely geo-engineering and carbon capture and storage technologies. While the focus on such solutions may be beyond the point, such thinking evokes a concern of whether a reliance on technological fixes is too risky a strategy to be relied on alone as a strategy for survival. While the Techemoths scenario assumes that markets solve environmental problems, an interesting further area of enquiry is the study of how markets in fact may incentivize powerful economic actors to seize the energy opportunity.

This group viewed the world of techemoths rather pessimistically, especially in fear of rising inequalities within societies. Indeed, the early 21st century has been characterized by a further growing influence of large multinational companies over nation-states. These large companies now hold considerable technological and human resources and have provided people around the world with technological advancement. In contrast, especially several Western states have been struggling for economic recovery for several years since the post-financial crisis. It may be concluded that if the transformation is handled by large companies, it remains to be seen whether there is enough wealth to be shared for everyone. Therefore, where companies are spearheading change a viable strategy might also entail considerations of how potential tensions between companies, the state and their citizens can be mitigated, so that the benefits of emerging innovations are shared equitably within the broader society.

3.3 Group 3: Green DIY Engineers

In this chapter the results of Group 3 on Green DIY Engineers scenario are presented.

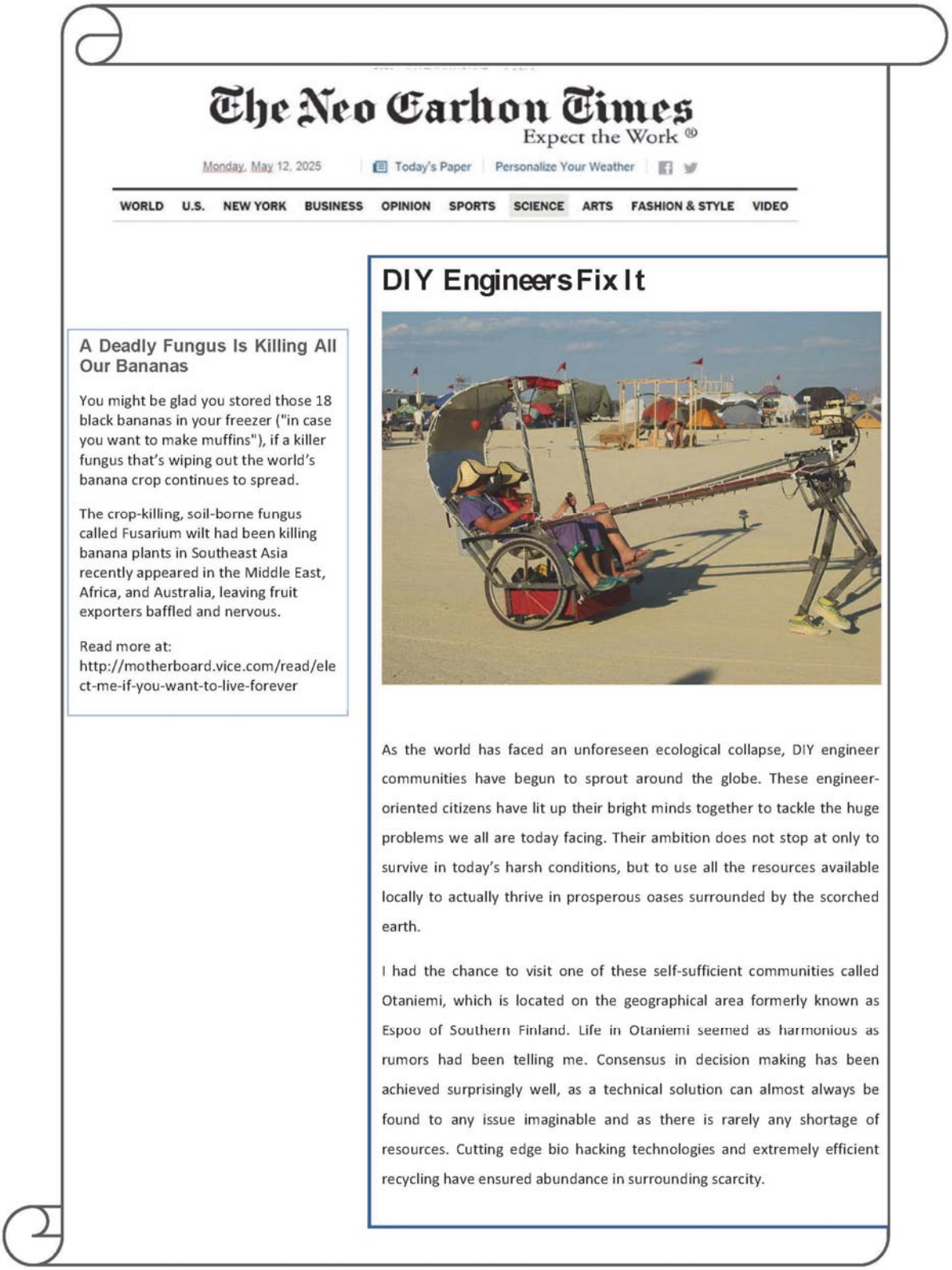


Figure 12. Litany – Group 3 studied the Litany of the Green DIY Engineers scenario.

The world has faced an ecological collapse. Engineer-oriented citizens have organized themselves as local communities to survive. Environmental problems are solved locally, with a practical mindset. Nation states and national cultures have more or less withered away. As global trade has plummeted, communities have to cope with mostly low-tech solutions

Group Members

Group 3 consisted of the following participants: Nick Balcom Raleigh (moderator), Matti Minkkinen (moderator), Ira Ahokas, Sanna Ahvenharju, Antti Holttinen, Mika Korkeakoski, Sara Moqaddamerad, Ali Rahneshin, Noora Stenholm, and Joonas Vola.

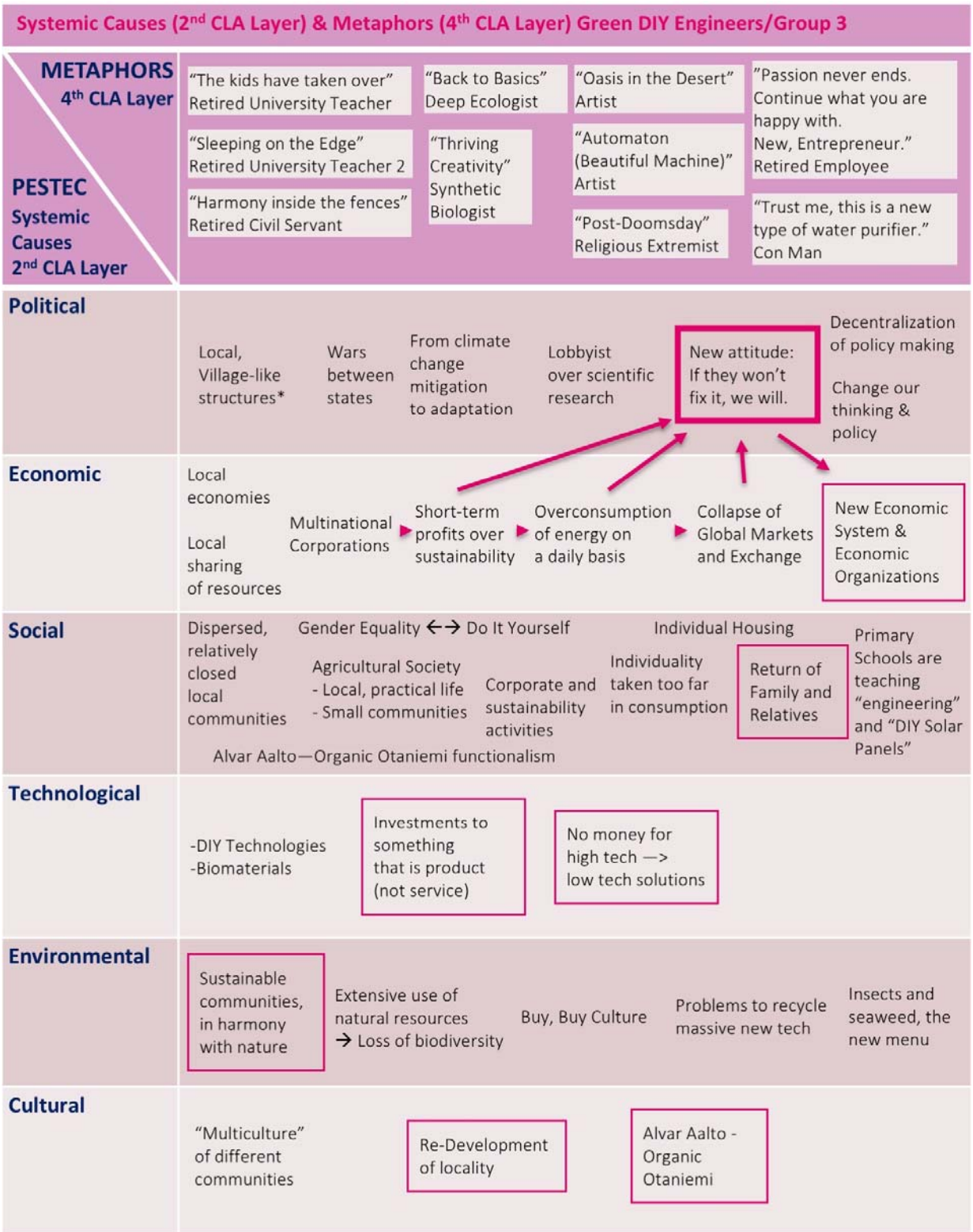
Figure 13. Group 3 presenting their role cards.

Group 3 worked on the scenario "Green DIY Engineers". There were 10 members in Group 3, including its two co-moderators, Matti Minkkinen and Nick Balcom Raleigh. All group members participated in contributing to the PESTEC.

PESTEC Table

Group 3 used its PESTEC table (Table 3) as a way to indicate some of the sequence of cause and effect in addition to identifying causes for the various rows. To some extent, the order of the items in the PESTEC rows indicates time sequence order, going from left to right.

Table 3. PESTEC – Group 3.



Because nobody has stepped up to challenge multinational corporations in their pursuit of short-term profits over sustainability, the overconsumption of energy skyrocketed which led to the collapse of global markets and exchanges (**E**conomic). This chain of causes and effects led to a prevailing attitude among people – "If *they* won't fix it, *we* will" (**P**olitical). The new attitude fed the development of a new global economic system and economic order (**E**conomic, again). The emphasis on local and practical life within dispersed and relatively closed local communities has brought families and relatives closer together and family bonds are strong (**S**ocial). After the old world economic order collapsed, there is little to no money for high-tech investments – only low-tech and highly practical solutions are viable in the market. Technology primarily takes the form of products instead of services. (**T**echnological.) The dispersed and local communities of this scenario are sustainable and in harmony with nature (**E**nvironmental). Redevelopment of localities in a grassroots way has led to a stronger sense of pride in community – for instance, people are proud to live in Alvar Aalto Organic Otaniemi (**C**ulture/**C**onsumer/**C**itizen).

The Metaphors

Harmony inside the fences (Retired Civil Servant)

Post-Doomsday (Religious Extremist)

Atomaton, Beautiful Machine (Artist)

Oasis in the Desert (Artist)

Sleeping on the Edge (Retired University Teacher 2)

Passion never ends. Continue what you are happy with. New, Entrepreneur. (Retired Employee)

Passion never ends. Continue what you are happy with. New, Entrepreneur. (Retired Employee)

Thriving Creativity (Synthetic Biologist)

Trust me, this is a new type of water purifier. (Con Man)

Back to Basics (Deep Ecologist)

The kids have taken over (Retired University Teacher)

Figure 14. The metaphors generated by Group 3, one metaphor illustrated. Photo: https://i.ytimg.com/vi/nErJfX-MBSc/maxresdefault.jpg

After groups selected and described their roles (see Role sections below), they came up with metaphors for the scenario from the perspective of the roles. Two participants chose to be Retired University Teachers – one expressed some unease in her metaphor **"The kids have taken over"**, while the other expressed a similar sentiment with **"Sleeping on the edge."** The Retired Civil Servant said her metaphor was **"Harmony inside the fences",** aside from a shortage on certain wines, life is pretty good inside Alvar Aalto Organic Otaniemi. The Synthetic Biologist had the metaphor of **"Thriving Creativity"** imagining there would be plenty of opportunities to generate new life forms to solve various problems (food, lack of ecological diversity) after the collapse. The Artist saw this DIY Green Engineers' future as **"Automaton (Beautiful Machine)"** and the locality as an **"Oasis in the Desert"** for creative people like him. The Retired Employee of a Multinational Corporation saw her role's metaphor as **"Passion never ends. Continue what you are happy with. New Entrepreneur",** identifying the end of her company's hold on her life within the context of the DIY spirit as a thrilling new path. The Con Man, a role invented by a participant, identifies his metaphor as **"Trust me, this is a new type of water purifier"** as an example of the type of con his role would sell to the other roles. The Religious Extremist sees this future **"Post-Doomsday",** after a great collapse predicted by her religion. The Deep Ecologist sees this future as closely aligned with the values she's been advocating all along with a metaphor of **"Back to Basics."** The group found one of the ideas from their PESTEC to be the unifying metaphor for the scenario, **"If they won't fix it, we will."**

Role Card Documentation

The role card documentations of the Group 3 are presented in the following.

Deep Ecologist	
Motivating	***Threatening***
• Sustainable communities in harmony with nature. • re-development of locality	• Short-term profits • Extensive use of natural resources • New economy
Best Ally	***Worst Enemy***
Uni Teacher Artist	Multinational corp employee Synthetic biologist

Con Man	
Motivating	***Threatening***
• **If they won't, we will (or I will)** • New economy system… • Investment in products…	• Return of the family • Re-development of locality
Best Ally	***Worst Enemy***
Artist	Synthetic biologist

Retired University Teacher 1	
Motivating	*Threatening*
Sustainable Communities	New DIY Attitude
Best Ally	*Worst Enemy*
Retired Civil Servant	Religious Extremist

Retired University Teacher 2	
Motivating	*Threatening*
Development of Locality	• New ways of thinking • Survival of the fittest
Best Ally	*Worst Enemy*
Retired University Teacher	Con Man

Synthetic Biologist	
Motivating	*Threatening*
Need for new food sources and reestablishing bio-diversity	• Collapse of multinational corporations. • "Do it ourselves" mindset.
Best Ally	*Worst Enemy*
Business People	Deep Ecology

Retired Civil Servant	
Motivating	*Threatening*
• Managers (illegible… few, offer, for?) • Local Power/ Decentralization • No more top-down • Bottom-up politics/policies	• Wine crops are suffering • Lack of resources • No more Chardonnay wine • People (from outside locality) • Con man threatens local safety and harmony
Best Ally	*Worst Enemy*
People with] same background/history: Retired University Teacher	Con Man

Retired employee of a multinational corporation	
Motivating	*Threatening*

• New attitudes to start or continue my own small business. • Inventing in product development	Politicians and new rules that reduce social welfare system.
Best Ally	***Worst Enemy***
Retired Civil Servant	Con Man

Artist	
Motivating	***Threatening***
• Locality • Deep ecology • Sustainable communities in harmony with nature	• Con man • Family
Best Ally	***Worst Enemy***
Retired University Teacher	• Engineers • Religious Extremists

Religious Extremist	
Motivating	***Threatening***
Return of the family values & community control	DIY attitudes & anarchy
Best Ally	***Worst Enemy***
Retired People + Teachers + Multinational Company Employees	Artist

The following figure shows the allies and enemies identified by the members of Group 3. Green arrows are pointing towards an ally identified, red arrows pointing towards enemies identified. Grey boxes are used to illustrate allies/ enemies identified outside of the group member roles.

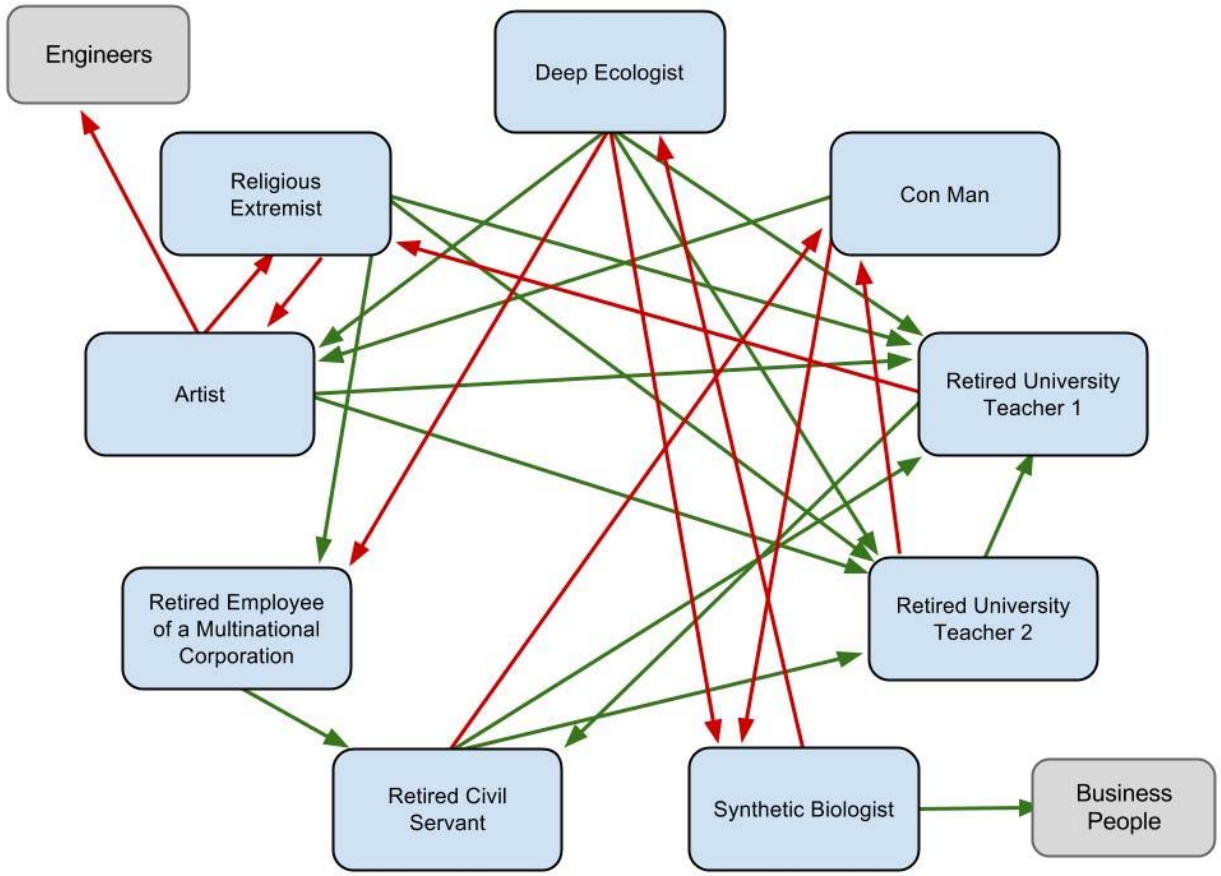


Figure 15. Identified allies and enemies of Group 3. Green arrows pointing toward identified allies, red arrows toward identified enemies.

Analysis

Because the group was asked to generate possible causes for the scenario, they became concerned with how to organize their ideas through time and indicate cause and effect. The group also discussed about whether to place causes of the collapse or systemic aspects of the new post-collapse world in the PESTEC table. This concern was the reason the group connected five Economic causes with arrows (see PESTEC table). The cause and effect system they described present an outlook that **corporate greed** led to **global economic collapse** and a **new economic order**. Group 3 imagined the Green DIY Engineers' future as one of high local and family cohesion and low contact with other places or outsiders. This is evocative of walled cities in Medieval Europe and gated communities such as Emerald Bay, California in contemporary times. There was a perceived duality in the post-collapse world. Community and family ties are strengthened and there is thriving creativity, but on the other hand there may be conflict between local communities and some people may be left outside the walled communities. The localism and DIY spirit also leave room for DIY criminals such as the conman. The conman represents the flipside of the DIY spirit: without institutional education and guarantees, there may be a fine line

between a DIY engineer and a conman, and the local community is responsible for making the distinction.

The overall metaphor selected by the group points to a belief that the **actions of many individuals and localities can produce systemic change,** as summarized by the famous slogan "Think globally, act locally". This belief links to deeply embedded emphasis **individual action** and **local control** in the Western world. The idea resonates here in Finland and much of Europe, but would it resonate in other cultures that deemphasize the role of local actions? In addition, this metaphorical basis of "fixing it ourselves" can be challenged by systems thinking – can a small locality have adequate or quick enough feedback from the system it seeks to change to actually make a difference? Do small localities have the ability to pull the right levers to trigger systemic transformation? The metaphors also suggest a sharp distinction between 'us' and 'them' ("Oasis in the desert", "If they won't fix it, we will", "Harmony inside the fences"). This implies that social trust only reaches to the local community, and others are treated with suspicion. Local self-reliance is the ideal. This further highlights the lack of wider social coordination and the question whether small localities can tackle systemic challenges. In a sense, the desirability of the scenario hinges on which is the predominant factor: the oasis and the harmony, or the desert and the fences.

It was interesting that several roles viewed the new DIY attitude as a threat. This may be partly due to the fact that so many retired roles and other critical roles such as the deep ecologist were presented to the participants. Nevertheless, this shows that different groups appreciate different sides of the scenario: if not the DIY ethic, then perhaps the return to localism and the importance of family.

In the group, there was also a discussion of gender implications in the PESTEC phase which was not fully represented by the final PESTEC table. Because the scenario represents a kind of return back to village life and it represents a post-collapse world, gender roles are likely be flexible and pragmatic: work needs to be done by those who are available to do it, regardless of their sex. This also resonates with the DIY ethic of the scenario. A flipside to this group's thinking about gender is if a "back to basics" mindset brings with it a reinforcement of old gender roles. Presently, DIY cultures tend to reinforce gendered expectations – for example men tend to lead and participate in "maker spaces" or brew beer more than women while women tend to participate in food preservation and knitting more than men." For the Green DIY Engineers scenario to be as transformative as possible, the group's thinking on how gender roles play out is more desirable than today's status quo.

In terms of Neo-Carbon Energy related implications, the threat of an ecological collapse suggests a necessity of inventing reliable low-tech energy solutions. In countries, which have already experienced an era of technological advancement, a related challenge might then stem from the lifestyle and mindset changes necessary to simplify the mode of life as well as tailor-make solutions for different needs. Contrast the urban folk of Western metropoles to farmers, for example, who in their rural homes

have always relied on self-sufficiency and therefore understand the value of land, animals and the importance of productivity. Farmers are entrepreneurs, in the real sense of the word and could have it easier conceptualizing such a world.

In relation to this, it should be noted that there are several regions across the world where energy infrastructure like the one in the West is not yet in place. Millions of people around the world currently live in a world where they lack the means of achieving local energy self-sufficiency, apart from the practices of using unsustainable amounts of firewood for household use. Extremely localized Neo-Carbon Energy solutions could have a major impact for the lives of communities living in remote areas. Already several communities around the world are using off-grid, micro-grid or mini-grid energy systems, when they live in areas that are not connected to the electricity grid. Even more challenging is the adaptation of future energy or electricity systems to the needs to nomadic lifestyles for groups unbound by any particular locality. After all, some nomadic groups have lived in harmony with the hardships of nature for decades if not centuries, adapting their lifestyles to the prerequisites of their livelihoods. It could be important to bear in mind such differences, when conceptualizing what is essentially locality for different groups of people around the world. This also challenges the conventional thinking where a national electricity grid is perceived as the sole energy alternative for reliable electricity generation in the coming decades of the 21st century.

3.4 Group 4: New Consciousness

This chapter presents the results of Group 4 on New Consciousness scenario.

The Neo Carbon Times
Expect the Work

Monday, May 12, 2025 | Today's Paper | Personalize Your Weather

WORLD U.S. NEW YORK BUSINESS OPINION SPORTS SCIENCE ARTS FASHION & STYLE VIDEO

The Girl Who Would Live Forever

Matheryn Naovaratpong was two years and two months old when she didn't wake up on the morning of April 19th, 2014. She was rushed to a hospital in Bangkok, where doctors discovered an 11 centimeter-long tumor in the left half of her brain. Matheryn—her family called her Einz for short—had ependymoblastoma, a rare form of brain cancer that afflicts the very young. The prognosis is exceedingly grim; at its highest, the five-year survival rate is 30 percent. Einz had fallen into a coma.

In that first surgery, doctors extracted half the tumor and drilled through Einz's skull to relieve the pressure on her brain. After it was over, they told her parents, both of whom are PhD-holding scientists, that she would probably never awaken. Even if she did, they said, the cancer was incurable—the hospital advised them to take Matheryn off life support.

Read more at:
http://motherboard.vice.com/read/the-girl-who-would-live-forever

We the Post-Human

"It is 2050 already, and many, for reasons I really cannot fathom, still linger to the idea of humanity dating back to at least the 16th century. I mean, it is barbaric!", cries out Scott, 35, a post-human. For those who have managed not to hear about this new notion of humanity, "post-human" refers to an exponentially strengthening movement which in recent years have quite convincingly argued that humanity is facing a change in consciousness altogether.

The new consciousness does not see humans as individuals separate from each other and from nature, but instead as deeply interconnected. According to Scott, this is not only a philosophical idea but concrete reality. "When I am constantly connected to the Network, how can I draw the line between my personality and the Hive Mind which I am part of? How can I say that I am somehow more important than a mouse, when 99 % of our genes are the same? And in the end, when everything from physics to genes to consciousness to the Network is information, aren't we all part of the same whole? I think we really have found the science of God!", Scott rallies on.

These thoughts indeed differ from what was so long understood to be a human, so it is little wonder why many people are finding hard to take the post-humans seriously. However, a staggering 75 % of people under 40 identify themselves as post-human. This new generation might end up saving the world. The modern view of separate, self-profit seeking individuals has been a major factor behind the global environmental catastrophe, as individuals pursued increasing material wellbeing and to satisfy their various needs. Now, as this notion of selfish individuals has begun to crumble, many believe the ecological crisis can finally be tackled and humanity step into a New Age.

Figure 16. Litany – Groups 4 and 5 studied the Litany of New Consciousness scenario.

An ecological crisis, "World War III" and ubiquitous ICTs have led to a new kind of consciousness and worldview altogether. Values of deep ecology have become the norm. People do not conceive themselves as separate individuals, but deeply intertwined with other humans and as parts of nature. Phenomena are conceptualized and understood from a systems-oriented worldview, which sees "everything connected to everything else" – as parts of a single, global system. Society is organised as an open global collaboration through sharing of resources and information.

Group Members

Group 4 consisted of the following participants: Joni Karjalainen (moderator), Yuko Aoyama, Tatiana Bernal, Yves-Pol Cabon, Cristiano Cagnin, Annie Ferguson, Ana Jakil, Alethia Montero and Poh Chuen Tan.

Figure 17. Group 4 working.

PESTEC Table

Group 4 generated metaphors and examined systemic causes for the scenario "New Consciousness". Their work is illustrated in Table 4.

Table 4. PESTEC – Group 4.

Systemic Causes (2nd CLA Layer) & Metaphors (4th CLA Layer) New Consciousness/Group 4	
METAPHORS 4th CLA Layer / **PESTEC** Systemic Causes 2nd CLA Layer	"One river" Child; "Gay dance" Hippie; "Systematic" Retired Civil Servant; "Black Hole" Spiritual Guru; "Collective pressure" Secularist Dissident; "Social progress" Citizen Activist; "New Frontier (and I'm the cowboy)" Robot; "Wild torrent" Retired employee of an oil company
Political	Wrong, useless public policies: Failure of national governments; Socialist governments; Community bottom-up decision making processes in which global, national, local issues are discussed and serve as input for decision-making at all levels, with mix representation for a and multiple ways to access and participate in the debate; Global government; Ecosocial economy; Peer-to-peer political system
Economic	Prosperity, efficient economy; Singular currency; Digital currency; Single marketplace; Even distribution of wealth; Personal profit does not matter → Shift from material values towards social values / wellbeing
Social	Communities, virtual as well as physical; Easy and cheap to travel and experience different cultures; Families: Enhanced families have greater value; Respect for diversity (religion, culture, etc.); Relying on technological issues; Lack of humanity awareness; New relationships & family structure (eg. Men/women; men/men; woman/woman; humans/animal; human/machine; real/virtual; etc.
Technological	Ubiquitous ICT; Robotized production; 100% networked and mobile penetration; Renewable energy; Virtual reality for all senses; Real time traduction; No more linguistic barriers; Technology implanted in body at birth; Religion: plays more important role
Environmental	Biophilia (inherent love of nature); Connected crops, fields → High-tech farms "We talk with the seeds"
Cultural	Post-individualism; Shared/global culture & feeling of connectedness; Technophilia → Tech is being intimately adapted unquestioned; "Information is power" thinking; Humans believed as the main beings of earth; Consciousness is taught in schools; Gender equality

The failure of national governments to meet the demands of their citizens and poor public policies have led to deep disappointment of the people, so much that a new global consciousness has emerged (P). A prosperous, efficient economy that uses a singular, digital currency has been a main prerequisite that has supported the achievement of this goal (E). In such a world, diversity will flourish. For instance, new family structures (e.g. man/woman, woman/woman, human/machine, real-virtual etc.) would prevail as well as would be seen possible (S). Technology would be omnipresent. For human beings, certain technologies will be implanted in their body already at birth. Linguistic barriers would be overcome in real time translation (T). However, in order for ecological problems to be solved an inherent love for nature would prevail (E). Culturally, two main lines of thinking emerge. One emphasizes *technophilia* where technology is adopted intimately without any questions. The second line of thinking is related to the imperative of achieving a new consciousness. Consequently, religion(s) might play an important role as enablers of the transformation for an emerging consciousness (C).

The Metaphors

Black Hole
(spiritual guru)

Social progress
(citizen activist)

Systematic
(retired civil servant)

Collective pressure
(secularist dissident)

Wild torrent
(retired employee of an oil company)

"New Frontier and I'm the cowboy."
(Robot)

One River
(child)

Gay dance
(Hippie)

Figure 18. The metaphors generated by Group 4, with one metaphor illustrated. [21]

[21] Forsberg, Per-Olof (2014) Ford cowboy robot, Dallas State Fair 2014 https://flic.kr/p/psMbmP, Retrieved 13.10.2015. Creative Commons license CC BY 2.0..

The metaphors perhaps best reflected the participants' sentiments of the scenario. The child saw this world as **"one river"**. Since everyone's education would be more or less uniform, all people would be connected by their mindset. The hippie was naively happy, merely stating **"gay dance"**. The representative of the world government seemed content in envisioning such a **symbiotic system** – of technology and governance. The retired civil servant also envisioned this scenario as somewhat a **systematic** world. In contrast, for a retired employee of an oil company, this world feels like **a wild torrent** beyond his/hers control. The secularist dissident perceived this system of global governance as a **collective pressure** that threatens individual freedom.

For the spiritual guru, a world of ubiquitous technology that enables "flower power" was something of **a black hole.** Her fear perhaps is that technological tools will undermine traditional spirituality and human-induced consciousness. The robot stood out from the rest. The robot sees this world as **a new frontier, where she/he/it is the cowboy.**

Role Card Documentation

The role card documentations of the Group 4 are presented in the following.

Retired employee of an oil company	
Motivating	***Threatening***
Wrong, useless public politics	Renewable energies
Best Ally	***Worst Enemy***
Retired civil servant	Hippie

Spiritual guru	
Motivating	***Threatening***
• Even distribution of wealth • Consciousness taught in schools	Religion plays more important role
Best Ally	***Worst Enemy***
Artist	Representative of world government

Robot/AI/Cyborg	
Motivating	***Threatening***
100% networked implanted tech	• Humans as main beings • Biophilia
Best Ally	***Worst Enemy***
Representative of world government	Spiritual guru Hippie

Representative of world government	
Motivating	*Threatening*
Multi-layered governance with citizens responsive and engaged	Dissidents who want to regain their individual power or influence
Best Ally	*Worst Enemy*
Artist	Secularist dissident

Retired civil servant	
Motivating	*Threatening*
Best Ally	*Worst Enemy*
Citizen activist	Secularist dissident

Secularist Dissident	
Motivating	*Threatening*
• Increased role of families • civil networks	• Collective pressure • Global government • Stronger role of religions in politics
Best Ally	*Worst Enemy*
Citizen activist Artist	Spiritual Guru Governments

Hippie	
Motivating	*Threatening*
Respect for diversity	Technology
Best Ally	*Worst Enemy*
Spiritual guru	Robot

Citizen Activist	
Motivating	*Threatening*
• Post individualism • Biophilia • Global culture/connectedness • Singular currency/market • Wealth distribution	• Wrong, useless policies • Humans as main being on Earth • Information is power
Best Ally	*Worst Enemy*
Child	Oil Company Government

Child	
Motivating	*Threatening*
• Gender Equality • Biophilia	• Global government • Global culture
Best Ally	*Worst Enemy*
Artist Hippie	Government

The allies and enemies identified by the members of Group 4 are illustrated in the following figure. Green arrows are pointing towards an ally identified, red arrows pointing towards enemies identified. Grey boxes are used to illustrate allies/ enemies identified outside of the group member roles.

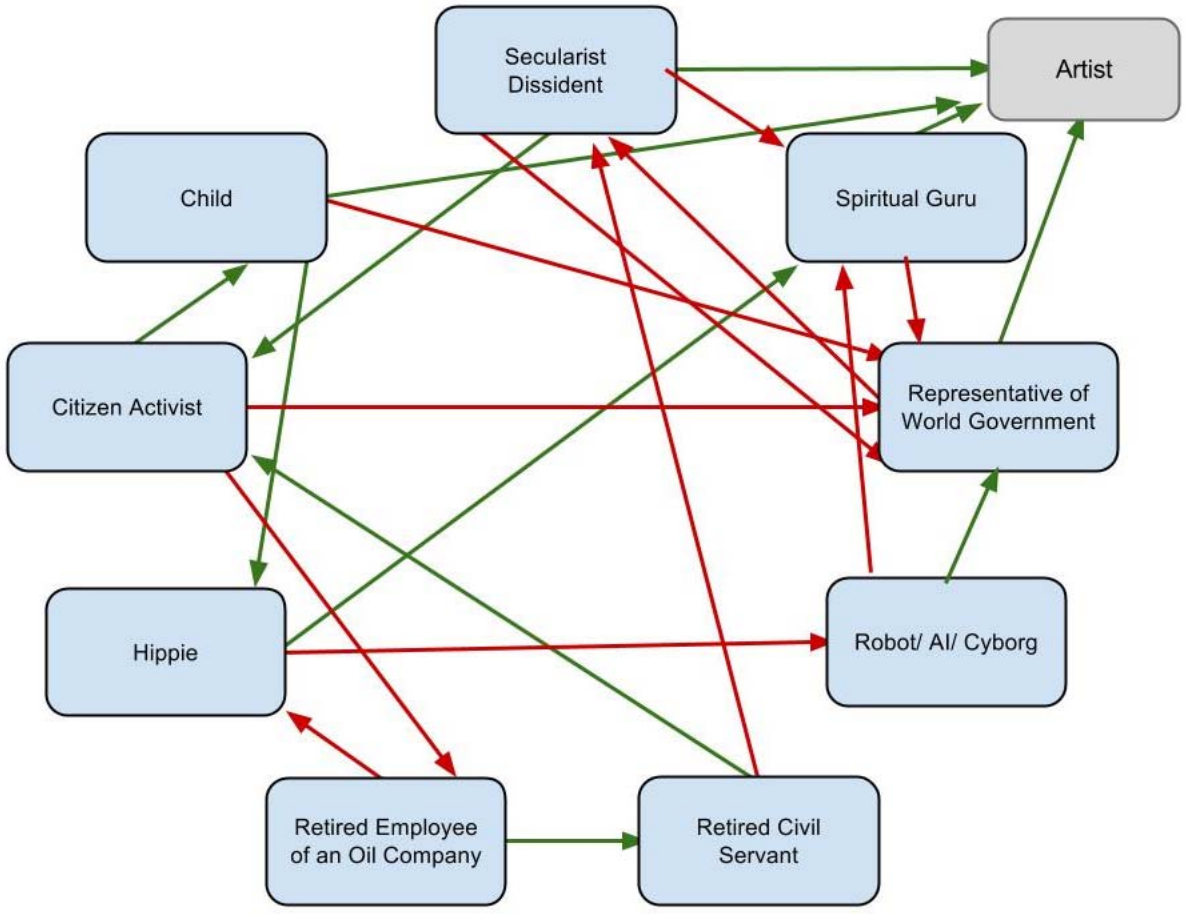


Figure 19. Identified allies and enemies of Group 4. Green arrows pointing toward identified allies, red arrows toward identified enemies.

Analysis

Defining post-humanity was not fully possible. From the group's discussion, it appeared that neither the ***technology-culture*** relationship; nor the ***collectivism-individualism*** tension could be completely resolved without tensions. The question ***how the human-ecology relationship could be re-established*** was not really addressed and perhaps will need further investigation. Participants seemed to find allies according to conventional lines of thinking. Children imagined a fair, pure and innocent world where they would enjoy living with hippies and spiritual gurus. Political power shifts might anticipate more power held by robots, the world government and governments that are increasingly responsive. Children grown into this world might adopt conscious technologies without questioning. Adults would face pressure to bridge these differences in perceptions as a generational gap.

Intimate conversations about conservation could be amongst the traits of this kind of a world of new consciousness. Collective consciousness could also play a major role in spreading awareness of the social choices related to energy use. Realizing this will be imperative for the future prosperity of the humankind.

An interesting question is how the urbanizing humankind can re-establish its connection with the ecology. In a world where people love their technology, could there be technologies that enable people to imagine and conceptualize those necessary solutions that enable a new consciousness? As human beings, an increasing number of us – living in our concrete jungles – fails to understand how valuable healthy ecosystems are, and how we ultimately depend on them. A Neo-Carbon powered world in a transformed society of collective mindsets is an intriguing idea.

3.5 Group 5: New Consciousness

In this chapter the results of Group 5 are presented. Similarly to Group 4, this group also elaborated the New Consciousness scenario. Consequently, their litany is the same as with Group 4, see Figure 16 in chapter 3.4.

Group Members

This group consisted of the following participants: Juho Ruotsalainen (moderator), Guillermina Baena, Jorge Bernardi, Kuo-Hua Chen, Heini Hämäläinen, Kelly Kornet, Jens Schütze, Ondrej Valenta and Cesar Villanueva.

Figure 20. Group 5 discussing PESTEC table.

PESTEC Table

Table 5. PESTEC – Group 5.

Systemic Causes (2nd CLA Layer) & Metaphors (4th CLA Layer) New Consciousness/Group 5					
METAPHORS 4th CLA Layer / **PESTEC** Systemic Causes 2nd CLA Layer	"Butterfly" Citizen activist	"Spiral" Secular Dissident	"Ying Yang" Secular Dissident	"Age of love" Artist	"We" Retired Civil Servant	"Youthful governance" & "All is same" Representative of World government
Political	Global government	Global governance but less government			Poor governance → social conflict	
Economic	Death of full employment Prosperous efficient economy Even distribution of wealth	Resource-based economy (no money)		New economic concept (not based on consumption)	Dominance of sharing economy	
Social	Global + local communities, virtual and physical	Border between "me" and "group" (conflict)		Youth-led environment movement	Zero-waste consumption	Consciousness of being unstuck
Technological	Ubiquitous ICTs Robotized production Virtual reality for all senses	Techno/consciousness, combined			Transhumanism wins	
Environmental	Biophilia (inherent love of nature)	Demand of equity of all life forms Humans and nature on same level			Tipping point	
Cultural	Individual suffering Cultural Creatives 90% (creative industry)	Post-individualism (shared identities)	Greater awareness of interconnectedness due to environmental psychology's upward status		Four intelligences for humans: Corporal Emotional Intellectual Spiritual	

The Metaphors

Butterfly
(Citizen activist)

Ying Yang
(Secular Dissident)

All is same
(Representative of World Government 1)

Youthful governance
(Representative of World Government 1)

Spiral
(Secular Dissident)

We
(Retired Civil Servant)

Age of love
(Artist)

Figure 21. The metaphors generated by Group 5, one metaphor illustrated. [22]

Role Card Documentation

The role card documentations of the Group 5 are presented in the following.

Retired Civil Servant	
Motivating	*Threatening*
• Global Governance • Fights to save pension and own home willing to loose either	• Doesn't agree and is afraid of youth take over. • Tries to stay away from younger people.
Best Ally	*Worst Enemy*
Global Governance Less government	Retired Cultural Creative

Robot/ Artificial Intelligence/ Cyborg	
Motivating	*Threatening*

[22] 0marchhare0 (2006) Downward Spiral, deviantart.com. http://0marchhare0.deviantart.com/art/Downward-Spiral-30906845, Retrieved 13.10.2015.

Global Governance	Transhumanism
Best Ally	*Worst Enemy*
Government representative	Citizen activist

Secularist Dissident	
Motivating	*Threatening*
• Individual suffering • Global gov. but less governance • Greater freedom, opportunity for change + breakdown of paradigms?	• Border between collective and individual? • Society is moving away from reason + rationale + towards holistic, deep ecology
Best Ally	*Worst Enemy*
Robot	Citizen activist

Citizen Activist	
Motivating	*Threatening*
Hivemind Border between the self and the group, post-individualism	People who are against global governance, but at the same time find global governance threatening if the hivemind isn't included
Best Ally	*Worst Enemy*
Zippie	Secularist dissident

Artist	
Motivating	*Threatening*
Post-individualism, shared identities • it's a good source inspiration for artistic performance – i.e. conflict and relation between the self and the wider system • It's easier to spread the good, the idea, new concept • New level of consciousness, awareness is present	Social conflict • conflict is seen as an injury to everyone, even those not involved in the conflict
Best Ally	*Worst Enemy*
Citizen activist	Representative of world government

Representative of World Government	
Motivating	*Threatening*
Human – Nature on same level • is a recognition of all life forms in the cosmos (human – nature as 1)	Global governance but less government • Breakdown of government and other governance structure in place that is cognizant of human-nature relationship… (world fails to design human-nature

	coming together)
Best Ally	***Worst Enemy***
Robot/ AI/ Cyborg	Secular dissident

Retired employee of an oil company	
Motivating	***Threatening***
Techno/ consciousness Combined • technical devices for help in daily life with interface to consciousness. Brain mind • Why? Makes life easier/ familiar with technical stuff	Human – nature on the same level • Created lot of pollution in his working life → Why? New mind-set is threatened
Best Ally	***Worst Enemy***
Robot/ cyborg	Representative of world government

The following figure shows the allies and enemies identified by the members of Group 5. Green arrows are pointing towards an ally identified, red arrows pointing towards enemies identified. Grey boxes are used to illustrate allies/ enemies identified outside of the group member roles.

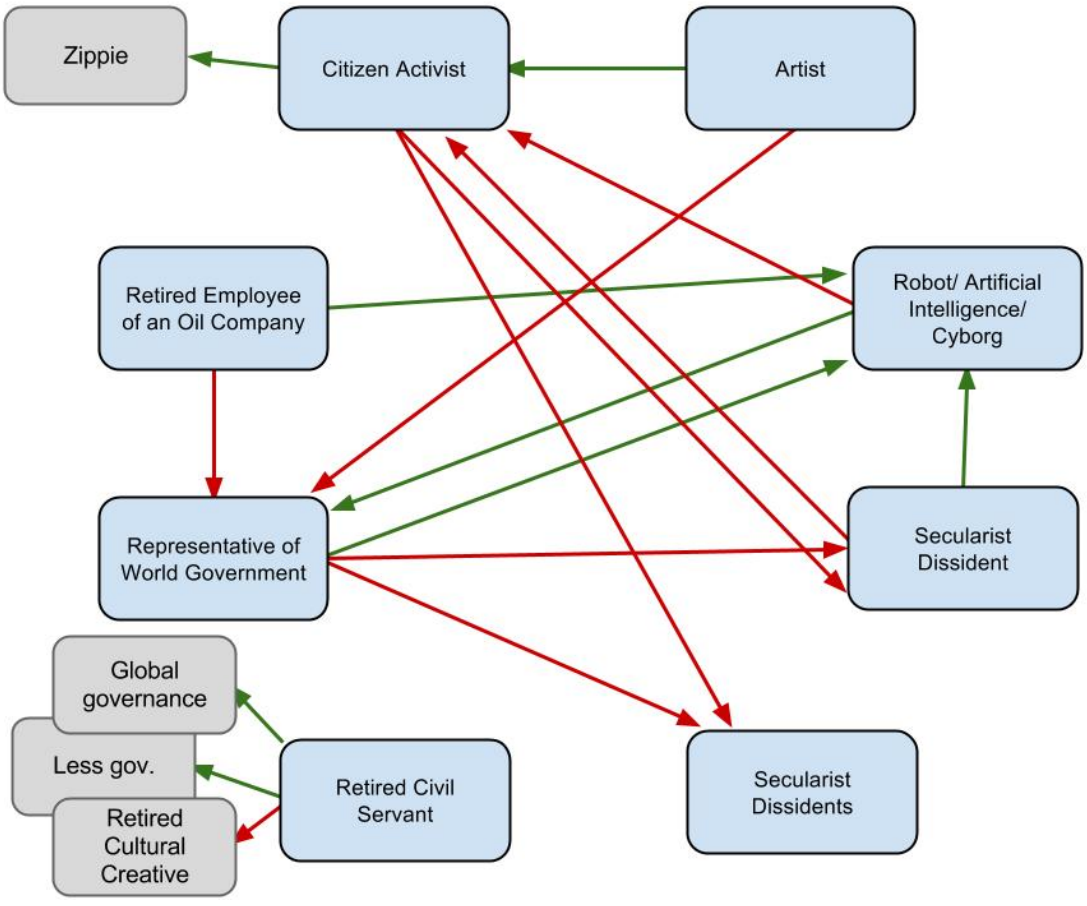


Figure 22. Identified allies and enemies of Group 5. Green arrows pointing toward identified allies, red arrows toward identified enemies.

Analysis

The second group that analysed the New Consciousness scenario (Group 5) made some different interpretation to the other group that played the CLA Game with the New Consciousness scenario (Group 4) in their visions of how the world of the future will look like.

Firstly, this group made less of a distinction between consciousness and technology. Instead, new consciousness was rather perceived to be intimately interwoven with ubiquitous technologies. A second difference stems from the functioning of the future economic system. Group 4 suggested that a single digital currency would connect the economic transactions of citizens globally, while this group rather assumed that in a resource-based sharing economy, no currency will be needed at all.

Such findings outline how different possible interpretations of the functionalities of a highly interconnected world can be made. Humans may eventually need help and different types of innovations to re-establish the connection they have had with their natural environment in the past. Purists may oppose technology-aided fixes, but for techno-optimists ubiquitous technologies play an enabling role. In both instances, however, a deeper philosophical understanding of ecology and energy would most certainly assist in countering the threat of over-relying on technological advancement.

Finally, from the work of the two groups that analysed the New Consciousness scenario, it is not possible to exactly define what kind of a relationship there is between human behavior and energy consumption. While assuming a neo-carbon powered world, the groups also did not further precise how technologies are interlinked with the neo-carbon energy system. There could be room for further enquiry to investigate how such a prosperous society is nurtured.

4. CONCLUSIONS AND DISCUSSION

The CLA game was conducted to elaborate and deepen the scenarios of the Neo-Carbon Energy project. The aim was to lay out a more elaborate picture of some of the actors in each scenario, their social relations and positions in the scenario world – to depict different worldviews within scenarios. In addition, the game was an effort to elaborate the scenarios by collectively mapping out social causes behind each scenario. Finally, each participant came up with a metaphor that captures the essence of the scenario – to illuminate the mythic layers of the scenarios.

The game was conducted on a very tight schedule, during two workshop sessions with an overall duration of three hours, which included the introductory presentation and debriefing. Due to the short timeframe and because the intention was to elaborate on existing scenario drafts, litany headlines were written in advance by the organizing team. The fact that the scenarios and the litany were pre-given somewhat limited the freedom of the participants to imagine alternative futures, but it also provided the session with more focus and it was justified given the tight schedule[23].

While drawing on the idea and descriptions of the CLA game in the literature, the conduct of the game was largely adapted and modified by the organizing team at FFRC (Inayatullah, 2015a; Terranova, 2015). Therefore, the CLA game session acted as a pilot: according to our knowledge, this form of CLA game had not been attempted before.

The justification for having groups according to scenarios rather than CLA layers was the following. First of all, the number of participants was too large to function as one group. Consequently, it was deemed as appropriate and necessary to form small groups. The organizing team considered having one small group for each CLA layer, and then each group would cover all the scenarios. This was deemed undesirable because then the linkages between the different CLA layers could not be discussed within the small groups. Another possibility would have been to include small groups per scenario with one or two participants representing one CLA layer. However, this would have made the structure overly complicated. Moreover, in both of the mentioned solutions, the roleplaying aspect would have been lost. The final structure was seen as a good compromise, especially since one of the aims was to produce more material for the system layer by using PESTEC tables. The game also benefited from the final stage where the scenarios could 'discuss' with each other through the group presentations and the comments that were made in character. This added argumentation from various points of views and actor background to the original scenario descriptions.

[23] Also, the risk with giving predefined roles to participants is that the choice of roles may predefine the results of the game, if participants play out the roles in stereotypical ways. The openness and space for inspiration and creativity was provided by securing free choice of actor roles.

The CLA game session confirmed the fact that Causal Layered Analysis is a versatile method that can be adapted to different practical aims. A key question for analysis is what kind of added value is achieved through the game. In this case, it was used to elaborate on existing scenario drafts by incorporating points of view that emerge from a game session. Thus, CLA is proven to allow for methodological innovation, i.e. it is a structured by an emergent methodology. The value in this game came from stakeholders embodying the worldviews of core archetypes within the scenarios. This allowed the scenario process to identify disowned perspectives (scenarios as deconstructed pointed to the disowned).

The benefit of the CLA Game is that the groups' interactions reveal certain implicit causalities or conflicting goals that otherwise might be difficult to conceptualize with the use of more conventional analytical tools such as a scenario-building within futures studies or policy analysis for the typical purpose of supporting decision-making. Therefore, based on our experience in the developing team, it may be stated that CLA Game can be used as one tool to analyse the quality of the scenario work. Because all the four Neo-Carbon Energy scenarios are purposed to be transformative by nature, the CLA Game is an evaluative tool to test their quality – are they really transformative or transformative enough – and the ability to achieve their stated objective.

In this particular case, the research to which the game participants were contributing to, investigates what different pathways might enable future societies to run on renewable energies. What is more, the futures research part of the Neo-Carbon Energy research project seeks to identify and better understand how such pathways could be attained. Now, by looking at some of the findings of the game, it can be observed how certain scenarios seem to be able to grasp a more serious level of transformation than other scenarios. Or at least they evoke different types of reactions in the game participants, when they are attempting to envision their future world.

Accordingly, in Group 1 on "Radical Startups" the view from big capital – control and dominate – was challenging the entrepreneurs and the community values group. In Group 2 on "Value-Driven Techemoths" the view from the underground anti-corporate hacker, the criminal came out – how to defend against those who seek to undermine a neo-growth system. In Group 3 on "Green DIY Engineers" the view from efficiency – economies of scale with the community scenario and the entrepreneur scenario – are they able to scale. In Group 4 on "New Consciousness" amazingly the new consciousness groups did not challenge big capital, seeing them as the norm. In Group 5 on "New Consciousness" the integrated view was that of consciousness interwoven of consciousness with technology and resource-based sharing economy.

Two scenarios assume a worldview of pragmatic ecology, and in these scenarios it seemed that the participants have some doubts about the ability of corporations to actually push for the envisioned change when they operate solely under the market logic. This was true especially for the Value-Driven Techemoths scenario that envisions market-driven solutions for an energy transformation. Related questions were posed of how states may assume a balanced role in supporting large companies in their

endeavours while securing the well-being and flourishing of their citizens. In turn, the group that analysed the Radical Startups scenario recognized the old large companies as potential enemies that represent the old economy. Finally, the Green DIY Engineers group imagined that the actions of corporations will drive a climate change disaster.

This would suggest at least two things. Firstly, in order for companies to champion transformative change, they may have to do a lot more than what many people currently perceive them being capable of. Secondly, the role of alternative approaches and new business models, such as impact investing or social entrepreneurship, could prove interesting mediating tools to mitigate at least some of the mismatches between the expectations of citizens and the reality of how the world currently works.

What is more, such examples could actually motivate certain companies to aspire to prove their true value.

The New Consciousness scenario, as interpreted by the groups, seems to have evoked sentiments of a transformation, which is either driven by a mindset and value shift for consciousness and/or fueled by the increasing omnipresence of technologies.

It could also be emphasized that a profound transformation seems increasingly attainable, when the standards for ecological thinking are high. What the groups did not have time to further elaborate, was an examination of what models can support the coexistence of an ecologically and socially motivated consciousness as well as ubiquitous information and communication technologies (ICTs). For example, if a virtual economy or a sharing economy characterized the economic relations of our future societies, it should be known what the impacts of such an economic system are to the ecology. Therefore, the game also revealed that a study of the role of the so-called rebound effect deserves further study for all of the four scenarios.

Another powerful part in the CLA game process was the metaphors that were generated in each group, reflecting the scenarios given, but created from the point of view of adopted roles that were played. The use of metaphors is part of a narrative approach, which can provide insights that inform policy questions (Strachan & Foxon 2012, 75). Metaphors are both informative and revealing by their influential nature. If metaphors indeed influence the worldview, systems, and litanies of our world, the metaphor selections of the participants indicate how various types of actors would engage in the scenarios. It should be noted that these metaphors were developed by individuals who are almost inevitably influenced by their own frames of reference and mental models that are presently available. The actual people of the year 2050 may have completely new metaphors to draw upon as they try to comprehend and thrive in their worlds. Despite their present-cast limitations, the metaphors generated during the CLA game offer valuable insight to the Neo-Carbon Energy scenarios, especially when inverted with an aim of heightening the transformative qualities of the scenarios. For example, the Secular Dissident in "New Consciousness" can become an agent of transformation, if his metaphor is changed from "[Downward] Spiral" to a positive and aspirational image such as "All Earth's Species

United". Another example can be found in the Techemoth Employee in "Value-Driven Techemoths" whose "Luxury Isolation in a Penthouse Skyscraper" becomes a contributor to transformation, if it is changed to "All of Society Sharing in Abundance".

These inversions of metaphors may be a key toward modeling how the anticipated actors in the Neo-Carbon scenarios shape changes required to make their transformational futures possible. The process of metaphor inversion can also be applied to present day actors such as company employees, teachers, government officials, startup founders, investors, and others. The key question is: "How the metaphors of individual actors could be changed so that these actors help shape a transformational Neo-Carbon Energy future for Finland and our world?"

In future adaptations of the CLA game, the process could be improved by increasing the immersion of participants in the alternative futures. For instance, the facilitator could read the litany out loud as a news report to highlight the vivid details that evoke the core of a particular scenario. If time permits, participants could instead perform the litany as a newscast.

The CLA game reported here was an experimental process. It is in our intention to pursue developing the concept according to the analysis and results. The game is planned to be continued virtually together with those participants of the CLA game session at the Turku Conference "Futures Studies Tackling Wicked Problems" who are willing to collaborate and thus will be regarded as co-developers of the game. A similar CLA game session, as documented in this report, can be conducted on some appropriate occasion in the future by using the same structure or varying it with some new modifications, to go deeper into the interaction between different CLA layers.

Finally, the notion was accentuated that scenarios are not just an analytic exercise but they need to convince others of why their future is the most compelling. This relates experimental and game-based futuring to Bell's and Flechtheim's normative approach in futures studies. According to Amara's third principle we can have an impact on the future; while based on Bell's view, we can advocate a specific future. These two lines of thinking combined reflect the claim by Dator that the main task of futures studies is to empower social change. (Amara 1981; Bell 1997; Dator 2009; Flechtheim 1970.) Serious gaming, such as this experiment with CLA game modification on Neo-Carbon Energy scenarios may contribute to this task by liberating our thinking about alternative futures. From deconstructing we can get energy for making a quantum leap towards the reconstruction of preferred futures.

REFERENCES

Amara, Roy (1981). The futures field: searching for definitions and boundaries The Futurist, 15(1), 25-29.

Bell, Wendell (1997). Foundations of Futures Studies. Human Science for a New Era. Volume 1: History, Purposes, and Knowledge. London.

Cornish, Edward (2004). Futuring: The Exploration of the Future. Bethesda, Maryland: World Futures Society.

Dator, James (2009). Alternative futures at the Manoa School. Journal of Futures Studies, 14:1–18.

Derrida, Jacques (1997). Of Grammatology. Baltimore: Johns Hopkins University Press.

Flechtheim Ossip K. (1970). Futurologie – Der Kampf um die Zukunft. Köln: Wissenschaft und Politik.

Foucault, Michel (2002). Archaeology of Knowledge. Routledge classics. London: Routledge.

Glenn, Jerome & Gordon, Theodore (2009). Futures Research Methodology V. 3.0. Millennium Project, CD. Washington D.C. http://www.millennium-project.org/millennium/FRM-V3.html

Heinonen, Sirkka (2000) Prometheus Revisited – Human Interaction with Nature through Technology in Seneca. Doctoral dissertation. Helsinki University. Commentationes Humanarum Litterarum Vol. 115, the Finnish Society of Sciences and Letters, 232 C

Heinonen, Sirkka & Balcom Raleigh, Nicolas (2015). Continuous Transformation and Neo-Carbon Energy Scenarios. FFRC eBOOK 10/2015. Finland Futures Research Centre, University of Turku, Turku, 69 p. https://www.utu.fi/fi/yksikot/ffrc/julkaisut/e-tutu/Sivut/home.aspx

Heinonen, S. and Ruotsalainen, J. (2013a). Energy Futures 2030: Towards the Neo-Growth Paradigm of the Sixth-Wave Era. FFRC e-Book 1/2013, Finland Futures Research Centre, http://www.utu.fi/fi/yksikot/ffrc/julkaisut/e-tutu/Documents/eBook_2013-1.pdf

Heinonen, S. & Ruotsalainen, J. (2013). Futures Clinique – method for promoting futures learning and provoking radical futures. European Journal of Futures Research (2013) 15:7, DOI 10.1007/s40309-013-0007-4, 11 p.

Heinonen, Sirkka & Hiltunen, Elina (2012). Creative Foresight Space and the Futures Window: Using Visual Weak Signals to Enhance Anticipation and Innovation. Futures, vol. 44, 248–256.

Heinonen, Sirkka, Karjalainen, Joni & Ruotsalainen, Juho (2015). Towards the third industrial revolution. Neo-Carbon Energy Project Futures Clinique I "Creating the third industrial revolution". FFRC eBook 6/2015. Finland Futures Research Centre, University of Turku, 74 p. https://www.utu.fi/fi/yksikot/ffrc/julkaisut/e-tutu/Sivut/home.aspx

Inayatullah, S. (2015a). The Continued Evolution of the Use of CLA: Using practice to transform in S. Inayatullah & I. Milojevic (eds.) CLA 2.0: Transformative research in theory and practice (pp. 13–21). Tamkang University Press.

Inayatullah, Sohail (2015b). What Works: Case Studies in the Practice of Foresight. Tamsui: Tamkang University Press, 249 p.

Inayatullah, Sohail (2008). Six pillars: Futures thinking for transforming. Foresight, 10(1), 4–21.

Inayatullah, Sohail (2004a). Causal Layered Analysis: Theory, historical context, and case studies. In S. Inayatullah (Ed.). The Causal Layered Analysis (CLA) Reader: Theory and Case Studies of an Integrative and Transformative Methodology (pp. 1–52). Tamsui: Tamkang University Press.

Inayatullah, Sohail (2004b). Appendix: The causal layered analysis pyramid. In S. Inayatullah (Ed.). The Causal Layered Analysis (CLA) Reader: Theory and Case Studies of an Integrative and Transformative Methodology (p. 543). Tamsui: Tamkang University Press.

Inayatullah, Sohail (1998). Causal layered analysis: poststructuralism as method. Futures, 30(8), 815–829. Retrieved from http://www.sciencedirect.com/science/article/pii/S001632879800086X

Inayatullah, Sohail & Milojevic, I (eds.) (2015). CLA 2.0: Transformative Research in Theory and Practice, Tamsui: Tamkang University Press.

Karjalainen, Joni, Käkönen, Mira, Luukkanen, Jyrki and Vehmas, Jarmo (2014). Energy scenarios in the climate change era, FFRC eBook 3/2014, University of Turku: Finland Futures Research Centre.

Kelly, A. (2003). Decision Making using Game Theory: An Introduction to Managers. West Nyack, NY: Cambridge University Press. ProQuest ebrary. Web. 14 October 2015.

Leponiemi, Lauri, Taylor, Amos and Heinonen, Sirkka (2014). Beware of the Used Futures – Sohail Inayatullah Highlighting the Best Foresight Practices. Special Conference Edition of the Finland Futures Research Centre's Newsletter, p. 6. http://www.utu.fi/en/units/ffrc/Documents/Futuuri_special-issue_2014-web.pdf

Lombardo, Thomas (2008). Contemporary Futurist Thought. Bloomington, IN: AuthorHouse.

Lund, Henrik (2014). Renewable Energy Systems: A Smart Energy Systems Approach to the Choice and Modeling of 100% Renewable Solutions, Academic Press 2nd Edition.

Malaska, Pentti (2010). A More Innovative Direction Has Been Ignored. In: Understanding Neogrowth – An Invitation to Sustainable Productivity. TeliaSonera Finland Plc. Helsinki, p. 200-210. http://www.sonera.fi/media/13069ab55806de22e8955bc2a3f1afeab17b28bd/Understanding_Neogrowth.pdf

Meadows, Donella (2008). Thinking in Systems. White River Junction, Vermont: Chelsea Green Publishing.

Minkkinen, Matti (2013). Images of the future of privacy: A privacy dynamics framework and a causal layered analysis of ideal types. Master's thesis in Futures Studies. University of Turku, Turku School of Economics. Retrieved 15 January 2016 from http://urn.fi/URN:NBN:fi-fe2014091644724

Myerson, R.B. (1991). Game Theory: Analysis of Conflict. Cambridge, Massachusetts: Harvard University Press.

Rifkin, Jeremy (2011). Third Industrial Revolution: How Lateral Power Is Transforming Energy, the Economy, and the World. New York: Palgrave MacMillan

Schwartz, Peter (1996). The Art of the Long View: Paths to Strategic Insight for Yourself and Your Company. New York: Currency Doubleday.

Slaughter, Richard (2008). What difference does 'integral' make? Futures, 40(2), 120–137.

Slaughter, Richard (2004). Beyond the Mundane: Reconciling Breadth and Depth in Futures Enquiry. In S. Inayatullah (Ed.). The Causal Layered Analysis (CLA) Reader: Theory and Case Studies of an Integrative and Transformative Methodology (pp. 147-161). Tamsui: Tamkang University Press.

Slaughter, R. (2002). Critical futures study as an educational strategy. In R. Slaughter (Ed.) New Thinking for a New Millennium: The Knowledge Base of Futures Studies (pp. 137–154). London: Routledge.

Strachan, Neil & Foxon, Timothy J. (2012). A Low-Carbon Transition. In: Herring, H. (ed.). Living in A low-Carbon Society 2050. Energy, Climate and the Environment Series. London, 75–81.

Terranova, D. (2015). Causal Layered Analysis in Action: Case studies from an HR practitioner's perspective. In S. Inayatullah & I. Milojevic (Eds.), CLA 2.0: Transformative research in theory and practice (pp. 371–384). Tamsui: Tamkang University Press.

Wangel, Josephine (2011). Change by whom? Four ways of adding actors and governance in backcasting studies. Futures 43(8): 880–889.

Wright, D. L. (2002). Applying Foucault to a future-oriented layered analysis in a post-bubble Japanese community. Futures, 34(6), 523–534. Retrieved from http://www.sciencedirect.com/science/article/pii/S0016328701000787

APPENDIX 1. Programme

FUTURES STUDIES TACKLING WICKED PROBLEMS

Conference organized by Finland Futures Research Centre

11–12 June 2015, Turku Finland

SESSION 4. Research Tools II & III: Causal Layered Analysis (CLA)

Thursday 11 June, 15:00–16:30 and 16:30–18:00

Part 1. 15:00–16:30

Chair: Professor Sirkka Heinonen

1. **Introduction to CLA and the Game**
   Sohail Inayatullah
   Tamkang University, Taiwan; University of the Sunshine Coast, Australia

2. **A CLA Game on Neo-Carbon Energy Scenarios in Action Learning**
   Sohail Inayatullah[a], Matti Minkkinen[b] & Sirkka Heinonen[b]
   [a] Tamkang University, Taiwan; University of the Sunshine Coast, Australia;
   [b] Finland Futures Research Centre, University of Turku, Finland

Part 2. 16:30–18:00

Chair: Dr. Sohail Inayatullah

1. **Results of the CLA Game on Neo-Carbon Energy Scenarios in Action Learning**
   Sohail Inayatullah
   Tamkang University, Taiwan; University of the Sunshine Coast, Australia

2. **Practical Guide to Using Causal Layered Analysis in Qualitative Futures Studies**
   Matti Minkkinen & Petri Tapio
   Finland Futures Research Centre, University of Turku, Finland

APPENDIX 2. List of Participants

Ahokas Ira, Finland Futures Research Centre
Ahvenharju Sanna, Finland Futures Research Centre
Aoyama Yuko, Hokkaido University
Baena Guillermina, National Autonomous University of Mexico
Bardi Ugo, University of Firenze
Bernardi Jorge, GTEC UNTREF
Bernal Tatiana, Universidad Externado de Colombia
Bishop Peter, Teach the Future
Bol Erica, Teach the Future
Cabon Yves-Pol, Société Française De Prospective
Cagnin Cristiano, Center for Strategic Studies and Management
Chen Kuo-Hua, Tamkang University
Daheim Cornelia, Future Impacts Consulting
Dufva Mikko, VTT Technical Research Centre of Finland
Ferguson Annie, World Futures Studies Federation (WFSF)
Heikkilä Katariina, Finland Futures Research Centre
Herlin Niko, Great Minds Oy
Holttinen Antti, University of Turku
Hämäläinen Heini, University of Turku
Jakil, Ana European Environment Agency
Kesti Terhi, University of Turku
Koponen Johannes, Demos Helsinki
Korkeakoski Mika, Finland Futures Research Centre
Kornet, Kelly OCAD University
Van Leemput Maya, Erasmus Hogeschool Brussel, WFSF
Moqaddamerad Sara, University of Turku
Montero Alethia, National Autonomous University of Mexico
Rahneshin Ali, Borzouyeh Petrochemical Company
Reinola Kirsi, University of Turku
Schütze Jens, Technische Universität Chemnitz
Stenholm Noora, Finland Futures Research Centre
Svenfelt Åsa, KTH Royal Institute of Technology
Tan Poh Chuen, Johannes Gutenberg University Mainz
Taylor Amos, Turku School of Economics, University of Turku
Valenta Ondrej, Technology Centre ASCR
Veeger Monica, Fontys University of Applied Science
Villanueva Cesar, World Futures Studies Federation (WFSF)
Vola Joonas, Arctic Centre of the University of Lapland
van Vuuren Rianne, University of Stellenbosch Business School
Xu Yueqiang, University of Oulu

Moderators:
Balcom Raleigh Nick, Finland Futures Research Centre, MA Programme in Futures Studies
Karjalainen Joni, Finland Futures Research Centre
Kurki Sofi, Finland Futures Research Centre
Minkkinen Matti, Finland Futures Research Centre
Parkkinen Marjukka, Finland Futures Research Centre, MA Programme in Futures Studies
Ruotsalainen Juho, Finland Futures Research Centre

Supervisors:
Heinonen Sirkka, Finland Futures Research Centre
Inayatullah Sohail, Tamkang University

APPENDIX 3. Role Cards and Photo Credits

Role Cards – Group 1, "Radical Startups"

Date: 11.6.2015 Group: 1 NeoCarbon Scenario:Radical Startups

Crowd Facilitator

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group: 1 NeoCarbon Scenario:Radical Startups

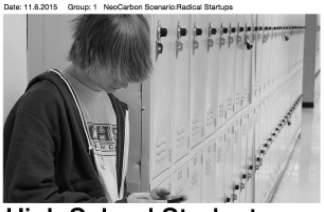
Business Angel

Your Real Name: _____

Motivating **Threatening**

Best Allies **Worst Enemy**

Date: 11.6.2015 Group: 1 NeoCarbon Scenario:Radical Startups



High School Student

Your Real Name: _____

Motivating **Threatening**

Best Allies **Worst Enemy**

Date: 11.6.2015 Group: 1 NeoCarbon Scenario:Radical Startups

CEO of a large corporation

Your Real Name: _____

Motivating **Threatening**

Best Allies **Worst Enemy**

Date: 11.6.2015 Group: 1 NeoCarbon Scenario:Radical Startups

Marginalized person with low level of education

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group: 1 NeoCarbon Scenario:Radical Startups

Zippie (tech-hippie)

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group: 1 NeoCarbon Scenario:Radical Startups

Crowd Facilitator

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Role Cards – Group 2, "Value-Driven Techemoths"

Date: 11.6.2015 Group 2 NeoCarbon Scenario: Value-Driven "Techemoths"

Employee of a "techemoth"

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 2 NeoCarbon Scenario: Value-Driven "Techemoths"

Small Entrepreneur

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 2 NeoCarbon Scenario: Value-Driven "Techemoths"

CEO of a "Techemoth"

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 2 NeoCarbon Scenario: Value-Driven "Techemoths"

Underground anti-corporate hacker

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 2 NeoCarbon Scenario: Value-Driven "Techemoths"

Marginalized person with low level of education

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 2 NeoCarbon Scenario: Value-Driven "Techemoths"

High school student

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 2 NeoCarbon Scenario: Value-Driven "Techemoths"

Transhumanist

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Role Cards – Group 3, "Green DIY Engineers"

Date: 11.6.2015 Group 3 NeoCarbon Scenario: Green DIY Engineers

Synthetic Biologist

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 3 NeoCarbon Scenario: Green DIY Engineers

Artist

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 3 NeoCarbon Scenario: Green DIY Engineers

Retired University Teacher

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 3 NeoCarbon Scenario: Green DIY Engineers

Retired Civil Servant

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 3 NeoCarbon Scenario: Green DIY Engineers

Retired employee of a multinational corporation

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 3 NeoCarbon Scenario: Green DIY Engineers

Deep Ecologist

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Date: 11.6.2015 Group 3 NeoCarbon Scenario: Green DIY Engineers

Religious Extremist

Your Real Name: _____

Motivating **Threatening**

Best Ally **Worst Enemy**

Role Cards – Group 4 & Group 5 - "New Consciousness"

Role Card Photo Credits – Alphabetical

The following images were used for the CLA game role cards used for the Neo-Carbon CLA game held 11 June 2015 at Futures Conference 2015.

Artist

Photo by John Sisson. "Sarah Schnadt, *Connectivity*, 2007" *Museum of Contemporary Art Chicago* 5.5.2009 http://www2.mcachicago.org/event/works-in-progress-sara-schnadt, retrieved 30.6.2015.

Business Angel

Illustration by unknown. Angel Tech Investors. *bloomberg.com* http://www.bloomberg.com/ss/10/02/0225_angel_investors, retrieved 30.6.2015.

Crowd Facilitator

Photo by Igal Koshevoy, "Enthusiastic facilitator explains the ground rules, while a whiteboard is prepared for the day's agenda", license Creative Commons BY-NC 2.0. 16.11.2011 https://flic.kr/p/aFitfz, retrieved 29.6.2015.

CEO of a large corporation
Photo by askingsmarterquestions.com, untitled http://www.sportsnet-worker.com/2013/09/20/pepsicos-ceo-indra-nooyi-explains-how-companies-can-better-market-to-women/, retrieved 30.6.2015.

CEO of a "Techemoth"
Photo by Giorgio Montersino, "Marissa Mayer: Now CEO of Yahoo", license Creative Commons BY-SA 2.0. 10.12.2008 https://flic.kr/p/5HZpNn, retrieved 29.6.2015.

Citizen Activist
Photo by Adrees Latif/Reuters, "Student activists at Washington University in St. Louis take part in the nationwide 'Hands up, walk out' protest", http://newshour-tc.pbs.org/newshour/wp-content/uploads/2015/03/RTR4GBJ5.jpg, retrieved 30.6.2015.

Deep Ecologist
Photo by themoose.no "Arne Naess: at the roots of deep ecology" *Down to Earth* 5.7.2012 http://downtoearth.danone.com/2012/07/05/arne-naess-at-the-roots-of-deep-ecology, retrieved 29.6.2015.

Employee of a "techemoth"
Photo by wlodi, "Rayman Raving Rabbids 2 for Wii - Developers playing the game (opening the bottle)", license Creative Commons BY-SA 2.0. 23.8.2007. https://flic.kr/p/4tpzFZ, retrieved 29.6.2015.

High School Student
Photo by Colin Duft/KOMU News "Jefferson City Residents Vote Down Tax Levy, Bond Increase for New High School," license Creative Commons BY 2.0. 2.4.2013 https://flic.kr/p/e8misG, retrieved 30.6.2015.

Marginalized person with low level of education
Photo by Franco Folini. "Homeless woman with dogs", license Creative Commons BY 2.0. 30.9.2006 https://flic.kr/p/oGRPp, retrieved 29.6.2015.

Religious Extremist
Photo by Martin Rickett/PA Wire. "Members of the Tyndale Free Presbyterian Church hold an outdoor service near to Windsor Park in protest against Northern Ireland's first match to be played on a Sunday" *BelfastTelegraph.co.uk* 29.03.2015 http://www.belfasttelegraph.co.uk/news/northern-ireland/religious-protest-ahead-of-northern-irelands-first-Sunday-home-international-31103079.html, retrieved 30.6.2015.

Representative of World Government
Unknown Photographer. "Untitled" *UsabilityGeek.com* 31.10.2011 http://usabilitygeek.com/official-usability-web-site-guidelines-of-governments-from-around-the-world, retrieved 30.6.2015.

Retired Civil Servant
Photo by /\ \/\/ /\ "neon price", license Creative Commons BY-SA 2.0. *flickr.com* 5.6.2011 https://flic.kr/p/9Qu1t2, retrieved 30.6.2015.

Retired employee of a multinational corporation
Photo by unknown. "Okay, I am ready to retire!" Wisconsin Department of Employee Trust Funds. http://etf.wi.gov/images/slides/etf/woman_room.jpg, retrieved 30.6.2015.

Retired employee of an oil company
Photo by Oleg Nikishin/Getty Images. "Azerbaijan Oil Industry" *GettyImages.fi* 12.10.2003 http://www.gettyimages.fi/detail/news-photo/oil-workers-service-a-well-in-the-oilfields-october-12-2003-news-photo/2585024, retrieved 30.6.2015.

Retired University Teacher
Photo by UW-Madison. "Gerda Lerner, c. 1981. Image #S05705 (Uwar01534x)", license Creative Commons CC-BY-3.0. 1981 https://commons.wikimedia.org/wiki/File:UW-Madison_history_professor_Gerda_Lerner.jpg, retrieved 29.6.2015.

Robot/Artificial Intelligence/Cyborg
Illustrator Unknown. Untitled. 28.6.2012 https://harveywalnut.wordpress.com/2012/06/28/artificial-brain-loves-to-watch-cat-videos/, retrieved 30.6.2015.

Secularist Dissident
Photographer unknown. Hanne Stinson with happy humanist tattoo. License unknown. 24.2.2009 http://www.patheos.com/blogs/friendlyatheist/2009/02/24/tattooing-yourself-in-the-name-of-humanism, retrieved 29.6.2015.

Small entrepreneur
Photo by Steven Depolo. "Child Entrepreneur Lemonade Stand 50 Cents Each Qiqi Lourdie June 24, 20111", license Creative Commons BY 2.0, *flickr.com* 24.6.2011 https://flic.kr/p/a3Pdjy, retrieved 29.6.2015.

Startup Entrepreneur
Photo by Kris Krüg. "Whever team has tea and conversation", license Creative Commons BY-NC-SA 2.0. *flickr.com* 2.3.2015 https://flic.kr/p/raZ5TE, retrieved 30.6.2015.

Synthetic Biologist
Photographer Unknown. Untitled, License unknown. 26.1.2012 https://crisisboom.files.wordpress.com/2012/01/dna_hacking.jpg?w=595, retrieved 29.6.2015.

Transhumanist
Illustrator Unknown "Transhumanism H+ symbol", license Creative Commons BY-SA 3.0, *Wikipedia* 9.5.2014 https://en.wikipedia.org/wiki/File:Transhumanism_h%2B_2.svg, retrieved 30.6.2015.

Underground anti-corporate hacker
Photographer Unknown. Untitled. http://www.americasfreedomfighters.com/2014/07/02/no2isis-anonymous-announces-cyber-warfare-on-isis-video, retrieved 29.6.2015

Zippie (tech hippie)
Photo by Neil Girling, "Truth is Beauty by Marco Cochrane at Burning Man 2013", license Creative Commons BY-NC-ND 2.0. 31.8.2013 https://flic.kr/p/fFA3Mv, retrieved 29.6.2015.

APPENDIX 4.

Sirkka Heinonen & Nick Balcom Raleigh (eds.)

NEO-CARBON ENERGY AT WORLD CONFERENCE "FUTURES STUDIES TACKLING WICKED PROBLEMS"

TURKU, FINLAND – JUNE 11 & 12, 2015

FINLAND FUTURES RESEARCH CENTRE (FFRC) – AUGUST 2015

NEO CARBON ENERGY

VTT

LUT Lappeenranta University of Technology

Turun yliopisto University of Turku

FINLAND FUTURES RESEARCH CENTRE

NEO-CARBON ENERGY WORKING PAPER 2/2015

TABLE OF CONTENTS

INTRODUCTION

This is a report of the Neo-Carbon Energy project contributions at the "Futures Studies Tackling Wicked Problems Conference" held June 11-12, 2015 at Turku School of Economics in Turku, Finland. The Neo-Carbon Energy project is funded by Tekes new strategic openings programme and carried out in collaboration between Finland Futures Research Centre, University of Turku, Technical Research Centre of Finland VTT Ltd (co-ordinator), and Lappeenranta University of Technology (LUT).[1] The Conference was an annual conference organised by Finland Futures Research Centre (FFRC), University of Turku, in co-operation with the World Futures Studies Federation (WFSF) and the Finnish Society for Futures Studies. The Neo-Carbon Energy project engaged the international futures studies community by way of multiple presentations, chairing of sessions, an experimental foresight game workshop, and a poster. The conference was attended by 260 people from 33 different countries.

The ten instances of Neo-Carbon Energy at the conference reported by the editors for this working paper were:

1. "The Neo-Carbon Energy project: Futures research in engineering future energy system" at the poster session with Pasi Peltoniemi
2. "Conscious Technology: Can we envision the future we want while we still have time to shape it?" by Jerome Glenn & Sirkka Heinonen
3. "Pathways towards long-term sustainability of the Finnish energy system" by Michael Child & Christian Breyer
4. "Futures thinking and strategy transformation, CAUSAL LAYERED ANALYSIS Game Session" by Sohail Inayatullah
5. "A CLA game on Neo-Carbon Energy scenarios in action learning" by Sohail Inayatullah, Sirkka Heinonen & Matti Minkkinen
6. "Practical Guide to Using Causal Layered Analysis in Qualitative Futures Studies" by Matti Minkkinen and Petri Tapio
7. "New consciousness: A societal and energetic vision for rebalancing humankind within the limits of planet earth" by Christian Breyer, Sirkka Heinonen & Juho Ruotsalainen
8. "Reverse engineering the state machinery for low-carbon public policy" by Joni Karjalainen
9. Initial findings of the Millennium Project Future of Work 2050 Real-Time Delphi study at Foresight Friday by Jerome Glenn
10. "New Consciousness in Transformational Neo-Growth Society" keynote speech by Sirkka Heinonen

These appearances of the Neo-Carbon Energy project at Futures Conference 2015 are briefly described in the following pages.

[1] See www.neocarbonenergy.fi and http://www.utu.fi/en/units/ffrc/research/projects/energy/Pages/neo-fore.aspx

1. "THE NEO-CARBON ENERGY PROJECT: FUTURES RESEARCH IN ENGINEERING FUTURE ENERGY SYSTEM" AT THE POSTER SESSION

PRESENTED BY **PASI PELTONIEMI**

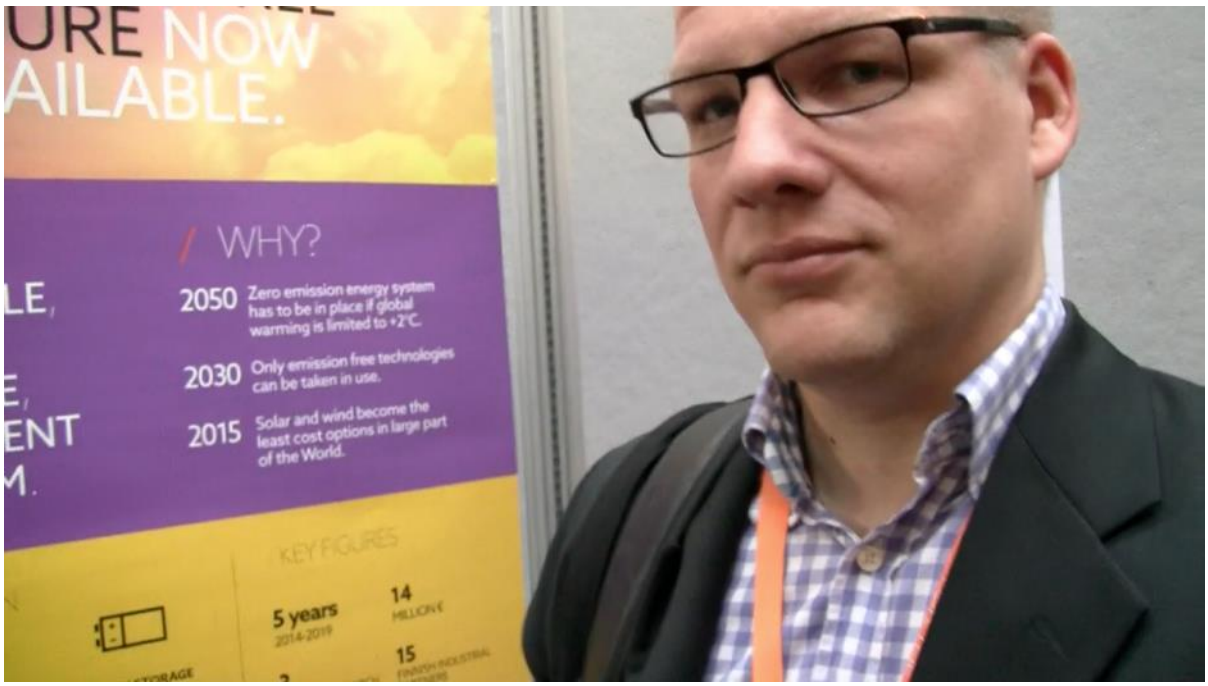


Figure 1. Pasi Peltoniemi presented the NEO-CARBON ENERGY poster at the conference poster session on Thursday, 11 June 2015. Photo: Nick Balcom Raleigh / FFRC.

CONFERENCE ABSTRACT

The Neo-Carbon Energy project is Finland's so far largest renewable energy project. It incorporates futures research with the technological design and modelling of future energy system. Future energy system is understood as a completely renewable energy system mainly based on solar and wind power. The future system with variable production and energy storages is technologically modelled on system and on process level by energy experts. In futures research the aim is to construct scenarios for the Neo-Carbon Energy world in 2050. Energy solutions, cultures, values and business practices vary from scenario to scenario. Merging the scenarios with engineering visions for the system, technology, policy, market and finance futures development paths can be sketched. These can be used for strategy development and building resilience to the third industrial revolution. Four transformative scenarios were developed: i) Radical start-ups where society is business-oriented, but economy is driven by a multitude of small-scale start-ups known for their radical values and approaches. ii) New consciousness where deep ecological values and distributed models have led to altogether new kind of consciousness and worldview. iii) Value-oriented "Techemoths" where peer-to-peer approaches are common, but they are practiced in more or less traditional organisations. iv) Green DIY Engineers where engineer-oriented citizens have organized themselves as local communities. The scenario sketches have been formed using two axes: Peer-to-peer and Ecological awareness.

Key words: Renewable energy, wind power, solar power, energy storage, energy system

HIGHLIGHTS

- The Neo-Carbon Energy poster explains the goals, components, and timeline of the Neo-Carbon Energy research project.
- It features the logo, the motto “Trust in Renewables,” and the program’s three key points Emission Free, Cost-Effective, and Affordable.
- The poster indicates wind, solar, and storage are technologies of interest in this project.
- Key figures regarding the research project including number of partners, timeline, and budget.

POSTER DETAIL

Figure 2. The NEO-CARBON ENERGY poster had a prominent placement in the poster session. Photo: FFRC.

VIDEO

Pasi Peltoniemi presenting Neo-Carbon Energy
https://sites.google.com/site/futuremediac/videos--presentations

2. CONSCIOUS TECHNOLOGY: CAN WE ENVISION THE FUTURE WE WANT WHILE WE STILL HAVE TIME TO SHAPE IT? AT SESSION 2 – STUDIES ON FUTURES RESEARCH I: TECHNOLOGY AND FORESIGHT

PRESENTED BY **JEROME GLENN** AND **SIRKKA HEINONEN**

Figure 3. Jerome Glenn, CEO and co-founder of the Millennium Project, described possibilities for the merger of technology with humans. Photo: FFRC

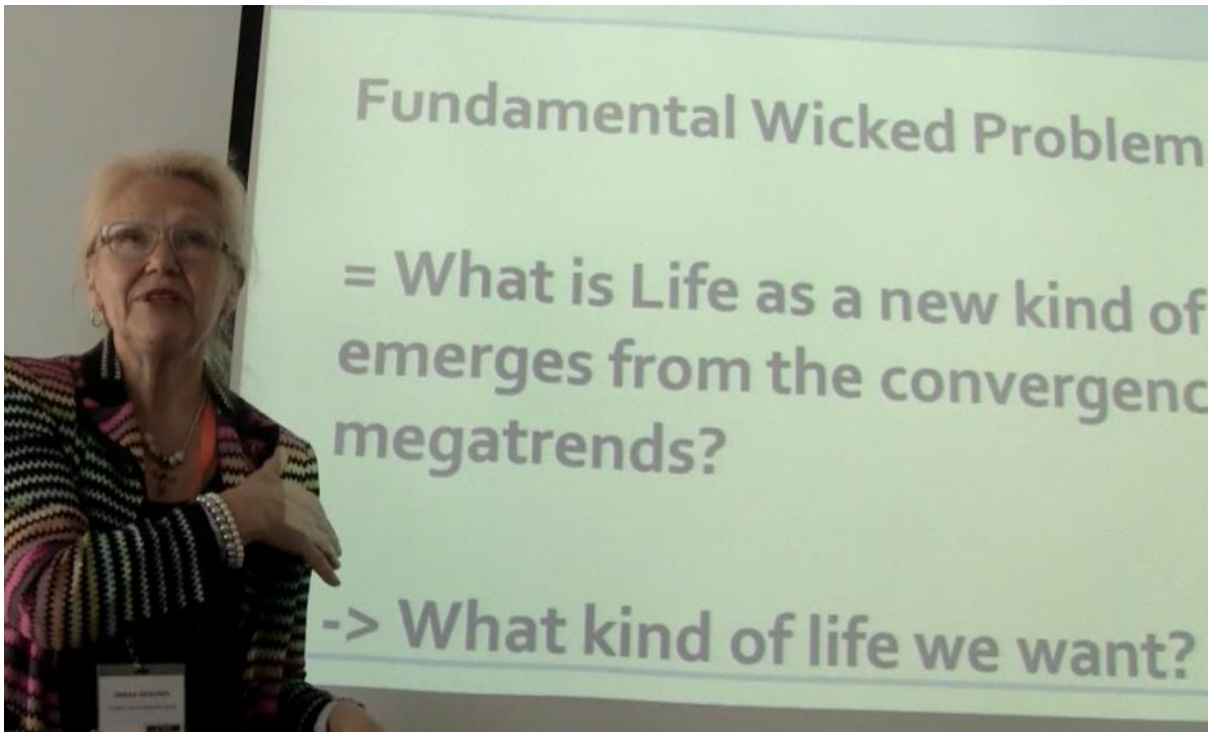


Figure 4. Sirkka Heinonen, research director at Finland Futures Research Centre raised questions about what will life be like and what kind of life do we want in a future of conscious technology. Photo: FFRC

CONFERENCE ABSTRACT

We are moving from the Information Age into the Conscious-Technology Age, which will force us to confront fundamental questions about life as a new kind of civilization emerges from the convergence of two mega-trends. First, humans will become cyborgs, as our biology becomes increasingly integrated with technology. Second, our built environment will be digitized and incorporate more artificial intelligence (AI). The Internet of Things (IoT) and Big Data will accelerate this phenomenon. With the fast speed of technological developments, technology foresight should be more highlighted as regards emerging societal impacts and wicked problems. Conscious-technology also raises profound dangers, including AI rapidly outstripping human intelligence when it becomes able to rewrite its own code, and individuals becoming able to make and deploy weapons of mass destruction. Minimising these dangers and maximising opportunities – such as improving governance with the use of collective intelligence systems, making it easier to prevent and detect crime, and matching needs and resources more efficiently – will require actively shaping the evolution of conscious-technology. The preferred vision of the future world permeated by conscious-technology must include transparent value premises and ethical considerations.

Key words: Conscious technology, collective intelligence, Information Age, cyborgs, artificial intelligence (AI), Internet of Things (IoT), Big Data, digitalized built environment, technology foresight, values

HIGHLIGHTS

- When general AI arrives, humanity will face a species we cannot outthink − so if you cannot beat them, join them!
- Comparing Mystic to Technocratic approaches to futures − the mystic goes to shared consciousness as the first strategy while the technocratic goes to technology.
- Conscious technology merges mystic attitude with a technocratic way of organizing.
- Glenn sees the convergence of technology leading to a blurring of consciousness.
- How can we know conscious technology will develop in a good way?
- Sirkka asked what is life as a new kind of species?
- When AI can rewrite itself, there is a huge span of dark sides in terms of risks.
- We have history of using technology to master nature − humanity will need to learn to use technology to live in harmony with nature.
- The focal question asked by the presenters is, “What is the preferred vision of the future of conscious technology?”

ABOUT JEROME GLENN, CEO OF THE MILLENNIUM PROJECT

Jerome Glenn is co-founder of the Millennium Project and has over 35 years of futures research experience working for governments, international organizations, and private industry. He has co-authored the State of the Future report, tracking 15 global challenges, for last 12 years and published hundreds of papers in distinguished journals.

Sirkka Heinonen from Finland Futures Research Centre has been Co-Chair of the Helsinki Node ever since its beginning in 2001. She has over 35 experience in futures studies. During the years 1979–2007, she was specialised in technology foresight and research on future of cities at VTT. Since 2007 at FFRC, University of Turku as Professor and Research Director.

Figure 5. Sirkka Heinonen, Chair of the MP Helsinki Node and Jerome Glenn. Photo: Anne Arvonen / FFRC.

SLIDES AND VIDEO

"Conscious-Technology as Post-Information Age: Can We Envision the Future We Want While We Still Have Time to Shape It?"
https://futuresconference2015.files.wordpress.com/2015/06/glenn_heinonen.pdf

"Interview of Jerome Glenn on Millennium Project and Collective Intelligence" (video)
https://sites.google.com/site/futuremediac/videos--presentations

Millennium Project website
http://www.millennium-project.org/

Helsinki node activities of 2015
https://sites.google.com/site/futuremediac/videos--presentations

Jerome Glenn was also special guest for Foresight Friday (see below in chapter 9), see also an article in conference edition of *Futuuri* newsletter (Confluence of Technologies Redefining Work – Previewing Millennium Project's Future of Work and Technology 2050 Study at Foresight Friday by Balcom Raleigh 2015, p. 9). http://ty.fi/futuuri2015

3. VISION AND INITIAL FEASIBILITY ANALYSIS OF A RECARBONISED FINNISH ENERGY SYSTEM: RESULTS FOR ENERGYPLAN SIMULATIONS OF 2050 FINLAND AT SESSION 2 – STUDIES ON FUTURES RESEARCH: CASES ON ENERGY SYSTEMS

PRESENTED BY **MICHAEL CHILD**

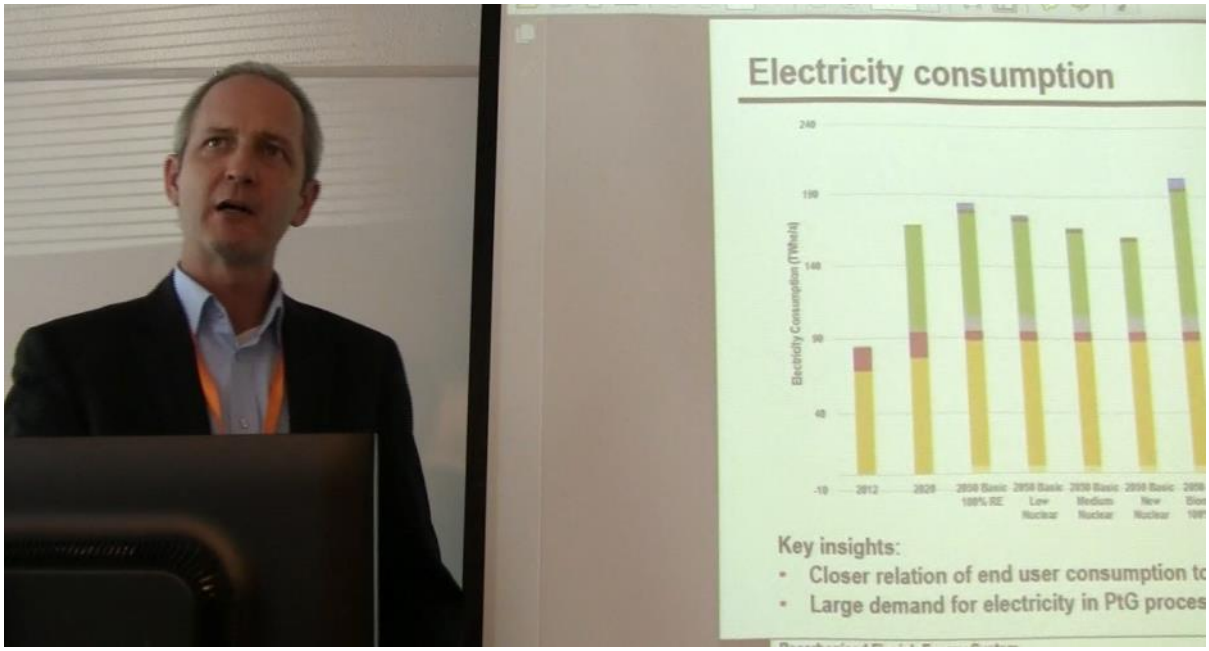


Figure 6. Michael Child from Lappeenranta University of Technology presented his modelling research which included a scenario in which Finland is running on 100% renewable energy. Photo: FFRC.

CONFERENCE ABSTRACT

The Finnish energy system is at a crossroads due to an aging system of power generation, opinions about different modes of low-carbon energy generation, responsibilities to mitigate climate change, worries of fluctuating energy prices, goals regarding national energy security and a wish to both retain a competitive industrial sector and meet the needs of a future society. The purpose of this research is to examine the components of a fully sustainable energy sector for Finland in 2050. A key motivation is to examine the benefits of Power-to-Gas (P2G) and energy storage systems. Naturally, there are several potential pathways towards the future. At the same time, there are a number of technological decisions related to energy use and production that are made years in advance and influence future possibilities for decades to come. Among these are the roles of renewable energy technologies, nuclear power, energy system infrastructure, and storage systems. Several scenarios were analysed in order to determine cost optimal solutions that meet the needs of future Finnish society. Our research concludes that a 100% renewable energy scenario including P2G and energy storage is the least cost solution for Finland in 2050 when compared to scenarios that include nuclear power generation. Unique amongst other modelling of the Finnish energy system, we incorporated the power, heating/cooling and mobility sectors. As well, we offer complete transparency of all technological and economic assumptions. Results assure the reliability and sustainability of a 100% renewable energy system at an hourly resolution.

Key words: Renewable energy, sustainability, Power-to-Gas, energy storage

HIGHLIGHTS

- Michael Child presented work he did with his doctoral dissertation supervisor Christian Breyer in modelling 100% renewable energy futures for Finland in the year 2050. The 100% renewable energy futures were calculated alongside scenarios featuring other mixes of energy sources.
- A key connection to Neo-Carbon Energy project is to explore the roles different storage technologies could play to address intermittency.
- The project's aims were to look beyond the horizon to the recarbonization of the Finnish Energy System, to present plausible future images from which to work backwards, and to broaden the conversation regarding energy matters.
- Recarbonization means that carbon-based gas is still a fuel source, but instead of coming from fossil fuels, it comes from BioEnergy or synthetic gas produced from renewable energy.
- The scenarios were produced using EnergyPlan simulation tool.
- The research team has placed great emphasis on transparency in publishing their assumptions and data sources.
- The numbers for wind and solar are huge compared to today's levels, but within theoretical and economically feasible limits.
- The scenarios show the costs for business as usual (BAU) and scenarios with more nuclear power go into fuels, whereas primary costs for renewable energy go into infrastructure investments.
- Child pointed out how PV has lower Levelized Cost of Energy (LCOE) than wind, but produces most of its energy during summer months requiring more storage than wind would.
- So far, the results say: 100% renewable energy futures are cost competitive with other energy mixes.
- A high level of energy independence seems achievable, but questions remain about how future Finns will see security as cooperating with neighbours or doing everything themselves.
- Renewable energy should play a prominent role in future modelling projects.
- Further study is needed regarding how people will choose to live, perceive risk, and see the role of energy in their lives. This is where the four transformational Neo-Carbon Energy scenarios come into play.
- Markku Wilenius asked what it will take to reach a 100% renewable scenario. Child gave a qualitative answer: it depends upon what energy infrastructure projects people will accept
- Christian Breyer chimed in from the audience to answer from the quantitative perspective: it would take roughly $5M per year of investments.

SLIDES

"Vision and Initial Feasibility Analysis of a Recarbonised Finnish Energy System: Results for EnergyPLAN simulations of 2050 Finland" by Michael Child and Christian Breyer

https://futuresconference2015.files.wordpress.com/2015/06/michael-child.pdf

4. INTRODUCTIONS TO THE CAUSAL LAYERED ANALYSIS GAME SESSION AT SESSION 4 – RESEARCH TOOLS: CAUSAL LAYERED ANALYSIS (CLA)

PRESENTED BY **SOHAIL INAYATULLAH** & **SIRKKA HEINONEN**

Figure 7. Creator of futures research method Causal Layered Analysis, Sohail Inayatullah presented about the method. Sirkka Heinonen introduced him, described the purpose the game, presented the Neo-Carbon Energy scenarios, and chaired the first Session on CLA. Photo: FFRC.

HIGHLIGHTS

- Sohail Inayatullah presented about Causal Layered Analysis including some of his insights from developing and applying the method in his consulting work.
- Causal Layered Analysis (CLA) is a futures research method that investigates the layers of a given future image or scenario:
- The top layer is Litany and focuses on “what is said”, the second layer is System and focuses on “what happens” and “causes and effects”.
- The third layer is Worldview and focuses on “what is believed,” and the fourth, deepest layer is Metaphor/Myth – the larger narratives that inform the other layers.
- The general premise of CLA is that changes in deeper layers appear in upper layers.
- Sirkka Heinonen presented the four Neo-Carbon Energy scenarios, described the launch of this game experiment and provided general instructions for the game.
- More details in next section, “A CLA Game on Neo-Carbon Energy scenarios in action learning”.

SLIDES & RESOURCES

"A CLA game on Neo-Carbon Energy scenarios in action learning"
by Sohail Inayatullah, Matti Minkkinen & Sirkka Heinonen
https://futuresconference2015.files.wordpress.com/2015/06/inayatullah_minkkinen_heinonen1.pdf

"Experimental Futuring through Serious Gaming" by Sirkka Heinonen
Blog post on Futures Studies Tackling Wicked Problems website
https://futuresconference2015.wordpress.com/2015/06/08/experimental-futuring-through-serious-gaming/

What Works: Case Studies in the Practice of Foresight
By Sohail Inayatullah

Books by Sohail Inayatullah including *CLA 2.0* (2015)
http://metafuture.org/books/

5. A CLA GAME ON NEO-CARBON ENERGY SCENARIOS IN ACTION LEARNING AT SESSION 4 – RESEARCH TOOLS: CAUSAL LAYERED ANALYSIS (CLA)

SOHAIL INAYATULLAH, SIRKKA HEINONEN & MATTI MINKKINEN

Figure 8. It required a team effort to create the CLA Game session. From left to right, Sofi Kurki, Sirkka Heinonen, Sohail Inayatullah, Marjukka Parkkinen, Joni Karjalainen, Juho Ruotsalainen, Matti Minkkinen, and Nick Balcom Raleigh. [2]

Figure 9. Juho Ruotsalainen (standing, left) and Joni Karjalainen (standing, right) moderating Groups 4 and Group 5.

[2] The Futures Clinique concept includes moderators' training by the leader of the Clinique. Each moderator gets training and detailed instructions for moderating his or her own group and documenting and commenting the results.

Figure 10. Marjukka Parkkinen moderates Group 2. Two of the four groups are in the background. Photos: FFRC

HIGHLIGHTS

- The participants split into five groups, each assigned one of the four Neo-Carbon Energy scenarios—two groups worked on "New Consciousness."
- Groups completed the following tasks in relation to each CLA layer:
    - **Litany:** The group reviewed a "newspaper" from the year 2035 in their scenario;
    - **Systems:** Brainstormed possible causes that led to that future in terms of political, economic, social, technological, environmental, and cultural dimensions and placed these causes on a PESTEC Futures Table;
    - **Worldview:** Each participant selected a role and considered what would be motivating and threatening about the scenario from the role's perspective, and who were allies or enemies among the other roles.
    - **Metaphor/Myth:** Each participant comes up with a "metaphor" or "myth" for the scenario from the role's point of view.
- All groups reported back to a larger session chaired by Sohail Inayatullah. He encouraged groups to "sell their scenarios." Groups responded by presenting their scenarios in character, each participant describing the scenario from their role's perspective.

FOUR SCENARIOS

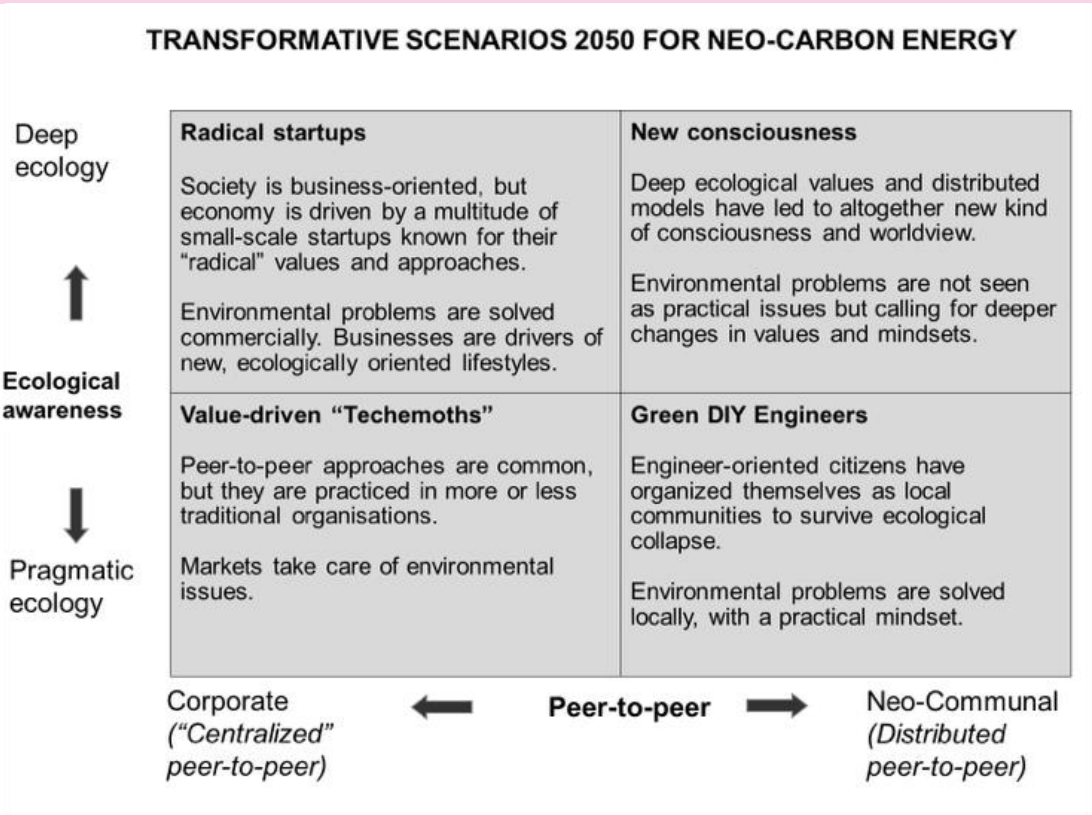


Figure 11. The four scenarios for Neo-Carbon Energy all start from the premise of a 100% Renewable Energy system. They are drawn from the quadrants made by the axes of Peer-to-Peer and Ecological Awareness.

GROUP 1: RADICAL STARTUPS

Moderated by ***Sofi Kurki, doctoral student at FFRC***

Figure 12. Group 1 working on the first task, identifying systemic causes for the future image presented in the news article. Futures Method used to do so was PESTEC Future Table. Photo: FFRC

SYSTEMIC CAUSES (PESTEC FUTURES TABLE)

Entrepreneurship pervades the whole society in this scenario **(Economical)**: the social security number issued to citizens also functions as the VAT identification code of their eventual business(es). Instead of a traditional democratic process, there is a **marketplace of ideas**, where **startups post their ideas** for developing the community, and the **citizens can vote** for the ones that they want to see implemented **(Political)**. S**chooling is completely intertwined, if not merged, with work and play**, and is constructed on the concept of **lifelong learning (Social)**. Smart cities with their ubiquitous ICT's are like the second nature around the people of this scenario, and functions as a **network of competing but compatible apps (Technological)**. This also enables the environmental sustainability, which is based on **digital monitoring the use of natural resources (Environmental)**. Fitting to the general mentality of this scenario, also bio-capacity of the ecosystem is conceived as a service: each individual is allotted their limit, but there is a possibility to pay for additional services.

METAPHORS

For a startup entrepreneur the metaphor of the world is **"win-win-win"**, as earning money and saving the planet happens by having fun. Another startup entrepreneur asks if s/he has died and gone to heaven, since the world appears to be a **"utopia"** to him/her. Business angel number one considers the world as **"New York"**, and angel number two refers to **"lottery"**, where only few win, many loses and all are hopeful. High school student feels that s/he is **"Tired of entrepreneuring"**. Marginalized person number one uses **"entrepreneur of your life"** as a metaphor. The marginalized person number states that **"everybody has value"**, because being born as an entrepreneur will give him/ her a chance, and s/he has learned to find her/ his power. Marginalized person number three uses **"Reversed Truman Show"** as a metaphor, as without technology s/he has no access, and s/he remains invisible and excluded, outside looking in. For the crowd facilitator the world is **"fruit of the poisonous tree"**.

GROUP 2: VALUE-DRIVEN ”TECHEMOTHS”

Moderated by ***Marjukka Parkkinen, student at Master's Programme in Futures Studies.***

Figure 13. Having selected game roles, Group 2 members discuss and review their PESTEC of causes to write what is motivating and threatening to them about this scenario. Photo: FFRC

SYSTEMIC CAUSES (PESTEC FUTURES TABLE)

In this scenario **governments have failed at producing welfare. Large companies have replaced governments in many tasks** that have traditionally been considered to belong to the government. **(Political)** One of these examples is the protection of economic sustainability. Although **“techemoths” have taken responsibility to protect the environment,** it is done because **environment has market value (Environmental).** As **cities have been built around the “techemoths”,** people who **are not working for these companies are also excluded from various other aspects of life**. The power status of “techemoths” thus **creates isolation of groups of people (Social)**. Among the “techemoths” there is a **hard competition for talent (Economic)**, and it can be said, that **talent will make you an insider.** Any **occurring resistance against the centralized power is appropriated by the centralized power itself (Cultural)**. The **Neo-Carbon state** of society has been made possible by **breakthroughs in carbon capture and geo engineering.**

METAPHORS

For the CEO of a “techemoth” the world appeared as a **“playground and cornucopia of resources”**. The employee of a “techemoth” stated that the situation reminded her of **“luxury isolation”**, although the world was not the highest positioned **“penthouse”** for her/him, it is at least a **“skyscraper”**. For a marginalized person the world reminded a **“luxury jail”**. For an underground anti-corporate hacker number 1 the metaphor was **“Closed door”**, where as the second hacker stated the world to be like a **“dark cave/**

evening with a light in the end of the tunnel". The second hacker stated, that although the world is dystopian and ruled by the elite, resistance provides hope for the eventual radical change in the society. Transhumanist saw himself as a **"warrior"** and **Don Draper of the 21st Century**, who is **willing to sacrifice everything to win.** Out of the two small entrepreneurs, the other already felt like winning, as the metaphor was "**lottery"**. Another small entrepreneur also felt like the world was beneficial for him/her, as s/he felt like **"the beetle in the anthill"**. Even though a beetle is a parasite of the anthill, **ants believe that the beetle is an ant and they feed it.**

GROUP 3: GREEN DIY ENGINEERS

Moderated by Matti Minkkinen, doctoral student, and Nick Balcom Raleigh, student at Master's Programme in Futures Studies

Figure 14. Group 3 showing each other the roles they selected to select an ally and an enemy. Photo: FFRC

SYSTEMIC CAUSES (PESTEC FUTURES TABLE)

Because **nobody has stepped up to challenge multinational corporations** in their pursuit of short-term profits over sustainability, the **overconsumption of energy skyrocketed** which led to the **collapse of global markets and exchanges** (**E**conomic). This chain of causes and effects **led to a prevailing attitude among people – "If *they* won't fix it, *we* will"** (Political). The new attitude fed the development of a **new global economic system and economic order** (Economic, again). The **emphasis on local and practical life** within **dispersed and relatively closed local communities** has **brought families and relatives closer together** and family bonds are strong (Social). After the old world economic order collapsed, there is **little to no money for high-tech investments –** only low-tech and highly practical solutions are viable in the market. **Technology primarily takes the form of products instead of services.**

(Technological.) The dispersed and **local communities are sustainable and in harmony with nature** (Environmental). **Redevelopment of localities in a grassroots way has led to a stronger sense of pride in community** − for instance, people are proud to live in Alvar Aalto Organic Otaniemi (Culture/Consumer/Citizen).

METAPHORS

Two participants chose to be Retired University Teachers—one expressed some unease in her metaphor **"The kids have taken over"**, while the other expressed a similar sentiment with **"Sleeping on the edge."** The Retired Civil Servant said her metaphor was **"Harmony inside the fences,"** aside from a shortage on certain wines, life is pretty good inside Alvar Aalto Organic Otaniemi. The Synthetic Biologist had the metaphor of **"Thriving Creativity"** imagining there would be plenty of opportunities to generate new life forms to solve various problems (food, lack of ecological diversity) after the collapse. The Artist saw this DIY Green Engineers future as **"Automaton (Beautiful Machine)"** and the locality as an **"Oasis in the Desert"** for creative people like him. The Retired Employee of a Multinational Corporation saw her role's metaphor as **"Passion never ends. Continue what you are happy with. New Entrepreneur,"** identifying the end of her company's hold on her life within the context of the DIY spirit as a thrilling new path. The Con Man, a role invented by a participant, identifies his metaphor as **"Trust me, this is a new type of water purifier"** as an example of the type of con his role would sell to the other roles. The Religious Extremist sees this future **"Post-Doomsday,"** after a great collapse predicted by her religion. The Deep Ecologist sees this future as closely aligned with the values she's been advocating all along with a metaphor of **"Back to Basics."** The group found one of the ideas from their PESTEC to be the unifying metaphor for the scenario, **"If they won't fix it, we will."**

GROUP 4: NEW CONSCIOUSNESS

Moderated by ***Joni Karjalainen, project researcher at FFRC***

Figure 15. Group 4 presenting their work. Encouraged by Sohail to "sell their scenarios", the groups created impromptu skits in which their roles presented their future. Photo: FFRC

SYSTEMIC CAUSES (PESTEC FUTURES TABLE)

Wrong useless public policies and the failure of national governments had enabled the forming of new global consciousness (**Political**), for which a prosperous, efficient economy was the main prerequisite, using singular, digital currency (**Economic**). In such a world, diversity and even new family structures (e.g. man/woman, woman/woman, human/machine, real-virtual etc.) would be possible (**Social**). **Technology** would be **omnipresent and implanted in body at birth**, and would **help overcome linguistic barriers** in real time. An **inherent love for nature would** have to prevail in order for ecological problems to be solved (**Environmental**). **Culturally,** there seemed to be **two lines of thinking** – one envisioning technophilia where **technology is adopted intimately without questions.** However, **new consciousness might also require religion(s) as enablers.**

METAPHORS

The child saw this world as **"one river"** since everyone's education would be more or less uniform, and all people would be connected. The representative of the world government seemed content of envisioning such a **symbiotic system (of technology and governance),** and also a retired civil servant envisioned a **systematic world.** For a retired employee of an oil company, this world was **a wild torrent** beyond his/hers control. For the spiritual guru, the world of **ubiquitous technology** for "flower power" was *a black hole*, **undermining**

traditional spirituality, and still likely **too focused on the techno-economic nexus.** For the secularist dissident, **global governance represented threatening collective pressure**. The robot perhaps stood out from the rest viewing **this world as a new frontier, where (s)he/it is the cowboy.** The hippie stated **"gay dance".**

GROUP 5: NEW CONSCIOUSNESS

Moderated by Juho Ruotsalainen, project researcher at FFRC

Figure 16. Group 5 presented by performing they were in a TV news story, the news anchor (right) miming she was holding a microphone. Photo: FFRC

SYSTEMIC CAUSES (PESTEC FUTURES TABLE)

Group 5 identified systemic in the **political** row as **"global governance but also less government"**. Resource-based **economy with no money**, a new economic concept **not based on consumption**, and **dominance of sharing economy** (**Economic**). Border between "me" and "group" in conflict (**Social**). Technology and consciousness combine into a "techno-consciousness" and transhumanism, the idea that humans are enhanced by technology, becomes dominant (**Technological**). **Biophilia** – humanity's inherent love of nature, a growing demand of equity of all life forms, and the **realization that humans and nature are on the same level** (**Environmental**). Post-individualism, **greater awareness of interconnectedness due to the ecological collapse**, and the four intelligences of humans (**Cultural**).

METAPHORS

From the perspectives their various roles, the Citizen Activist had chosen the metaphor of **”Butterfly,”** the Secular Dissidents (there were two) chose the metaphors of **”Spiral,”** and **”Ying & Yang”**, the Representatives of World Government chose **”Youthful Governance”** and **”All is the Same”,** the Retired Civil Servant chose **”We”** and the Artist chose **”Age of Love.”**

FURTHER INFORMATION

CLA Game Report eBook (forthcoming):
https://www.utu.fi/en/units/ffrc/publications/Pages/FFRC-eBooks.aspx

“New ideas for a novel energy system sparked at Futures Clinique”
Sitra Blog post by Sirkka Heinonen
http://www.sitra.fi/en/blog/carbon-neutral-industry/new-ideas-for-novel-energy-system-sparked-futures-clinique

The CLA Game on Neo-Carbon Energy project will be developed further at FFRC.

6. PRACTICAL GUIDE TO USING CAUSAL LAYERED ANALYSIS IN QUALITATIVE FUTURES STUDIES AT SESSION 4 – RESEARCH TOOLS: CAUSAL LAYERED ANALYSIS (CLA)

PRESENTED BY **MATTI MINKKINEN**

Figure 17. Matti Minkkinen, a doctoral candidate in futures studies at Turku School of Economics, presents research he and professor Petri Tapio co-authored regarding practical matters related to using CLA in research. Photo: FFRC

CONFERENCE ABSTRACT

Causal Layered Analysis (CLA) is a qualitative futures studies method for analysing the layers of meaning in qualitative research material in order to identify and build images of the future. Typical materials are texts, visual material (pictures, videos) or tape-recorded speech, e.g. from a workshop, individual inter-views or focus groups. With the CLA process the researcher analyses and interprets the material to four layers: 1) litany, 2) system, 3) worldview and 4) myth. The layers make sense and bear an important lesson to be learned in foresight processes, but in practice placing aspects of the research material to the four layers has proven difficult and less clear. In this paper, we examine the intersections between CLA and standard qualitative research methods. We offer a solution to the problem by showing how reflexive interpretation and the key concepts of qualitative content analysis (QCA) help in the analysis and interpretation process as well as in the identification of the future images. The contribution of the paper is twofold. On the one hand, CLA is interpreted as an extension of qualitative methods, and futures re-searchers can thus draw on the extensive qualitative research literature. On the other hand, standard social scientific methods do not work directly for futures studies, but they must be reframed to study images of the future. We argue that, once reframed, qualitative social scientific methods can offer powerful tools to futurists and increase the validity of creative and heuristic futures studies.

Key words: Causal layered analysis, qualitative content analysis, images of the future

HIGHLIGHTS

- Matti Minkkinen presented practical issues in conducting scientific futures research using Causal Layered Analysis.
- He walked through an example of labelling segments in texts to analyse themes as a means to generate metaphors.
- Inayatullah responded to Minkkinen's remarks.

SLIDES

"Practical Guide to Using Causal Layered Analysis in Qualitative Futures Studies"
by Matti Minkkinen and Petri Tapio
https://futuresconference2015.files.wordpress.com/2015/06/matti-minkkinen_petri-tapio.pdf

7. NEW CONSCIOUSNESS: A SOCIETAL AND ENERGETIC VISION FOR REBALANCING HUMANKIND WITHIN THE LIMITS OF PLANET EARTH AT SESSION 11 – TOWARD A FUTURES MOVEMENT: RESEARCH COLLABORATION ON CLIMATE CHANGE AS AN OPPORTUNITY TO BUILD A FUTURES CONSCIOUSNESS FOR GLOBAL SUSTAINABILITY

PRESENTED BY **SIRKKA HEINONEN** AND **CHRISTIAN BREYER**

Figure 18. Prof. Sirkka Heinonen presented the four transformational scenarios of Neo-Carbon Energy project, asking "Is [the New Consciousness scenario] a preferred future?" Photo: Nick Balcom Raleigh / FFRC

Figure 19. Prof. Christian Breyer described reasons for urgency for switching to renewable energy. Photo: Nick Balcom Raleigh / FFRC

CONFERENCE ABSTRACT

Humankind has reached a level of ongoing crises, which is mainly due to an unsustainable energy system and the non-acceptance of planetary boundaries. On a more fundamental level the crisis is caused by the prevailing worldview and values. Universally accepted values of today emphasize material wellbeing and growth, consider nature only as resources to be exploited by humans, and neglect the notion that humans are connected to each other and to nature on a very fundamental basis.

Currently, 140% of the resource and absorption capacity of planet earth is required for human activities and the trend is against rebalancing. The dire consequence will be a collapse of the hosting capacity of our planet, as a simple matter of fundamental environmental facts. There is a sense of urgency to tackle this wicked problem of growing unsustainability and breaking the planetary boundaries. Futures research should focus its major efforts on addressing it. From the framework of 15 Global Challenges by the Millennium Project, four challenges are directly dealing with this issue and the rest 11 challenges are indirectly concerned as well.

We would like to draw a world, which is mentally, ethically and spiritually aware of the fundamental limits and the requirement to live in harmony with 'mother earth'. This describes nothing else than a new level of evolutionary development of humans and can be called 'New Consciousness'. The two major drivers in that new world beyond the limits of today's economic, societal and governmental limits are a very deep ecological orientation of humans, which goes hand in hand with a global, technology-enabled peer-to-peer interaction. Everything is part of the global network but as much as possible is organised on a local level and the final goal is to optimise the attitude of thinking global and acting local.

Such a fully sustainable society is sketched and on that basis a very first estimate is given on the requirements and consequence for a fully sustainable energy supply in the second half of the 21st century. Negative environmental impacts have to be reduced close to zero: energy has to be harvested in a highly sustainable way, CO_2 needs to be removed from the atmosphere, nuclear waste needs to be neutralised and standards of living in respect to energy services have to be guaranteed for the whole humankind at least on the level of today's developed world.

Based on the qualitative sketch of the 'New Consciousness' society created in the Neo-Carbon Energy project, a very first preliminary quantitative estimate is presented. It remains unclear and from today's perspective even improbable whether humankind is able to go for that evolutionary transition in the future, however, nearly all other options might end in a collapse scenario in the dimension of geological history.

Key words: Sustainability, new consciousness, renewable energy, peer-to-peer

HIGHLIGHTS

- Climate Change is a wicked problem, or even a super wicked problem. In this age of crisis, Neo-Growth is a solution.
- Wicked problems such as climate change require long time horizons and solutions built on strong visions in order to be tackled, yet time is running out.
- The universalization of energy is a global trend as living standards converge.
- Our utilization of renewable energy in minimal while we keep building nuclear, even with its higher costs and higher risks.
- Today, more subsidies go to fossil energy than renewable energy.
- A 100% renewable energy world is possible – all the technology we need is available.
- Power-to-Gas is a storage technology that can address intermittence.
- New Consciousness is a radical, transformative scenario in a Neo-Growth world.
- The project combines foresight of societal change, energy perspectives and quantified data. It's a combination of qualitative and quantitative research.
- By 2050, a zero emission energy system has to be in place if global warming is to be limited to an increase of 2 degrees Celsius. It is critically important.
- The goal is a completely new renewable energy system where energy is emission free, also cost effective and independent.
- This foresight project explores societal implications of this new energy system.
- The whole modern era, about from 18th century to late 20th century was fundamentally based on the idea of progress.
- There are four theses that modern progress is based on:
    1. Societies progress when individuals are given freedom to follow their inherent rationality. Many key authorities, such as for example religions, are questioned.
    2. Knowledge is accumulated through rational sciences.
    3. Democracy is a rational form of governance. Nation states are dominant and representative democracy is the prevailing type of democracy.
    4. Material prosperity has been achieved through natural sciences, technology, and industrial production.
- On the other hand, this progress has certainly many shortcomings:
    - Modern progress has led to unprecedented prosperity and standards of living, but it is not evenly distributed and it has caused a lot of environmental problems based on wasteful use of energy and material. Modern progress has caused the environmental crisis.
    - High emphasis on individuality hinders and prevents cooperation.
    - Growth is narrowed down to mere economic growth.
    - Energy is needed for progress, but for example the question of population growth on our planet–but how can we accommodate 10 billion people within planetary boundaries? It's becoming more and more an impossibility in environmental terms and also from the social aspect.
    - Emphasis on rationality and scientificity undermined other areas of cognition such as artistic creativity. We just heard the presentation where Heal Being emphasizes this kind of artistic creativity—there is growing need for that.
    - Modern progress has emphasized representative democracy. It is a good, of course, but this emphasis has caused us to neglect other forms of democracy, such as direct democracy.

- Neo-growth is unlike de-growth. Neo-growth does not reject growth, but emphasizes new kind of growth that is environmentally sustainable and merges economic growth with cultural, social, and "spiritual growth."
- In this model, politics should be global and technology must be planetary.
- Jim Dator, futures studies professor from University of Hawaii describes four categories of future scenarios: Grow, Collapse, Discipline, Transform.
- All four of the Neo-Carbon scenarios are transformational scenarios—and are all based on renewable energy.
- The four transformational scenarios are:
    - Radical Startups
    - Value-Driven "Techemoths"
    - Green DIY Engineers
    - New Consciousness, the most transformational of the four
- In the New Consciousness scenario, human relationships to nature, to each other, and to themselves had to be completely rethought leading to values of deep ecology becoming the norm.
- Preceding this scenario, there is an ecological crisis and World War III.
- It's emissions-free, least cost model, and independent. But it a preferred future?
- The most important thing is our willingness as a species to survive.
- We are the last generation that can make this conversion.

SLIDES

"New consciousness: A societal and energetic vision for rebalancing humankind within the limits of planet earth" by Christian Breyer, Sirkka Heinonen and Juho Ruotsalainen
https://futuresconference2015.files.wordpress.com/2015/06/breyer-heinonen-ruotsalainen.pdf

Interview of Christian Breyer on 100% Renewable Energy Finland 2050? by Nicolas Balcom Raleigh
https://sites.google.com/site/futuremediac/videos--presentations

8. REVERSE ENGINEERING THE STATE MACHINERY FOR LOW-CARBON PUBLIC POLICY AT SESSION 11 – TOWARD A FUTURES MOVEMENT: RESEARCH COLLABORATION ON CLIMATE CHANGE AS AN OPPORTUNITY TO BUILD A FUTURES CONSCIOUSNESS FOR GLOBAL SUSTAINABILITY

PRESENTED BY **JONI KARJALAINEN**

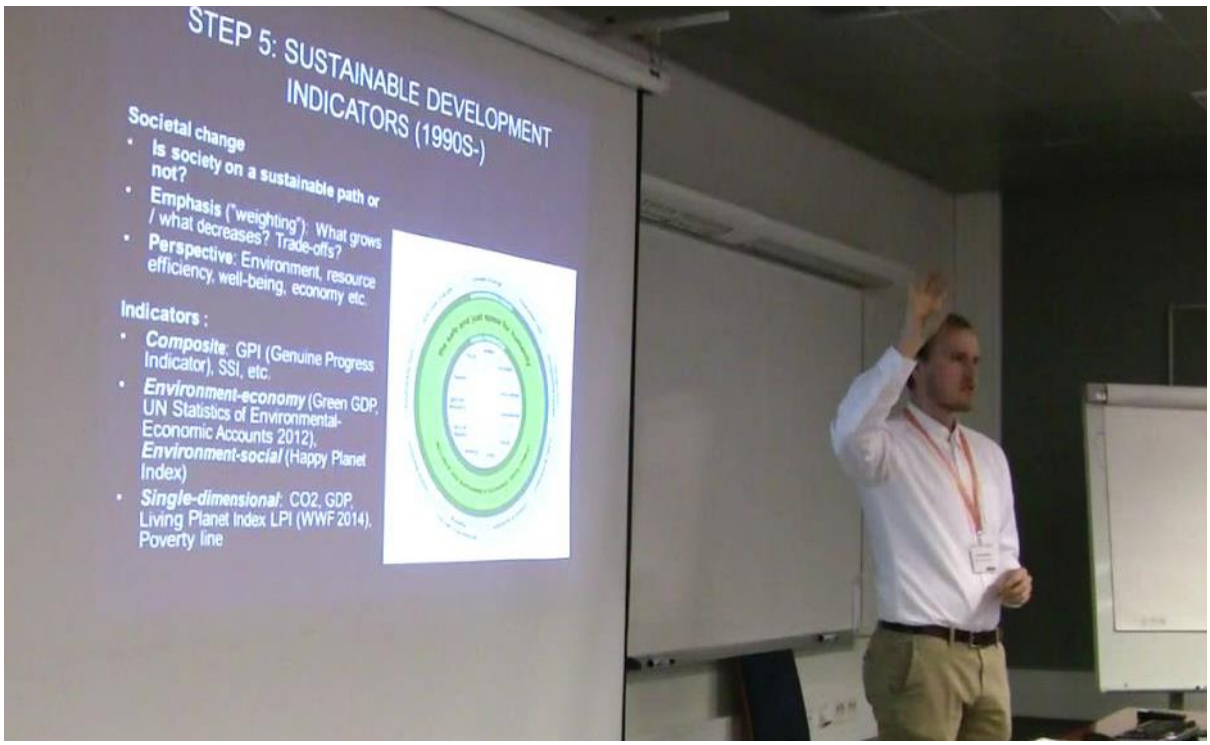


Figure 20. Project researcher Joni Karjalainen described the steps in the evolution of indicators. Photo: FFRC

CONFERENCE ABSTRACT

Remaining within the planetary boundaries and the urgency of moving towards a low-carbon future are recognized challenges of the 21st century. Problematically, the ideological context of conducting public policy has been detached from these biophysical limits.

As a result of the historic origins of the nation-state (wealth maximization, only later well-being and environmental governance), the key indicators used by the state as technologies of governance adhere to standard economic theory. In the 1940s, states took into use the gross domestic product (GDP) to measure the accumulation of material well-being, which also greatly helped the post-Second World War re-construction. However, in this historical process, states paid little attention to the future implications of their energy choices. Today, the world energy system is over 80-percent reliant on fossil fuels. In the 20th century, energy consumption grew 10-fold, and various energy forecasts expect high future energy demand.
In order to resolve this tension, the state machinery may need to be "reverse engineered". This implies the design, experimentation and institutionalisation of new frameworks and technologies of governance.

In order to resolve this tension, the state machinery may need to be "reverse engineered". This implies the design, experimentation and institutionalisation of new frameworks and technologies of governance in both developed and developing countries. Several countries have already taken initial steps. Alternative indicators for tracking sustainable development have been developed, states have set policies and strategies, taken up legal measures such as climate change acts, as well as shifted budgetary allocations to move away from environmentally harmful subsidies. Making ecological or low-carbon indicators visible across inter-governmental platforms (e.g. post-2015 framework and UN statistical database) is also receiving increasing attention.

This paper discusses how the premises of scientific enquiry yield power and influence evidence-based policy-making. The work builds on findings in sociology of science and modelling studies in order to contextualise the epistemological and ontological premises of measurement and valuation. Institutionalist theories have traditionally been unable to explain institutional change, but discursive institutionalism suggests that agents themselves are able to renew institutions. The work summarizes initial findings from the Neo-Carbon Energy project, research about development futures and energy scenarios, as well as a master's thesis work about the role of indicators of sustainable development by the writer.

Key words: Planetary boundaries, low-carbon, indicators, technologies of governance, public policy

HIGHLIGHTS

- The future that is emerging will be different than what we have now, yet governance systems are based on past institutional and historical arrangements. This tension needs to be addressed.
- Indicators are evidence-based autonomous models that inform policy-makers and have increasing prominence in policy debates.
- Indicators shape perception and can be conceived of as a technology of governance.
- In developing sustainable development indicators, what are the institutional pre-requisites for these indicators to have an impact?
- Karjalainen presented two explanations for the power of indicators: 1) Science as an institution with various approaches and branches compared to 2) historical institutionalization of indicators for actual policy-making
- Economic indicators are more frequently discussed than other indicators. Neo-Classical Theory steers public discussion on economics instead of the broader reality.
- Energy often gets left out as an indicator. Why are we still dependent on fossil fuels?
- If we're abstracting the wrong way, we might be focusing on the wrong issues.
- What indicators should we have to best anticipate the needs of future emission-free society?

SLIDES

"Reverse engineering the state machinery for low-carbon public policy" by Joni Karjalainen
https://futuresconference2015.files.wordpress.com/2015/06/joni-karjalainen.pdf

9. FUTURE DYNAMICS OF WORK & TECHNOLOGY ALTERNATIVES TO 2050 – FORESIGHT FRIDAY WITH PRIME MINISTER'S OFFICE AND FINNISH SOCIETY FOR FUTURES STUDIES

PRESENTED BY **ULLA ROSENSTRÖM** AND **JEROME GLENN**

Figure 21. Jerome Glenn explains how the convergence of technologies will change work in 2050. Photo: Marjukka Parkkinen / FFRC

ABSTRACT

Stephen Hawkins, Elon Musk, and Bill Gates are warning the world about the potential dangers of artificial intelligence growing beyond human control. Whether AI does or does not, it is certain that it and other future technologies will have fundamental impacts on the nature of work and economics. A growing body of AI experts believes that if socio-political-economic systems stay the same, and technological acceleration, integration, and globalization continue, then half the world could be unemployed by 2050.We need to think seriously about this now, because it may take a generation or more to make changes necessary to improve our work-technology future prospects.

The results of the Future Work/Technology 2050 Real-Time Delphi conducted by The Millennium Project were presented and discussed in this session. These results will also be used as input to the construction of alternative scenarios and road maps. These drafts will be made available for comment prior to final versions. Strategies will be drawn from these final scenarios and used as inputs to national planning work-shops. National workshops will be initiated by Millennium Project Node Chairs and others who express interest during this process.

The results of the planning workshops will be integrated, distilled, and made available in a variety of media for public discussion. The audience will be invited to comment on this process as well as the results from the Future Work/Technology 2050 Real-Time Delphi study.

HIGHLIGHTS

- Jerome Glenn presented early findings from the Millennium Project's Future of Work and Technology 2050 study
- The study has gathered input from hundreds of futures researchers and practitioners via a first-round Real-Time Delphi questionnaire.
- Glenn presented key ideas from the study including:
- The convergence of radical technologies such as 3D/4D printing, General Artificial Intelligence, robotics, synthetic biology and other fields will lead to 25 percent global persistent unemployment.
- A guaranteed income may become common, liberating people to pursue creative interests.
- Drawing analogy to the "Leisurely Priestly Class" of ancient Egypt, Glenn imagines an integration of technology into humans will lead to the risks and rewards of billions of augmented super geniuses.
- This special Foresight Friday was organized through the cooperation of the Prime Minister's Office, the Helsinki Node of the Millennium Project, and the Finnish Society for Futures Studies.

SLIDES AND VIDEO

"Future Dynamics of Work & Technology Alternatives to 2050"
https://futuresconference2015.files.wordpress.com/2015/06/jerome-glenn-foresight-friday.pdf

Video archive of Foresight Friday featuring Jerome Glenn
https://onedrive.live.com/redir?resid=6BEC141404E29746!2067&authkey=!ACo3UCzZvc0DhIo&ithint=video%2cmp4

Press release of the Future Work/Technology 2050 study by the Millennium project
http://www.prweb.com/releases/2015/04/prweb12672038.htm

"Interview of Jerome Glenn on Millennium Project and Collective Intelligence" (video)
https://sites.google.com/site/futuremediac/videos--presentations

Interview of Ulla Rosenström by Nicolas Balcom Raleigh about Foresight in Prime Minister's office. "Inclusive Foresight for Finland"
http://www.aaiforesight.com/content/inclusive-foresight-finland

Confluence of Technologies Redefining Work – Previewing Millennium Project's Future of Work and Technology 2050 Study at Foresight Friday by Nick Balcom Raleigh in Futuuri 2015, p 9.
http://ty.fi/futuuri2015

10. NEW CONSCIOUSNESS IN TRANSFORMATIONAL NEO-GROWTH SOCIETY AT FINAL SESSION – KEYNOTE SPEAKERS

PRESENTED BY **SIRKKA HEINONEN**

Figure 22. Sirkka Heinonen presented the futures studies basis for the Neo-Carbon Energy scenarios in her keynote presentation. Photo: Marjukka Parkkinen / FFRC

CONFERENCE ABSTRACT

The concept of futures consciousness is pivotal in creating the futures mindset, capable of tackling wicked problems. It originates from futures thinking, futures planning, futures studies, creating futures literacy – the capacity to "read" signals and streams for emerging futures in order to gain futures intelligence. Futures research is not just exploring alternative futures, but also proactively making the preferred futures happen.

Future is about Change. Change has many colours, though: it can be incremental, systematic, radical, fundamental or transformational. The "Grand Theory of Futures" is concerned with the theories of change and transformation processes. If traditional social sciences see change caused by economy and culture, futures studies relies on systems theory – change occurs from a complex interplay of a multitude of different factors. Futures studies sees change not as incremental but transformational. Transformation means systemic, fundamental, radical and profound change, affecting the total system, not just its parts. It is also a quantum leap – transition – to another level of thinking and consciousness, in our society, on our planet, but essentially in our intertwined relation between humans, nature and technology.

Does change always imply growth? In our growth-orientated thinking growth is often synonymous to economic and technological growth – "More is Merrier". However, the

growth that wastes energy and resources, also endangers species on earth, including us humans. Growth is much broader a concept than mere economic growth – it encompasses all things human, even beyond that – all living forms on earth.

Unsustainable growth is not a preferred future, but progress should be adjusted to the Limits to Growth and seen as covering all spheres of life. On the other hand, there are No Limits to Learning, increasing futures consciousness. The growing change in our values and lifestyles towards immaterial renewal and wealth is a desirable future. This kind of societal Neo-Growth model à la Malaska may also yield new techno-economic innovations, while basing its foundation in deep cultural and ethical pursuits.

In my keynote I will briefly present a transformational scenario “New Consciousness” that we constructed in an ongoing Tekes Project “Neo-Carbon Energy”. In total, we sketched four scenarios, which all are transformational. The most extreme scenario probes the boundaries and potentials of our futures consciousness and willingness to adopt a profound change of thinking and lifestyles, and to renew ourselves, not just our energy system towards renewables. Does this kind of transformation require a preceding massive catastrophe to be a possible and preferable future, instead of remaining a ubiquitous utopia?

HIGHLIGHTS

- We need futures consciousness/futures mindset to tackle wicked problems.
- Futures mindset originates from futures thinking, futures planning, futures studies, creating futures literacy, and the capacity to “read” signals.
- Ethical and emotional dimensions of futures consciousness are also important. We also need capacity to feel futures, to experience futures.
- The attempted “grand theory of futures” is concerned with change and transformation.
- Futures Studies relies more on systems theory − change is seen to occur from complex interplay of a multitude of different factors and their interconnected implications.
- Transformation here means systemic, fundamental, radical and profound change, affecting the total system, not just its parts.
- Of the four transformational Neo-Carbon Energy scenarios, New Consciousness is the most transformational because, in it, ecological thinking has been deeply internalized culturally.
- One of the challenges is for Futures Studies is to suggest and propose new approaches for creating, gathering, and analysing futures oriented information.
- The Gilles Deleuze and Félix Guattari's rhizomatic model of knowledge creation based on non-hierarchical sharing and creation can be useful in explaining and anticipating unexpected outcomes.
- In this rhizomatic model of knowledge sharing and creation, the knowledge is not disseminated systematically or logically based on a very hierarchic binary tree model − but rather, it is following an organic way of rhizomes − to grow in all directions. It can be seen as a map with multiple entry ways.

- Pentti Malaska's concept of Neo-Growth, in which progress should be adjusted to the limits of growth, we can merge economy with social, cultural, and spiritual growth. There are no limits on learning or increasing our futures consciousness.
- Growth that wastes energy and resources, [especially fossil] energy and material resources, also endangers species on Earth, including us humans.
- The growing change in our values and lifestyles towards immaterial renewal and wealth is a desirable future.
- The Neo-Growth model may also generate new techno-economic innovations, while basing its foundations that in deep cultural and ethical ethos.
- Developing futures consciousness can be combined with experimenting with new futures research methods, as happened in the CLA Game session at the conference.
- The pathway to the "New Consciousness" scenario include collapse in the form of World War III – but is it required? Or, can the scenario be reached through consciousness transformation?
- Business as Usual (BAU) is the most dangerous thing.
- If futures consciousness is meaning to make transformation happen, perhaps Buckminster Fuller was very practical when he said "You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete."

SLIDES

"New Consciousness in Transformational Neo-Growth Society" by Sirkka Heinonen
https://futuresconference2015.files.wordpress.com/2015/06/sirkka-heinonen.pdf

CONCLUSION

Neo-Carbon Energy project had a higher number of appearances at this international conference than is usually the case with a single research project. This is because the project had an excellent opportunity to present itself for the international foresight community representing various other disciplines, and internationalisation is one the project's strategic focuses. For the next similar conferences the Neo-Carbon Energy project is planned to have the capacity to present – besides the scenarios as elaborated – Neo-Carbon case studies from Argentina, China, Africa and Australia. Overall, these appearances contribute to the internationalisation goal of the overall project by disseminating information and some tentative results, exploring possible applications, as well as inviting comments and perspectives from beyond the project team. Neo-Carbon Energy project team members also made new contacts within the futures research and foresight community, growing the project's international network. These global networks, notably the Club of Rome and the Millennium Project, would play a key role if the world's energy economy is to be transformed into an emission-free Neo-Carbon system. We do this work not only for Finland's future, but for the well-being of all of Earth's inhabitants.

The Neo-Carbon Energy scenarios, under development at the time this report was prepared, will be published when completed. Several brainstorming sessions and compact Futures Cliniques are planned in the coming years to gather more response from various types of participants. Your feedback is also valuable. Professor Sirkka Heinonen and her project team at Finland Futures Research Centre (FFRC) from the futures-oriented WP of the Neo-Carbon Energy project invite readers of this working paper to share their own thoughts and perspectives in the spirit of shaping a bold new vision for renewable and emission-free energy in Finland and the world.

CONTACTS

Correspondence regarding this report may be sent to:

Prof. Sirkka Heinonen, Futures Research Centre, University of Turku
sirkka.heinonen@utu.fi

Dr. Pasi Vainikka – VTT
pasi.vainikka@vtt.fi

Prof. Christian Breyer – Lappeenranta University of Technology
christian.breyer@lut.fi

Prof. Jarmo Partanen, Lappeenranta University of Technology
jarmo.partanen@lut.fi

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Turun yliopisto
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