BOOK OF ABSTRACTS

Futures of a Complex World

12-13 June 2017, Turku, Finland

Updated 2 June 2017

18th International Futures Conference organised by
Finland Futures Research Centre, University of Turku

in association with

Finland Futures Academy
National Foresight Network, Finland
Foresight Europe Network, FEN

www.futuresconference.fi/2017

FINLAND FUTURES RESEARCH CENTRE

Turun yliopisto
University of Turku

ffa
Finland Futures Academy

NATIONAL FORESIGHT NETWORK

Foresight Europe Network

Day 1: Monday 12 June

Venue Session	Katariina	Eerik	Kristiina	Pietari	Juhana	Kustaa	Dining Room
13:00–14:30 Session I	Complexity and Systems Thinking	Futures of Energy: Methodologies	Education on Futures Studies	Futures Organizations and Business Innovation	Methods and Methodology of Futures Research	**Special Session with a Keynote Speech:** Aging Society and Urbanization	Futures of University and Scientific Knowledge *Workshop*
15:00–16:30 Session II	Complexity and Systems Thinking	Futures of Consumption and the Economy	Futures of Education, Learning and Work	Foresight in Technology	Methods and Methodology of Futures Research	Security Forecasting in a Complex World	Futures of Democracy, Society and Values
16:45–18:00 Session III	Challenges and Opportunities for Global Governance	Futures Education	Futures of Consumption and the Economy	Technology Foresight: An Era of Transformation, Human and Technology Interaction	Methods and Methodology of Futures Research	Futures Studies in Science and Technology	Futures Consciousness *Participatory Workshop*

Day 2: Tuesday 13 June

Venue Session	Katariina	Eerik	Kristiina	Pietari	Juhana	Kustaa	Dining Room
9:00–10:30 Session IV	Futures Education	Resilient Futures: Food Safety	Innovation in Future Energy	Futures Technology in Health and Well-Being	Methods and Methodology of Futures Research	Curating the Complexity *Futures Workshop*	The Role of Visions in a Scenario Process - Case "Winland"
10:45-12:00 Session V	Futures of Education, Art and Cultural Studies	Resilient Futures: Water Safety	Complexity in Future Cities	Case Studies: China and Other Countries Outside Europe	Gaming and Virtual Reality in Futures Research	Curating the Complexity *Futures Workshop*	Hallituksen tulevaisuusselonteko työn murroksesta *(in Finnish)*
13:00–13:30 Chaired Poster Session							
13:30–15:00 Session VI	Futures Research, Cognitive Neuroscience and Transformation	Complexity and Systems Thinking in Governance	Futures of Energy	Strategic Thinking and Security Foresight	Methods and Methodology of Futures Research	The Future of Work: An Interactive Workshop on Perspectives among Europe	City of Turku, Foresight System *Round Table*

CONTENTS

KEYNOTE SPEECHES

Prosperity on the Edge of Crisis (or, Why the Trend is Not Your Friend)

Professor John L. Casti
The X-Center, Vienna and Technical University of Vienna, Austria

Major movements in human social progress are almost without exception driven by extreme events ("X-events") that wipe away existing power and social structures that have outlived their usefulness. Example: The asteroid that wiped out the dinosaurs 65 million years ago. Bad news for the dinosaurs but good news for us humans, as that X-event opened up many eco-niches that our ancient ancestors exploited to create the humans of today.

In this presentation, I will make the point that such X-events are a *necessary* condition for major human progress (or regress!). I also argue that the drivers of these rare, surprising and high-impact events are mostly mismatches in the complexity levels of the different subsystems that compose the overall living systems of the time. That ancient asteroid had a much higher level of complexity than the dinosaur society, with the result that that complexity gap or mismatch created a stress that the system was unable to accommodate. Result: Extinction of the dinosaurs and opportunity for other organisms not so vulnerable to that kind of impact.

During the course of this presentation, I will make the argument that virtually all social advances and declines are the end result of just such a complexity mismatch. In modern (i.e., human) times, the mismatch is accompanied by major shifts in the mood of the population (their beliefs about the future, positive or negative). These two factors combine to create not only the X-event, but also the most likely new state that the human system will take in the next major epoch.

These theoretical arguments will be supported by examples taken from areas as disparate as popular culture (the shifts in musical tastes and fashion) to medium timescales events such as the outbreak of war and shifts in political ideology to very long timescale events like the rise and fall of a civilization.

The Future of Work – Scenarios for 2050 from the Millennium Project and beyond

Director Cornelia Daheim
Future Impacts Consulting and President, Foresight Europe Network, FEN

The Millennium Project, an international think tank on global future perspectives, has developed long-term scenarios on the future of work and technology until 2050. The keynote will report on the outcomes on the study, which is based on an international real-time Delphi survey, and on its current phase, where results are reflected upon in national workshops around the world. It will highlight critical issues that arise from the study, such as changes in work forms, the debate on basic income and new social system structures as well as a necessary new understanding of the concept of work, and relate these insights back to changes and disruptions already evident today.

Key words: Future of Work, Jobs & Skills, Automation & technology, 2050, scenarios, Europe

The Lack of Tangibility of the Mid-Term Death

Professor René Rohrbeck
The Aarhus School of Business and Social Sciences, Aarhus University, Denmark

In his research, René Rohrbeck has investigated how successful firms are able to work towards a desired future by planning ahead and shaping the world around them. Firms that stay successful over long periods of time, continuously monitor the environment, employ systems-thinking tools to foresee systemic change, and constantly probe into future markets. In his talk, he will share best practices and recent results that indicate that future prepared firms can expect a 33% higher profitability and a 200% higher market capitalization growth than average firms.

Industry 4.0: The New Production Paradigm and Its Implications for Policy

Professor Kristel Van der Elst
The Global Foresight Group, Switzerland; College of Europe, Belgium

In recent years, there have been signs that manufacturing is entering a new era, sometimes referred to as 'industry 4.0', in which the widespread adoption of ICT is blurring the lines between the human, machine and virtual worlds. This will have a significant impact on the way goods are manufactured, companies do business, economies operate, societies react and markets function, and that gives rise to a host of opportunities and risks.

Industry 4.0 is expected to be a source of significant economic growth in the future. However, these forecasts are tabled on a number of critical assumptions. For industry 4.0 to be a driver to achieve smart, sustainable and inclusive economic growth, policy institutions have to show foresight by reflecting on what might happen and what is needed to accompany this transformation towards a future which is desired and beneficial for society.

The presentation will be based on a paper authored by Kristel Van der Elst, CEO of The Global Foresight Group, as member of the European Commission Expert Group 'Strategic Foresight for R&I Policy in Horizon 2020' (SFRI).

Transforming the Future: Anticipation in the 21st Century - announcing a new UNESCO Publication

Riel Miller
Team Leader Futures Literacy, UNESCO, Paris

(Forthcoming Q3 2017) offers evidence that people all around the world are currently changing the way they *use the future*. This is important because transformations in why and how people use the future change what they perceive and what they do. In turn, this has significant practical consequences for both the meaning and the pursuit of humanity's fundamental goals such as sustainability, social inclusion and peace. Around the world people are experimenting with new ways of integrating complexity into their thoughts and actions. Pushed by the desire to respect and cultivate diversity. Pulled by advances in scientific efforts to understand complex emergent reality. Reacting to the inadequacy of yesterday's solutions.

People are inventing and testing approaches to sensing and making sense that go beyond reductionism and extrapolation. They are embracing collective intelligence knowledge creation and different ways of using the future. They are changing the conditions of change by changing why and how they anticipate, thereby 'transforming the future'.

Towards Multi-Generational Cohabitation in the Era of Matured Aging Society; From the Perspective of S&T Foresight in Japan

Naoki Saito
Deputy Director General, National Institute of Science and Technology Policy (NISTEP), Japan

The aging society poses many challenges and opportunities to nearly all regions, and scientists and policy makers are considering how to make significant contributions to improving the lives of elderly people and enhancing the living conditions of multi-generational families and communities. Especially, Japan is confronting the drastic changes in its population pyramid, and it is anticipated that by 2060, about 40% of the total population will be over the age of 65.

Facing such a future society in advance, it is expected that elderly people will become more dependent on machinery and consume more energy. Thus, there might be an interrelationship between the proportion of the elderly and the level of carbon emissions. Carbon usage can be minimized by improving health conditions and resolving mobility problems by realizing smart and compact city in aging society. Thus it is considered that we would better encourage a harmonization of aging communities and low-carbon society through fully utilizing scientific findings and advanced technology, while pursuing interaction and consensus among multi-stakeholders. In addition, there are growing the number of elderly people without family support. To fully utilize their capability, adequate welfare policies need to be implemented, while incorporating most advanced innovation such as tele-work and remote sensing of health condition at home. We need to take an integrated approach.

In this presentation, I would like to introduce major issues facing the aging society and suggest plausible solutions, by illustrating the Japanese experiences and NISTEP's foresight activities. Finally, I would like to propose a possible transformation of demographic trends of Japan from "population onus" to "population bonus" by widening the share of population which can create a new added-value to the whole society (through extending 'healthy aged life') and thereby lowering the dependency ratio among the whole population. In the end, such a society would be rejuvenated through efficient multi-generational cohabitation between juniors and "active seniors" enriching the quality of life (QOL) of both.

Session I
Monday 12 June at 13:00–14:30

Complexity and Systems Thinking

Time: Monday 12 June at 13:00–14:30
Room: Katariina
Chair: Professor Markku Wilenius

Complex systems studies and predictability of sociopolitical phenomena

Czeslaw Mesjasz
Management Process Department, Cracow University of Economics, Poland

Collapse of the Soviet empire, environmental threats, terrorism, increasing vulnerability of technostructure of modern civilization, financial turmoil are summarised as indicators of growing complexity of the world. A new element in the discourse between policy making and "complexity studies" is resulting from awareness of limited possibility of prediction of social phenomena. A thorough study of the uses of utterance complexity shows that in majority of cases, this term is applied without a sufficiently deep understanding. Numerous applications of the term complexity of sociopolitical systems show that their authors rarely or never realize that there are about 45 interpretations (definitions) of complexity. In some of my publications I tried to explain the subtleties of the meaning of the term "complexity" applied in social sciences. The aim of the paper is to present a survey of concepts showing how complex systems studies (the term complexity science is purposively avoided) can be applied in better understanding limitations in predicting sociopolitical phenomena. The survey of applications of complex system ideas for prediction/anticipation in social theory and policy making will be focused upon two approaches. First, prediction/anticipation of dynamics of social systems with application of mathematical models of complexity ("hard" complexity). Second, prediction/anticipation, with qualitative interpretations of complexity ("soft" complexity) with analogies and metaphors. Examples from security theory and policy, management, and from the discourse on sustainability will be depicted. The survey is a part of my research on the impact of systems thinking upon normative social sciences.

Key words: Anticipation, Complexity of Social Systems, Limits of Prediction/Anticipation, Prediction

Will the future of public administrations be innovative though disruptive? Insights from Wallonia

Vincent Calay[a], Jean-Luc Guyot[b] & Maxime Petit Jean[c]
[a] Foresight and Statistics, Walloon Institute for Evaluation, Belgium
[b] Foresight and Statistics, Catholic University of Louvain and Walloon Institute for Evaluation, Belgium
[c] Political Science Department, University of Liege, Belgium

After an era dominated by the New Public Management paradigm that focused on strategy, governance, performance and evaluation (Bouckaert & Crompvoets, 2016), innovation appears today as the new key

concept in the management of public administrations (De Vries at al. 2016). With it, other concepts such as agility, user-oriented action, public start-ups, open innovation, design thinking and fab labs emerge to challenge traditional ways of designing policies. This trend could involve massive changes in how administrations are currently conceived and managed. Is a process of radical transformation of public action currently emerging under such trends or does it remain a marginal phenomenon? Are creativity and disruption becoming crucial skills for civil servants or do we merely observe the consequences of a change in generations of workers? How does the hierarchical public service infrastructure react to such changes? The paper will discuss those questions by emphasising what is currently at stake under those trends. It will also propose prototypes of scenarios about the future of public administrations that should be discussed. These discussions and scenarios will draw upon the results of a set of workshops and a Delphi survey that will be organised in February and March 2017 with a large panel of key stakeholders active in public institutions in Wallonia, Belgium.

Key words: Public Administration, Public Services, Management, Innovation

The future of deliberative policy-making in Finnish welfare services

Hanna-Kaisa Pernaa
Faculty of Philosophy/Administrative Sciences, University of Vaasa, Finland

The research leans on the perception of increasing welfare policy complexity and therefore, a demand for growing the role of deliberative democracy (DD, equivalent to discursive democracy) in public governance. Despite the efforts of Finnish ministries and public offices in developing citizens' engagement and municipal democracy, the experiments in deliberative policy-making have remained local and relatively small-scale.

The Finnish Institute of Deliberative Democracy defines the conception of DD as follows: "…political decisions can be seen as legitimate if they are based on discussion in which different views and population groups have been equally represented. Deliberative democracy is therefore a question of reciprocity and respect for different opinions."

The aim of my doctoral dissertation is to gather information about the possibilities and obstacles of deliberative policy-making development in welfare services at the municipal level in Finland. The empirical part of the research consists of a Delfoi-study where an expert panel consisting of 37 participants representing the executive managers of 3rd sector organizations, the chairmen of the municipal councils or welfare service boards and the leading office-holders of municipal welfare offices estimated and discussed the projections of municipal welfare policy making for the year 2030.

The results of the eDelfoi-study indicate that despite the approving attitudes towards more discursive administrative culture, the participative practices to function as a means of or policy-making in welfare services are not fully trusted. Citizens' influence in welfare services was primarily seen channelled through consumerism. Increasing individualism and inequality was considered inhibiting deliberative policy-making practices.

Key words: Deliberative Democracy, Municipal Policy-Making, Welfare Services, eDelfoi

How to overcome barriers for innovations in organizations from the public sector – the Local governments for the future

Karolina Mackiewicz
Finland Futures Research Centre, University of Turku, Finland

The aim of the study ''How to overcome barriers for innovations in organizations from the public sector – Local governments for the future'' was to evaluate the systemic barriers for innovative thinking, new ideas and outside-the-box solutions in city administration. Since the capacity for innovation is recognized as a crucial factor for the survival of modern organizations, the research is of high relevance to every public sector organization with strong implications for their future performance.

The research material collected during interviews with administrators, policy makers and researchers was analyzed with Causal Layered Analysis (CLA) and through the lenses of the three-dimensional system (mechanic, dynamic, organic). As a result, four visions of the future of the organizations from the public sector, five systemic barriers and four drivers for innovations were extracted. The visions are: 1) Locked Tower – the system with predominant mechanistic dimension; 2) Turtle in the City, with the organic dimension present to a bigger extent than in a previous one; 3) The Ice is Cracking – with the balance between mechanistic and organic dimension, the dynamic dimension appears; 4) Open and Fearless – the system with predominant dynamic dimension – emerging but aspirational at the moment.

The five barriers revealed during the study are: hierarchy, poor communication, imbalanced work division, poor leadership and bad management of human resources. At the same time, investing in human resources, promoting experimental culture, brave leaders with commitment to change as well as work division that allows more time for brainstorming and implementing were identified as drivers.

Key words: Public Sector Management, Innovations, System, Leadership, Organizational Change

Futures of Energy: Methodologies

Time: Monday 12 June at 13:00–14:30
Room: Eerik
Chair: Dr. Jyrki Luukkanen

Strangers in the night? Analysing the developer – User nexus in scenario practice through concepts of plausibility

Ricarda Scheele
Stuttgart Research Center for Interdisciplinary Risk and Innovation Studies (ZIRIUS),
University of Stuttgart, Germany

Scenarios become ever more popular in discourses on German energy transition goals. In this context, my research focuses on the still under-developed 'plausibility concept' of scenarios: How is plausibility established, assessed and evaluated? A problem I argue is that the literature often addresses energy scenario development, evaluation and usage in separate silos, meaning debates revolve around the superiority of individual methods without considering implications for the use and purpose of scenarios. I

pro- pose by considering the life path of energy scenarios as the unit of analysis, we can better follow the trajectories of plausibility and understand its implications. The framework demonstrates how decisions in the development phase may determine formal evaluation processes, but may not account for, or even contradict users' perceptions. I present qualitative and quantitative findings from an experimental study that examines the way users perceive scenario plausibility. The study uses approaches from educational psychology, it considers plausibility as a precondition for conceptual change and relates it to topic emotions, desirability, source credibility and scenarios' fit with individuals' pre-conceptions. The analytical and empirical findings inform a discussion on how and why plausibility can add value to future-oriented practices. The discussion revisits scenarios as boundary objects and alternatively explores the notion of scenarios as epistemic objects.

Key words: Socio-Technical Energy Futures, Life Path of Scenarios, Plausibility, Experiment, Developer-User Relation, Epistemic Objects

Understanding smart energy transition: Tapping into experts' views on future energy market disruption in Finland

Tatu Marttila[a], Tero Ahonen[b], Mikko Jalas[a] & Mikko Rask[c]
[a] School of Arts, Design and Architecture, Aalto University, Finland
[b] School of Energy Systems, Lappeenranta University of Technology, Finland
[c] Consumer Society Research Centre, University of Helsinki, Finland

The international consensus as well as several energy market actors are gradually acknowledging that future energy solutions must be radically renewed, in order to serve more dynamic and de-carbonized production based on more sustainable sources, and to meet the expectations of future users and producers. The Academy of Finland funded Smart Energy Transition (SET) project is focusing to the analysis of future energy market disruptions in Finland, to understand how this information could be utilized in future decision-making.

A topical and yet overarching theme such as 'smart energy' invites a wide range of actors and interests to interaction. Often the thematic contents of a research agenda become defined already in setting up the project, and the consortium itself may outnumber the partnering experts, or become influenced by views of dominating paradigms in politics, industry or academia. And yet, the validity of the perceptions is based on bridging these perspectives and expertise together.

This paper discusses how to ensure balanced contributions in developing themes of interest in futures research, to build on extensive external inputs in structuring understanding. It describes the process of refining such themes together with varied groups of experts, supported by a two-round Delphi-survey and a workshop that acted as a concluding round, in which the survey results were processed further into detail. The focus is on understanding how the original research focus developed, who were invited to interaction, how themes of interest were introduced to the process, and how these themes evolved into resulting categorizations for findings.

Key words: Delphi survey, Energy System, Futures Research, Energy Technologies, Sustainability

What are the conditions for scenarios to configure policy making? A comparative analysis of four energy foresight studies for Wallonia (Belgium)

Aurore Fransolet
Center for Studies on Sustainable Development (IGEAT), Université libre de Bruxelles, Belgium

Literature starts to reveal an abundance of low-carbon scenarios for different parts of the world, institutional levels and sectors (Hughes et Strachan, 2010). Since scenarios aim at tackling the uncertainty and the complexity inherent in problems characterised by distant time horizons, they appear as suitable orientation and decision support tools to devise policies aiming at reducing greenhouse gas (GHG) emissions by 80-95% by 2050. Nevertheless, while initially designed as decision support tools, low-carbon scenarios don't readily translate into public policies. There is indeed a broad gap between scenarios – and, more generally, between science – and public policy (Banister et Hickman, 2013). This gap materializes at least partially through the "non-use" of scientific information by politico-administrative authorities (Cash et al., 2002). Despite the widely recognized gap between scenarios and public policy, the social work (c.f.: social construction, implications and use) of scenarios have attracted little analytical interest. What are the conditions for energy foresight studies to be "useful"/influential in public action? The paper develops on an empirical study aiming to analyse comparatively four energy foresight studies carried out for the Walloon Region (Belgium). This analysis is based on extensive semi-structured interviews with actors involved in the long-term policy process of GHG-emissions' mitigation, both from the perspective of producers of these scenarios (i.e. consulting firms, universities…) and of users (ranging from administration to utilities). I intend to link the influence of the energy foresight studies with the perception that the different actors have of their credibility, saliency and legitimacy (Cash et al., 2002).

Key words: Foresight, Energy Scenarios, Decision Support, Science-Policy Interface, Discourse Qualification

Synergies and trade-offs between energy efficiency and sustainability indicators: The EU-28 study of sustainable energy use

Jari Kaivo-oja, Jyrki Luukkanen & Jarmo Vehmas
Finland Futures Research Centre, University of Turku, Finland

The synergy method serves us for envisaging the linkages among policy sectors and track the sustainable development in more integrated approach to develop coherent energy and sustainability policies in the EU-28 region. Also transition paths towards better sustainability can be analysed by such synergy analyses.

Policymakers, and institutions like European Commission, European Parliament and the governments of the EU member countries must be guided not by faith, but by evidence of what has worked. This article includes many interesting empirical results and findings. These results are studied in the EUFORIE project, which aims to analyse European futures for energy efficiency. This report provides a lot of new information about relevant trends of energy efficiency in the EU-28 region. This large empirical and explorative evaluation study is based on new methodology of synergy analysis. Comparative regional analyses and policy relevant observations were delivered for all 28 European member countries.

These reported synergy analyses reveal that in many EU member countries there are needs to correct incentive schemes of energy policy. The European Union also has knowledge based reasons to pay special attention to the following energy policy issues: (1) Improving energy efficiency in Central and Eastern European member states, (2) improving energy efficiency in the context of fast urbanization in European

cities and metropolitan regions and (3) paying a special attention to energy and sustainability policy harmonisation in the EU member states.

It is very important to critically evaluate the integration of sustainable development policy with energy savings and efficiency solutions. In some EU member countries, there are still some problems in the integration of these policy arenas. The results of the article reveal that the potential synergy differs from country to country and also overt time. This article gives us very detailed information about these differences, but also vital information about similarities. The article reveals also interesting linkages of sustainability policy. The results of the article are relevant for energy saving/energy efficiency policies in the EU-28 region.

Keywords: Synergy Analysis, Energy Saving, Energy Efficiency, Sustainable Development, EU-28 region

Education in Futures Studies

Time: Monday 12 June at 13:00–14:30
Room: Kristiina
Chair: Dr. Tamás Gáspár

When futures meets engineering: Pedagogical journey and learning

Mei-Mei Song[a] & Shang-Hsien Hsieh[b]
[a] Graduate Institute of Futures Studies, Tamkang University, Taiwan
[b] Department of Civil Engineering, National Taiwan University, Taiwan

As the world becomes increasingly complex and vastly unpredictable, engineering education is in need of major paradigm shifts in order to educate engineers with new ways of thinking. Futures can be the medium to help expanding the horizon and stretching the scope of imagination for engineering students. What happens when futures thinking is incorporated into engineering curriculum?

The authors have gone on such a journey since three years ago, attempting to bring futures thinking into civil engineering classrooms. Two threads of curriculum experiments were carried out in the Department of Civil Engineering at National Taiwan University: one in an elective, cross-disciplinary Capstone course for senior and graduate students; the other in a required course of Conceptual Design in Civil Engineering for first-year students. Using the structure of Six Pillars of Futures Thinking (Ianayatullah, 2008) as the starting point but evolving into different paths, each thread has gone through three cycles of curriculum change so far, with one cycle per year.

This paper will briefly depict the curriculum design but mainly focus on pedagogical learning from the overall experience. It includes the following: What futures methods worked well for engineering students? What did not? What were the overall challenges? Which parts of the Six Pillar process were modified and why? What kinds of new activities were devised in order to provide scaffoldings for the students and how were their effects? The discussion is aimed to provide insights for futures educators seeking to bring futures thinking to other disciplines.

Key words: Futures Thinking, Engineering Education, Futures Pedagogy

Educational foresight-event and personal-resource mapping as methods of developing future thinking

Tatiana Yakubovskaya[a] & Tatiana Kovaleva[b]
[a] Head of Scientific-Educational Centre for Foresight-competence development, National Research Tomsk State University, Russia
[b] Moscow Pedagogical State University, Russia

In this presentation we consider the problem of using the concepts of time in education in the formation of the concepts of individualization of education and reveal the possibilities of cultural-historical theory (L.S.Vygotsky) to solve developmental challenges of pedagogical activity.

The concepts of time and future in educational theories becomes the new historical challenge for the classical idea of western education and necessary subjects to study in the connection with the issues of formation of image of the future and futures thinking, when considering how the image of the future begins to affect the understanding of the past and present, how to establish links between the future, past and present.

In the context of the global trend of individualization of education one of the insufficiently studied and difficult to approach is the issue of how and by what means it is possible to organize interaction with the child on the temporal aspects of processes of individualization.

Based on analysis of the educational technology "open Foresight-laboratory" (Russia) we will discuss specific formats of educational activities, such as educational foresight-event and personal-resource mapping, which play systematizing role in the practice of education individualization. In terms of the key provisions of the cultural-historical theory educational foresight-events and personal-resource mapping are aimed at stimulating the process of learning, that is, to overcome the deficit of experience of self-dependent and productive activities, avoiding the formal and fictitious learning outcomes in relation to the problems of personal perspectives and future.

Key words: Individualization of Education, Educational Foresight-Event, Personal-Resource Mapping, Concept of Time, Future Thinking

Future scenarios: A tool to make students and citizens more aware of future technological change

Cristina Pozzi[a] & Andrea Dusi[b]
[a] Impactscool, CEO and Founder, Italy
[b] Impactscool, Chairman and Founder, Italy

The pace of change driven by exponential technologies such as AI, robotics, 3D printing, genetics, nanotechnology, biotechnology and blockchain, is making it increasingly difficult for many people to understand the present society and to cope with the future, mainly because of the lack of awareness and education, causing incapability to think about the future with a positive attitude.

Impactscool aims to bring citizens globally free education, discussion and collaboration on how emerging exponential technologies will disrupt and transform our industries, companies, careers and lives; and

about the opportunities and challenges we are going to face, and how to drive humanity toward the best possible future.

Starting from February 2017 we held 15 immersive workshop in Universities working with students in the range 19 to 24 years old, bringing them the basics about Exponential Technologies and starting the discussion about future scenarios and the impacts these technologies are going to have on society.

Main objectives of the workshops are: learning to understand future scenarios and trends that will define the environment in which the students will work, understanding and developing soft skills necessary for the future, learning forecasting basics to be able to understand future society.

The format encourages also skills development such as fast prototyping, moonshot thinking, ability to see future scenarios, presentation skills, insights on ethical and moral issues, lateral thinking, ability to work in group.

Next step is to teach ambassadors and school teachers our methodology, scaling the number of workshops we can hold nationally and internationally.

Key words: Exponential Technologies, Technology Change, Future Scenarios, Scenario Building, Ethics, Impacts

Strategic foresight as experiential education

Tamás Gáspár
Budapest Business School, College of International Management and Business, Hungary

The aim of the paper is to discuss and to extent some aspects of strategic foresight from the viewpoint of experiential education. Its theory and methodology cover many different areas, from which the paper focuses on the following topics: experiential education as a strategic foresight process; sustainability and the completion of the individual; the future in experiential education; consciousness versus ignorance; dependency and independency; education for wholeness.

Strategic foresight appears on the one hand to be a nurture-educational process, and hence develops the foresight concept. While foresight exceeds strategy by involving the conceptual process of visioning, nurture theory adds that vision should only take place within a sustainable cultural range of communities (enculturation). At the same time foresight cannot become estranged from the members of a society, since, as a nurture process, it also aims at completing the individual, developing its skills and abilities (individuation).

In this respect strategic foresight is a learning process too. Not only in a 'horizontal' sense of development; that is, owing to the changing environment the future image and its strategy always vary both in terms of the direction and the execution, as well as by the experience of the process foresight recomposes the enculturation. Strategic foresight, however, has a 'vertical' dimension too on the community level. In the long term the generational composition of a community also changes: the new grown-ups in most cases view or express their cultural needs in different aspect. Intergenerational questions are neglected areas in strategic researches both in regional and macro levels. This is one reason to extend the strategic foresight researches and methods.

Key words: Strategic Foresight, Experiential Education, Nurture, Consciousness, Sustainability

Futures Organizations and Businesses Innovation

Time: Monday 12 June at 13:00–14:30
Room: Pietari
Chair: Director Vicente Marrama Zorrilla

Future software organization – Agile goals and roles

Maarit Laanti[a] & Petri Kettunen[b]

[a] Nitor Delta, Finland
[b] University of Helsinki, Department of Computer Science, Finland

Digital transformation is rapidly causing major, even disruptive changes in many industries. When digital elements and data are increasingly incorporated, more and more software is included both in existing and totally new processes in different organizations. Moreover, such global developments as digital platforms (cloud) and IoT create fundamentally new connections at many levels between objects, organizations and people (systems-of-systems). These are by nature dynamic and often working in real time – further increasing the complexity. Those systemic changes bring up new profound questions: What are those new software-intensive systems like? How are they created and developed? These questions are increasingly imperative for software development organizations to comprehend, requiring new capabilities. Which principles should guide such organizational design? Agile enterprises are by definition proficient with such capabilities. What roles are the current scaled agile frameworks such as SAFe and LeSS proposing, and why? Is the only problem we are solving how to achieve faster time-to-market by improving flow, or are there also other aspects to consider? In this paper, we disentangle that from the organizational resource-based view. We aim to recognize the design principles of the future (agile) organizations, and discuss the existing experiences from various different organizations under large-scale agile transformations, and the insights gained. Software development organizations have the added need to not only understand the new systems to be developed but also be able to create and evolve the strategy, software and solutions to create those. The agile strategy drives to organizations, software systems development and HRD.

Key words: Digital Transformation, Agile in Large Scale, SAFe, LeSS, Agile Enterprise, Systems Thinking, Value Streams, Strategic Agility

From interactions to cocreation. A systems view on digitalisation and the thereby changing management practices

Sanna Ketonen-Oksi
Information Management and Logistics, Tampere University of Technology, Finland

Purpose: Considering technology as a combination of multi-actor practices, processes and symbols through which various social and technological aspects are connected, the adoption of social tech-nologies has fundamentally changed the ways how people interact and communicate. In order to create more

value through digitally enabled human-nonhuman interactions, organisations need to systematically relate and combine their activities and resources with one another, thus making the growingly service-provisioning networks and the entire service ecosystems more efficient.

Design/methodology/approach: Empirically, this study builds on (a) thematic interviews conducted with a number of actors working in or collaborating with novel service ecosystems, and on (b) a set of social media data associated within them. Theoretically, this study builds on the foundations of Systems Thinking and of Service-Dominant logic. The focus will be in creating a better understanding of the ways to manage in the increasingly complex and dynamic service ecosystems.

Originality/value: Succeeding in the increasingly digital business environments will not take place unless mature and specific understanding of the motivational aspects (e.g. clear purpose, effective communication, management by example, boundaryless working settings) are being offered to and adapted by the companies.

Practical implications: New insight and practical advice will be provided for managers interested in leading their organisations towards more creative and innovative customer solutions, that is, the more systemic development of their customer and stakeholder relationships. Hence, this study encourages managers to become active in transforming existent organisational culture(s) and different practices fostering creativity and innovation.

Key words: Systems Thinking, Service-Dominant Logic, Service Ecosystems, Value Cocreation

How strategic foresight is used in strategy implementation: Exploring cases of business model innovation

Christina Bidmon[a], Kirstin Bosbach[b] & Anne-Sophie Brillinger[c]
[a] Department of Management, Aarhus University, Denmark
[b] Technische Universität Berlin, Faculty of Economics and Management, Germany
[c] Chair for Organisation and Human Resources, FI ingolstadt school of Management, Germany

Scholars as well as practitioners acknowledge future preparedness as an important criterion for the successful implementation of strategic projects, as for instance business model innovation. Those complex and long-term projects are characterized by multi-dimensional uncertainty arising from volatile environments. Strategic foresight activities can support the implementation of new business models by creating a profound information basis for strategic decisions. However, in practice foresight activities are often used only in the ideation stage of projects, but not within the implementation phase. Scholars have frequently pointed to the potential that lies in a further exploration of the link between foresight and implementation, but so far it has not been examined in detail how foresight activities are used in the implementation phase. Following an embedded case study design within a corporation undergoing major strategic transformation, we examine multiple business model innovation projects in terms of how they use foresight resources available to them. Preliminary results, based on interviews with key informants and the analyses of project documentation, point to a discrepancy of the perceived need of conducting foresight in comparison to the actual use in the implementation phase. Based on the demands and best practices reported we formulate recommendations on the incorporation of foresight activities in the implementation of strategic projects. Our paper contributes to the literature on corporate foresight, but

also to the wider literature on strategy research. Herein, particularly the business model literature benefits from insights on the micro processes that support the implementation of new business models.

Key words: Business Models, Business Model Innovation, Strategic Foresight, Strategy Implementation, Project Management

FUTURING – The Future Intelligence for Organizations

Vicente Marrama
La Escuela de Futuring, Barcelona & Florida Universitaria, Valencia, Spain

As director of LA ESCUELA DE FUTURING, director of the first Program of Futuring in a Spanish University (Florida Universitaria) and author of the book FUTURING, THE FUTURE INTELLIGENCE FOR ORGANIZATIONS, which will be published next January 2017, the first book of Futuring in Spain, I should like to speak about this talent to anticipate and build the futures desired by organizations and people, necessary in these Futuring times, where the change is global and exponential. In my country we have a Mediterranean way of thinking and in this paradigm we haven't the habit of anticipate as you have in the Scandinavian world. So we need organizations with a new and powerful relation with future.

In my book I explain a Decalogue to live in the Futuring Times and I explain our methodology where I use and synthesize different fields of future knowledge, like Future Studies, Theory U, Scenario Planning, Systemic Events of Future like Future Search, Trends and Visionary Leadership. Another important issue is the characteristics to be a futuring organization and a futuring leader.

Another important issue is the need of a new role in Spanish Organizations: Expert in Organizational Futuring. This professional leads companies along the path of future and gets the forward thinking to be a daily activity, key in taking decisions.

Key words: Futuring, Expert in Organizational Futuring, Exponential Change, Organizations, Leadership.

Methods and Methodology of Futures Research

Time: Monday 12 June at 13:00–14:30
Room: Juhana
Chair: Professor Ted Fuller

No theory, methodological chaos in scenario planning

Matthew J. Spaniol[a] & Nicholas J. Rowland[b]
[a] Danish Maritime, Dept of Philosophy, Roskilde University, Denmark
[b] Sociology and Science and Technology Studies, the Pennsylvania State University, USA

For decades, scholars in futures studies have prefaced their scientific communications (i.e., articles, books, etc.) by conspicuously bemoaning the lack of theory to support foresight methods. This presents readers with a paradox. Concern over a lack of theory in scenario planning, for example, is well known, but not so well known that it no longer requires frequent rendition; moreover, the task of attending to this veritable abyss in theory has yet to be bridged despite repeated calls since the 1970s. The authors examine the claim that scenario planning lacks theory, and, in so doing, consider a multitude of "other" interpretations for why scholars in futures studies lament it. The authors conclude that while this concern over the lack of theory is reasonable, it also serves a number of secondary collateral functions. In exchange for voicing this concern scholars release themselves from responsibility to resolve it, even provisionally, thus freeing scholars to adopt theoretical commitments untethered from past research in futures studies. Alternatively, because of the repetitiveness of the concern over time, the authors speculate on the ritualized quality of the concern and consider whether or not voicing it has become an insider signal among scholars actively publishing in the field. In the end, stating that scenario planning lacks theory is a resource for establishing theoretical innovation and the incorporation of outside theory; however, like any self-fulfilling prophecy, it ironically appears to deprive scenario planning of the foundational theory that scholars claim it so desperately needs.

Key words: Futures Studies, Methodological chaos, Scenario planning, Science and Technology Studies, Theory

Methods for sustainability assessments of future scenarios

Eléonore Fauré [a, b], Yevgeniya Arushanyan [a, b], Elisabeth Ekener [a,b], Sofiia Miliutenko [a, b,] & Göran Finnveden [a, b]
[a] KTH Royal Institute of Technology, Division of Environmental Strategies Research, Sweden
[b] KTH Royal Institute of Technology, Centre for Sustainable Communications (CESC), Sweden

Future scenarios are often used to address long-term challenges characterised by uncertainty and complexity as they can help explore and analyse alternative future pathways. Scenarios can therefore be a useful tool to support policy and guide action towards sustainability.

But what sustainability perspectives are put forward by scenarios and how can we assess them? This paper aims to develop a toolbox for assessing future scenarios. By conducting a literature review and a document analysis, we map which tools and methods are currently used to assess sustainability aspects in future

scenarios, both quantitatively and qualitatively and with a focus on both environmental and social aspects. We draw on experiences from case studies and also on methods for impact assessments of Swedish municipal comprehensive plans, which can be considered as types of scenarios. We identify the potential challenges and opportunities of using various assessment tools in different areas and contexts and for different types of scenarios. We also identify whether some sustainability aspects are less recurrent than others in the reviewed assessments or even left out. The outcome is a toolbox presenting assessment methods and tools with recommendations on their application for assessment of scenarios as well as a discussion whether further assessment tools might be needed in order to include a wider array of potential environmental or social consequences of scenarios.

Key words: Future Scenarios, Sustainability Assessments, Assessment Methods, Assessment Tools, Environmental, Social

The past and the future are both foreign countries

Carlos López Galviz
Institute for Social Futures, Lancaster University, United Kingdom

The techniques and approaches in use for futures thinking are based on a specific understanding of the past. The relationship between, for example, forecasting and the past is one that might be comparable to that between history and the future. The aim of this paper is toexplore that relationship by focusing on four key concepts historians use when researching the past, namely, contingency, diachrony and synchrony, path dependency, and the cycles ofrise and decline. It will do so by focusing on one event, the opening of the first section of the Metropolitan Railway in London,the first underground railway to open to passenger services in 1863. The event is significant for thinking about the potential futures of a complex world in at least three respects: it anticipated a trend that is commonand will grow in cities worldwide as our planet is urbanised; it posed significant challenges to urban, metropolitan and national governance, encouraging innovation in a range of fields; it showed technology being adaptive and responsive to specific conditions that were characteristically urban. As historical geographer David Lowenthal has argued 'the Past is a Foreign Country' (1985, 2015); the same might be said of the future. The paper will thus reflect on the challenges and significance of thinking creatively about the ways in which thepast and the future connect.

Key words: Past Futures, History, Contingency, Futures Methods

A discussion on the complex consequences of Anticipatory Systems theories on futures methodologies

Ted Fuller
Professor of Entrepreneurship and Strategic Foresight, University of Lincoln.
Brayford Pool, Lincoln, Lincolnshire, the United Kingdom

Rosen's theory of Anticipatory Systems asserts that anticipation is causal and that its effectiveness depends on the state of the modelling relations between the agent and its environment. Also, it states that agents are enrolled in multiple anticipatory systems whose interactions are unpredictable. It is such interactions that are characteristic of complex worlds. 'Anticipation' is interpreted as a mediating process between knowledge and action, where 'feed-forward' is causal. The context is one of ontological insecurity; raising

issues of epistemological and therefore methodological uncertainty. The paper draws on re-emerging areas of study in the futures literature especially with respect to anticipatory systems and post-normal science. For Rosen, causality is mediated through a modelling relationship between actor and environment which entails causality, not by the direct effect of the environment on the actor. The paper discusses the implications of this perspective multiple anticipatory systems are at work. The argument is further developed by considering 'modelling relations' which are inherent to active anticipatory systems. The conclusion is that in human social systems in uncertain environments require approaches to anticipation that recognise the multiplicity of modelling relations. The paper concludes by suggesting that the epistemology of anticipatory systems and methodology developed from Post Normal Science might be used to reduce Cartesian anxiety with respect to ontological insecurities of uncertain times. In short, the focus should be on modelling relations rather than models. This has significant implications for foresight and especially scenario planning as it is currently conceived.

Special Session with Keynote Speech: Aging Society and Urbanization

Time: Monday 12 June at 13:00–14:30
Room: Kustaa
Chair: Professor Sirkka Heinonen

Keynote Speech:

Towards Multi-Generational Cohabitation in the Era of Matured Aging Society; From the Perspective of S&T Foresight in Japan

Naoki Saito
Deputy Director General, National Institute of Science and Technology Policy (NISTEP), Japan

The aging society poses many challenges and opportunities to nearly all regions, and scientists and policy makers are considering how to make significant contributions to improving the lives of elderly people and enhancing the living conditions of multi-generational families and communities. Especially, Japan is confronting the drastic changes in its population pyramid, and it is anticipated that by 2060, about 40% of the total population will be over the age of 65.

Facing such a future society in advance, it is expected that elderly people will become more dependent on machinery and consume more energy. Thus, there might be an interrelationship between the proportion of the elderly and the level of carbon emissions. Carbon usage can be minimized by improving health conditions and resolving mobility problems by realizing smart and compact city in aging society. Thus it is considered that we would better encourage a harmonization of aging communities and low-carbon society through fully utilizing scientific findings and advanced technology, while pursuing interaction and consensus among multi-stakeholders. In addition, there are growing the number of elderly people without family support. To fully utilize their capability, adequate welfare policies need to be implemented, while incorporating most advanced innovation such as tele-work and remote sensing of health condition at home. We need to take an integrated approach.

In this presentation, I would like to introduce major issues facing the aging society and suggest plausible solutions, by illustrating the Japanese experiences and NISTEP's foresight activities. Finally, I would like to propose a possible transformation of demographic trends of Japan from "population onus" to "population bonus" by widening the share of population which can create a new added-value to the whole society (through extending 'healthy aged life') and thereby lowering the dependency ratio among the whole population. In the end, such a society would be rejuvenated through efficient multi-generational cohabitation between juniors and "active seniors" enriching the quality of life (QOL) of both.

Critical futures of aging in society- enabling futures of intergenerational knowledge creation

Nourhan Hegazy
Strategic Foresight and Innovation, OCAD University, Toronto, Canada

Our relationship with younger and older generations in our lives can facilitate our need for personal care, material security as well as our search for identity and belonging. Yet at a time when intergenerational collaboration becomes imperative, age is becoming an emerging divide in society with age inequality on the rise in Canada [Conference Board of Canada, 2013]. Using Sohail Inayatullah's Causal Layered Analysis as a framework, this project aimed to understand how might we enable futures of intergenerational knowledge creation through rethinking the aging narrative?

The "assembly line of aging" is revealed as a narrative that describes a rigid system of age specialization which is based on the standardization of activities across the life course. However, as trends in demography, lifestyle, technology and lifespan continue to change, the assembly line of aging is argued to be too rigid to adapt to the needs of future generations. The "meandering river" is introduced as an alternative narrative that has the potential to work with and balance a rigid system through recognizing age heterogeneity and challenging conventional age specializations. In order to so, enablers and key stakeholders are highlighted to address the issue more systematically by representing opportunities for agency and action for individuals, communities and organizations.

Key words: Critical Futures, Sociology of Knowledge, Intergenerational Relations, Age Integration

Engineering future cities – The value of extreme scenario methodologies

Christopher D. F. Rogers
Department of Civil Engineering, School of Engineering, University of Birmingham &
UK Government Foresight, Future of Cities Project, United Kingdom

It is widely accepted that engineering of future cities must start with a deep understanding of the existing city context and its historical development, and an appreciation of likely future contextual changes, since this will influence the effectiveness of proposed urban interventions. This requires a foresight process, which naturally develops into predictions and projections of current trends – the basis of engineering practice. While this might have been acceptable in the past, there is a growing tension between the ever-increasingly rapid changes in the way cities are expected to meet citizens' needs and the fact that civil engineers design city infrastructures that shape cities for decades, even centuries, thereby 'locking in' city systems and societal behaviours. Coinciding with the need to deliver sustainability, resilience, adaptability and liveability, there is an urgent need to augment the engineering process by which interventions and conceived, designed and operated.

UK research (e.g. *Urban Futures*, *Liveable Cities*) has explored these issues, while the UK Government *Foresight Future of Cities* project has addressed the challenge of looking forward to different time horizons – 2040 and 2065 – using two points of focus – the UK's city systems and the UK's system of cities. Noting that "far future predictions will be wrong, it is simply a question of how wrong", the UK has developed different ways of working using alternative far future scenarios. This paper introduces the various methodologies for creating and exploiting future scenarios, and analyses their efficacy in enriching, empowering and future-proofing today's engineering interventions in cities.

Key words: Predictions, Far-Futures Thinking, Extreme-Yet-Plausible Scenarios, Aspirational Scenarios

Futures of University and Scientific Knowledge Workshop

Time: Monday 12 June at 13:00–14:30
Room: Dining Room & Library
Moderator: Education Manager Leena Jokinen

Åbo Akademi University, the Swedish speaking university in Finland, will celebrate its 100 years in the year 2018. These 100 years have contained manifold accomplishments but also many tumultuous changes – to universities as institutions and to the notion(s) of knowledge they work with. To honour its history, this special session will discuss the next 100 year of universities and the role of scientific knowledge in future societies.

Dr. Nina Kivinen will give an overview of Åbo Akademi University's present role in the Nordic scientific community and its future prospects.

The Faculty Manager Pirjo Kuhanen form Tampere New University development project will present guidelines for remodelling the university. The session will include an idea workshop of the future universities and scientific knowledge in society. We wish to see to the future of knowledge-production, the ways in which science can and will change, and challenge the notion of the university. In other words, we want to imagine and re-imagine the university in numerous ways.

Åbo Akademi University's present role in the Nordic scientific community and its future prospects

Nina Kivinen, Åbo Akademi University, Finland

Tampere New University – Guidelines for remodelling the university

Pirjo Kuhanen, Tampere New University, Finland

Session II
Monday 12 June at 15:00–16:30

Complexity and Systems Thinking

Time: Monday 12 June at 15:00–16:30
Room: Katariina
Chair: Dr. Osmo Kuusi

Systems analytics: what is it? And why is it necessary?

Veerendra K. Rai
Tata Research Development and Design Center, Tata Consultancy Services, India

'Data analytics' and 'Big data' are terms that have acquired tremendous popularity in the world of business research. Data scientists, data analysts, and data engineers have come to define a new profession that seek to derive business insight from data. Independent of whether or not data analytics has lived up to its expectations it is time to look beyond into what this paper refers to as 'Systems Analytics'. Systems are becoming increasingly complex and data analytics alone cannot generate the insight, knowledge and understanding necessary to ensure the viability and survival of the systems we have built around us. Our utilitarian society is more concerned with getting things done 'somehow' even if we do not understand what we do.

This paper proposes the idea of "Systems Analytics" to profile and analyse a system with systems thinking approach for various properties and characteristics it must have in order to fulfil its promises in a given environment and context. This paper develops a system profiling schema with a 3 X 5 grid with 3 horizontals and 5 verticals. The horizontals are purpose, stakeholders, and context & environment. And, the verticals are historicity, impact of disorder, regeneration and organization, viability, and a set of general properties. Each vertical has been detailed out further. For instance, historicity includes initial state of the system, changes across timeline, policy history, policy structure and evolution thereof etc. This paper discusses this schema in detail. It is by no means exhaustive. It is just the beginning.

Key words: Systems analytics, Systems Profile, Complexity, Data Analytics, Systems Thinking

Complexity, systems thinking and the development of new business models to support investment in municipal solid waste infrastructure

Christopher J. Bouch & Christopher D. F. Rogers
Department of Civil Engineering, School of Engineering, University of Birmingham, United Kingdom

The UK has identified the need for almost £500 billion of investment in infrastructure up to 2021. The private sector will account for around half of this, but only if new business models can be developed to

give investors the confidence they will capture their fair share of the value generated. Birmingham is a UK city with significant infrastructure development plans: for example, the Smithfield area is due to be redeveloped as a 'zero emissions' district, which will require a new business model to support investment in municipal solid waste (MSW) infrastructure. MSW is a highly complex socio-technical system: the unpredictable behaviour of the city's citizens interfaces with expensive, long-lasting and process driven infrastructure, all of which will be subject to potentially disruptive change during the lifetime of the system. The University of Birmingham is researching into the creation of new business models for Smithfield to support investment in sustainable MSW resilient over the long term.

This paper will describe work that has been done to model the existing, complicated waste management system, as a necessary foundation for thinking about innovation of the new. It will show how a process for business model development has been used to drive a systems thinking approach to the identification of potential system dependencies as opportunities for value capture. Moreover, it will show how the future resilience of ideas for value capture can be tested.

Key words: Systems Thinking, Systems Engineering, Business Model, Infrastructure, Resilience

Using systems thinking to design actionable futures: a nuclear weapons example

Leon Young
Future Strategic Thinking, Australia

It is a general observation that foresight is analogised with forecast. Yet foresight, or futures thinking, is not predictive or deterministic. The perception appears to be based on the belief that foresight does not result in tangible results that is immediately applicable within an executive or policy decision arena. Foresight, it is assumed, is unfounded on reality and thus not relevant to fast tempo or strategic level operations. This paper contends that the use of evidence-based methods allows foresight work to be immediately operational and useful.

Using a case study of nuclear weapon security within Pakistan, this paper explores the structured use of systems thinking, scenario development and options analysis to develop plausible, feasible and actionable strategic policy options. The case study demonstrates that it is possible to develop quantifiable options derived out of traditional foresight methods. This paper argues that useful foresight needs to be tangible and provide feasible options.

Key words: Systems Thinking, Strategic Thinking, Scenario Development, Policy, Options Analysis

Why do firms engage in forward-looking search? Performance, slack resource, and environmental determinants

Tymen Jissink[a], René Rohrbeck[a] & Eelko Huizingh[b]
[a] Aarhus University, School of Business and Social Sciences, Department of Management, Denmark
[b] University of Groningen, faculty of Economics and Business, department of Strategic Innovation Management, Netherlands

This study examines to which extent performance feedback and environmental characteristics predict a firm's engagement in forward-looking search. We refer to forward-looking search as the search for information pertaining to the location of future opportunities or threats. We draw our theoretical frame

from recent propositions of the behavioural theory of the firm, prospect theory, and contingency theory. We utilize objective firm performance data from 2010 to 2014 and survey data from 2013/14 on forward-looking search practices and environmental perceptions. We find that firms that have performed below aspirations are less likely to engage in forward-looking search, suggesting that forward-looking search is not a form of problemistic search. In contrast, firms that have abundant uncommitted (slack) resources as well as firms expecting to outperform in the near future are engaging more into forward-looking search. We also find interaction effect between performance feedback and environmental characteristics. Interestingly firms with a high level of slack resources are only surpassing their less rich peers in forward-looking search, if they are in technologically turbulent environments. Also firms with a low level of slack resources engage to a much lower extent into forward-looking search, if they operate in high-competitive-intensity environments. Our findings not only carry important implications for predicting a firm's engagement in forward-looking search, but also potentially for predicting a firm's ability to discover superior opportunities.

Key words: Forward-Looking Search, Behavioural Theory of the Firm, Prospect Theory, Performance Feedback, Slack Resources, Performance Expectations, Environmental Characteristics.

Futures of Consumption and the Economy

Time: Monday 12 June at 15:00–16:30
Room: Eerik
Chair: Dr. Tuomas Kuhmonen

Scenarios of consumption and wellbeing in the EU to 2050: exploring the missing dimension of transition

Tadhg O'Mahony & Jyrki Luukkanen
Finland Futures Research Centre, University of Turku, Finland

Growing global material consumption, linked to increasing greenhouse gas emissions, is placing global emissions reduction goals agreed under the Paris agreement in doubt. The 'over consumption' of the affluent, and growing middle classes and elites in developing countries, is driving environmental damage, social inequality and increasing the risk of missing the necessary targets. This has been an intractable issue in intergovernmental debates on environmental and climate change treaties since the early 1990's. The low carbon transition is frequently framed as a technological challenge, but much evidence suggests that it will be difficult to meet this challenge through technological change alone, and measures to improve eco-efficiency and induce behaviour change have been insufficient. A key assumption within these debates is that reducing material consumption and emissions involves cost and loss, an unpalatable political choice and an unpopular social one. However, an alternative approach involves more fundamental change in our relationship with consumption. The 'double dividend' describes change that is beneficial for human development while reducing material consumption and emissions in tandem. Efforts to describe what this concept is, and what it entails, are beginning to gain traction but require further explication. The concept of 'sustainable wellbeing' could facilitate the unlocking of this Gordian knot. This paper will examine a set of scenarios for the EU to 2050 that explore alternative relationships of human wellbeing to

consumption. As integrated scenarios they will backcast qualitative social visions of wellbeing with quantitative scenarios that determine the absolute emissions reductions achieved through balanced wellbeing pathways.

Key words: Consumption, Climate Change, Transition, Scenarios, Wellbeing

The role of governments in a circular economy, a transition narrative

Peter De Smedt[a] & Kristian Borch[b]
[a] Transition Lab, Belgium
[b] DTU Department of Management Engineering, Denmark

To design and implement effective ways for managing societal changes, governments need to understand and act upon the current transformative developments that societies are facing. In 2016, the Government of Flanders presented its new strategic outlook for the future: Vision 2050. This long-term strategy combines an assessment of the relevant drivers of change (e.g. megatrends) with a selection of seven intervention priorities. These priorities can be seen as the essential societal transformations that will require fundamental system innovations (e.g. transitions) in the way people live, work and enjoy life.

Innovation is both a source of and possible key response to tackle societal challenges. A new governance model of innovation is needed to strengthen sustainable entrepreneurship whilst moderating the powerful forces of closure and lock-in in science and technology. The paper will focus on a new innovation governance model and the circular economy transition initiative in Flanders. The proposed governance model combines a conceptual approach on social complexity and long-term structural societal change with an operational transition management model for critical thinking, co-design, experimentation and learning-by-doing. The model also includes a new form of organisational infrastructure within government: a policy lab (e.g. the Transition Lab) that will create a safe space for experimentation.

We will demonstrate that by bringing science and technology into action through collaborative partnerships and experimentation, the transition towards a circular economy can offer fascinating opportunities for citizens, business and civil society organisations. Hence, the implementation should be cross-sector and in collaboration with innovators, entrepreneurs and stakeholders.

Key words: Vision 2050, Transitions, Policy Lab

Managing complexity -The cultural dynamics and change linked to temporal processes

Katariina Heikkilä & Anna Kirveennummi
Finland Futures Research Centre, University of Turku, Finland

In this paper, we will address the complexity and the cultural dynamics of change in our society by exploring the outcomes of the futures processes that we have participated as ethnographically oriented futurists.

We will discuss how the various complex cultural processes can be approached and understood by looking at the temporal practices, networks and discourses in everyday life consumption. In everyday life situations the complexity builds upon the many emerging cultural phenomena and trends that evolve in time and space, on the individual level or among small and intense groups or networks.

Using examples from our development projects we will look at the possible links between the experimentality and innovativeness of things and events and the cultural phenomena behind them. It means focusing on processes that can be seen converge and reproduce old as well as new ideas in various temporal contexts and thus both increasing and managing the complexity in the processes of change or transformation.

Finally, we wish to discuss what Arjun Appadurai's thoughts of the future as cultural facts (2013) could mean for the research and development projects and the daily practices of futurists.

Key words: managing complexity, ethnography, culture, temporality and change

The future of consumer decision-making

Hanna Willman-Iivarinen
Miratio (Marketing research company), Finland

Consumers have nearly endless amount of opportunities nowadays. Since the products are quite similar and there are no significant differences in quality or price, the choices must be based on other than these "traditional" variables. Based on large survey database (n= 1208) combined from several studies about consumer behavior and psychology (The choice of social media, The choice of traditional media, The motives for visiting museums, The choice of beer, The choice of favorite ice-hockey/soccer team) it is concluded that consumers' choices are more and more based on identity play, role-taking, self-branding. Furthermore the choices are significantly influenced by consumer's subjective feeling of time scarcity and the nature of time the consumer attaches to both decision-making moment and the moment of intended consumption. Future developments of variables affecting consumers' choices are estimated and implications for future branding, product development and marketing are discussed.

Key words: Consumption, Decision making, Time scarcity, Identity

Futures of Education, Learning and Work

Time: Monday 12 June at 15:00–16:30
Room: Kristiina
Chair: Dr. Maria Höyssä

The Cogitaire 5 Model – Thinking our way into the future

Jude Walker
FutureWorking, Australia

Current research identifies the impact of new technologies on a range of global occupations and the changing nature of work itself, as many employers eliminate full-time jobs in favour of casual or contract jobs in the "gig economy". This means that, not only can many people expect to change careers numerous times in their working lives, but they may also find themselves having to work several jobs concurrently. Unfortunately, the education/training system is not keeping pace with the changes occurring in the labour market. Anecdotal evidence from employers is that they are not interested in their employees undertaking long-term university or vocational courses, whilst students are becoming more reluctant to take on extensive education-related debt for qualifications which may not get them a job in their chosen profession. This paper puts forward the proposition that, rather than delivering vocationally specific courses, we should be assisting students, jobseekers and employees to develop cross-sector capabilities, and then offering them short, "just-in-time" vocational programs for the work they are about to undertake. The author has developed the *Cogitaire 5 Model*, which consists of five "thinking" capabilities which she believes will prepare people for the varied types of work and personal decisions which they need to make in the modern, chaotic world. These capabilities include Futures Thinking, Systems Thinking, Complexity Thinking, Entrepreneurial Thinking and Design Thinking. Dr. Walker will discuss the tools and techniques which relate to each capability as well as the personal attributes which people can develop by learning these methods.

Key words: New technologies, Labour Market, Education/Training, Gig Economy, Futures Thinking, Systems Thinking, Complexity Thinking, Entrepreneurial Thinking, Design Thinking, Neuroplasticity, Curriculum, Competencies

Human-centric organisations and the culture of work in a complex world

Sofi Kurki
Finland Futures Research Centre, University of Turku, Finland

Increasing complexity challenges traditional organisations. Simply to survive in complex environments requires agility, innovativeness, and ambidexterity. In addition, the systemic multi-crisis that at the same time produces complexity, and makes it more difficult to manage, poses moral pressure to both individuals and organisations to present solutions to the impounding existential threats. What kinds of organisations could thrive in such dire conditions? Is it even possible? In conditions of rapid environmental change, complex feedback loops make it impossible to rely on strategies that only respond to change. In this paper, three case studies illustrate how organisations are striving to maintain organisational stability,

function in complex and at times chaotic environments, and pursue a sustainable existence within the global context.

Reaktor, a Finnish IT-consulting company, Buurtzorg, a Dutch home care organisation, and Patagonia, a manufacturer and retailer of outdoor apparel, all share three common features:

1) human-centric organisational principles, 2) horizontal organisational culture, and 3) systemic approach to their environment. It is argued that a combination of a culture that promotes individual empowerment within the community, and entails a systemic understanding of how the organisation affects its environment, results in the organisation becoming a conscious agent of change.

The studied organisations are able to provide psychological safety, and a platform for their members to enact their personal values. While accepting the contingent nature of their position, these organisations are able to remain sensitive to the changes in their environment, and in these difficult times succeed to a certain degree in managing complexity.

Key words: Complexity, Organisational Culture, Human-Centric Organisations, Systemic Crisis, Managing Complexity

Exploring the future of work in drama workshops

Mikko Dufva, Minna Halonen, Mika Kari, Tapio Koivisto, Raija Koivisto & Jouko Myllyoja
VTT Technical Research Centre of Finland Ltd, Finland

The way of working and earning a living is undergoing a transformation driven by digitalization, globalization and democratic changes, among other factors. The importance and uncertainty around the future of work is reflected in the large amount of talk and research on the topic. However, there seems to be a lack of diversity of the views around the future of work. Many of the scenarios are characterised by technological determinism, excessive ambiguity or uninventiveness. Part of the reason may be that there is no one clear answer and we are unwilling or unable to question existing structures of welfare and institutions. While many see that work is changing radically, few think that that would affect their own work.

In this paper we approach the future of work through other ways of knowing. We describe a workshop process using drama interventions and plural person narratives to paint a picture of the changes ahead. Drama interventions facilitate participants to think differently and have a bodily experience of possible futures of work. Translating this experience into shareable narratives requires new processes of documenting and presenting. We describe the use of partly conflicting person narratives to give a concrete but multifaceted description of possible future of work. Theoretically the research is based on the emerging literature on experiential foresight and futures. The results are based on a project on the future of work in Finland, funded by the Prime Minister's Office of Finland.

Key words: Future of Work, Drama, Experiential Foresight, Scenarios

Envisioning future innovative experimental ecosystems through foresight approach- How Design Factory educates students/ change makers by year 20x6, x = {2, 3}

Vikram Munigala
Design Factory, Aalto University, Finland

Change-makers are visionaries who wish to bring change in their respective fields. Design Factory at Aalto University as an innovative experimental ecosystem with multi-disciplinary principles and radical teaching methodologies has been successful and forefront in educating the students to be change makers. The students are educated with the skills, knowledge and provided with a safe environment that guides them to become a changemaker in their respective fields such as social organizations, entrepreneurship, and career in start-up or Industry.

Educating the students to be change-makers will evolve with future, the aim of the thesis is to holistically anticipate plausible futures for innovative experimental ecosystems utilizing foresight approach. The focus of the study is with the perspective on Design Factory's ways of working, spaces, and teaching methods will educate to support students learning by year 20x6 {x = 2, 3}.

This study is about drawing imaginary lines that connect the trends, future drivers, visions, and scenarios, using a contemporary approach that fuses qualitative and quantitative methods. This research on future trends and drivers were performed and analysed through semi structured interviews and an online survey based on principles of the Delphi method. Further, the drivers are used to build mini scenarios which are further evaluated with the Design Factory stakeholders in a workshop.

The results from the study will be plausible futures future scenarios for the Design Factory. These results are expected to further foster or trigger new research directions on building radical environments, new teaching methods and define ways of working.

Key words: Foresight, Future Ways of Working, Future Problem Solving, Scenario, Future Experimental Education, Future Innovation Spaces.

Foresight in Technology

Time: Monday 12 June at 15:00–16:30
Room: Pietari
Chair: Professor Sirkka Heinonen

Participatory foresight and the future internet: Building futures through communication

Mario Guillo[a], Ana Bossler[b] & Enric Bas[c]
[a] IMEP-University Miguel Hernandez, Spain
[b] Bossler and Bourscheid Associates, Brazil
[c] FUTURLAB, University of Alicante, Spain

The rise of ITCs sets a network society where communication has a strategic role in reducing information asymmetry. Consonant this, Internet has transforming economical transactions and social interactions, giving birth to categories such shared economy, on demand economy, social networks. These emerging frameworks have in common the emphasis on communication which enable their existence. As fast evolving ITCs are rapidly expanding worldwide, the transformative impact of Internet can be seen in the adoption of new behaviour patterns such interaction through devices, emphasis in reputation and customized information, creating post truth.

These emerging behaviours have disruptive capacity such the obsolescence of judicial systems or supply chains when automating interactions. Prominence of ITCs through big data and analytics will make participatory foresight essential in the building of futures, whereby communications assumes a strategic role when reduces transaction costs and stabilizes this new order.

The authors participated in the collective work "The Future Internet; Alternative Visions" (Springer USA, 2016), edited by Ryota Ono and Jenifer Gidley, so this paper is a step beyond where their three perspectives merge into one shared vision about the impact of the coming technological developments linked to the Internet and social networks on social life in a broad sense, paying special attention to the key role of communication in the "prosumer" life regarding economics and politics.

It is expected to develop an interactive exercise with the participants in order to stimulate collective work.

Key words: Participatory Foresight, Participatory Democracy, Shared Economy, Communication, Social Networks, The future of law, The future Internet, Complexity, Social Change

The strategic transformation for future societal vision – Japan's innovative approach

Miki Kuribayashi, Kazuhiro Hayashi & Shinichi Akaike
Ministry of Education, Culture, Sports, Science, Technology (MEXT), National Institute of Science and Technology Policy (NISTEP), Japan

Foresight is certainly an elaborate method which requires complex procedures with many experts' efforts and contributions. Science and Technology Foresight Center (STFC) at National Institute of Science and Technology Policy (NISTEP) in Japan has been conducting research activities for over 28 years. In order to enrich next foresight activities, we have streamlined them in all aspects. We assume that utilizing ICT, especially Big Data, should be considered for improving our foresight activities, and we take new insights of future society for solving global common issues.

Our latest foresight follows three steps, (1) Vision survey, (2) Delphi survey and (3) Scenario-Planning from the viewpoint of globalization. These steps will be enhanced with new schemes using multi-stakeholders, data-driven engineering and strategic planning. For the first step, we have designed various sets of participants to stimulate fruitful and innovative discussion. Numerous combinations have been tested by examining workshops to be held several times in Japan, with a purpose of maintaining the optimal balance. For the second step, we have merged different perspectives from participants to detect weak signals and emerging trends. Then, we integrated them into the Delphi survey by data-mining to find hidden insights rather than just skimming the surface. For the final step, we have broadened Scenario-Planning and created richer and more efficient policy options for the formulation of the S&T Basic Plan in Japan by strategically thinking complex and uncertain future. It supports to engage both local and global issues actively and constructively.

Key words: Foresight, Future Society, Delphi, Strategic Management, Data-Driven Method

To understand creativity in virtual work: identification of leadership toward creativity in different types of companies

Iris Humala
Faculty of Education, University of Tampere, Finland

Facing the importance of ICT, virtuality, and mobility, and the need to enhance innovations and productivity in today's business and work, leaders need to understand creativity in the interaction between technology and human creative processes, and in virtual work to manage the complexity. Virtual work refers to people working in different locations using ICT to manage a business. However, empirical research on leadership toward creativity in virtual work is scarce. This multiple case study was designed to develop a descriptive typology to better identify leadership toward creativity in virtual work in different types of companies. The study combines the research of virtual work to creative-conductive transformational, emotional and complexity leadership approaches, and heterarchy perspective in leadership, where power shifts among team members. Also, it connects business and educational research together. Data was collected during April through June 2016 by interviewing face-to-face 21 persons: leaders and subordinates in five companies in the ICT sector, and one leadership coach. The study was a basic qualitative research; an interpretivist approach and an abductive form of analysis were applied in the data analysis. The four different types of companies in the typology define alternative trajectories in the transition toward leadership creativity. Creativity is best inspired, and major business outcomes are achievable in the "Collective mind" company, characterized by shared values and meaningful work, collective intelligence and reflection, transparency, coaching leadership, effective multichannel interaction and assertiveness. The findings empirically support to apply heterarchy perspective to lead a virtual workforce toward creativity.

Key words: Virtual Work, Creativity, Leadership, Human and Technology Interaction, Heterarchy, Complexity, Typology

The capability of Strategic Foresight – A cultural approach

Stefan Josef Marquart[a] & Michael König[b]
[a] INVENSITY GmbH, Business Development, Germany
[b] Department of Strategy and Innovation, Vienna University of Economics and Business, Austria

Companies are exposed to change and discontinuity throughout their corporate development. These changes can be identified early by weak signals. The purpose of Strategic Foresight is to recognize those signals, interpret them and derive appropriate recommendations for the company. Furthermore, Strategic Foresight is an ability that includes any structural or cultural element that enables the company to create and maintain a high-quality, coherent and functional forward view. It enables the company to detect discontinuous changes early, interpret the consequences and formulate effective responses to ensure competitive advantage and long-term survival of the company.

There are two different approaches to build a high Strategic Foresight ability. The structured approach is executed accordingly to a process by dedicated corporate units. The response is achieved by the connection of the foresight process with other corporate functions and follow-up processes. This means that large-scale enterprises have the financial power to afford these corporate units. On the other hand, the cultural approach builds on the responsibility of the current employees to detect and respond to weak

signals. The organizational response is not caused by foresight and follow up processes but by corporate entrepreneurship and the motivation of the employee to take the initiative.

The aim of this research is to identify how companies are able to master Strategic Foresight as a cultural approach. To get a broader view on the current research, not only large-scale enterprises but also small and medium-sized enterprises are considered.

For a better comprehension of this concept, the study starts with the history and definitions, as well as the theoretical and conceptual foundations of Strategic Foresight. Moreover, the Corporate Foresight Model from Rohrbeck and its five dimensions' information usage, method sophistication, people & networks, organization, and culture is introduced.

Based on nine interviews it is shown how companies can achieve strategic foresight as a cultural approach without the need of a defined foresight processes or a dedicated corporate unit. It has been found that some of the dimensions are more important than others. The most important impact on the execution and success of Strategic Foresight has the dimension's corporate culture and organization followed by people & networks and information usage. The dimension method sophistication has the lowest effect on the foresight output. Further qualitative investigation to create a solid and consolidated view on a cultural approach to Strategic Foresight is needed.

Key words: Strategic Foresight, Foresight, Weak Signals, Capability, Dimensions

Methods and Methodology of Futures Research

Time: Monday 12 June at 15:00–16:30
Room: Juhana
Chair: Dr. Kaisa Oksanen

Methods and tools to place foresight at the forefront of democratic renewal

Alun Rhydderch
Soif-Horizons, United Kingdom

At a time when we are more aware than ever of future challenges, we are more than ever prisoners of the present. Excited and entranced by new modes of communication, we tag along with the causes and debates of the day, expressing support and commitment by liking and e-petitioning.

Is there a way of putting the future back in the picture? And a way that doesn't just rely on educating elites so that they can guide the present-obsessed masses?

Our approach at Soif-Horizons, with our partners, is to create tools and apps that reconnect people with the future through the stories and timeline of their hopes, fears and aspirations. Starting with simple questions and progressing to narrative and scenario creation – in groups and networks characterised by high levels of trust based on existing relationships – our approach seeks to recreate the collective community dynamics of earlier times.

To do this requires simplification of our methods, and especially our language. We need to create physical and digital tools that people want to use, which enable them to think together and communicate with others when and to the extent that they wish to.

These tools treat the future not simply as an alternative to today, but as a driver of changed behaviours and re-engaged action. They should reinvigorate democratic processes that have been left behind by the pace and complexity of today's world.

We will bring to Turku prototypes of an initial set of tools for conference attendees to try out with us.

Key words: Foresight, Tools, Engagement, Political, Democracy, Narratives, Scenarios, Collective, Participation

Learning from mistakes – A modified backcasting approach to investigate success and failure in reaching the preferred future

Liisa Haapanen & Petri Tapio
Finland Futures Research Centre, University of Turku, Finland

In the backcasting approach, feasibility of a preferred future end-state is examined by looking backwards from the preferred future to the present. The purpose of this paper is to revisit the history of the concept and introduce a modification of backcasting which explicitly takes into account failures in reaching the preferred future end-state and utilises information about failures in the feasibility assessment. According to Robinson (1990), iterating the backcasting process is necessary in order to solve any inconsistencies between the defined goal and the results. However, Robinson does not discuss whether and how the identified deviations should be reported, and it seems that usually only clean and consistent versions of future pathways are described. This is problematic for two reasons: 1) Valuable information is lost when the problems faced and the solutions generated are not reported transparently and 2) the uncertainty of actually being able to achieve the goal is dismissed from the analysis. After describing the history and current developments of backcasting, the paper focuses on developing a version of backcasting where deviations from the preferred future end-state are allowed and scrutinized. These deviations can provide valuable information on what distinguishes successes from failures in reaching the preferred end-state. Suggestions are made on how to identify, analyse and report these deviations. It is also described, how this modified version of backcasting will be applied and tested in a research on futures without economic growth. Finally, the pros and cons of the modification are assessed.

Key words: Backcasting, Methodology, Preferred Futures

The participation paradox. Critical reflections on the design and conduct of participatory foresight interventions in organizations

Christina M. Bidmon & René Rohrbeck
Aarhus University, Department of Management, Denmark

The motivation of this paper stems from the observation that the role of the single intervention in foresight processes and projects, such as workshops and meetings, as well as the influence of participation on the outcome of such interventions has not yet received sufficient attention within research. We set out to reflect on the design of participatory foresight interventions and highlight the benefits, but also the challenges that result from participation. We specifically consider the influence of two micro-processes, *repeated consensus* as well as *linguistic and identity lock-in*, which seem to shape the application of foresight

methods in participatory settings. We use the illustrative case of FIRM, which represents experiences accumulated in the collaboration with a variety of organizations, to exemplify what we label a *participation paradox*. We hope our paper stirs further work on the role of participation in corporate foresight interventions, which is a highly relevant topic considering how strategic decisions are taken in current organizational practice.

Key words: Corporate Foresight, Foresight Interventions, Foresight Methods, Participation, Strategic Decision-making

Future dreams of young people – Tools to promote young people's civic participation

Katariina Heikkilä[a], Tuulia Nevala[a], Ira Ahokas[a] & Liisa Hyttinen[b]
[a] Finland Futures Research Centre, University of Turku, Finland
[b] Helsinki-Uusimaa Regional Council, Finland

How can young people's conceptions about the future prospects of Finland be observed and taken into account? In what ways can the society promote the civic participation of young people? These questions in mind, a research project "Young people and their futures images of 2067" was planned. The purpose behind producing material for futures images by young people in futures camp and asking them to identify potential obstacles for positive futures images to come true, is to produce suggestions to develop Finnish society along the views of young people and make young people involved in the making of the future in common.

Research seeks to encourage young people to actively think and express their viewpoints related to the future and to learn to consider alternative futures images. The participatory aspect is applied in different ways during the three phases of the project. First, it is experimented how a tool called future camp can be applied to gather young people's views about the topics in question and to promote futures thinking in a participatory atmosphere. Second, a survey is conducted where young people are asked to evaluate the futures images that are created based on the material from the first phase. They are also challenged to ponder factors that might prevent desirable futures to come true. Third, a group of young people is invited to use the results of the two earlier phases, to pick up issues they see important and to get their views out in the open in a seminar that is organised while Finland celebrates its 100th anniversary 2017.

Key words: Futures Images, Young People, Future Camp, Participatory Tools, Civic Participation, Futures Thinking

Security Forecasting in a Complex World

Time: Monday 12 June at 15:00–16:30
Room: Kustaa
Moderator: Mikko Lappalainen., Defence Research Agency, Finland

Presentation:

Rhett Hatcher and Simon Cole, UK MOD DCDC

Panelists:

PhD Vesa Valtonen, Security Committee Secretariat, Finland

Dr. Olaf Theiler, Future Analysis, Bundeswehr, Germany

Joachim Isacsson, Futures UK DCDC (Armed Forces, Sweden)

Jasmin Diab, Future Concepts, Department of Defence, Australia

Björn de Heer, Land Warfare Centre, Netherlands

This session will focus on the long-term strategic security foresight: how to develop a comprehensive yet actionable enough strategic context for those in the wider Government who are involved in developing long term plans, policies and capabilities in the area of security.

The session will begin with an introduction of a current best practice: representatives of the UK MOD´s think tank DCDC will brief the audience on the Global Strategic Trends (GST) program. GST has been running since 2001 and currently, the GST6 is in the making.

The International panel will then give prepared comments sharing their latest national insights: how we are approaching complexity in the security foresight while keeping products useful to our customers: lessons learned the hard way, new methods, novel ways in support of the implementation etc.?

The audience, including representatives from the government of Finland, is then asked to join the discussion and challenge the panellists with their remarks, views and ideas. The researchers in the audience will gain knowledge about the evolving customer needs in the times of complexity and will be informed about the joining opportunities in various security foresight programs.

Futures of Democracy, Society and Values

Time: Monday 12 June at 15:00–16:30
Room: Dining Room
Chair: Dr. Katriina Siivonen

The future of Belgian democracy according to political science students

Sébastien Brunet[a] & Jean-Luc Guyot[b]
[a] University of Liege (Political Science Department) and Walloon Institute for Evaluation, Foresight and Statistics, Belgium
[b] Catholic University of Louvain-la-Neuve and Walloon Institute for Evaluation, Foresight and Statistics, Belgium

This contribution reports on a teaching experiment on the future of democracy. Within the framework of a course specifically dedicated to foresight and futures studies, six groups of 15 students in political science and geography (University of Liège, Political Science Department) engaged in a prospective reflexion on Belgian democracy in 2030. The six groups worked separately during the first three one and a half hour sessions. The fourth session was a plenary session dedicated to comparing the ideas and scenarios that the groups developed for democracy in Belgium. All groups used a common method and shared the same tools. First, the students proceeded to a SWOT analysis of the Belgian political system; second, they qualified other systems in interaction with the political system; third, they worked on the actors, their objectives and representations of the world; finally, the students produced different scenarios. The final outcomes of the students' work, with all the intermediate material they produced during the sessions were then gathered in a time capsule. The latter is conserved by the academic authorities of the University and will be opened in February 2030. What are the different scenarios that were produced? Do they differ strongly from one group to another? From a teaching perspective what are the lessons to be learned?

Key words: Scenario, Democracy, Students, Teaching, Prospective

Transdisciplinary agenda setting for future research and innovation – Comparing results of expert based foresight to large scale citizen centred forward-looking

Niklas Gudowsky[a], Philine Warnke[b], Aaron Rosa[b], Nora Häuser[b] & Walter Peissl[a],
[a] Institute of Technology Assessment, Austrian Academy of Sciences, Austria
[b] Fraunhofer Institute of Systems and Innovation Research ISI Karlsruhe, Germany

Dealing with the Grand Challenges requires science, technology and innovation to be increasingly oriented towards societal needs and demands. Here, eliciting socially robust knowledge in forward looking multi-actor settings may contribute to responsible innovation governance by complementing expert-based anticipation with multiple perspectives and normative assumptions, carrying values and societal needs. Stakeholder engagement has become a norm in foresight over the last decades, yet, including lay-people into forward looking science, technology and innovation (STI) governance is underexplored and research programme development may be well suited to function as early entry point for orienting the innovation process towards societal needs and values.

This paper will briefly review the theoretical basis for transdisciplinary foresight and provide in depth insights into a highly deliberative Europe-wide foresight and co-creation process that engaged science, society and policy makers in 30 countries – CIMULACT – Citizen and Multi-Actor Consultation on Horizon2020. The paper will especially focus on comparing results of this transdisciplinary agenda setting process to results of traditional experts-based foresight activities with a similar scope of consulting for research programme development. We will present preliminary results that elaborate differences, overlaps and potential contradictions between the futures these different actor groups depict and implications for today's decision making.

Key words: Transdisciplinary Foresight, Multi-Actor Engagement, Demand Orientation, STI Governance, Programme Development, Agenda Setting, Methodology

Utopias, dystopias and atopias in Jerusalem 2060

Julia Lampert
Institut Futur, Institute for Educational Science and Future Research, Germany

Looking at Utopias, Dystopias but also Atopias for Jerusalem in 2060 is challenging but at the same time very rewarding. Many of the challenges are rooted in its unequalled historic magnitude. It is a city with an unique importance to the three monotheistic religions and the ongoing Israeli-Palestinian conflict. Furthermore, it holds a distinct symbolic value essential to the construction of collective identity in the region. Therefore it is being claimed exclusively by two different people.

This delicacy of discussing different futures in Jerusalem made it very suitable to an in depth analysis with qualitative interviews. Different opinion leaders of various fields crucial to the city's development were considered to provide the raw data for a 'Leitbild' analysis, a tool especially designed to uncover underlying and hidden guiding principles, developed by Prof. Gerhard de Haan and the Institut Futur.

With all its complexity Jerusalem is also a very beautiful and diverse city, that deserves a bright future shaped by all it's citizens. Therefore, the aim of this work is to shed a light on a genuine discourse of different futures, a blind spot for both societies who are locked in the conflict. But there is also the theoretical potential to bridge the constantly growing inner societal divides the city is facing. Analysing the city's different futures gives the opportunity to step away from the present, away from a political standoff, and into a long term perspective of what is desirable, hopeful or at all possible.

***Key words**: Futures in Conflict, Jerusalem 2060, Middle East, Leitbild Analysis, Israel and Palestine, Qualitative Interviews, Utopia, Dystopia, Atopia*

Deconstructing survivalism as futures knowledge

Marjukka Parkkinen
Finland Futures Research Centre, University of Turku, Finland

Survival is in the core of being human, and specifically, it is a question concerning the futures. This research focuses on the socio-individual paradigm of looking at the futures with an aim to survive by preparing for it. I analyse survivalism (also known as preparedness) as a futures-oriented approach and knowledge. Survivalism is a very specific, yet under-researched approach towards futures. It is a sociomaterial futures-oriented practice embedded in every day. According to the hypothesis of the research

survivalist knowledge is free of external focal limitations. The lack of restrictions to concentrate on something particular enables peripheral vision and the rhizomatic process of exploring the futures in constant flux offers leverage to meet the challenges set by complexity.

This paper answers the research question: ”How are alternative futures observed, constructed and prepared for in survivalist discussions?” Causal layered analysis is utilised as a method to deconstruct and critically observe survivalism as an approach to futures. The primary research material consists of Finnish survivalist web forum texts. The purpose of this paper is two-fold, combining empirical and theoretical approaches. The empirical objective of the study is to analyse survivalism as futures knowledge. The second purpose of this paper is to contribute to the critical post structural framework of futures studies as well as the discussion on the epistemological foundations on which the knowledge or assumptions on futures can be based on.

Key words: Survivalism, Preparedness, Causal Layered Analysis, Futures Knowledge, Deconstruction

Session III
Monday 12 June at 16:45–18:00

Challenges and Opportunities for Global Governance

Time: Monday 12 June at 16:45–18:00
Room: Katariina
Chair: Dr. Juha Kaskinen

Reaching zeitgeist: On complexity, decision making and participatory foresight

Enric Bas[a] & Michal Pazour[b]
[a] FUTURLAB-University of Alicante, Spain
[b] Department of Strategic Studies at Technology Centre of the Academy of Sciences, Czech Republic

As Immanuel Wallerstein, founding father of the *World Systems Theory* stated in his book *Utopistics, or the historical options for the 20th century*: "guess that, when systems work normally, determinism prevails on both individual and collective free will. But in times of crisis and transition, the free will factor becomes key. The world of 2050 will be what we make of it".

This is even more obvious today, in 21st century, when technological change meets radical transformations (demographic, economic, political) all around the world. So ignoring the complexity of the changing times we are living in, while feeling wrongly safe in the comfort area provided by determinism (forecasting) and experts' opinion (foresight) can be highly ineffective and dangerous.

In this paper the authors, which are jointly working as members of the SFRI (Strategic Foresight Research for Innovation) experts group of the DG-RTD at the European Commission, try to explore a new analytical framework (participatory foresight) on the basis of the main patterns currently shaping social reality. Futures Studies might definitively become a useful tool for supporting effective decision making both in organizations and individuals, being more emphatic with the current Zeitgeist. A Sign of the Times featured by the transformative key role of individuals (citizens, consumers, users…)

The presentation intends to be kind of interactive, mixing the scientific/narrative approach of the proposal together with a small participatory/dynamic exercise to promote joint analysis as example.

Key words: Participatory Foresight, Complexity, Social Change, Sign of the Times, Empathy, UX-User Experience, Decision Making, Governance, Citizenship, Post-truth, Social Development

(A)Political futures: Examining the rise and role of fiscal councils in global governance and policy making

Stuart Connor
Faculty of Education, Health and Wellbeing, University of Wolverhampton, United Kingdom

In recent years, independent fiscal councils have become an increasingly prominent feature of governance and policy making across the globe. The aim of this paper is to review the rationale, nature and operation of fiscal councils, and forecasting in particular, as a means to considering the challenges and opportunities

for futures research in global governance and policy making. Proponents have argued that the transparent and non-partisan forecasts that independent fiscal councils can provide, will ground and limit the excesses of politicised policy actors and help ensure the discipline and sustainability of fiscal policies. However it is argued that attempts to secure the de-politicisation of governance and policy making is neither possible nor desirable. Such a project may at best be considered laudable, but naïve, and at worst represent an ideological sleight of hand in attempts to colonise the future. There is a necessary tension between technocratic and deliberative aspects of global governance. A tension that is exacerbated where there are no future facts, but projections of position and power. Moving forward, it is argued that foresight, rather than forecasting, does and should have a vital role in global governance, not as a means of resolving such tensions, but using these tensions to create the necessary *ficta* of policy making and global governance, where engaging with futures is not a struggle between advocates of the real and the possible, but a question of asking what do we take to be real and what is really possible?

Key words: Foresight, Technocracy, Governance, Temporal Colonisation, Policy

The science of laws: Impact on 21st century governance

David G. Schrunk
Science of Laws Institute, USA

This presentation discusses the function, objectives, and benefits of a new science: the science of laws. The traditional method of lawmaking, which is presently used by governments to create laws, has been unable to resolve persistent societal problems such as war, poverty, and human rights abuses. The principal reason for the lack of success of the laws of government is that the traditional method of lawmaking is not based upon scientific knowledge or methods. To improve the problem-solving performance of laws, therefore, the science of laws was created in 1995. The discussion focuses on the two branches of the science of laws: investigative science and creative science. The purpose of the investigative branch is to accumulate knowledge of the outcomes of laws so that the mechanics (cause and effect) of laws will become known. With this knowledge and history, governments will be able to identify and repeal, as well as avoid in the future, those laws that fail to solve societal problems. The purpose of the creative branch is to employ quality design standards and engineering best practices (e.g., modelling and simulation) in the creation of new laws that are effective, safe, just, and cost-efficient in the solution of societal problems. The presentation will discuss ongoing science projects, annual conferences, and the potential of the science of laws to improve the human condition by enabling governments to develop a much more efficacious and beneficial rule of law.

Key words: Science, Engineering, Law, Governance

Exploring the future of science and innovation diplomacy

Jos Leijten & Daniel Gehrt
Joint Institute for Innovation Policy, Belgium

Science diplomacy links the two domains of foreign affairs and science policy. The objectives and practices of science diplomacy are changing. Foreign policy analysts see it as a way to wield the ”soft powers” of collaboration to improve the overall relations between countries. The increasing role of knowledge and the linking of science to innovation in a globally competitive environment so far has received less attention, but is gaining importance rapidly. Innovation policy with its orientation at strengthening a country’s

or region's innovation system has very strong competitive elements. This only becoming more complex by the fact that today innovation has, just as science, become global, for example through global technology platforms and innovation networks or the need to integrate complex systems to address global challenges. And has to be seen in the light of current de-globalisation politics.

The presentation and paper will explore the future roles and development of science and innovation diplomacy as the outcome of interactions between the evolving characteristics of science, technology and innovation on the one hand and of international relations and foreign policies on the other. The main questions to be addressed are the following: Which will be the main issues which shape and characterise the field of S&I diplomacy? (E.g. global challenges versus national competitive interests). What are the likely stakeholder configurations shaping the field? (E.g. the role of multinational or global companies). How will this shape the policy instruments and working methods?

It will build on a few case-studies (e.g. Photovoltaics in China-EU relations and the EU "exporting" the model of smart specialisation for regional innovation in Latin America) and on the early results of a foresight approach to science and Innovation diplomacy.

Based on research supported by Horizon 2020 Framework Programme for Research and Innovation (2014-2020), Societal Challenge 6 – Europe in a changing world: inclusive, innovative and reflective societies", call INT-2014-2015, topic "Europe as a global actor".

Key words: Science Diplomacy, Innovation, Foreign Policy, International Relations, Soft Power

Futures Education

Time: Monday 12 June at 16:45–18:00
Room: Eerik
Chair: Senior Advisor Sari Söderlund

Ugly and its interpretations in craft

Ana Nuutinen, Textile and Clothing Design, University of Lapland, Finland
Riikka Räisänen & Päivi Fernström, Craft Studies**,** University of Helsinki, Finland

Futures studies argue that future cannot be predicted, but rather alternative futures can be explored and preferred futures can be imagined. Furthermore, our images of the futures can be a resource that informs our decision making. Understanding and imagining futures needs transdisciplinary inquiry, it calls for creativeness and freedom from prejudice.

In this study we present a design experiment accomplished in the Textile teacher education at the University of Helsinki. Our aim was to explore and strengthen skills that students will need in their future work. The creative basis of our experiment applies David Kolb's experimental learning theory where learning process forms an expanding and progressive spiral.

Expression, design and technology are characterized by open-ended and complex design problems. When solving them student internalizes, that there are no right or wrong solutions to all problems, that the path of the design process cannot be precisely defined in advance, and that the same starting point can produce very different solutions.

Experiment familiarizes students with the interrelation of materials and their manipulation techniques and guides them to understand the possibilities of manual experimentation, spontaneous invention and

discovery. Carrying out these experiments entails the free, unusual or absurd manipulation of the materials. Ugly is especially selected viewpoint to discuss possible new futures.

Data was collected from students' portfolios and analyzed using qualitative content analysis. The study shows that making something intentionally ugly raises emotional debate. Ugly was understood and defined in numerous ways. Ugly experiments impacted on motivation to invent and discover, for example by empowering or discouraging.

Key words: Craft, Design, Ugly, Experiment, Empower

Particularities of educational practice for developing futures and foresight literacy in Finland and Russia (comparative analysis)

Tatiana Yakubovskaya
Head of Scientific-Educational Centre for Foresight-competence development, National Research Tomsk State University, Russia

In this presentation based on the comparative analysis is considered how in Finland and Russia the futures studies are used to modernise school education.

In the Finnish education policy and educational practice the use of futures studies and foresight is considered as important task since 2000. In modern Russia, we can talk about the education policy in area of "futures/foresight literacy" only after 2010.

At the same time in Finland and Russia there are educational practices, where are generated the educational models and methods, concepts and tools for the developing futures/foresight thinking as a part of a worldview. One of the insufficiently studied and difficult to approach is the issue of "futures in education": what problems and opportunities of using the concepts of time and future in the formation of the "futures/foresight literacy" concepts and the futures thinking development there are for the modern theory and practice of education in Finland and Russia.

We will discuss specific format of educational activities "educational foresight-event", based on analysis of the educational technology "open Foresight-laboratory", which goes beyond "futures" as isolated lessons or subjects. In the educational foresight-events is established links between the future, past and present in the connection with the issues of formation of image of the future. The research is based on the experience of the educational projects "Open Foresight-laboratory" in Siberia (2012-2107 by cooperation of Tomsk State University and Seversk gymnasium, Russia) and in the Arctic area (Yamal, Russia, 2017).

Key words: Futures in Education, Futures Literacy, Foresight Literacy, Foresight Competence, Educational Foresight-event, Concepts of Time, Concepts of Future

On futures of geographic information

Toni Ahlqvist
Geography Research Unit, University of Oulu, Finland

The presentation argues that geographic information is a key element for any future socio-technical system. In this context, geographic information can be defined as a set of features of technological systems

in order to collect and utilise location-based information, and, in interaction with users and other technological systems, to channel and orient their functioning and behaviour. In the context of emerging ubiquitous technological systems, such as "Internet of Things", the geographic information builds on multiplicity of components, that is, data sources, information layers, nodes, relations and flows. When these components interact, one could speak about technology-based "geoassemblages" that harness specific forms of multidimensional "geoknowledge". In this presentation I speculate upon futures of geographic information in the context of generic societal and technological development. I focus particularly on so-called radical technologies, and on their potential impacts for future of geographic information. I open prospects towards futures of socio-technical systems and environments both from the perspective of regular citizens and the perspective of geographic information professionals.

Key words: futures, geographic information, socio-technical system, radical technology, societal development

Futures of Consumption and the Economy

Time: Monday 12 June at 16:45–18:00
Room: Kristiina
Chair: Dr. Riel Miller

Measuring tomorrow's economy: Which tools for measuring and analyzing circular and collaborative economies?

Sébastien Brunet[a], Vincent Calay[b] & Jean-Luc Guyot[c]
[a] Political Science Department, University of Liege, Foresight and Statistics, Walloon Institute for Evaluation, Belgium
[b] Walloon Institute for Evaluation, Foresight and Statistics, Belgium
[c] Catholic University of Louvain and Walloon Institute for Evaluation, Foresight and Statistics, Belgium

The recent emergence of strategies to develop the circular economy (Heshmati, 2015) and the strong rise of the sharing economy (Marshall, 2015) call for a questioning of how the "real" economy is actually measured (i.e.: the quality of available data, the indicators used and the information sources mobilized). Both economies are gaining ground in an environment characterized by an increase in the productivity of raw materials (by means of the 3R principles which are reduced use of materials, their reuse and recycling) and by new types of consumption based on collaborative principles. These new economies therefore develop a new relationship with respect to value.

On December 9, 2016, IWEPS organizes a methodological conference dedicated to a foresight perspective on appropriate tools for measuring these circular and collaborative economies. It will yield a diagnosis of existing knowledge, through a panel of speakers who will present tools and methods used today, and a debate with major stakeholders, in thematic workshops, to address the major challenges for measuring tomorrow's economy.

The purpose of our paper is to present the results of this debate. Four topics will be examined: (1) how to deal with circular and collaborative economies in future public policy evaluation, (2) methods to report

on macroeconomic dynamics generated by circular and collaborative economies, (3) how to develop collaborative strategies amongst stakeholders so as to promote and manage new communities of information and data sharing and (4) the use of qualitative and quantitative methods in the analysis of tomorrow's economy.

Key words: Tomorrow's Economy, Circular Economy, Collaborative Consumption, Methodology

What future for businesses in Visegrad countries?

Anna Kononiuk[a], Anna Sacio-Szymańska[b] & Judit Gaspar[c]
[a] Bialystok University of Technology, Poland
[b] Institute for Sustainable Technologies – National Research Institute, Poland
[c] Corvinus University of Budapest, Hungary

Research problem: Authors tackle present challenges associated with the limited awareness of foresight and constrained access to foresight training offer in Visegrad (V4) region (that is in: Poland, Czech Republic, Slovakia and Hungary), which leads to insufficient futures literacy competences among managers and thus stiffens the opportunity to take advantage of foresight in their business practice.

Aim of the research: Authors aim to advance futures research by outlining the context and development perspectives of business foresight in the V4 region.

Aim of the presentation: The main aim of this presentation is: 1) to give the overview of the status and perspectives of foresight research and practice in Visegrad countries; and 2) to share the results from the visioning workshop, which aimed to provide a learning-by-doing scenario practice for the business representatives from the four above mentioned countries.

Methodology: The authors will present two perspectives of analyzing business futures. A macro perspective, which concerns possible development scenarios of V4 economies, and a micro perspective which concerns possible development scenarios of individual companies from V4 region.

Acknowledgment: The research portrays the results achieved in the International Visegrad Fund FOR_V4 project: "Mobilising corporate foresight potential among V4 countries".

Key words: Business Foresight, Visegrad Region, Futures Literacy, Scenario Building

Longevity – postmoney – immortality: Value function in the domain of postmoney

Boyan Ivantchev
Economics, University of National and World Economy, Bulgaria

Since the brilliant work of a Georg Simmel "The Philosophy of Money", published more than a 100 years ago, there are very few works criticizing the philosophy and the "soul" of money. The Theory of Postmoney is trying to prove, that money is not anymore just a simple tool with three functions: medium of exchange, store of value and unit of account. Emergence of Postmoney is a result of latest developments in market economy, scientific exponentiality and human beings mental changes. Value Function and Prospect Theory is saying, that increase of a money quantity and status quo shift is leading to a diminishing sensitivity of a money gains and losses. That statement is valid nowadays with the exception of a short lasting periods of deviant consumption and usage of money. Perceivable future belongs to the domain of Postmoney Era. Increase of a money quantity will lead to a qualitative transformation and psychological increase of a money sensitivity. Scientific

development and possibility for "buying" more years of life or even immortality will change the reference point and humans status quo. Perception of an intrinsic value of the money will be different and will change the shape of a value function - from concave for gains into convex and probably exponential. Money will be transformed from a simple toll into the aim per se i.e. Postmoney. By conducting a survey it is proved, that perception of a money intrinsic value changes because of the shift in reference point and status quo of the respondents - depending on current age and possible future scientific achievements.

Key words: Postmoney, Longevity, Immortality, Value Function

Future studies of tacit knowledge innovation in exploring generational change and enterprise development in family business

Lee Kean Yew
Asia Europe Institute, University of Malaya, Malaysia

This important topic of knowledge transformation is closely related to the concept of 'learning organizations' where man knows more than he can explain. In the literature on family business, a founder's personal experience, inherent qualities and competence are persistently noted with much reference to transforming this tacit knowledge into codified knowledge. If this objective is achieved, the codified knowledge will serve as an asset for the enterprise development that subsequent generations can develop to increase its competitive power. However, this task of transforming, commercializing and capitalizing on tacit knowledge is not easy. Codifying knowledge is considered a long term investment within an organization or enterprise development. Different generations propose different characteristics, managerial styles and goals. Each generation brings new ideas and improvements developed from their past experiences and events. New generations bring new ideas and are more prepared and trained to develop an enterprise. In family businesses that operate over a few generations, research have shown that the founders would be less likely to transform their tacit knowledge (defined here as personal experiences) to codified knowledge (that is, knowledge embedded in the firm but cannot become immediately available in the market). Therefore, the future studies to access the family legacy in tacit knowledge innovation is essential to transform the firm's knowledge. Undoubtedly, the economic prosperity of the future market is largely dependent on tacit knowledge codification align with increasingly adaption to the innovation.

Keywords: Tacit Knowledge, Codified Knowledge, Generational Change, Enterprise Development, Family Business, Innovation

Technology Foresight: an Era of Transformation, Human and Technology Interaction

Time: Monday 12 June at 16:45–18:00
Room: Pietari
Chair: Dr. Fiona Kerr

Partnering with AI for a humane future

Fiona Kerr
Faculties of Professions, Engineering and Health Sciences, University of Adelaide, Australia

Technology profoundly changes what people do and how they connect, some aspects of which are physiologically critical to societal and individual wellbeing. Technological advancement presents us with immense opportunity and capability enhancement, but engagement with technology and ever-more-powerful AI is complex and multifaceted as increasing intermediation, distraction and addiction change how we connect, think, feel and belong.

Technology is neither good nor bad but neutral – we shape the drivers, whether actively or passively. This presentation explores how we should actively shape our technological advancement to ensure a human-centric outcome, taking advantage of breakthroughs and surprises, identifying drawbacks and predicting unknown threats. It is based on data gathered over thirty years in industry, and research combining complex systems engineering, cognitive neuroscience, psychology and anthropology. Relevant issues explored include:

- Ever-growing processing power increases big data's aggregative capacity, informs decisions and allows us to discover relationships between seemingly disparate phenomena. But it also shapes and limits our horizons and information capture, and has neurophysiological impacts which curb creativity and minimise long-lens complex problem solving.
- With sweeping changes to the nature of work, a different approach is required in shaping not only new jobs, but aspects such as education, global pay systems, and societal measurements of productivity and worth, to ensure technology benefits organisations and societies alike.
- Whilst striving to build robots with emotion, the current state of AI and computer science and the complexities of human emotional cognition mean we may build perfect psychopaths
- As we move towards technological intermediation we wrestle with the lack of ability to set parameters around the behaviour of both AI and human, and with a limited understanding of the emergent nature of consequence.

Key words: Human Centric, Technological Partnerships, Emergent Consequence, Big Data, AI, Societal Wellbeing, Cognitive Neuroscience

Options for future human evolution: Technology/transhumanist, sustainability, civilization, consciousness, and space-based perspectives

Linda Groff
Global Options & Evolutionary Futures Consulting, USA

Humanity and our planet are at another cutting-edge time, due to a number of accelerating changes in each of the following areas: multiple technological changes, with 11 technologies covered, including transhumanist views; sustainability and threats to the planet in a number of areas in the Anthropocene Age; all the cultural-civilizational diversity of humanity now coming together in our increasingly interdependent world (and finding positive ways to do that based on intercultural, intercivilizational, interfaith dialogue and other tools); an evolution of thinking, mindset, and consciousness (to dynamic, interdependent, complex whole systems thinking) needed to deal effectively with all these changes and challenges; and the challenge of some humans moving to space – a totally new environment. How does humanity deal with all these challenges and changes all happening at once, and create more dialogue between these different perspectives? And will humanity evolve together or diverge in different ways going forward?

Key words: Futures, Evolution, Future Human Evolution, Echnology, Transhumanism, Sustainability, Civilization, Consciousness, Space

The role of technology futures analysis in e-government: A systematic literature review

Jenny Marcela Sánchez-Torres[a] & Ian Miles[b]

[a] Computing Systems and Industrial Engineering Department, Universidad Nacional de Colombia, Colombia
[b] Manchester Institute of Innovation Research - Manchester Business School, University of Manchester, United Kingdom

On one hand, the Technology Futures Analysis, TFA, is an umbrella concept, which included wide forms of forecasting technology, technology intelligence, foresight methods and tools for identifying future developments and its implications on society, especially, there is a highlight link between TFA and public policies design. On the other hand, Electronic government (e-government) is a concept related to the way for providing government services digitally with an open government approach, which means improving transparency, communication and public accountability between government and citizens. The aim of this paper is to answer how the role of TFA for e-government initiatives is. For this purpose, a systematic literature review was conducted in order to observe research design, TFA method, scopes, and stakeholders of e-government initiatives. Although, during the last decades in most countries have been designed and implemented e-government policies, our critical review of the literature suggests that there are a few e-government experiences based on TFA approach.

Key words: Technology Futures Analysis, Futures Studies, E-Government, Open Government

Methods and Methodology of Futures Research

Time: Monday 12 June at 16:45–18:00
Room: Juhana
Chair: Dr. Tuomas Kuhmonen

Beyond internal consistency: An alternative technique to choose most relevant scenarios for cross-impact balance (CIB) method

Arash Shojachaikar & Wolfgang Weimer-Jehle
Stuttgart Research Center for Interdisciplinary Risk and Innovation Studies (ZIRIUS), University of Stuttgart, Germany

Scenario methods use different strategies against future uncertainty of complex systems. Quantitative methods and some qualitative methods like Cross-Impact Balance analysis (CIB) try to handle the uncertainty by generating a large set of scenarios to cover all possible future states. However, for practical reasons only few scenarios can be taken into account for the final analysis. Thus, specific criteria have to be applied to choose most important/relevant scenarios from the generated ensemble. In the same line, CIB ranks scenarios based on their internal consistency degree, and chooses the most consistent ones for the final analysis. However, this leads to selecting few out of thousands of generated scenarios, and overlooking the absolute majority which are to various degrees inconsistent. Also, consistency as a unique quality yardstick for future scenarios has been criticized by some scholars, pointing out that future is not necessarily consistent with our current definitions. Accordingly, this paper aims to implement an alternative criterion than consistency, in order to discover most important/relevant among both internally consistent and inconsistent scenarios. To this end, the paper suggests that if scenarios are being connected together on the basis of an inconsistency adjustment algorithm, a network of successive scenarios will be resulted which can be analyzed through network analysis techniques later. By forming this network, the most relevant scenarios from the point of view of system's behaviors could be discovered which are not necessarily consistent ones. Thus, a richer look into the future of the system under study becomes possible.

Key words: Internal Consistency, Cross-Impact Balance Method, Network Analysis, Future Uncertainty

Axiom method for cross-impact modelling and analysis

Juha Panula-Ontto
Finland Futures Research Centre, University of Turku, Finland

Cross-impact models represent systems as events and system states and interactions between them. They operate on expert-sourced data instead of empirical or statistical data and can capture the qualitative-nature understanding that domain experts possess of a system, enabling modelling and simulation efforts in domains that could not be modelled by traditional modelling techniques because of lack of data. Especially in cases of futures studies and foresight, which deal with changing dynamics of systems, the kind of empirical data required for traditional modelling is often not available and the best available data to base the modelling effort on is expert-sourced opinion data. The existing cross-impact approaches offer partial solutions to this modelling niche but have several shortcomings.

AXIOM method for cross-impact analysis is a novel cross-impact modelling approach that combines the best practices of existing cross-impact approaches to a flexible and practical modelling technique with good fitness for actual research cases and the modelling of real systems. AXIOM models have rich analytical possibilities in testing for the effects of changes in the modelled system and the effect of interventions, policy actions and the viability of strategy, but also in identification of consistent system states and scenarios, co-occurring phenomena and system states and evaluation of multiple actors' strategies. The AXIOM approach offers good modelling primitives, a freely available software implementation of the method and transparent documentation, making it a strong candidate for a cross-impact modelling approach and a systems modelling approach in general.

Key words: Modelling, Simulation, Cross-Impact Analysis, Systems Analysis, Interaction Analysis

Hybrid scenarios for the future

Petri Tapio & Akhgar Kaboli
Finland Futures Research Centre, University of Turku, Finland

A recent trend in futures research is to operate with hybrid methods. Hybrid methods use a combination of various methods with the aim to benefit from each method's strength without having to compromise the outcome with the weaknesses. This paper makes a short review of hybrid methods in futures research and proposes a novel combination. The novel combination includes a Delphi study for gathering data (first round interviews and second round with a questionnaire), qualitative content analysis and cluster analysis of the data, Causal Layered Analysis to interpret the results and to build the scenarios and stakeholder engagement with focus groups to make the results meaningful, usable and negotiable. This kind of transdisciplinary process effectively combines academic and non-academic knowledge formation. The approach is basically planned to be used to outline the future of academic profession in Finland, however, it is also applicable to other subjects, which benefit from a profound investigation and also an interactive intervention of stakeholders and decision makers.

Key words: Hybrid Methods, Delphi, Causal Layered Analysis, Cluster analysis, Qualitative Content Analysis, Focus Groups

Integration of trends monitoring and bibliometric analysis into technology roadmapping: The case of unmanned aerial vehicles (UAVs)

Nadezhda Mikova
Department for Private-Public Partnership in Innovation Sector, National Research University Higher School of Economics, Institute of Statistical Studies and Economics of Knowledge, Russia

This paper presents an approach to integration of trends monitoring and bibliometric analysis into technology roadmapping in the area of UAVs: it provides an overview of the trends influencing the development of UAVs (using STEEPV-categories); performs bibliometric analysis of the publications in 2005-2015 to identify the hot topics; and presents the ways how this information can be used in technology roadmapping process. The results obtained can be taken as a guide by researchers, business representatives or policy makers involved in foresight activity.

The methodological approach implies usage of the following methods: qualitative (literature review, expert procedures) and quantitative (bibliometric analysis, technology mining). It includes the following stages:

- Semi-quantitative monitoring of STEEPV-trends (using different information sources: international reports, news, foresights, strategic documents, conference materials, etc.).

- Quantitative analysis of Scopus publications in 2005–2015 (bibliometric analysis and technology mining with Vantage Point and VOSviewer).

- Combination of the results of quantitative and qualitative procedures and their integration into a technology roadmap.

As a result of this study, the relative assessment of STEEPV-trends influencing the area of UAVs was conducted using quantitative data processing and expert procedures; the main research fronts and hot topics were detected (f.e. green UAVs, flying cars, sensor UAV technologies, drone swarms); and the possibilities for integration of trends monitoring and bibliometric analysis on different stages of technology roadmapping were explored and analyzed. Studying the ways for using these tools in developing, validating and updating technology roadmaps is an open room for further research.

Key words: foresight, technology roadmapping, trends monitoring, technology mining, bibliometric analysis, UAVs

Futures Studies in Science and Technology

Time: Monday 12 June at 16:45–18:00
Room: Kustaa
Chair: Professor Piero Dominici

Beyond Turing? The notion of economic performance in the new normal

Michael König
Department of Strategy and Innovation, Vienna University of Economics and Business, Austria

"Although prospection allows us to navigate time in a way that no other animal can, we still see more than we foresaw". This seminal statement by Gilbert and Wilson aptly frames the paradox of the 21st century: While we are increasingly equipped in employing advanced foresight techniques, we have to accept that the nature and rate of disruptive change in the "new normal" overwhelms us. A major catalyst to this is the rapidly emerging phenomenon of artificial intelligence, ranging from human and technology interaction to the illusion of technological singularity. This poses manifold challenges to several scientific disciplines. This paper selects the notion of "performance" in economics and explores how it will be affected. Currently, there is a paradigm shift in economics, refuting the rationally acting "homo oeconomicus" by establishing the (partly) irrationally acting "homo emotionalis" in its models. With the rise of perfectly rationally acting artificial intelligence, however, will there have to be a third perspective, a "machina oeconomica", or a mix? Building on Turing's idiosyncratic test of human and machine performance, this paper systematically synthesizes key insights from sense-making theory, economics and control theory, and conducts phenomenological research in order to provide new insights and interesting research hypotheses.

Key words: Artificial Intelligence, Foresight, Homo Oeconomicus, Homo Emotionalis, Machina Oeconomica, Performance, New Normal, Turing Test

Science and Technology: enablers or inhibitors of fairness and sustainability in a complex world?

Carlos Alvarez-Pereira
Innaxis Research Institute, Spain

Alarms have been raised since a long time about the systemic challenges that humankind is facing. In this context, it is taken for granted that Science and Technology (S&T) are key to find solutions to those dramatic challenges. This is a strong paradox, since S&T have been not only central elements of the development model followed by human societies, but often (and still today) very effective instruments of mass destruction, environmental degradation and social exclusion. This paradox is grounded in some implicit assumptions, namely that the evolution of human societies is driven by technological change and that S&T are essentially beneficial and neutral with respect to their applications, which depend on human decisions. But it can be argued that the processes and rules through which scientific discoveries and technological innovations are produced are not neutral, but rather reflect a particular organization of society and therefore embody certain values and interests. So, we cannot take for granted that S&T will drive our course away from socio-ecological disasters.

On the contrary, they could pave the way to "technolitarian futures" in which human and environmental purposes will be secondary to the fulfillment of the logic of technological innovation.

Overcoming this situation requires a different conceptual framework in which could be made explicit the processes, rules and motivations driving S&T as they are practiced today. Such a framework is proposed, as a step forward in the clarification of the actual potential of S&T as enablers of a societal transformation towards sustainability.

Key words: Science and Technology, Complexity, Sustainability, Social Exclusion, Technological Innovation, Technolitarian Futures, Disruption, Societal Transformation

For an Inclusive Innovation. Healing the fracture between the human and the technological

Piero Dominici
Department of Political Science, University of Perugia, Italy

Hurled into hypercomplexity, we are facing a complex process of anthropological transformation (1995), of a shift in paradigms, models and codes, other than an irreversible synthesis of new value systems and criteria for judgment. Our extraordinary scientific discoveries and technological innovations not only open dizzily onto as yet unimaginable horizons and scenarios, but show, ever more clearly, the urgency of radically rethinking education, teaching and training, and of a systemic approach to complexity, underlining the substantial inadequacy of our schools and universities in dealing with this hypercomplexity, in dealing with the indeterminateness and ambivalence of the ongoing metamorphosis, in dealing with the global extension of all political, social and cultural processes. The social and cultural innovation belongs to those who will succeed in healing the fracture between the human and the technological, to those who will succeed in redefining and rethinking the complex relationships between the natural and the artificial, to those who will manage to bring knowledge and skills together (not to separate them), to those who will, furthermore, know how to unite and merge the two cultures (scientific and humanistic), both in terms of education and formative training and in defining profiles and professional competences. In this sense, the urgency that can be felt is to leave behind what I – long before it came into vogue – first called “false dichotomies”: theory vs. practice/research; scientific fields vs. the humanities; knowledge vs. competences; hard skills vs. soft skills (“European Qualification Framework for permanent learning” (EQF) and the Dublin Descriptors). All of this implicates also the rethinking of the very concepts of liberty and responsibility on a relational basis.

Futures Consciousness – Participatory Workshop

Time: Monday 12 June at 16:45–18:00
Room: Dining Room
Moderators: Sanna Ahvenharju, Matti Minkkinen & Fanny Lalot

The five dimensions of futures consciousness and how to measure them

Sanna Ahvenharju[a], Matti Minkkinen[a] & Fanny Lalot[b]
[a] Finland Futures Research Centre, University of Turku, Finland
[b] University of Geneva, Switzerland

Advocating for the benefits of widespread human awareness and thinking of the future has been a generally shared commitment among futures researchers. Future consciousness is one of the terms used for this phenomenon, a concept which refers to a capability of a person – or an organization – to comprehend possible future developments and their impact to our present situation as well as the impacts of our present choices to the future.

This session concentrates on presenting and discussing a novel five-dimensional model of futures consciousness, which has been developed at Finland Futures Research Centre. The model integrates theoretical thinking from futures studies with related psychological literature and relevant research-based psychological constructs. The model consists of the following psychological dimensions, namely, a) Time Perspective, b) Agency Beliefs, c) Openness to Alternatives, d) Systems Perception, and e) Concern for Others. The presentations provide the theoretical underpinnings behind each of the dimensions based on futures research literature, and describe the psychological constructs that can be used to depict these dimensions in human behavior. Based on the model a psychological measurement scale of futures consciousness has been developed and tested. The scale could be used in empirical research to measure and assess the presence and impacts of future consciousness.

The participants of the session will be asked to discuss the model of future consciousness as well as test the scale. Those wishing to participate in the session, can test and fill in the scale beforehand at https://link.webropolsurveys.com/S/1FE9272FD48DD66F

The programme includes a presentation of the model and the test scale of futures consciousness. The discussion will start out with the following topics:

- Does the presented model meet your idea of futures consciousness?
- Are all the necessary aspects of futures consciousness included or should something be added or left out?
- Can future consciousness be measured with a simple scale?
- Strengths and weaknesses of a survey approach?
- What could the model and the scale be used for?

The session will be facilitated and the model presented by its developers Sanna Ahvenharju and Matti Minkkinen from the Finland Futures Research Centre (FFRC) and Fanny Lalot from the University of Geneva.

Session IV
Tuesday 13 June at 9:00–10:30

Futures Education

Time: Tuesday 13 June at 9:00–10:30
Room: Katariina
Chair: Conscious Future Designer Erica Bol, Teach the Future

ICT impact on the future of education

Reyhan Huseynova,
Azerbaijan Future Studies Society, Millennium Project Node, Azerbaijan

The world today is entering a phase of global changes.
One of the main areas, which will change the entire planet in future, is education.
The next twenty years will be the era of revolutionary transformation in education.

The main source of these transformations is not the educational system itself, but the impact of the information technology and the financial coverage aspect in the educational scheme and training system. Since the formation and broadcast of modern technologies are intrinsically cross-border process, they set new requirements to the architecture of the educational system, which must also be defined globally in the future. The transformation of the educational sector is under the influence of new technologies, changing the concept of life of billions of people on the planet.

Two main spheres have the greatest influence on this transformation:

- The information and communication technologies, affecting all the processes of accumulation and transmission of information.
- Financial and investment module, which sets the general rules for cooperation in the economic and educational system.

The development of digital technology and telecommunication systems changes the ways that fix, transmit and create knowledge. Speeding economical dynamics in the industrialized countries sets the demand for new types of competencies and new forms of preparation. Education is inevitably endorsed as an intangible asset investment, the formation process of fixing and capitalization to be managed smartly.

The arrival of new industries affects the existing formula of employment in the economy - in particular, due to the automation of processes in the next decade will imminently lead to the emergence of a large number of "extra" people.

Education should become a key solution of the reduction the "extra" employees phenomena in future, which will initiate the sustainable development of countries and nations on the Earth.

Key words: Education, ICT, Employment, Economic Dynamics

Plan Ceibal 2020: Future scenarios for technology and education

Matías Mateu[a], Cristóbal Cobo[a] & John Moravec[b]
[a] Plan Ceibal, Uruguay
[b] Education Futures LLC, USA

This study analyzed a nationwide policy on education and technology in Uruguay: *Plan Ceibal*. Since 2007, this initiative aimed at reducing the digital divide and enhanced education through technology, such as devices, internet and educational platforms.

In this work a set of futures studies were implemented in order to answer the following question: *what will be the futures scenarios in the next five years regarding new technologies in public education sector in Uruguay?* For that purpose two Panels (20 participants internal to the program and 25 experts external to the program) were set up to conduct a Delphi study. This approach to foresight allowed us to define possible technological futures for the program and inform further policy development. In addition, an historical analysis of the use of Internet resources at schools (traffic and connections) was developed. A model was then adjusted to project trends in network use over the next two to four years. Finally the study integrated Delphi results and internet use analysis as a method for prospective scenario planning, from which four main possible education and technology scenarios for 2020 were identified.

We found that key challenges are not technological, but rather social and cultural factors. Some of the challenges to be explored in future scenarios are: How can we better rethink the role(s) of teachers? How can we rethink how technology is being used, adopted and adapted in learning environments? And, what systemic changes are needed to better respond these possible scenarios through policy development?

Key words: Education & Technology, Scenario Planning, Demand & Supply, 2020, Delphi, Plan Ceibal

Futures guidance as a means to promote futures thinking

Leena Jokinen, Johanna Ollila, Sari Miettinen, Nina Pietikäinen & Katariina Heikkilä
Finland Futures Research Centre, University of Turku, Finland

In this paper we will introduce and examine the concept of futures guidance. This concept has been developed and tested in various ESF funded projects within FFRC since 2009.

The main questions in this paper are:

- How does futures guidance differ from ”traditional counselling” in the schools?
- How to promote futures thinking or learning from the future with different target groups?
- How to evaluate the impact of this guidance model? (ideas for the further study)

Futures guidance is about achieving consciousness and understanding of an entity consisting of past experiences, present needs and hopes, and future possibilities. Futures thinking abilities are especially relevant in the context of life management and study guidance. Learning for the future leads us to experiential learning approaches and theories, which highlight contexts, social structures, settings, interactions, emotions and moreover the development of individual reflective ability and interaction with surrounding systems. Modern guidance and life management discourse are based on social learning theory and self-efficacy theory. These theoretical starting points together with futures studies frameworks offer a rich and fruitful field contributing to guidance pedagogy and didactics.

The futures guidance emphasizes futures orientation, self-reliance as well as creative and open-minded attitude towards the future. It promotes non-linear thinking and emphasis on alternative futures, happenstance, uncertainty and meaning of context. Understanding and exploring the meaning of one's values is central to the futures guidance. Futures guidance tools include aspects of gamification, simulation, holistic guidance and art based methods. Futures guidance can be and has been used with different age groups and at different educational levels (in junior high school, high school, vocational schools, university and employment services).

Key words: Futures Guidance and Tools, Futures Thinking, Personal Futures, Experimental Learning, European Social Fund Projects

Teach the Future

Peter Bishop & Erica Bol
Teach the Future, USA & EU

There is little debate that the rate of change and complexity of the world is increasing driven by information and communication technology. As a result, the traditional ways of approaching the future are no longer adequate. The world needs a new way to go beyond the traditional linear extrapolation and planning that is so common today.

As a result, Dr. Peter Bishop established Teach the Future to introduce futures thinking to classes and schools around the world. Erica Bol, responsible for the European satellite, joined him from the start.

Their goal is to inspire educators to teach young people to embrace change, think about it and influence it. This stimulates a positive and sustainable future for them selves and their surroundings. They encourage, enable and support progressive educators and institutions to integrate future thinking skills into the curricula, pedagogy and learning of young people in schools (age 8-24).

They are active on different levels, from creating awareness to (co) designing curricula and from developing tools to bringing together a network of supporters.

To inspire and assist teachers to teach the future they designed a special 'future thinking in the classroom' course for teachers. They address different 'future shapes'; *future consciousness, future styles, future spotting, future design, future creation and future happiness.* They are piloting it at the moment and like to briefly show you what it looks like. And of course bring you up to speed on their developments so far.

Keywords: Foresight, Futures Studies, Education, Curriculum, Teaching Materials, Teaching Courses, Enrichment, Teachers

Resilient Futures: Food Safety

Time: Tuesday 13 June at 9:00–10:30
Room: Eerik
Chair: Dr. Maria Höyssä

Food safety and nutrition – How to prepare for a challenging future?

Anne-Katrin Bock & Laurent Bontoux
DG Joint Research Centre of the European Commission, Unit Foresight, Behavioural Insights and Design for Policy, Belgium

The European Union (EU) has one of the most advanced policy and legislative frameworks on food safety and nutrition in the world. However, past performance is only a partial guide to ensure future performance. Therefore, the European Commission's Directorate Generals Joint Research Centre (DG JRC) and Health and Food Safety (DG SANTE) collaborated closely on a foresight exercise to assess the framework's ability to deal with possible future challenges. To that end, four exploratory scenarios were developed and used in a two-phase process involving a broad range of stakeholders.

The scenarios were used in two ways:

- In one approach, participants were asked to define the four unique sets of challenges that each scenario would create for food safety and nutrition. These sets of challenges were then confronted to current EU legislation to develop policy recommendations towards improving the future fitness of the EU food framework. This generated questions about how DG SANTE would best play its future policy role.
- To address this challenge, a second approach was developed. The scenarios were brought to life in a serious gaming platform, the JRC *Scenario Exploration System* (SES), in which DG SANTE could explore how best to play its policy role in realistic new circumstances when confronted to the behaviour of its main stakeholders under contrasting scenarios.

Both approaches, especially in combination, showed how powerful scenarios can be for practical policy making. The process demonstrated the usefulness of an immersive experience to foster a more forward looking mindset and thus pro-active preparedness.

Key words: foresight, scenarios, food safety, nutrition, serious game, policy support

Institutional interventions to prepare Indian farmers for a complex future

M.V. Ashok
National Bank for Agriculture & Rural Development (NABARD), Mumbai, India

India is home to over one fifth of the world's population. The country with a population of 1.31 billion has about 50% dependent on the agriculture sector. India's agricultural production increased from about 50 million tons in mid 1900s to 250 million tons now and has shown spectacular growth in the last 65 years. The country considered a major importers of food grains then became a net exporter today with overflowing granaries.

Farming in India is largely small holder based with not only small land holdings but also small livestock holdings More than 85% of the farmers are small farmers. These smallholder farmers already face numerous risks to agricultural production. Agricultural production in India, largely dependent on the monsoon, is now faced with a complex future where climate change is taking its toll in terms of erratic monsoon, freak weather conditions like frost, hail storm and catastrophes like floods and droughts. Climate change is expected to disproportionately affect smallholder farmers and make their livelihoods even more precarious. The high rates of population growth and natural resource degradation, with continuing high rates of poverty and food insecurity make India one of the most vulnerable regions to the impacts of climate change and is known to be one of the most disaster prone region in the world.

In general, past and present climate trends and variability in India can be characterized by increasing air temperatures and there is an increasing trend in the intensity and frequency of extreme events in the subcontinent over the last century. Temperature projections for South Asia for the twenty first century suggest a significant acceleration of warming over that observed in the twentieth century. Significant negative impacts have been projected for India in medium-term i.e. 2010–2039. It is predicted to reduce yields by 4.5 to 9 percent, depending on the magnitude and distribution of warming.

The impacts of climate change are global, but countries like India are more vulnerable to it due dependence of major population on agriculture and predominance of small and marginal farmers who possess low financial and technical capacity to adapt to climate variability and change. The projected impacts of climate change in India are expected to vary across sectors, locations and populations. Temperature rise will negatively impact crop yields in India where these crops are already being grown close to their temperature tolerance threshold. While direct impacts are associated with rise in temperatures, indirect impacts due to water availability and changing soil moisture status and pest and disease incidence are likely to be felt.

Agricultural production in India is faced with a serious problem for the future, if not tackled appropriately. Farmers in India have developed several adaptive techniques which have reportedly helped them in preparing for an uncertain and complex future using a variety of risk coping strategies. Some farmers have adjusted their farming strategies in response to climate change within their limited resources and capacity. Several social sector organizations are doing their best to create awareness among the farmers about climate change and in helping them prepare them for the complex future. However these initiatives are highly localized and not widespread.

India has already shown its commitment to help address the global climate challenge and Government of India accorded top priority for addressing climate change related concerns. India has signed the United Nations Framework Convention on Climate Change (UNFCCC), and has acceded to the Kyoto Protocol in 2002. The Government formulated the National Action Plan on Climate Change (NAPCC) in 2008 that established 8 National Missions which are further scaled down through State / Provincial Action Plan on Climate Change (SAPCC) for each of the 29 States and 7 Union Territories to reduce the vulnerability to the impacts of climate change through adaptation and mitigation measures.

Government of India has taken-up early steps for a concerted approach for addressing climate challenge through development of policy framework in the form of creation of National Action Plan on Climate Change (NAPCC). This approach promote local adaptation action based on the localized needs for development of climate resilience. The Government of India also established the National Adaptation Fund for Climate Change (NAFCC) which is a pioneering step to address climate change adaptation needs of the farmers. India's only Development Financial Institution for agriculture, the National Bank for Agriculture & Rural Development (NABARD) has been accredited globally as a National Implementing Entity (NIE) in 2012 and is the only NIE for India for implanting projects funder under the Adaptation Fund as

well as the Green Climate Fund. The NIE bears full responsibility for the overall management of the projects and programmes funded. NABARD has taken-up projects and programmes aimed at building climate change resilience and low emission pathways for the Indian farmer preparing him for the complex future. Besides these dedicated funding support, NABARD also supports projects relating to plantation, horticulture, Forestry, Land development, Watershed development, micro irrigation, solar power projects, hydel power projects, etc., under which 100% refinance support is provided by NABARD to banks for adaptation & mitigation projects posed by individuals .

This paper plans to capture not only the coping mechanisms adopted by the farmers in India, especially in the vulnerable areas but also the various initiatives taken under the Climate Change funds for improved understanding of the climate change impacts, vulnerability and the adaptation practices to cope with climate change, and explore measures to mainstream the good practices for adaptation to climate change into sustainable development planning in the region.

Key words: Farmers, India, Climate Change, Adaptations, Institutions, Government of India, NABARD, Non Governmental Organisations

How to utilize resilience approach when constructing scenarios?

Titta Tapiola
Natural Resources Institute Finland, Finland

Because of major global challenges, it is no longer possible to optimize or solve one single problem at a time. That is why systems thinking, especially resilience thinking, gives us better opportunities to understand complex systems such as food systems - especially their future capacities to confront changes and disturbances we are not able to foresee. Scenario techniques are effective way of organizing knowledge and understanding of futures. Futures studies, scenario techniques and resilience thinking are all ultimately connected to a systems approach. This presentation proposes an approach to combine resilience parameter framework and scenario construction process so that different resilience parameters could be systematically taken into consideration during the scenario construction process. In addition, some of the resilience parameters are discussed. Futures table using PESTE categorization (political, economic, social, technological and environmental factors) is used to include the relevant drivers affecting the system under consideration and these are combined to resilience parameter framework.

Key words: Resilience, Scenario, PESTE

Transformative spaces for agriculture? Analysing how Finnish farmers discuss their work

Maria Höyssä
Finland Futures Research Centre, University of Turku, Finland

Disturbances in the nutrient cycles are presently challenge the resilience of our planet. Phosphorus (P) and nitrogen (N) are "displaced" from the ground (P) and atmosphere (N) and released in a reactive form, as fertilizers, into fields where they help crops grow but easily leak to other places disturbing various ecosystems. The present rate of extracting P and N is vastly greater than the planet's ability to convert them back to their initial states. Growing awareness of this planetary resilience problem puts societal pressure for farmers to modify their work. The situation is complex for historical reasons: Whereas the

20th century saw farmers adopting novel techniques and fertilizers to increase yields and becoming part of the global food industry that enabled population growth, present day farmers face the additional challenge of embracing harm-minimizing techniques old and new without compromising their productivity and competitiveness. In this wicked tangle of reasons and consequences, there is a dire need to understand the farmers' perspective in more depth. First, such understanding is needed to design policies so that they fit with farming. Second, it provides the transformative space for farmers to re-interpret their work from a perspective that contributes to the creation of alternative futures. This paper approaches this issue by analysing farmers' accounts of how and why they develop their farm and their work. More specifically, the paper asks how farmers understand their possibilities to change their farming practises. This question is explored through causal layered analysis (CLA). It is an approach developed to get a more fundamental understanding of complex problems by critically examining underlying assumptions and world-views. The primary data of the present study consists of repeated interviews of ten Southwestern Finland grain farmers, supplemented with other interviews, documents and field notes. The paper contributes theoretically e.g. to Burton and Wilson's (2006) study of three different identities of a "good farmer" – the productionist, the diversifier and the conservationist - by deepening the understanding of the contexts in which such identities are supported and modified. Especially, it illuminates the kinds of beliefs and knowledge involved. The practical aim is to invite farmers and their stakeholders into dialogue regarding agricultural sustainability transition.

Key words: Sustainability Transition, Farming, Nitrogen Cycle, Causal Layered Analysis, Resilience

Innovation in Future Energy

Time: Tuesday 13 June at 9:00–10:30
Room: Kristiina
Chair: Dr. Jyrki Luukkanen

Surprise as the new normal – Implications for energy security

Sirkka Heinonen[a], Joni Karjalainen[a] & Karlheinz Steinmüller[b]
[a] Finland Futures Research Centre, University of Turku, Finland
[b] Z-punkt, Germany

We are living in a world of ever increasing interconnectedness through digitalisation and globalisation, exacerbating environmental conditions, severe economic challenges, uneven distribution of wealth, and geopolitical crises. Nation-states claim independence and sovereignty for themselves, but their autonomy is restricted by the tsunami of transborder flows of trade goods and finance, of information, people, weapons, technology, energy, and pollution. The world is a complex system and the rapid change among its sub-systems builds up enormous pressure for any efforts to anticipate change and shape the processes of transformation.

Surprise is an intrinsic aspect of change, in particular when it takes place at an accelerating pace with high degrees of volatility, uncertainty, complexity, ambiguity (VUCA). In foresight, which aims to alleviate uncertainty associated with impending changes, horizon scanning has much focused on the probable or even predictable – surprise-free developments. We assume that more emphasis should be paid on the

constant and systematic anticipation of wild cards and black swans. Taleb even claims that the world is most changed by such events.

Energy is a complex issue. Without energy there is no life, neither biological nor economic. Taking into account the huge ecological and social costs of the present energy system, the need for a new emission-free, cost-effective, and democratised energy system is obvious. An energy transformation to reach 100% renewable energy is envisioned in four transformational neo-carbon energy scenarios. Energy is no more just an economic or technical issue. It is increasingly a societal and even cultural issue – above all a security issue. As regards energy security, various sudden events and surprises – wild cards and black swans – could play a major role. Therefore, we probe the resilience and anti-fragility of these transformational energy scenarios. We present the results of a futures clinique where the scenarios were tested. This way, we explore the implications of surprises for energy security, as the world increasingly seeks to move towards a renewable energy based society.

Key words: Renewable energy, Transformative Scenarios, Energy Security, New Normal, Complexity, Wild Cards, Black Swans, Uncertainties, Turbulent Times

Transition towards long-term sustainability of the Finnish energy system

Michael Child & Christian Breyer
Department of Energy, Lappeenranta University of Technology, Finland

The Finnish energy system is at a crossroads due to an aging system of power generation and opinions about different modes of low-carbon energy generation. In addition, there are 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 (PtG) 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. A cost optimal energy system transition was simulated for Finland for the years 2015-2050 using the LUT energy system model. Our research concludes that a 100% renewable energy system is possible for Finland in 2050. 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

The postnormality of renewable energy – Complexity, contradictions and chaos in a world of abundance

Juho Ruotsalainen, Sirkka Heinonen, Joni Karjalainen & Marjukka Parkkinen
Finland Futures Research Centre, University of Turku, Finland

By 2050 we will be able to satisfy our growing energy needs with renewables. This paper anticipates the futures of energy-related societal development by taking a critical view on the narrative of progress: by

potentially increasing the amount of available energy in societies, renewables may also bring about more complexity, contradictions and chaos – defining features of postnormal times as described by Ziauddin Sardar.

Thanks to cheap and often even free energy, a renewable energy system will improve energy security, self-sufficiency and decrease the costs of living and production. This empowers citizens to organise their lives around peer-to-peer communities. The renewable energy system thus enables a power shift from traditional institutions and organisations to self-organising citizens. The decentralisation of social power could increase the complexity of societies and pose novel challenges for current models of governance, as the number of actors affecting societal and economic development would grow. At the same time, social stability could decrease due to the decentralisation of social power, as Erving László claims.

The paper complements the theory of postnormal times by adding new energy systems as among its defining features. It opens a critical perspective to the "grassroots power" fostered by information and communication technologies. It anticipates new social contradictions and social problems in a future information society of material and immaterial abundance. Along with energy, it deals with robotisation and the future of the internet as causes of increasing chaos, complexity and social contradictions.

Key words: Renewable Energy, Postnormal Times, Complexity, Progress, Power Shift, Information Society

Understanding smart energy transition: Insights to the future energy technologies and their market disruption in Finland

Tero Ahonen[a], Tatu Marttila[b], Igor Dyukov[a] & Mikko Jalas[b]
[a] School of Energy Systems, Lappeenranta University of Technology, Finland
[b] School of Arts, Design and Architecture, Aalto University, Finland

The international consensus on climate change prevention and general acknowledgment of the need for future energy solutions has challenged the traditional energy system for instance through the uptake of wind energy systems in Sweden and Denmark. As Finland is as well facing this energy system disruption, the Academy of Finland funded project *Smart Energy Transition* (SET) is studying how and in what ways Finland could benefit from this disruption, or alternatively from this expected transition in the energy sector.

To get expert opinions and alternative views on the future energy system and on the role of different technologies in it, a two-round Delphi survey and with concluding workshop was organized in spring 2016. Energy technologies were selected from both nationally promising ones (such as demand response) and currently marginal ones (such as solar photovoltaics), and were further developed into seven technology themes that were considered in the second round of the survey and in the workshop.

This paper introduces how survey respondents see the role and significance of the selected technology themes in Finland, and how different energy technologies are seen to be linked to each other. This perception was also tested in the workshop, where the participants were divided to the technology-specific tables (e.g. solar, wind, biomass, etc.) with general background information about the technology in hand, and one of the tasks in the workshop was to determine the linking or supporting technologies for the own table.

Key words: Delphi Survey, Energy System, Futures Research, Technology-Related Scenarios

Key trends of energy efficiency in the EU-28 region

Jarmo Vehmas, Jyrki Luukkanen & Jari Kaivo-oja
University of Turku, Finland Futures Research Centre, Finland

Energy efficiency has been a very common and always actual policy objective of the EU and its Member States' energy policies since the 1970s. At a first glance, energy efficiency seems very handy to offer a win-win situation: improving energy efficiency decreases energy use and thus also energy costs, and at the same time, negative impacts related to energy use such as carbon dioxide (CO_2) and other emissions in the air decrease. Thus, improving energy efficiency is considered as an important means to reach the EU climate policy targets as well as other policy goals related to energy use, directly or indirectly.

Some general observations are worth mentioning from the analyses carried out in this article:

Observation 1: There is significant variation between the annual changes among the EU Member States, both in the absolute trends of energy efficiency drivers FEC/GDP and TPES/FEC, as well as in the decomposed effects of these drivers on total primary energy supply and carbon dioxide emissions from fuel combustion. The variation is large especially in small EU Member States and the new EU Member States.

Observation 2: The energy efficiency performance of the EU Member States seems to improve over time. Time period 2000–2005 was the worst period in practically all Member States, but since then both total primary energy supply and CO_2 emissions from fuel combustion have decreased in many Member States, but not in all of them.

Observation 3: The trend of energy intensity is good in general terms, but in practice it depends not only on good performance in energy efficiency, but also on poor economic performance which is directly reflected into the indicator FEC/GDP.

Observation 4: The trend of TPES/FEC ratio reflects the efficiency of the energy transformation system from primary energy to final energy consumption.

In some countries there is a decreasing trend, but also increasing trends have been identified. This may partly be due to changes in real efficiency, but is also influenced by the fact that energy statistics do not treat different energy sources used in electricity production in a similar way. Some energy sources such as hydro, wind and solar have a TPES/FEC ratio of 1, but nuclear has a ratio 3, and geothermal even higher ratio 10. Fuel-based electricity generation is more coherent in this sense, when primary energy is calculated from the fuel's energy content, and electricity and heat are treated as such in final energy consumption. However, it is good to know that the TPES/FEC ratio does not take into account the efficiency of the appliances consuming the final energy and providing the actual energy service.

Key words: Energy Efficiency, CO_2 Emissions, EU-28, Decomposition Analysis, Economic Growth

Futures Technology in Health and Well-Being

Time: Tuesday 13 June at 9:00–10:30
Room: Pietari
Chair: Dr. Fiona Kerr

Drivers, trends and scenarios for the future of health in Europe: Impressions from the FRESHER project

Susanne Giesecke & Beatrix Wepner
Center for Innovation Systems and Policy (Crisp), Austrian Institute of Technology, Austria

Non-communicable diseases (NCDs) such as cardio-vascular problems, diabetes, cancer, multi-skeletal disorders, depression and many more lead to the loss of 3.4 million potential productive life years in EU countries and account for more than 70% of health costs in the OECD. They are the major cause of health problems and death in OECD countries; these diseases develop earlier in underprivileged people and lead to death more often and earlier. Chronic-degenerative diseases, however, are to a large degree avoidable. In our Foresight projects FRESHER (Foresight and Modelling for European Health Policy and Regulation) which was funded from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 643576, we discuss policy options with stakeholders from health, research, care, patient organisations, insurances and policy-making that go beyond the usual activities and pose alternatives that promise to be more successful. In doing so we rely methodologically on qualitative Foresight tools combined with quantitative micro-simulation. In our paper we present a concise analysis of trends that affect NCD development far beyond the usual determinants of tobacco and alcohol consumption, salt, sugar and fat intake and sedentary behaviour. In our analysis we ask: what are the determinants that lead to the unhealthy trends and how could they be changed? The options for alternatives are presented in our scenarios where we also discuss policy options for the future of comprehensive health policies in the EU that include "health in all policies".

Key words: Foresight, Micro Simulation, Non-Communicable Diseases, Public Health, Health Policy

Quantification of selves – The future of personal data

Daniela Gutierrez
Universidad Pedagógica (UNIPE) & Argentina/Fundación Medifé, Argentina

The concept of self-tracking using digital technologies has recently begun to emerge in discussions of the ways in which people can conduct their lives. Monitoring, measuring and recording elements of one´s body and life as o form of self-improvement and or self-reflection are practices that have been discussed since ancient times. The introduction of the digital technologies that facilitate these practices has led to renewed interests in what self-tracking can offer and to a future expansion of the domains and purposes to which these practices are applied. This paper will focus on new and future uses of the numbers and algorithms obtained from the registration of personal information (done in both digitally and automat forms) and how these will lead into major interconnected social practices that have significant social, cultural and political implications. We will share our foundlings regarding future usages of these personal

and bio data by some third parties such as: developers, data mining companies and their clients, government agencies, cyber criminals who may access illegally to that information. Our aim is also to present our latest research on the legal status of personal data: do we own the data on ourselves? Is it possible to legislate on it? Is there any possibility that personal information is misused? Usually the self-tracking technology is presented as individual empowerment over the own body and production but is this really so? Who and where will all our personal data be stored? Will it be safe? Will be retrievable? By who? The presentation will include a small video

Key words: Technology, Self-Tracking Devices, Personal Data, Cultural and Digital Life, Computerization of Life, Surveillance, Mercantilization of Information, Usage/Store/Retrieve of Data

Nursing and technology foresight in futures of a complex world

Mohammad Reza Dawuodi,
Turku University of Applied Sciences, Finland

Medical technology is one of the foundations health care systems in the world. Patient care technology has become increasingly complex and medical technology has improved health care efficiency, quality safety and cost. However, it is shown in patient care centers that current technology alone is not enough. Up to now several tools were originally created for morbid monitoring e.g. pain scale and bedsores protection to help patients communicate about their pain. However, in spite of the importance and prevalence of pain, there are currently no clinically accepted tools to objectively monitor changes in pain level, requiring physicians to rely on patients' subjective assessment, or to simply guess, when patients cannot describe their pain. [1] This article aimed to provide the theoretic framework for improving patient safety system, and enhances the ability of health care professionals to coordinate care by providing a patient's health information. This framework is based on Morbid-Monitoring Systems include "Pain and Unconsciousness Scales-measurements" and "Thermal Wound Injury Prevention System (TWIP)". The multimethods approaches to monitor these processes are Morbid Motion Monitoring, Facial expressions and effective Thermal Radiation. This article identifies these novel technologies that change the practice of nursing, and explores issues on how these novel technologies are driving change in the nursing environment.

Key words: Nursing informatics, Morbid monitoring, Pain scale, Bedsores, Thermal radiation.

The future of drug development and pricing

Philippe Vandenbroeck[a], Irina Cleemput[b] & Lydia de Heij[c]
[a] shiftN, Belgium
[b] Belgian Healthcare Knowledge Centre (KCE), Belgium
[b] Zorginstituut, Nederland (ZIN), The Netherlands

High drug prices are an increasingly topical and urgent issue on the agenda of political decision makers and the international health care community. A growing number of observers admit that the current trend is not sustainable. In an unprecedented collaboration the *Belgian Healthcare Knowledge Centre (KCE)* and *Zorginstituut Nederland (Dutch Health Care Institute, ZIN)* initiated a consultative and deliberative process involving a carefully selected group of experts and stakeholders from Europe and North

America, including patient representatives, industry leaders, academics, not for profit research organizations, regulators, payers, and government representatives.

The aim of the process was to elaborate creative scenarios and to explore novel, more sustainable ways to ensure patient access to safe and effective drugs, while providing strong incentives for innovation and focussing on real health needs.

The resulting four scenarios offer possible evolutionary pathways of the current drug development and pricing system. They all rest on the principle that being entitled to medical care is a basic human right. Consequently, they project a range of futures in which the development of new medicines is emphatically guided by the public interest.

An inescapable conclusion of this work is that drug development and pricing will have to go through a significant transition to respond to 21st century public health challenges.

Informed by new rationales to weigh the risks and benefits of investments in health improvements, the relationship between patients, payers, and drug developers will change.

In our presentation we want to pay particular attention to the methodology employed to craft these 'solution scenarios'.

Key words: Healthcare, Medicines, Drug Development, Drug Pricing, Pharmaceutical Industry, Multistakeholder Process, Future Scenarios

Methods and Methodology of Futures Research

Time: Tuesday 13 June at 9:00–10:30
Room: Juhana
Chair: Dr. Juha Kaskinen

Futures knowledge management in and after a futures workshop

Hanna Heino
Department of Geology and Geography, University of Turku, Finland

Participatory futures workshops are commonly used to create future oriented knowledge. This research examines how futures knowledge regarding urbanizing society is created in Participatory Futures Workshop and how such knowledge develops further in the participating organizations. Knowledge management in the field of futures studies has emerging interest. Recently few studies of futures knowledge creation in the futures workshops have been published. It is central to manage knowledge and organize its production and use, to achieve the best results in administration and decision making. However, it is not clear how the created futures knowledge is used and interpreted in participating organizations. The question will be answered by a case study in research project URMI workshops. Demos Helsinki will organize a series of Participatory Futures Workshops for the key stakeholders of the project. The aim of the workshops is to anticipate the drivers of urbanization in coming decades. To analyze the knowledge creation and use, several methods will be applied. Short questionnaire is done at the beginning of the workshop, participatory observation is carried out during the workshop and interviews with selected participants are

done after the workshop. With the interviews intra-organizational knowledge creation processes in participating organizations will be studied. Additionally, the final results of the workshop will be analyzed with content analysis. The results will show how new futures knowledge is created, how the created knowledge is used after the workshop and how and to whom participants disseminate new futures knowledge.

Key words: Futures Workshop, Knowledge Management

Towards a larger Delphi panel: Delphi study of 200 experts completed with futures workshops on lake restoration

Nina A. Nygrén & Petri Tapio
Finland Futures Research Centre, University of Turku, Finland

Delphi studies are most often carried out by utilizing an expert panel of couple of dozen carefully selected respondents. In this study the aim was to find out whether two dominating paradigms of lake restoration are losing significance among researchers, and therefore, it was considered that a larger expert panel would reveal the signs of a possible paradigm shift better. 200 freshwater experts were contacted at plenary lectures of three popular and distinguished conferences on the topic. The first round of the Delphi survey was conducted as a questionnaire sheet on the spot. The second round of the Delphi was carried out as an Internet questionnaire sent to the participants of the first round. The Delphi study was completed with five futures workshops, involving attendants also outside the Delphi panel. It was concluded that the paradigms seem rather persistent and no radical changes appear in horizon although some signals of change was discerned. It is hypothesized that the paradigms would change easier, if a new paradigm would be introduced to replace the old beliefs. Especially the lay attendants of the workshops seemed to be reluctant to abandon old beliefs, if there will be no substituting paradigm to rely on. If a new paradigm would be introduced, transition management (TM) could provide tools for steering the transition towards the new socio-technical system.

Key words: Delphi study, Expert Panel, Lake Restoration, Eutrophication, Futures Workshop

Experiencing insight: Engaging complexity with 'scalable fruit'

Amos Taylor
Finland Futures Research Centre, University of Turku, Finland

Developed from a grass-roots need to seamlessly gain insight and inspire dialogue and debate, this workshop method was first utilised to aid multicultural networking. Picture this: participants arrive for an evening experience and were greeted with the task of choosing from a vibrant box of fruit to use through the evening to answer questions inscribed on a labyrinth of tables. Responding with fruit, the tables offered a scale of choices (similar to a 5 point questionnaire). Slowly participants wondered table to table, answering with fruit, sometimes in small groups or individually, aided by a few moderators giving simple instructions. Once the tables were filled with fruit responses, everyone invited to tour the tables and explain their ideas. Moderators took note and event culminated with tables being merged where fruit, vegetables and food were laid out for a beautiful dinner that continued the networking. This method was particularly useful in seamlessly bringing shy participants to give responses to questions, to interact with

other workshop people and to gather important insight through a shared experience. This method was inspired by A. Knowels avant garde happening performances bridging art and life, mixing futures workshops and the desire to seek a strategic performance experience in alternative spaces. Often important questionnaires/workshops have terrible attendance, this method offers an effective way in which to engage qualitative & quantitative insight, almost where workshops mix art and life. Proposed is a presentation and practical 'scalable fruit' workshop experience to gain insight into futurists approach to the theme 'complexity'.

Key words: Insight, Futures Workshop, Performance, Multicultural, Fruit & Vegetables, Experience

Methods mashup for generating visions of a good anthropocene in Southern Africa: From seeds to scenarios

Tanja Hichert
Centre for Complex Systems in Transition (CST), Stellenbosch University, South Africa

The Anthropocene is the new geological epoch in which humanity has become a dominant global force reshaping the geological, biological and atmospheric dynamics of Earth. In the Anthropocene, we, especially those of us in southern Africa, face new and diverse challenges, such as increasing disconnect between people and nature, widening inequalities, and potential planetary tipping points.

New methods and approaches are needed to engage with the differentness and complexity of the Anthropocene, as well as to envision futures that can counter currently dominant dystopic ones. This presentation demonstrates one such method, which an adaptation of the Mānoa approach for generating scenarios combined with the Three Horizons Framework.

Using this experimental mashup of methods in Cape Town in November 2016, a carefully selected group of 25 key thinkers, artists, scientists and change-makers were convened to produce visions of a Good Anthropcene in southern Africa from the "Seeds of Good Anthropocenes" initiative (https://goodanthropocenes.net). These seeds – 'pockets of the future in the present' – represent alternative ways of thinking, doing, technologies or institutions that exist in experimental or prototype form, but are not dominant features of today's world.

The presentation critically discusses the Mānoa mashup method and provides useful features of the initiative such as:

- Enabling interactive engagement about radically different futures from radically different perspectives.
- Facilitation of transdisciplinary futures literacy.
- Outputs that embody systemic change and complex systems futures.
- A tool with which to generate vivid, bold, hopeful stories to help navigate the Anthropocene challenges.

Key words: Anthropocene, Southern Africa, Method, Novel, Complexity, Radically Different, Systemic Change

Curating the Complexity – Futures Workshop Session, part 1

Time: Tuesday 13 June at 9:00–10:30
Room: Kustaa
Moderators: Katriina Siivonen, Pasi Hario, Marjukka Parkkinen & Satu Tuittila
Finland Futures Research Centre, University of Turku, Finland

Our proposition is to organise a futures workshop with the theme: Futures Museum. Museum is in our interpretation an actor with an intention to gather people to ponder, understand, work and create cultural and societal changes. In our futures workshop we will partly simulate, partly investigate possibilities for a Futures Museum as a working platform for people in a complex world.

Complexity refers to a reality as a holistic entity, within which everything influences everything. It defines ever more the challenges for futures studies, and also for museums as institutions working with holistic, temporal processes in time and place.

Our workshop session focuses on the methodological possibilities of a participatory futures processes in tackling the complexity of the world. We are combining ideas of curating and designing daily cultural and societal activities with participatory futures methodology. Curation refers to the act of gathering, selecting, organising and presenting content related to different interrelated topics. Design covers not only the material world, but also ways of acting with and in it and the impacts of these activities in the surrounding world.

In our workshop we ask: what could be the possibilities of museums to curate people to understand and create everyday activities in order to be able to tackle our current, rapidly changing and complex world. In order to simulate museum curation in our workshop, we will utilise methods with creative multi-sensory elements. With them our aim is to find possibilities for understanding the interrelatedness of different tangible and intangible elements of the world.

Key words: Futures Workshop, Museums, Curating, Participation, Complexity

** The capacity of this session is limited **

The Role of Visions in a Scenario Process – Case "Winland"

Time: Tuesday 13 June at 9:00–10:30
Room: Dining Room
Moderators: Dr. Burkhard Auffermann and Dr. Marko Keskinen

Introduction to the session: what visions, what scenarios, what Winland?

Winland research project – Introduction to the case study
Marko Keskinen
Aalto University, Finland

Scenario process and future visioning in Winland
Matti Minkkinen, Burkhard Auffermann & Riikka Saarimaa
Finland Futures Research Centre, University of Turku, Finland

Comment speech: Visioning Winland from the point-of-view of the relationship of human agency to planning and complexity
Riel Miller, UNESCO, Paris

Presentations are followed by discussions and facilitated participatory workshop on the role of visions in the scenario process and values.

In this session we will discuss what role future visioning can -and cannot- play in a scenario process. Our case study, Winland, is a strategic research project that aims to provide an insight to possible futures with the help of scenario planning, decision analysis and co-creation methods. Winland studies how water, food and energy related pressures, shocks and policy responses affect Finland's overall security. We will also focus on how resilient our systems and policy-making processes actually are to food and energy security related risks and threats. Scenario process forms a key integrative method for Winland's co-creation and interdisciplinary activities, and it runs through the entire duration of the project. Future visioning forms a key step in our scenario process from Failand (undesired future Finland) to Winland (desired future Finland), and will be the next step in our scenario process. Based on the presentations, we will share experiences and discuss together the pros and cons related to future visioning as a part of scenarios process.

Session V
Tuesday 13 June at 10:45–12:00

Futures of Education, Art and Cultural Studies

Time: Tuesday 13 June at 10:45–12:00
Room: Katariina
Chair: Senior Advisor Sari Söderlund

Learning entangled empathy with trees: Experiences from the joint drama educational arts-science project concerning connection of climate change and loss of biodiversity

Heli Aaltonen
Department of Arts and Media Studies, Theatre and Drama Studies, Norwegian University of Science and Technology (NTNU), Norway

Current extensive clear cutting of boreal forests, threatens their whole existence. The outcome of boreal forest clear-cutting is that CO2, which is captured in the soil, returns to the atmosphere. Boreal forests are home for many species, which disappear without forests. The main question in environmental education has become how to change human values, and attitudes from anthropocentric to inter-relational. In the paper, I will discuss the outcomes of the joint interdisciplinary participatory action research project (led by two drama teachers and a biology teacher) that ended in outdoor performance events facilitated by the bachelor students of drama and theatre studies. The project, Applied Theatre and Climate Change, addressed scientific knowledge about climate change combined with drama educational approaches, where affective, creative encounters between trees and students were at focus. The overall aim of the project was to explore how performance practice can illuminate interconnection of all living beings, and stimulate humans' personal commitment for sustainable future for all earth beings. The philosophical grounding of the project was based on Lori Gruen's concept "entangled empathy", and Mark Bekoff's notion of "rewilding the human heart" that proposes a pathway for humans to build compassion and coexistence with other species. 37 students participated in the course, and the research material consist of many forms of qualitative material produced during the course. Result of the research suggests that drama educational methods combined with science teaching require real life meetings with living beings outside classroom. Those encounters with other species and visits in their homes activate students' capacity to become critical learners, awake entangled empathy, and deepen understanding of human's inter-relational position with other living beings.

Key words: Climate Change, Biodiversity, Drama Education, Environmental Education, Boreal Forests, Entangled Empathy

Political and cultural transformation in an accelerated warming world

Christopher Burr Jones
Core Faculty, School of Public Policy and Administration, Walden University, USA

This paper explores how to optimally "surf the tsunamis of change" – global driving forces – to take account of planetary complexities, and create better futures. Premises: a 6° rise in global mean temperature by 2100 and that such heating will result in trigger events, system breaks, and disruptions, which in turn will have consequences for humanity. The paper addresses the challenge of these "wicked problems" through the lens of causal layered analysis: the litany of challenges, social change strategies, competing narratives, and mythologies of climate futures. The problem addressed is: how to leverage system change and global dynamics in ways that maximize the chances for collective survival, to realize preferred Green futures. The purpose: to better understand the strengths of increasing human cultural diversity, technological complexity, and Gaia system dynamics, such as geological feedback loops, atmospheric homeostasis, and planetary resilience in the face of human, solar, and galactic inputs. One conundrum continues to be the *anthropic principle* and the role of humans in directing planetary chemistry, with godlike power over evolution and subatomic physics. Taking all this into account, how can we adapt in ways that are creative and resilient, what are the sources for new narratives and myths to mobilize new global social movements? How can hard times ahead be faced in such a way that backlash, xenophobia, racism, and sexism be minimized? How can the global commons be protected, the energy paradigm transformed, traditional systems and indigenous people be empowered, and we be more wise in our collective choices?

FUTURES of learning and negotiation, policy-making, and awareness/consciousness

Heiner Benking
Journalist, futurist, activist, tutor
Member of the Advisory Board of the European Citizen Sciences Association (ECSA)
Future Worlds Center (FWC), Re-Inventing Democracy project, UN-Democracy Fund (UNDEF),
Academic Board member of the International Encyclopedia of Systems and Cybernetics

The paper/presentation explores the fate of concrete solutions to introduce a combination of Solution Spaces in times of exploding Problem Spaces.

Innovative presentation and conceptualization methods were introduced at the 'Communication Camp' organized at the WFSF conference in Turku in 1993 and covered in the newsletter 'Knowledge Spiral' of the Youth and in the Finnish weekly; Helsingin Sanomat.

These new communication methods have since been widely used and therefore we can now reflect on their successes, challenges, and possibilities for further use.

The key concepts included:

a) Open-Forum/Open-Space: a 'Magic Roundtable' conversation method which has led to online dialogues as well as 'live encounters', to encourage empathy in communication, as well as multi-track diplomacy and peace-making efforts for community building.
b) Cognitive Panorama: Immersive spaces, externally oriented workspaces of the mind for spacial Erörterungen (deliberations and encounters) for an extra shared overview.

The session will revisit the 10 theses from 24 years ago: "our view of life is too flat", will try to expand the themes, introduces "Out of the Box thinking and Paradigm-mapping" seminars, and critically review developments, looking back and forward.

We will discuss democracy, education, the future of the media, as well as the need to revisit the intersection of systems and models, imagination and shared augmented virtual realities, complexity and perplexity, signs and senses, concepts/signs and percepts/senses, ethics and policy-making.

Keywords: Democracy, Education, the Future of Models, Systems, Media, Signs and Senses

Resilient Futures: Water Safety

Time: Tuesday 13 June at 10:45- 12:00
Room: Eerik
Chair: Dr. Jarmo J. Hukka

Global water ecosystem – Past, present, future?

Tarja Meristö & Jukka Laitinen
Laurea University of Applied Sciences & FuturesLab CoFi, Finland

Water resources at the globe are critical elements of life conditions for all biological processes. Water reserves are limited, and not only the water consumption for different purposes but also the destroying of water reserves is essential for the future development.

Many trends are shaping the future water ecosystem. The trends include e.g. climate change, pollution, population growth, technology development, legislation and finance. It is considerable, that even though the trends are global, they often have local effects.

The aim of our paper is to describe global water ecosystem and trends affecting its future. Also, additional objective is to conceptualize alternative business opportunities based on water-related issues. As a methodological framework we apply ecosystem framework combined to scenario thinking methodology. The ecosystem consists of actors related to water, divided into core actors, support actors as well as enablers. Furthermore, based on the scenario approach, we apply visionary concept design in order to develop new solutions for future needs in the market. The data collection methods consist of a web survey and depth interviews among actors from water ecosystem. The collected data will be processed into alternative scenarios and concepts in futures workshops.

The paper is based on ongoing research project Circle (9/2016–8/2018). The expected outcomes of the project include a holistic view to global water ecosystem with its actors, role of different actors in the ecosystem and trends & signals changing the landscape.

Key words: Water, Ecosystem, Trend, Scenario, Visionary Concept

How complex technological systems act as a mediator between City's socio-technological system and nature's materiality – A case study of the Helsinki's water supply system

Lassi Lemponen
Faculty of Management, a graduate in Politics of the Environment and Regions, University of Tampere, Finland

My presentation will show how nature, humans and the technology are often highly inter-related to each other. My intent is to use my master's thesis as an example how natural things, like water of a lake is transformed via technology to more suitable form to humans, in the form of clean drinking water. The focus of this presentation will be in the Helsinki's water supply system, and more precisely the Päijänne Tunnel, sewage treatment plants and drinking water network that are, based on my interpretation, the key factors that transform nature's materiality, like water, to more suitable form to humans, and transfer it towards the city and its surroundings.

My master's thesis was a case study of Helsinki's water supply system. I investigated how Helsinki's water supply system acts as a mediator between the water of Päijänne and Helsinki's residents. In my thesis I picture nature acting as a city's material base (Haila & Lähde 2003). So in this presentation I will highlight this relationship between nature's materiality and the city's socio-technological system.

In summer 2016 I did four expert interviews in water services unit of Helsinki Region Environmental Services Authority (HSY). I chose my interviewees that their expertise would cover the critical points where this transformation of water takes place. My theoretical framework consists of technological networks, that are the intermediate link between nature's materiality and the city and it's processes (Swyngedouw & Kaika 2000). The results of my work will confirm later.

Key words: Technological networks, Urbanization, Water

Ignorance of economics undermines water services – and our resilient future

Jarmo J. Hukka
Construction Management and Economics, Department of Civil Engineering, Faculty of Business and Built Environment, Tampere University of Technology, Finland

The aim of this paper is to discuss specific enabling governance and institutional conditions, how to achieve the Sustainable Development Goal 6 (SDG6) *"Ensure access to water and sanitation for all"* by 2030. This paper is based on the author's recent and on-going research on water services pricing and infrastructure asset management. The author argues that obsolete policies concerning water services pricing and cost recovery represent major risks for the future in all regions. The outcome document of the United Nations Conference on Sustainable Development (UNCSD, Rio+20) "*The Future We Want"* recognized that water is at the core of sustainable development as it is closely linked to many key global challenges. In particular, the report underlined the critical importance of water and sanitation within the three dimensions of sustainable development.

Benefit-to-cost ratios have been reported to be as high as 7 to 1 for well-functioning basic water and sanitation services in developing economies.

Although water and sanitation are explicitly recognized as a human right, 700 million people lacked improved drinking water sources and 2.4 billion people lacked improved sanitation facilities in 2015. The

total investment of meeting the SDG water and sanitation related targets is estimated at USD114 billion per year–three times the current investment levels. This excludes the costs for financial and institutional strengthening needed to ensure sustained and resilient operation of services. Focusing on effectively managing assets to sustain services is as important as focusing on the development of new infrastructure.

Key words: Sustainable Development Goal 6, Importance of water and sanitation, Water services pricing; cost recovery, Asset management, Aging and decaying infrastructure

Complexity in Future Cities

Time: Tuesday 13 June at 10:45–12:00
Room: Kristiina
Chair: Dr. Sari Puustinen

Fast forward: Multimodal transportation in the Greater Golden Horseshoe

Helen Kerr
Strategic Foresight and Innovation, OCAD University, Canada & Kerr Smith Design, Canada

Southern Ontario, Canada is a rapidly growing region. The government has adopted an aggressive intensification strategy in an effort to reduce greenhouse gas emissions and forestall climate change impacts. The Ministry of Transportation (MTO) commissioned an innovative approach to long-term transportation and land use planning: a provocative fifty-year forward foresight exploration. We helped MTO move to resilient thinking through the exploration of multiple alternative future scenarios built on deep research of emerging change signals and broad participatory involvement of thought leaders and regional stakeholders. Rather than projecting forward solely using quantitative data and potential technological advancements, we crafted comprehensive narratives layered onto an adaptation of the Four Generic Alternative Futures, seen through the experience of imagined personas. We created complex dynamics of economic activity within each possible world, with systemically designed social and climactic conditions. Tangibly expressing the futures, we geo-spatially mapped the correlated land use structure and transportation networks to provide a sustainable future vision.

Key words: Resilience, Land Use, Transportation, Alternative Futures, Complexity, Longterm Futures, Strategic Foresight, Scenario Development, Risk Analysis

Do cities need systematic futures thinking?

Waltraut Ritter
Knowledge Dialogues, Hong Kong S.A.R.

Technically, Hong Kong is a city with an "expiry date": the legal basis for governing Hong Kong has been laid down in the Sino-British Joint Declaration in 1984, thirteen years before the handover of the former

British colony to the People' Republic of China in 1997, resulting in a "One Country, Two Systems" model of governance. Under this system Hong Kong is granted a high degree of autonomy as well as set of principles in the Basic Law (a mini-constitution) that they will remain "unchanged for 50 years".

Nearly halfway between 1997 and 2047, questions about the development beyond 2047 are beginning to enter the public discourse. However, there is no official response to questions about the future, because it is not clear which government agency or organisation could answer questions about the long-term future of the city. Does a city need an institutional mechanism to develop her future(s)? The Constitutional and Mainland Affairs Bureau, a government agency in Hong Kong, declares that the "HKSAR is still a work in progress."

The presentation is a qualitative analysis of organisations which potentially could contribute to imaging the future of the Hong Kong Special Administrative Region. Organisations dealing with Futures and Foresight typically are public or private agencies, think tanks, research institutes or foundations, however, in the case of Hong Kong, an analysis across different sectors reveals an institutional void of systematic futures thinking. What futures are there in a state of flux?

Key words: Policy Development, Futures Research, Urban Futures

Peoople and mobility in Turku: Futures of mobility as a subsystem of a complex city

Nicolas A. Balcom Raleigh, Anna Kirveenummi, Ellinoora Leino-Richert, Hoa Nguyen, Sari Puustinen & Markku Wilenius
Futures of Cities and Communities Research Group, University of Turku, Finland

A city is a complex system, made up of several subsystems (e.g. energy, waste management, real estate, mobility). Mobility, as a city subsystem, affects people's lives in multiple and varied ways. At the same time, it affects and is affected by other subsystems of a city's complex system of systems. The Future of Cities and Communities research team at the University of Turku is conducting a seven-part, multi-method study of mobility in future Turku. The overall aim is to gain insight into future key variables affecting mobility in 2040. Drawing theoretical concepts from the mobilities paradigm launched by sociologists John Urry and Mimi Sheller in 2006, this multi-method study integrates and associates knowledge generated from a literature review, data source mapping, horizon scanning, public sector interviews, analysis of mobility apps, media analysis, participation in a city vision-making process, mobility diaries, and a Delphi study aimed at surfacing future variables of the mobility of people in Turku 2040. This presentation describes the overall research design of the study, which is ongoing in 2017, and discusses some of its preliminary findings. These preliminary findings include links between the mobilities paradigm and complexity, the current state of mobility systems in Turku, some of the city's mobility plans, a pre-analysis of mobility in the media, a review of mobility apps and ICT systems, and a mapping of mobility-related data sources. This paper describes an emerging approach to researching future complexities of urban mobilities.

Key words: Complexity, Mobility, Mobilities Paradigm, Cities, Futures

Case Studies: China and Countries outside Europe

Time: Tuesday 13 June at 10:45–12:00
Room: Pietari
Chair: Professor Petri Tapio

China 2030 or the way towards a viable cooperation with China

Epaminondas Christofilopoulos[a], Stavros Mantzanakis[b], Tomas Larsson[c] & Constantine Styliaras[d]
[a] Foundation of Research and Technology & Millennium Project Greek Node, Greece
[b] Phemonoe Lab, Greece
[c] KAIROS Future, Sweden
[d] University of Macedonia

The paper presents the outcome of a cooperative foresight work that took place simultaneously in Europe and China, aiming to produce scenarios for the global innovation environment in 2030, drawing special focus in the cooperation potential between Europe and China. The project team has utilised a combination of foresight methodologies such us desk-study analysis, Delphi, media scanning, interviews, exploratory workshops, and patent/paper analysis, in order to identify critical drivers and trends, and draw plausible scenarios for China in 2030.

During the first phase of the study, the China based team focused on China's current innovation capabilities, and challenges that may drive innovation toward 2030, as well as on specific trends in business model innovation resulting in scenarios for Chinese innovation in 2030. In parallel, the European based team focused on the western views towards China (current status and future cooperation potential). In addition, specific technological areas presenting opportunities for research and technological cooperation, and emerging business models and markets are presented and discussed.

During the second phase, the project team digs deeper and identifies specific emerging markets and niche technological sectors that provide substantial opportunities for cooperation. Finally, the paper pinpoints specific technological sectors that gather the greatest cooperation potential between EU and China, aiming to support the "future-proof" decisions of policy makers, RTOs, and corporations.

Key words: China, Innovation, Business Model, 2030, Scenarios, EU

Economic growth and gross domestic expenditure on R&D in G7-countries and BRICS countries: A long run comparative synergy analyses in 1997–2014

Jari Kaivo- oja[a], Jyrki Luukkanen[a] & Teemu Haukioja[b]
[a] Finland Futures Research Centre, University of Turku, Finland
[b] University Consortium of Pori, University of Turku, Finland

The development patterns of GDP and R&D differ strongly among countries. The study focuses on this central economic policy issue. The paper is based on new interesting methodological approach, which helps to analyse synergies between key societal variables. The purpose of the study is to analyse the strength and direction of synergy between economic growth and gross domestic expenditure on R&D in the G7-countries and in the BRICS countries.

There are three alternative scenarios about synergy development. Synergy can be positive, negative or non-existing (0). This study reveals the strength of synergy and its observed direction in central global economies (G-7 and BRICSA countries). All results of the article are novel and policy relevant empirical results about observed global synergy trends between GDP and gross domestic expenditure on R&D.

The synergy of these variables will be analysed in the following spatial context, G7-countries, Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. The study covers also BRICSA countries, Brazil, Russian Federation, India, China and South Africa.

Empirical synergy analyses are reported for 12 key global players and countries. The research interest of the paper is to evaluate empirically the relations between economic growth and R&D investments. The study covers the period of 1997–2014.

The following novel empirical research results and findings will be reported in the article:

1. Stabilised synergy analyses for the 7-G countries and for the BRICSA countries.
2. Non-stabilised cyclical synergy analyses for the 7-G countries and for the BRICSA countries.
3. Comparative synergy analyses of the 7-G countries and for the BRICSA countries.
4. Special synergy analyses about the synergy impacts of the global financial crisis after year 2007.
5. Benchmarking trends analyses about the 7-G countries and about the BRICSA countries.

Keywords: Synergy, Trade-off, De-linking, Globalization, G-7 Countries, BRICSA Countries, Economic Growth, Gross Domestic Expenditure on R&D

Disruptive factors affecting the E-Commerce industry in China up to 2030: A consumer Delphi study

Yuan Qi[a] & Petri Tapio[b]
[a] Graduate in Futures Studies, Turku School of Economics, University of Turku, Finland
[b] Finland Futures Research Centre, University of Turku, Finland

With the exponential growth in the number of Internet and mobile phone users and the continuous increase in the disposal income of the upper-middle class, China has become the world's largest and most vigorous online sales marketplace. On account of the growing influence of China's e-commerce industry domestically and abroad, and the interconnectivity among key stakeholders, any unexpected disruptions in the environment would result in a significant ripple effect on interrelated businesses, industries and even economies. The present study, embracing a future-oriented mindset, is set out to identify, analyse and interpret the potential disruptive factors that could jeopardize the growing momentum of the e-commerce industry in China by 2030. The collection of the potential factors is interpreted as disruptive transformation. The research is performed in a combination of qualitative and quantitative methods in the form of horizon scanning and a Consumer Delphi study. Horizon scanning collects the futures signals indicating the seeds of change (i.e. weak signals) and potential disruptions (i.e. wild cards), whereas Delphi study solicits the evaluations on the degree of likelihood and impacts of the collected factors from an expert panel. As a result, 27 potential disruptive factors are discovered, categorized, estimated by the consumer panel and discussed. Of the 27 factors, six are estimated to be low probability in occurrence and moderate in impact contributing to a potential nomination for the wild cards of the e-commerce industry in China by 2030.

Key words: E-commerce, Foresight, Disruptive Factors, Horizon Scanning, Consumer Delphi Method

The application of Causal Layered Analysis to understand the present conditions & possible futures of media politics in Iran

Sara Talebian[a] & Hamed Talebian[b]
[a] Media and Global Communication, University of Helsinki, Finland
[b] International Relations, University of Kharazmi, Instructor of Culture, Art & Communication Research Institute, Iran

A significant phenomenon of media politics in Iran is the fact that it extremely reflects the state will. Top-Down governmental approach to control media objectives, whether to inform or amuse, has been applied either through press censorship in the rising era of making centric modern state in early nineteenth century or through social media filtering in recent years. Although media technology is transformed or the characteristics of governmental policy are changed, the necessity to conduct people with media along with education remains fixed. Questioning what conditions are making possible the continuity of this powerful governmental intervention in media politics as well as what myths & discourses are justified, is the main goal of this article. Causal Layered Analysis (CLA), as a critical futures studies method, is considered an appropriate method to deconstruct the present status and make a vision about the future of media politics in Iran. In four different layers of analysis, first, we determine different aspects of Litany level, including the role of media in promoting enmity discourse concerning real and fictitious Iran's enemies. In the second layer, we specify different social causes for the current situation of media politics, like the attempts of Iran's state regime to control and dominates the entire media sphere in Iran. In the third level, which is about the deep discourses related to the issue under the study, we review the various revolutionary discourses which mainly emphasize on creating alternative responses to the controversy between tradition and modernity in the contemporary history of Iran. Regarding the fourth layer of CLA, which is entitled as the level of metaphor or myth, we discover the narrative of "Training Public" as the deepest myth behind media politics in Iran. At the final stage of this study, we construct the possible scenarios for the future of media politics in Iran.

Key words: Causal Layered Analysis (CLA), Futures Studies, Futures Methods, Media Politics

Gaming and Virtual Reality in Futures Research

Time: Tuesday 13 June at 10:45–12:00
Room: Juhana
Chair: Professor Markku Wilenius

Virtual reality in future studies: Chances and risks of using VR-technology for and in future studies

Aileen Moeck & Markus Meißner
Free University, Institut Futur, Freie Universität Berlin, Germany

Due to the new generation of HMDs that are entering the marketplace, virtual reality is becoming suitable for large-scale purposes and not only associated with entertainment anymore. Moreover, virtual reality (with HMDs) has already successfully been used in social sciences as a tool for presenting and gaining knowledge. This arises the question, whether virtual reality can be useful for Future Studies too and thus, what risks or chances come with it.

Together with you we want to discuss the outcome of our paper which is based on a kick-off creativity workshop at Freie Universität Berlin, where we tried to discover whether new technologies such as virtual reality, specifically through the use of head-mounted-displays, can be a relevant tool for Future Studies. We will start with giving you a short overview why latest innovations in VR increase relevancy for Future Studies purposes. We then want to uncover first ideas regarding possible standards and guidelines for the use of VR in Future Studies since our research also showed that present ones no longer apply. Many of the mentioned risks were reasonable concerns, but not inevitably inhibiting. The defensive attitude of participants for example, are not due to the technology itself, but could rather be blamed in a lack of knowledge and an incorrect handling of technology.

Key words: Future Studies, Virtual Reality, Method, Tool, Technology

Gaming, a non-linear method to think and navigate the current complex world

Camille Souhard
proGective & LAMPA, France

Playing is the first autonomous action performed by a child, beyond biological reflexes like eating or sleeping. This is his/her first and often more powerful way to interact with the surrounding world, from imitating to categorizing. Yet playing will gradually lose its importance while the child is aging until adulthood when ultimately, he is required to stop playing to face the real, complex and serious world. The advent of video games in the 2000s has amplified the contempt of adult Westerners for this sort of so-called useless and addictive way to spend one's time. Demonization is easily creeping.

Yet the emergence of the global Alien Generation – bringing together Y Gen, Millennials and all people discovering they are wired for this very special mindset – is fuelling an exponential growth of video gaming as demonstrated by esports, 2 billion gamers, a business of 100 million USD/year…

Are we going toward a clash between these two different even opposite communities? Is videogaming only a lure orchestrated by major companies to get profit, even some kind of drug market? Or shall it be

recognized as the best non-linear method to think and navigate the current complex world, as new trends in recruitment seem to show?'

This research aims to explore this perspective in order to bring fresh thoughts to the renewal of foresight methodology.

Key words: Gaming, Esport, Foresight, Alien Generation

Narrative gaming – Gaming narratives

Nele Fischer & Sascha Dannenberg,
Freie Universität Berlin, Germany

Narratives and games are - once again - strongly discussed issues in Futures Studies. And again, the current discussion seems to focus on their application for engaging workshop participants or addressees of the output of futures thinking, leaving further potentials to develop alternative futures aside. Thus, an experiental potential of games and narratives is assumed, but mostly lacks theoretical underpinning. Moreover, the systemic implications of both – narratives and games – as epistemologies are mostly neglected.

The presentation tries to enhance both approaches by providing theoretical underpinning as well as showing the potential of combining narrative analysis and gaming for the development of alternative futures. Based on poststructural theories, the contribution will, on the one hand, introduce analytical approaches from semiotics (R. Barthes) and discourse analysis (H. White) in order to show and analyse the narrative structures of futures thinking. As these form the base for constructing futures, narrative analysis aims at making the applied system explicit, thereby opening it for reframing. In effect, the emergent character of futures thinking is shown, which allows, literally speaking, to play with the foundations a future is built upon and thus enables the re-construction of alternative futures. That is why, on the other hand, the contribution shows a way to combine these narrative approaches with scenario techniques based on gaming, which allows for the experience of the conceived alternative futures as well as their reflection (educational effects). Playing with alternative futures by rearranging their conceptional basis thus allows the construction of futures that are resilient and flexible.

Key words: Narrative foresight, Games, Semiotics, Alternative futures

Curating the Complexity – Futures Workshop Session, part 2

Time: Tuesday 13 June at 10:45–12:00
Room: Kustaa
Moderators: Katriina Siivonen, Pasi Hario, Marjukka Parkkinen & Satu Tuittila
Finland Futures Research Centre, University of Turku, Finland

Hallituksen tulevaisuusselonteko työn murroksesta (in Finnish)

Time: Tuesday 13 June at 10:45- 12:00
Room: Dining Room
Moderator: Dr. Kaisa Oksanen
Prime Minister's Office, Finland

Hallituksen tulevaisuusselonteko työn murroksesta
Kaisa Oksanen
Prime Minister's Office, Finland

Sessiossa keskustellaan hallituksen tulevaisuusselonteosta, jonka aiheena on työn murros. Tulevaisuusselontekojen tehtävä on tunnistaa tulevaisuudessa huomiota vaativia asioita yli hallituskausien ja niissä linjataan valtioneuvoston yhteistä tahtotilaa tulevaisuuden rakentamiseksi.

CHAIRED POSTER SESSION

Tuesday 13 June at 13:00-13:30

Higher education is at a crossroads of globalization, social changes and technical developments

Krisztina Némethy[a] & Dr. József Gáti[b]
[a] University Research and Innovation Center, Óbuda University, Hungary
[b] Rector Office, Vice Rector, Óbuda University, Hungary

Globalization, social changes and technical developments are the base for future changes. They are the most important aspects for an Economists analysis and understanding of global relationships, with a multidisciplinary eye to collect information for future research, as the foundation for long-term strategic planning. Because of expectations for sustainable development and inclusive growth, the practice of HRM and SHRM has experienced significant transformations. Global connections, cloud based technology, smart cities, human like robotics and new media are only some of the main thrusts concerning how we think about work, what constitutes work, and the skills we will need to be productive workers in the future. Higher education is at a crossroads for all of these perspectives.

Key words: SHRM, Future Research, Higher Education, Workplace in the Future, Humanoids

Students are the future of experts

Johanna Hautamäki & Tarja Mäkitalo
Research and Development, Centria University of Applied Sciences, Finland

The aim was to experiment rapid reacting to a working life assignment in different fields study sessions and show students' potential as development resource. Iteration and co-creation, typical characteristics to service design, were utilized. Anticipation and service design were combined for creating visions of Mobile preventive community policing at urban areas. Four stages innovation process was applied during one month. At the first stage case topic and visual assignment material were co-created with work life partners, Keski-Pohjanmaan Kirjapaino and Ostrobothnia Police Department. During second stage in futures workshops students created visions of future community policing as a continuum to described resent development of police force in Finland. 80 students from eight countries, and three different fields, took part. In third stage visions were discussed and refined with work life partners. At fourth stage service ideas were formed. Based on feedback pedagogues found connection to working life and R&D valuable, students found co-creation with working life motivating. Partners found outside perspectives useful, process brought new insight to their services.

The results show, that this cooperation model can work and create added value to participators. Service design and anticipation gave structure for the process, visualization of ideas enhanced encountering different views. Students were seen as a resource, not merely learners. The benefit was bidirectional, cooperation has to produce value to all participants in order to work in long term. This process will be further developed into pedagogical model implementing problem-based and social interaction principles into cooperation between education, R&D and work life.

Key words: Anticipation, Service Design, Working Life Cooperation, Education

Futures guidance and tools in OMASI and UTUA projects

Leena Jokinen, Johanna Ollila, Sari Miettinen, Nina Pietikäinen & Katariina Heikkilä
Finland Futures Research Centre, University of Turku, Finland

This poster/posters will present two ESF funded ongoing projects and experiences of using futures guidance tools:

Get another life (UTUA, https://utua-hanke.fi) project focuses on developing future oriented guidance model, tools and services to use in coaching programs in educational institutions or in other organizations, such as employment agencies. The new guidance model promotes future orientation, self-reliance as well as creative and open-minded attitude towards the future.

Futures images of working life as seen by young women (OMASI, https://omasi-hanke.fi/). The aim of the project is to increase authorities' and employers' knowledge of the young women's expectations about working life and their educational choices. In addition of producing knowledge the project strives to encourage young women's vocational dreams with help of futures thinking methods. The project improves young women's life management and promotes their integration to the society.

Key words: Futures Guidance and Tools, Futures Thinking, Personal Futures, Experimental Learning, European Social Fund Projects

Futures of lake restoration

Nina A. Nygrén & Petri Tapio
Finland Futures Research Centre, University of Turku, Finland

Eutrophication of freshwaters is a complex problem, consisting of intertwined natural and societal processes. The efforts to restore freshwaters constitute a relatively stable socio-technical system that involves actors, institutions and systems that are interrelated. Two prevalent paradigms have been guiding the restoration efforts of eutrophicated lakes for decades. It has been widely believed that oxygen concentration at the water-sediment interface regulates internal phosphorus loading of a lake, and consequently, oxygenation/ aeration is an effective management method of eutrophicated lakes. However, new research shows that oxygen may not have as remarkable role as previously thought, and the paradigms may be a subject to change. Therefore, we performed an international Delphi study with a relatively large expert panel to reveal how strongly lake scientists believe in the remarkable role of oxygen, and what could change their views. In addition, we explored how the experts view futures of lake restoration. We concluded that the paradigms seem rather persistent and no radical changes appear in horizon although some weak signals of change can be discerned. The paradigms would probably change easier, if a new paradigm, i.e. a new measure to tackle eutrophication, would be introduced to replace the old beliefs. Nevertheless, the experts viewed the future of lakes quite positively: efforts to reduce external loading are anticipated to succeed, restorations will be conducted more frequently and lakes will be in better condition by the year 2030, according to the expert panel.

Key words: Eutrophication, Lake Restoration, Oxygenation, Aeration, Paradigm Change, Delphi Method

Energy security analysis and future recommendations to enhance energy security based on expenditures for R&D and education and levels of rule of law and democracy

Abdelrahman Azzuni & Christian Breyer
Energy Technology, School of Energy system, Lappeenranta University of Technology (LUT), Finland

As energy security is a global concern, countries differ in their level of energy security. The concept of energy security has many dimensions to be addressed, when evaluating energy security. In this research, energy security is analysed based on four parameters, of which two are related to the Literacy dimension and the others to the Policy dimension. The four parameters to be addressed are Research and Development (R&D) expenditures, Education expenditures, Democracy index, and Rule of law. As found in previous researches, these parameters have a strong relation to energy security. R&D expenditure affects energy security; new renewable energy technologies developed to use different courses of energy, better understanding of the energy systems gives an opportunity for efficiency gain, and more tools for societal interaction. Education is important to spread awareness about energy security, to teach individuals certain attitudes to consume energy conservatively and to empower societies to take control of energy production e.g. rooftop PV systems. Further, as democracy and rule of law are enhanced, so is energy security. Once citizens have their demands achieved, their needs covered and their will listened to the energy system is considered more secure. As the energy system is meant at the end to serve the citizens, their well-being should be the determining-key for their energy security. After that, each of these parameters is compared to GDP PPP. Then countries around the world are divided into four groups. Countries with high GDP PPP and score high at the same time in a certain parameter are considered to have achieved energy security. Vice versa, countries with low GDP PPP and having low achievement in a parameter is considered to lack energy security. Countries in between the two ends are considered to be in a transition mode. Recommendations for those countries to achieve higher energy security levels in a future scenarios are given. The conclusion of this research emphasizes the need of many countries to invest more in their education system and spend more on research and development in order to achieve higher levels of energy security. In addition, more democratic rule with higher rule of law enhance energy security.

Futures Platform – Strategic foresight tool

Tuomo Kuosa
Futures Platform Oy, Finland

Futures Platform™ (www.futuresplatform.com) is a web-based strategic foresight tool that pursues to transfer the role of foresight, from dedicated once a year strategy work, into everyday practice. It helps you and your team make your plans future proof. Futures Platform's trend radar visualizes which trends and megatrends will shape your future. You can tap into articles and videos on future topics curated by future foresight experts. You can blend in your own insights and assess future changes together. You make sure your plans and activities are in sync with how the world is changing.

Key words: Foresight, Future, Platform, Trend, Radar, Tool

Diagnosis process in foresight research using network visualization

Alicja Ewa Gudanowska
International China and Central-Eastern Europe Institute of Logistics and Service Science, Faculty of Management, Bialystok University of Technology, Poland

The contemporary world attaches growing significance to the experience, intuition and practical use of research methods, including predictive ones, particularly while making decisions in uncertain conditions. For this reason foresight studies may become a tool for assisting enterprises and decision-making authorities in the country and the region. Among the issues addressed within the execution of foresight studies the first stage of their methodology should be especially emphasised since it involves a diagnosis of the existing state of affairs. It is a phase that provides information to the development decision-makers (e.g. within technology) and primarily dominates the legitimacy of the decisions that are made. This stage, regardless of its subject matter, supports the creation of a justified image of the future changes. On the other hand, it appears to be particularly vital in the case of technological foresight that focuses on dynamically changing technology that is difficult to define and classify.

In its initial part the paper presents the conclusions of the Author's deliberations in the context of the diagnosis process in foresight studies. The major purpose of the studies that the Author assumed was developing a procedure that allowed for conducting a diagnosis in foresight studies with reference to technological deliberations. Taking into account observations made on the basis of the reviewed literature, an important element of the procedure was considered an aspect of visualising a technological network. The conducted analyses led to a proposal of carrying out a diagnosis process in foresight studies. The Author termed this procedure as technology mapping. The paper presents the course of technology mapping and indicates a technological database that is possible to generate during its execution.

Key words: Method of Diagnosis, Foresight, Technological Foresight, Technology Mapping, Network Visualization

Session VI
Tuesday 13 June at 13:30–15:00

Futures Research: Cognitive Neuroscience and Transformation

Time: Tuesday 13 June at 13:30–15:00
Room: Katariina
Chair: Dr. Osmo Kuusi

Towards the scientific integration of futures research and cognitive neuroscience

Osmo Kuusi
Aalto University & University of Turku, Finland

Now are available rather good explicit and practical quality criteria for futures research made e.g. by German Netzwerk Zukunftsforschung (NZF) (Gerhold et al. 2015) and Kuusi et al. (2015). However, the position of futures research as the scientific approach among other sciences is still very unclear. If futures research likes to be the covering study field of the futures oriented science the lack of the link between future oriented aspects of natural sciences and futures research is the particularly urgent problem. Besides "hard facts" of natural sciences, the futures oriented behavior of human beings is based on the sense-making in natural languages and in other systems of signs (e.g. de Saussure 1916, Peirce 1934). Cognitive neuroscience is a link between the "hard facts" of natural sciences and the sense making of single human beings. Recently in the field of the cognitive neuroscience, "Future-Oriented Mental Time Travel" (FMTT) has been a much discussed theme. It is the main theme of the book "Seeing the future, theoretical perspectives on Future-Oriented Mental Time Travel" (Michaelian et al 2016). Comparing this approach and futures research, the presentation suggests that the General Frame of Consistence (e.g. Kuusi 1999) is suitable for the integration cognitive neuroscience and futures research and beside that for the study of machine learning based on concepts.

[1] Gerhold, Lars / Holtmannspötter, Dirk / Neuhaus, Christian / Schüll, Elmar / Schulz-Montag, Beate / Steinmüller, Karlheinz (eds.) 2015. Standards und Gütekriterien der Zukunftsforschung. Ein Handbuch für Wissenschaft und Praxis. Wiesbaden: Springer Fachmedien.

[2] Kuusi, Osmo, Kerstin Cuhls and Karlheinz Steinmüller (2015) The Futures Map and its quality criteria, European Journal of Futures Reasearch (2015) 3:22

[3] De Saussure, Ferdinand (1916) Cours de Linguistique Generale, Payot, Paris,

[4] Peirce, Charles S. (1934). Collected papers: Volume V. Pragmatism and pragmaticism. Cambridge, MA, USA: Harvard University Press.

[5] Michaelian Kourken, Stanley B. Klein and Karl K. Szpunar (2016) Seeing the future, theoretical perspectives on future-oriented mental time travel, Oxford University Press

Towards a society of living: Connecting transformation, complexity theory and life sciences

Joséphine von Mitschke-Collande
Innaxis Research Institute, Switzerland

Humanity finds itself at the tuning point of an era with a huge potential of change. In particular, alternative ways of living, as well as entrepreneurial visions developed in niches and subcultures are praised for their potential of change for a more just and sustainable society. However, during their dissemination process they lose the capacity to impact effectively the root causes of our societal dysfunctions. Systemic hurdles prevent these initiatives to drive fundamental transformation, as very often they become themselves a mean for legitimizing the status quo and reinforcing unsustainable trends. The current state of transformation research when explaining the bottleneck of how to go from local seeds to a global change often uses mechanistic approaches and frameworks rooted in management thinking to envision large-scale intentional change in a controllable path towards sustainability, set by goals and indicators. However we believe in a radically different approach rooted in the findings of systems thinking and complexity sciences and ultimately in life itself. Autonomy and connectedness is the dual principle underlying the complex, networked nature of dynamical systems and in particular of living organisms, everything from bacteria and human beings to ecosystems and societies, which share a common resistance to predictability and controllability, although they can develop emergent properties such as self-organization and self-consciousness. Hence the challenge of transformation research is to embrace such concepts from complexity theory and life sciences in order to pursue a purposeful evolution without controlling it. This contribution proposes an agenda for further research in that direction.

Key words: Transformation, Complexity, Sustainability, Niches, Subcultures, Systems Thinking, Life Sciences, Societal Transformation

Cultivating physiological coherence with possible futures

Tyler Mongan
Heart Lab LLC and Quantum Medicine University, Hawaii, USA

While investigate complex and uncertain futures, foresight can unknowingly be limited by human physiology. At the foundation of the person that is thinking into possible futures is a dynamic, changing physiology that is designed to conserve energy and maintain survival. It takes more energy and more neuronal interconnectivity for the brain to think into the future than it does for the brain to recall the past and thinking into the future may be interpreted as a threat to survival. Thus, physiology influences the futures we think are possible, probable and preferred.

Interestingly, research on heart-brain coherence is revealing that we can use simple techniques to experience enhanced cognitive function, increased creativity, and group collaboration. A physiological based approach to foresight allows us to understand how to cultivate more optimal physiological states for not only thinking into the future, but also feeling into the future. In a sense we can begin to develop empathy with a possible future.

In this participatory workshop you will learn about the science of heart-brain coherence and how that influences individual and group physiology. You will learn practical methods that have been used by Heart Lab to help executive teams cultivate coherent physiological states to scan the horizon for future innovations. We will experiment with proven frameworks that encourage more coherent physiological

states for thinking and feeling into possible futures. You will learn techniques to develop a coherent physiological relationship with possible futures both as individuals and as groups, and how those states influence the strategies for taking action towards a particular future.

Key words: Physiological Coherence, Heart-Brain, Empathy, Thinking and Feeling

Only human: Towards a neuroscience-based understanding of futurefacing organizational culture

Medina Abdelkader
OCAD University, Canada

Providing its goal is continued existence, every organization has a stake in the future. The very notion of sustainability is rooted in the desire to exist in the future, to endure shifts in values, behaviours, and needs of our society. In many ways, human beings are restricted by our individual hardware; the human brain is inherently predictive, but there are several human factors that prevent us from thoughtfully and objectively considering the future.

Strategic foresight is an organization's realization of their preferred future, and their capacity to imagine, invent, and align their business goals with this vision. But for many, institutional dynamics stimulate a myopia that makes imaging and realizing a preferred vision of the future a near impossible task. This work argues that the brain's temporal wayfinding networks play a significant role in strategic myopia, and that there are several neurological interventions that organizations need to consider to nurture futurefacing culture. It explores the relationship between strategic foresight and organizational culture and uses neuroscience to better understand the human factors associated with futuring. And using foresight maturity principles developed by Terry Grim and René Rohrbeck, it will outline key areas from which organizations can learn to build culture that gazes into the future.

Key words: Organizational Culture, Neuroscience, Strategic Foresight, Leadership, NeuroLeadership, Organizational Psychology, Team-Building

Complexity and Systems Thinking in Governance

Time: Tuesday 13 June at 13:30–15:00
Room: Eerik
Chair: Professor Czesław Mesjasz

The future of government workforces: Serving the people in the 21st century

Katherine LY Green[a], Jennifer Jarratt[b] & John B. Mahaffie[b]
[a] Green Consulting Group LLC
[b] Leading Futurists, LLC, Jennifer Jarratt

We propose to explore the future of government workforces and to assess the implications for them of 5 critical issues. In the next decade, all governments will have to: 1) do more with less, 2) do it with fewer people, 3) meet more and new demands for services, 4) work with an aging population and aging workforce, 5) do it all digitally.

Like many other mature organizational systems, government is slow to adapt to changes in its roles and expectations of the citizenry. It often has to work with outdated equipment and manage regulation, legislation and missions designed for pre-digital eras.

Governments often operate with significant productivity constraints. Recruitment and retention of skilled workers is hampered by salary limitations, and many workers, near retirement, take their institutional knowledge and skills with them, leaving significant workforce gaps. The situation is exacerbated by reduced training budgets. Training is crucial to building a replacement workforce with the right mix of operational skills and knowledge.

Our experience in working with the State of Maine on scenarios and strategies for the future of the state's human resources will be the starting point for this presentation, enhanced with our research on how governments are tackling these workforce issues.

What does "serving the people" mean in a future where everyone is mobile, all systems are smart, people expect to freelance their work, policies are fast-changing and complex, and the nature of government becomes more global.

Key words: Workforce, Foresight, Government, Aging, Digital

Business and Peacebuilding: Towards a framework for mapping governance linkages

Aviva Silburt
University of Waterloo & Balsillie School of International Affairs, Canada

Around the world, private companies are increasingly participating in peacebuilding activities. Many scholars, politicians, and business leaders are enthusiastic about what they now call "business for peace," but to date the results of corporate involvement in peacebuilding have been mixed, particularly in the extractives sector. Current single-factor explanations for the successes and failures of "business for peace" do not reflect the sheer complexity of peacebuilding contexts. This paper takes an alternate approach and draws on global governance and complex systems theory to disentangle the dynamic web of actors, institutions, rules, and norms involved in the governance of foreign-owned mining and peacebuilding. The

paper will provide a synthesis of relevant literature and initial conceptual work towards a framework for understanding how foreign-owned mining activities intersect with peacebuilding activities. Key questions to guide this work include:

- Who are the main actors and what are the main institutions, rules, and norms surrounding foreign-owned mining activities and peacebuilding at the local, national, and international level?
- Where and how do foreign-owned companies, as individual actors, intersect and interact within this broader framework of connections?

This paper represents an additional area where complexity and systems thinking can inform and improve the effectiveness of public and private governance activities. In considering a current multi-level and multi-dimensional governance challenge – peacebuilding and foreign-owned extractive operations--the paper also captures both challenges and opportunities for global governance.

Key words: Business for Peace, Peacebuilding, Extractives Sector Governance, Corporate Social Responsibility, Multinational Corporations, Complex Systems, Global Governance

Ignorance and politically correct worst case scenarios of sociopolitical phenomena

Czesław Mesjasz
Management Process Department, Cracow University of Economics, Poland

In all cases when sociopolitical phenomena are predicted or anticipated with scenarios, the most negative visions of the future events are also proposed. Taking into account a social and political context, in one of my earlier works, I put before the term "politically correct worst case scenarios". This paper constitutes a continuation of my earlier research. Political correctness means in such case consideration of all sociopolitical factors preventing the participants of the process of prediction/anticipation from proposing or maybe even considering tacitly in their minds such scenarios. The aim of the paper is to present the conditions how variously defined sociopolitical constraints force the actors involved in making scenarios to avoid elaboration and publication of the scenarios unacceptable according to those constraints. A set of necessary ideas and definitions will be prepared. The typology of external and internal factors as well as the typology of consequences of elaborating and publishing such scenarios will be presented. The concept of the meta-rules of explicit and tacit control of development of scenarios and their role in meta-prediction (meta-anticipation) will be proposed. Meta-prediction (meta-anticipation) mean in this case the assumed knowledge of the negative consequences of elaborating and publishing such scenarios possessed by actors proposing (imposing) directly and/or indirectly such meta-rules, i.e. "You do not think about (considering/publishing) this specific scenario due to negative consequences it might bring about". A methodological novelty will be proposed. Instead of referring to knowledge in the process of making predictions (scenarios), ignorance in reference to uncertainty will be applied. Examples of the impact of politically correct worst case scenarios in normative sciences such as management and security studies will be presented and discussed.

Key words: Constraints of Prediction, Norms and Prediction, Norms and Scenarios, Worst Case Scenarios

Futures of Energy

Time: Tuesday 13 June at 13:30–15:00
Room: Kristiina
Chair: Dr. Juha Kaskinen

Future for bio-fuel consumption and energy security: India's policy advocacy

E. N. Ashok Kumar
Centre for Foresight Studies, Solapur University, Maharashtra State, India

According to International Energy Agency, by 2030 the demand for energy in India is likely to increase by 40 per cent as one of the growing economies of the world. Energy issues are central to socio-economic development. In India transport is the most energy demanding sector which is heavily dependent on import of petroleum oil which is nearly 80 percent. This trend is likely to increase by two folds by 2030 and will have consequences on carbon emission, climate change, and higher costs on the exchequer of the Government. In view of promoting energy security and to reduce import cost and environmental cost, Government of India has contemplated ***National Policy on Bio-fuels*** to augment the use of bio-fuels. The vision of this policy is to mainstream bio-fuels to meet the energy consumption of the transport sector. The goal is to achieve a target of 20 per cent blending of Bio-fuels in Bio-diesel in the short term. Against this backdrop, this paper examines various scenarios for mainstreaming bio-fuels in the country. The paper employs "morphological matrix, scenario building and back-casting" methods and advocates the most desirable scenario and linkages needed to achieve the policy targets. The prime drivers considered are strategies and interventions of the state, markets, financial and fiscal incentives, quality standards, technology and international cooperation, institutional mechanisms and public awareness.

Key words: Bio-fuels, National Policy, Transport Sector, Morphological Matrix, Back-Casting

Futures images of a bioeconomy

Päivi Pelli[a], Teppo Hujala[a], Elena Kulikova[b] & Timo Karjalainen[a,c]
[a] School of Forest Sciences University of Eastern Finland, Joensuu, Finland
[b] European Forest Institute EFI, Joensuu, Finland
[c] Natural Resources Institute Finland, LUKE

Development of a bioeconomy has gained momentum during the past five years, not least due to the EU and national strategies directing attention towards a more intensive use of the biological resources and processes. The ideas of a bioeconomy or the ways envisioned towards it, however, vary considerably: the technological and economic emphases are claimed to override the perspectives of a societal transformation and sustainability. Furthermore, the necessary renewal of the traditional natural resources sectors and the emerging new bioeconomy proceed in parallel, which on its part causes ambiguity among the stakeholders.

This paper compares the futures images of one traditional natural resources sector, the forest-based sector. Empirical data is based on the scenarios produced by the participants of an international training course "Young Leadership Programme on the Forest-based Bioeconomy: Focus on Russia" in three successive years 2014-2016. The futures images elaborate two distinct angles towards a bioeconomy: that of

linear and manageable processes based on the largely known forest-based value chains and that of more profound transformations which encompass the changes of the resource base and production but also society at large. The paper discusses the opportunities and challenges in disseminating futures information, supporting shared sense making and initiating futures thinking in an international collaboration. Follow-up interviews of the organizers and participants are planned to be carried out in the spring 2017 – thus, providing information on whether the process has widened up the horizons for seeking and utilizing futures information and signals.

Key words: Bioeconomy, Forest-Based Sector, Futures Information, Sense-Making, Participatory Methods

Can we overcome complexity with anticipation for climate compatible governance?

Joni Karjalainen & Juho Ruotsalainen
Finland Futures Research Centre, University of Turku, Finland

Our ability to understand how society works is evermore challenged. The aim of this contribution is to examine how knowledge about planetary boundaries and climate change is inducing systemic pressures to society and shaping decision-making. The contribution derives from an on-going foresight project that studies energy-society transformation to explore how a renewable energy society could be achieved by 2050. As old dependencies in fossil fuel use are being questioned, novel systemic dependencies between renewable energy, economy, society and politics may emerge to determine when and how energy will be used. The current pathways to reach a 100% renewable energy system assume intermittent renewable energy, smart and interconnected grids, energy storages, and demand-side management. In the future, nature and weather patterns around the world could affect the use and design of energy-related technologies. This may shape related costs, trading prices, and allow energy to be managed in a nano- to millisecond level. Together, this may be seen to add systemic complexity. However, we may also wish to reduce systemic complexity. Emerging off-grid solutions and services increase the independence of actors, and decrease the systemic connections of actors in the energy system. We suggest that for climate compatible governance, a long-term development vision on a 100% renewable energy society may be desirable, but it is worth anticipating these two opposing drivers to counter unexpected and yet inevitable contestations. Furthermore, to reach renewable energy around the world, energy independence and forms of hybrid governance may deserve further attention in energy policy debates.

Key words: Decision-Making, Governance, Independence, Long-Term Vision, Nature, Off-Grid, Renewable Energy, Systems Thinking

Clean transformation as a complex endeavour – The case study of Chile

Noora Vähäkari, Joni Karjalainen & Sirkka Heinonen
Finland Futures Research Centre, University of Turku, Finland

Societies are complex systems where some elements change fast, others more slowly. Our paper studies energy transformation in Chile, a country with plentiful renewable energy resources, and focuses on the energy-society nexus. We explore local pathways for change by using four transformative socio-cultural scenarios 2050 that explore how renewable energy could be harnessed in line with the peer-to-peer principles. The scenarios were reflected with local experts in a futures clinique in Chile in October 2016. Following a semi-backcasting approach, the local experts used the futures wheel and the PESTEC method to analyse opportunities and risks of an energy transformation for Chile. The participants highlighted the need to diversify Chile's economic structure and the democratization of energy. A post-copper era was

proposed, in which 'new' wealth and business could emerge from Chile's abundant renewable energy resources, assuming that they are responsibly harnessed. In literature, it has been argued that the politics of energy transformations can be either citizen-, market-, technology- or state-led. However, our findings rather emphasize the cultural, institutional and social dynamics of transformation. Such factors may include trust and civic engagement to build commonly shared values. Community needs would be expected to inspire innovation, public and private investments as well as private-public partnerships. Democracy, too, may have to extend beyond conventional representation to ensure opportunities and wealth are equally shared. As conclusions, Chile has the capacity to become 100% renewable energy powered in the future by harnessing its abundant solar and wind resources. In support, a long-term vision and an encouraging business culture where failure is tolerated are required. Increasingly dynamic relations across actors and sectors, more localized management structures, and a collective mindset can further nurture the complex process of energy transformation in Chile's society.

Key words: Chile, Complexity, Diversification, Neo-Carbon, Post-Copper, Renewable Energy, Transformation, Trust

Strategic Thinking and Security Foresight

Time: Tuesday 13 June at 13:30–15:00
Room: Pietari
Chair: Dr. Burkhard Auffermann

Navigating the great transition: Futures for a complex world

Fabienne Goux-Baudiment
proGective & University of Angers, France

Most thinkers, including futurists, have been formatted to think the world within a fixist worldview as if evolution would always be linear, leading thus to incremental visions of the future like business-as-usual and more-of-the-same scenarios. Yet the great Transition we are crossing through becomes every day more obvious, fueled by recent "surprises" (e.g. Brexit), X-events (e.g. climate change, economic crisis), exponential technology and business models (digitalization). The vision of the future it induces reflects fear more than a real understanding of the increasing complexity, especially in the Western culture where doomsaying is spreading.

The concept of a Great Transition between a dying multi-decade world and a slowly emerging one, based on drastic systemic change (in economics, politics, society, technology…), offers an interesting framework to think both the short- and long-term in a very new way. 'Macroscaling' is part of this new way to build and use the big picture that gives enough perspective to understand the unfolding changes, especially the disruptive ones.

This paper aims to show how foresight can evolve, in terms both of concepts and methodology but mainly in terms of understanding and anticipating, to help decision-makers to navigate the VUCA world that characterizes this very peculiar moment of the Great Transition.

Key words: Transition, Foresight, Strategy, Future

Cyber security is likely to fail because we architect on the wrong assumptions – The flip side of exponential Internet growth will lead to massive security challenges

Michiel Jonker
Grant Thornton, South Africa

The presentation will focus on the future of cyber security from a complex systems thinking perspective:

- Cyberspace is a complex system due to billions of people interconnected:
  - Cyber-crime and crime syndicates will increase due to increased political, geo-political, economic and job polarisation in the world:
    - We are already losing the war against cyber-crime and attacks (what makes us think we will succeed in the future?).
- Our flawed thinking in cyber security will be our downfall – we architect on the basis of success instead of failure:
  - We create our own Black Swans by:
    - By treating cyberspace as a simple and/or complicated system, and not as a complex system.
    - Thinking we understand cause and effect (and that we can prevent security breaches and succeed with security measures that are ineffective in a complex system).
- A different approach to cyber security is needed:
  - Understand the context of cyber systems and learn to which domain cyberspace belongs (i.e. explain complex systems vis-à-vis complicated and simple).
  - Understand robust controls vis-à-vis the need for resilient controls in a complex cyber environment (i.e. the need for more detective and corrective (resilient) controls vis-à-vis preventive (robust) controls):
    - The reasons why best practice doesn't work in a complex system.
    - The reasons why preventive (robust) controls will be less effective in the future.
    - The basis (foundation) on which resilient controls will operate – resilient strategies will emerge as you continue.
- Conclusion:
  - Approaching the future – embrace the principle of emergence!

Key words: Cyber Security, Cyberspace, Cyber-Crime, Complex Systems, Robust Controls, Resilient Controls, Emergence, Black Swans

Strategic foresight in the German armed forces

Henning Hetzer, Dr. Annika Vergin & Dr. Olaf Theiler
Bundeswehr Office for Defence Planning, Branch Future Analysis, Germany

Strategic foresight is the ability to recognize important changes in the environment and to react with adequate arrangements in time to take advantage of opportunities and to avoid risks. This is not only important for companies but, alongside other government agencies, also for armed forces. Security policy oriented strategic foresight involves identifying trends and developments including weighing challenges and risks in order to identify potential future threats for national security.

The future analysis branch of the Bundeswehr Office for Defence Planning produced a comprehensive security policy environmental analysis. One component was a systematic trend analysis, resulting in on the one hand an extensive trend landscape and on the other hand several possible Future Conflict Pictures. Trends and Future Conflict Pictures were important basics in order to develop a separated portfolio of future security environments. Additionally, a catalogue of wildcards (or black swans) served essentially as a benchmark to identify potential gaps in the understanding (and capabilities assessment).

To better identify future challenges for the German Armed Forces, we established a so-called Dialog Process as part of our projects. This is the point where we are involving capability-development-experts in the process. Only all these inputs summed up together provide the German Armed Forces with important inputs for their future capability development in an increasingly complex world.

The presentation will be strictly focused on the process and methodology of strategic foresight in the German Armed Forces.

Key words: Strategic Foresight, Trend Analysis, Scenario Analysis, Wildcard, Black Swans

Rethinking the unthinkable – Revisiting the classics of nuclear strategy

Jan Hanska
Finnish Defence Research Agency (FDRA) Doctrines and Concepts Division, Finland &
Faculty of Social Sciences, University of Lapland, Finland

Strategic foresight is the ability to recognize important changes in the environment and to react with adequate arrangements in time to take advantage of opportunities and to avoid risks. This is not only important for companies but, alongside other government agencies, also for armed forces. Security policy oriented strategic foresight involves identifying trends and developments including weighing challenges and risks in order to identify potential future threats for national security.

The future analysis branch of the Bundeswehr Office for Defence Planning produced a comprehensive security policy environmental analysis. One component was a systematic trend analysis, resulting in on the one hand an extensive trend landscape and on the other hand several possible Future Conflict Pictures. Trends and Future Conflict Pictures were important basics in order to develop a separated portfolio of future security environments. Additionally, a catalogue of wildcards (or black swans) served essentially as a benchmark to identify potential gaps in the understanding (and capabilities assessment).

To better identify future challenges for the German Armed Forces, we established a so-called Dialog Process as part of our projects. This is the point where we are involving capability-development-experts in the process. Only all these inputs summed up together provide the German Armed Forces with important inputs for their future capability development in an increasingly complex world.

The presentation will be strictly focused on the process and methodology of strategic foresight in the German Armed Forces.

Key words: Strategic Foresight, Trend Analysis, Scenario Analysis, Wildcard, Black Swans

Methods and Methodology of Futures Research

Time: Tuesday 13 June at 13:30–15:00
Room: Juhana
Chair: Dr. Ted Fuller

Grasping the future of digital society

Tomi Dufva[a] & Mikko Dufva[b]
[a] The School of Arts, Design and Architecture, Aalto University, Finland
[b] VTT Technical Research Centre of Finland Ltd., Finland

Society is increasingly digitalised and connected, with computers and algorithms mediating much of the daily actions of people in one way or another. The degree of digitalisation and its consequences are challenging to understand because most people lack a first-hand experience of what digitalization actually feels like. Digitalization is abstract and difficult to grasp, which leads to a detached sense of digital surroundings. In this paper we argue that in order to grasp the nature and future of digitalized society, a embodied understanding of digitalization is needed. This can be achieved through approaching coding and the manipulation of digital world as a craft, as "doing-by-hand".

In this paper we elaborate the meaning of doing-by-hand in a digital society, a skill and mindset we call "digi-grasping". Digi-grasping is active sense making and existing in the world that consists of both digital and "real" world, and creates an ethical and aesthetical attachment to society. It can empower people to understand and question the choices and motivations behind current digital structures and create new structures. Digi-grasping is thus an important approach to shaping the futures of digital society.

The paper draws theoretically from futures research, embodied cognition science and artistic research. It combines the recent research on "the experiential shift in foresight" with the long tradition of research on art and craft.

Key words: Digitalization, Digital Society, Experiential Foresight, Craft Education, Art Education, Artistic Research, Embodied Learning, Critical Theory

Dancing with a wicked problem – Approaching designer's deeper understanding of multisensory user experience through design diaries

Laura Mononen, Rebekah Rousi, Johanna Silvennoinen, Emma Vuorenmaa & Tiia-Elina Kokko
Faculty of Information Technology, University of Jyväskylä, Finland

Designerly thinking is still a great scientific mystery. User experience is manifesting as a wicked problem, requiring systems thinking and understanding of complexity. The need arises from the different touch points where the client encounters the company (e.g. mass media, internet, telecommunications, services etc.) and the necessity to orchestrate the multimodal designs to portray one coherent, clear and effective message. Designers would benefit from understanding the ways in which people process and experience multisensory information, and in turn view their design outputs and spaces as a complex whole where the digital and physical connect. From a cognitive scientific perspective, this provides us with the challenge of understanding how designers think and understanding their work, and in what ways we may enrich the design process and experience - not just for users, but designers themselves. This presentation

introduces an explorative on-going study titled The Language of Designers. We present the design, development and current phase of the R(M)UE (rich multisensory user experience) data collection process, which involves a series of interviews and workshops, plus the adoption of an interactive digital design diary (RIDDD) research method. The study investigates the thinking of 20 designers over the course of a year. Grounded theory and a digital design diary are used to reveal 'ad hoc' designers experiences, feelings, thoughts and questions arising during their creative work. Aspects considered when analyzing the results include: design questions; words utilized by designers when describing multisensory phenomena; how they think through the senses; and how sensory experiences are understood.

Key words: Design Thinking, Wicked Problem, Multisensory, User Experience, Digital Diary

How futures thinking can benefit from design thinking and strategic thinking

Leon Young
Future Strategic Thinking, Australia

What makes a great Futures Thinker? While an old practice, the formalisation of futures thinking, often called foresight, has been relatively new. It is also, without a doubt, a multi-disciplinary field where professionals hail from a variety of schools of thought. Yet where is the cohesive foundation of thought that allows the structured growth of 'futurists'? Using two other multi-disciplinary fields, this paper proposes four key cognitive traits required by futurists.

This paper will contend that to be a 'good' futures thinker, the following cognitive characteristics should be present: systems thinking, visionary thinking, creative thinking and holistic intuition. Furthermore, this paper establishes strong linkages with the fields of design thinking and strategic thinking. These clear links are then able to provide an insight into the development of futures thinking.

Key words: Design Thinking, Strategic Thinking, Cognitive Behaviours, Education

A recipe for making deep, meaningful images of the future

Akhgar Kaboli & Petri Tapio
Finland Futures Research Centre, University of Turku, Finland

Images of the future are products of expectations, values, beliefs and life experiences of individuals. They are developed both intentional and subliminal and influence people's decisions and behaviors. In order to create deliberate images of the future, individuals' beliefs and meanings should be investigated systematically. This paper makes a brief review of the significance of the images of the future in future research and propounds a combination of methods in order to achieve more insightful images of the future. A mixture of semi-structured interview, long interview and active imagination is employed to collect the data. Then, Causal Layered Analysis (CLA) is utilized as a framework for deductive qualitative content analyses of the research material. The images of the future explored through this approach embody various levels of their holders' understandings and judgment. This combination of methods was developed for a study on the images of the future of a group of multicultural young adults who live in a complex late-modern world. This study resulted in four images of the future including the participants' anticipations for their personal future and the future of their surrounding environment.

Key words: Images of the Future, Interview Technique, Causal Layered Analysis, Young Adults

The Future of Work: An Interactive Workshop on Perspectives among Europe

Time: Tuesday 13 June at 13:30–15:00
Room: Kustaa
Moderators and panelists: Cornelia Daheim[a], Epaminondas Christofilopoulos[b], Sirkka Heinonen[c], Ondrej Valenta[d] ,Ole Wintermann[e], Ibon Zugasti[f]

[a] Future Impacts Consulting, Germany
[b] Phemonoe Lab, Greece
[c] Finland Futures Research Centre, University of Turku, Finland
[d] Technology Centre ASCR, Czech Republic
[e] Bertelsmann Foundation, Germany
[f] Prospektiker, Mondragon Corporation, Spain

The Millennium Project, an international think tank on global future perspectives, has developed long-term scenarios on the future of work and technology until 2050. This workshop brings in different perspectives on the scenarios and the question how work might develop, by contrasting different national or regional perspectives and facilitating an interactive discussion.

These perspectives are brought in by representatives of different countries, mostly chairs of the regional Nodes of the Millennium Project and members of the Foresight Europe Network, who share what is specific in their national or regional discourse on the topic, e.g. from national workshops or studies on the topic. The session is organized as a participatory workshop, i.e. it will feature short presentations as a starting point, but will afterwards enable an interactive, yet systematic discussion. Exemplary questions are: Could the synergy of automation, digitalization and robotics replace a major share of jobs in Europe (and other world regions)? What are upcoming changes in skills demands, which new occupations might emerge? How does the trend towards new organizational forms (agile work, teams "without" hierarchy as in holocracies etc.) bring about new demands on the education system? How can public and private institutions prepare for and answer to the potentially disruptive changes in the work landscape?

Thus, the discussion will focus on how participants expect work, jobs and skills demands to change in the next decades, and what actions should be pursued in order to deal with potentially disruptive developments in the field.

Key words: Future of Work, Jobs and Skills, Automation & Technology, 2050, Scenarios, Europe

City of Turku, Foresight System Round Table

Time: Tuesday 13 June at 13:30–15:00
Room: Dining Room
Moderator: Education manager Leena Jokinen

The development process of the foresight and innovation system for city of Turku

Tarja Vuorinen, City of Turku, Finland

The case study of foresight capacity amongst leaders within the city of Turku

Anna Einola, Turku School of Economics, University of Turku, Finland

Comment the foresight system elements and methods for enhancing foresight culture in organizations

René Rohrbeck, the Aarhus School of Business and Social Sciences, Aarhus University, Denmark

In the special session Project Manager Tarja Vuorinen will present the development process of the foresight and innovation system for the city of Turku. A masters' student Anna Einola will present her study of foresight capacity amongst leaders within the city of Turku. The conference key note speaker René Rohrbeck will comment the foresight system elements and methods for enhancing foresight culture in organizations. The round table discussion welcomes attendee's questions and reflections on the development of foresight systems in different organizations.

ISBN 978-952-249-475-7

This Book of Abstracts is published by

FINLAND FUTURES RESEARCH CENTRE

Turku School of Economics

University of Turku

Turku: Rehtorinpellonkatu 3, FI-20500 Turku

Helsinki: Korkeavuorenkatu 25 A 2, FI-00130 Helsinki

Tampere: Åkerlundinkatu 2, FI-33100 Tampere

tutu-info@utu.fi

utu.fi/ffrc

Turun yliopisto
University of Turku