Strategic Research - Scientific Conference: A fair, just and sustainable society

12.-13.10.2022, Helsinki

Summary of abstracts

(in alphabetical order according to presenter)

From autonomous actors to collaborative professionals: Perceptions of co-teaching in a Finnish school community

Presenter: Heini Ahonen

Co-authors: Tuire Palonen, Niilo Franska, Netta Tiippana, Hanna Reinius & Kai Hakkarainen

This study examined the factors that shape co-teaching in a Finnish primary school. Co-teaching practices in Finnish schools are increasing and especially principals perceive co-teaching to support school culture renewal. Furthermore, developing teachers' solitary work into more collaborative one mitigates educators' task to response the societal challenges. The study was part of a co-development project between Helsinki University and the City of Helsinki Education Division. Research data were collected using two qualitative methods. 12 staff members, representing different grade levels and lengths of professional expertise were first interviewed by utilising semi-structured questions regarding school's development targets, collaboration and teamwork, and school culture. Secondly, a co-teaching questionnaire with open-ended items was administered to all teachers at the school (n=28), with detailed questions about co-teaching practices in the school, as well as future development ideas. The analysis revealed five factors that were experienced as motivating the co-teaching practices: providing collegial support, team building, co-teaching as an independent value, the structure of the work community and continuous development. These factors were compiled into two larger factors: the arenas of teacher influence and the upper structural arena, which was experienced to be beyond individual teacher influence. Finally, we mapped the educators' experiences of their own opportunities to influence their workplace community. We distinguished pioneers, travelling companions and critical observers as three diverging roles that educators have adopted in relation to influencing the coteaching practices being developed at the school. In addition, we identified individual, communal and resource-specified challenges regarding co-teaching.

Effect of maintenance and construction practices on carbon sequestration of urban lawn as measured using the eddy covariance technique

Presenter: Joyson Ahongshangbam

Co- authors: Liisa Kulmala, Outi Tahvonen, Esko Karvinen, Olivia Kuuri-Riutta, Leena Järvi

Urban areas are growing and are the highest contributors to global CO2 emissions. Urban green spaces such as urban lawn are a potential sink to offset part of the urban CO2 emissions locally. It is important to understand how the maintenance such as irrigation, mowing and constructions of a lawn as well as lawn age will affect the CO2 sequestration. In this study, our aim is to examine the impact of construction and maintenance practices, and environmental conditions on CO2 sequestration of an urban lawn in Espoo, Finland, using the eddy covariance (EC) technique. The EC measurements were conducted over a maintained lawn where part of the area was reconstructed using common practices to assess the impact of maintenance practices and constructions on CO2 flux. The EC measurements at 1.2 m height along with other meteorological and soil data were started in summer 2021 with the measurements still continuing in summer 2022. The total CO2 flux in summer 2021 was 66 g C m-2, indicating the urban lawn acts as source for CO2 over the period of June and September. The newly constructed lawn sequestered about 39 g C m-2 while the old lawn released about 248 g C m-2 during summer 2021 indicating a difference between the newly constructed and old lawns. As the next step, data from summer 2022 will be included to the analysis to understand carbon sequestration of the urban lawn in detail and the impact of the maintenance activities and environmental conditions on it.

Sustainable green at your doorstep - how to bring carbon smart nature in cities

Presenter: Mari Ariluoma

Under increasingly acute climate crises cities are looking for solutions to become carbon neutral. Every stone needs to be turned as it has become clear that achieving climate targets is not an easy task. Nature based carbon sinks, especially forests, have been suggested as a means of mitigating the greenhouse gas emissions of cities, but in urban areas there hardly are possibilities to increase forested area. However, the potential of creating new carbon sinks in the built up areas by using nature-based solutions is less studied and often underestimated. In my doctoral thesis I'm searching for solutions to create more sustainable urban green solutions in terms of carbon smartness and biodiversity. The research is focusing on urban blocks and yards, which often constitute approximately a third of the urban green structure as a whole. However, the built areas also consist of large areas of paved or built surfaces that both accelerate the effects of climate change and have a high carbon footprint during the life cycle. In my research, I identify possible carbon smart urban green solutions and test their applicability in case studies. For instance, in the case study block located in Helsinki it was found that carbon sequestration potential of an urban yard can be enhanced by using trees and biochar. The research will contribute to optimizing nature-based carbon sink in urban blocks, which also creates other benefits for nature and urban residents - right at their doorstep.

Leaving no one behind? Legal avenues for climate citizenship in Finland

Presenter: Antti Belinskij

Co-authors: Netta Karttunen, Paula Leskinen, Anu Lähteenmäki-Uutela & Seita Romppanen

Finland’s transition to carbon neutrality by 2035 will have considerable distributional impacts across society. Therefore, it is crucial to ensure the legitimacy of the transition. Legitimacy can be divided into input and output legitimacy with the former referring to fair, inclusive, and transparent processes and the latter to material effects of the transition. Climate citizenship entails that the public can effectively participate in the processes as well as successfully influence the material effects of climate policies. From the legal perspective, input legitimacy is required in the Aarhus Convention (procedural pillars on access to information, public participation in decision-making and access to justice in environmental matters), while the Finnish Constitution (731/1999) and e.g., the Local Government Act (410/2015) underline the right of everyone to participate and influence the decisions that concern their own living environment. However, it is currently unclear whether legal framework and rules ensure that the public not only has the procedural possibilities to participate but also that the participation is effective and citizen concerns are adequately considered in the substantive law (i.e. the participation de facto has an influence impact on the outcome). In this context, the presentation argues that there is a need for substantive changes in legal systems to ensure that demands of the output legitimacy are met. In Finland, the question of how ambitious climate policy targets can be translated into substantive law has gained only little attention beyond the new Climate Change Act (423/2022). The presentation acknowledges this gap and discusses the legal avenues in Finnish law ensuring the input and output legitimacy of climate neutrality transition and climate citizenship. In addition, the presentation provides preliminary thoughts on how Finnish law should be developed to better support climate neutrality transition and climate citizenship.

Towards transformative sustainability – capabilities for impact driven transformative city governance

Presenter: Riina Bhatia

Co-authors: Kirsi-Maria Hyytinen, Matti Pihlajamaa & Anni Jäntti

The development of societies and different socio-technical systems has strongly prioritized economic growth as a driving principle. Increasingly, attention is paid to the adverse effects of pursuing growth and the sustainability challenges of our time. It is proposed that public policies should strike a balance between environmental, social and economic goals and pursue transformative societal change. Such ideas are found, e.g., in innovation policy, public management, and social policy. However, transformative change requires solving problems characterized by contestation, complexity, and uncertainty. Many socio-technical systems are spatially embedded, giving local actors, such as cities, a vital role in driving sustainability. Cities may maintain unsustainable systems but also have the opportunity to formulate new, more sustainable policies. In practice, local actors have faced difficulties promoting sustainable transformation. Transformative change requires a broad view of different actors, institutions, and their connections. The emerging challenges and requirements raise the question of the capabilities needed to pursue transformative change. We conducted a case study of the city of Espoo, Finland, which launched a development project to develop a capacity to drive transformative change. Drawing from our data set of top city management interviews and workshops, we investigate the capabilities required for a city to become a transformative actor. Our results highlight new transformative capabilities needed at all levels of city governance. From the high-level political strategic goal setting to individual civil servants, it is essential to adopt new institutional practices and cultures that enhance inclusivity, reflexivity, proactivity, and resiliency. While universal, the materialisation of these may vary depending on the level of governance. New tools and skills for foresight-driven impact assessment are crucial for transformative sustainability governance.

Nature-based solutions and sense of justice: a workshop for secondary school students in Kumpula

Presenter: Eugenia Castellazzi

In order to aim for a fair, just and sustainable society it is essential to consider what kind of education is provided to the youngest generations. The school system must take on the responsibility of developing a sense of social justice amongst young people through an education that addresses issues of power and justice. Environmental education has gained momentum and it has been integrated mainly into natural science disciplines, where it is usually connected to the destructive consequences of the climate crisis. The novelty of these workshops lies in adding a discussion on possible and preferable futures to this knowledge based on ecological thresholds, by transforming the wickedness of climate change into a more manageable phenomenon for younger generations. This research explores the opportunity to support a value- and justice-based learning by organizing interdisciplinary and solution-oriented workshops. Ten workshops were run in May 2022, involving 2 high schools in Helsinki and about 170 students. This learning activity employed a role-play method, so that students were actively involved in working with the concepts of justice and nature-based solutions. The study explores the structure of the workshop activities, examining their limits and opportunities to be extended to other schools. Preliminary findings support the above-mentioned considerations and are based on two surveys conducted before and after the workshop (respectively 169 and 150 respondents), participant observation and results from the role-play activity. The results suggest that the workshop encouraged a critical reflection on the human and non-human otherness, giving a prospect of values and needs of all those affected by the urban green spaces development. Students resulted to be more motivated to be heard by policy makers and to contribute in

environmental planning. Limits and future opportunities will include the workshop's length, languages used and variability of outcomes.

Additive Manufacturing Point-of-View to Firm Resilience

Presenter: Mikael Collan

Resilience is the ability of firms to cope with sudden and dramatic changes in the business environment. Typically, firms with the flexibility to change the way they are operating in terms of what they produce and how they operate are less vulnerable to dramatic changes than companies with fixed architectures and product sortiments. In the field of manufacturing resilience is a topic that has risen in importance with the pandemic. Digital additive manufacturing, commonly known as 3D-printing, is a highly flexible digital manufacturing process capable of producing parts with highly complex geometries by using metals, plastics, and resins. An additive manufacturing unit is substantially a "universal production machine" capable of producing any geometry within its limits. This means that the owner of the unit has flexibility to decide what to produce - flexibility that a single purpose machine does not carry. When a fleet of additive manufacturing machines is used, a company can flexibly and with relatively low costs, change their production according to demand. This makes flexible manufacturing companies robust and resilient. The flexibility is not automatic that is, it has to be constructed by way of preparing processes, know-how, and the personnel for possible fast changes and by obtaining access to libraries of digital "recipes" for a wide range of products. A strategic real options and dynamic capabilities view on these issues are taken and the topic is illustrated with a short example.

The COVID Laws impact on the WHO Pandemic Treaty Drafting: the UN, EU and Finnish levels

Presenter: Nasiya Daminova

Co-author: Shisong Jiang

The complexity and the multilayer structure of the modern global legal order make the co-ordination of the legislative efforts in the area of pandemic prevention a difficult task. The ongoing COVID-19 public health crisis seems to have fueled the discourse, as it has demonstrated the weaknesses of the World Health Organization's International Health Regulations (2005) and hence the need to provide a global response to these challenges, in the form of the so-called WHO Pandemic Treaty. However, the drafting process turned out to be rather problematic because 27 of the WHO Member States simultaneously take part in the European Union. As a consequence of the COVID-19 pandemic, the EU legislator harmonized the pandemic legislation to a significant extent which, in turn, shall be implemented in the national pandemic legislation. It will be argued that Finland could be a great test case for this study, considering that it participates both in the UN/WHO (international organizations) and the EU (supranational sui generis legal order), and developed simultaneously the significant body of the post-COVID pandemic national laws. Given this background, this paper aims to address if and how the post-COVID legislation of the UN, the European Union and Finland (both the UN/WHO and the EU State) could affect the substance of the WHO Pandemic Treaty, given the incredible uncertainty surrounding this issue.

The Freedom of Movement of Persons during Emergencies in the European Union

Presenter: Mehrnoosh Farzamfar

One of the fundamental and basic human rights, which gets affected immediately in a negative way during the states of emergency, is the right to the freedom of movement of people. The examples of restricting the freedom of people in the European Union (EU) during emergencies are many, from strict internal Schengen border control during the so-called '2015-2016 refugee crisis' to recent restrictions due to the COVID-19 pandemic. These restrictions and the endeavours of EU States in balancing the public health concerns against the obligation on not to restrict the freedom of movement of individuals have become the subject of serious political and legal debates. This research is part of the ongoing intellectual efforts and endeavours in understanding the implications of states of emergencies upon human rights discourse. In this research, I analyse the implications of states of emergency on the right to freedom of movement of people in the EU in a very detailed and systematic manner. The importance of this research is that the typology of debates and arguments behind the decisions to limit and/or derogate from rights is a strong indicator of the foundations of a constitutional democratic society, meaning respect for the principles of the rule of law, human rights and democracy.

Modelling the regional potential for reaching carbon-neutrality in Finland: sustainable forestry, energy use and biodiversity protection

Presenter: Martin Forsius

Co-authors: Anu Akujärvi, Risto K. Heikkinen, Maria Holmberg, Virpi Junttila, Heini Kujala, Annikki Mäkelä, Niko Karvosenoja, Ninni Mikkonen, Francesco Minunno, Ville-Veikko Paunu, Minna Pekkonen, Mikko Savolahti, Torsti Schulz, Sampo Soimakallio & Raimo Virkkala

The EU aims at reaching carbon-neutrality by 2050 and Finland has an even more stringent policy-target (year 2035). We integrate results of several spatially distributed model systems to evaluate the potential to reach this goal at both regional and national scale in Finland, considering biodiversity protection targets. Modelling of both anthropogenic emissions (FRES model) and forestry measures (PREBAS model) is carried out, and forested areas important for biodiversity protection are identified based on spatial prioritization (Zonation model). Forests (trees and soil) currently absorb a significant proportion of the Finnish CO2 emissions and are of key importance for biodiversity protection. We use scenarios until 2050 based on assumptions on energy use and mitigation measures of the national climate and energy strategy and forestry measures. We evaluate how implementation of forestry and biodiversity protection scenarios would affect the possibilities to reach carbon-neutrality at the different spatial scales. The results can be utilized for integrating national/regional climate and biodiversity policies, accounting of ecosystem services, and allocation of forest areas for nature conservation.

The need for future-oriented ethics for AI technologies -- Foresight for anticipating ethical risks and societal impacts of Artificial Intelligence technologies

Presenter: Nadezhda Gotcheva

Co-author: Nina Wessberg

Artificial Intelligence (AI) technologies have numerous and diverse implications that have the potential to affect deeply society. AI generally refers to the increasing capability of machines to perform tasks intelligently. As AI technologies are developing rapidly and new application areas are emerging, there is uncertainty related to many aspects of their design, implementation and societal implications in the future. There are pressing concerns in terms of understanding AI's impact on society, especially relevant is how the human values, norms and overall culture are included into AI,

will be affected and could influence the long-term implications. In ETAIROS project, “Ethical AI for the Governance of the Society”, we utilized horizon scanning to explore the links between AI and future-oriented ethics by detecting and making sense of weak signals, and used scenario building to systematically anticipate ethical issues and societal impacts of AI technologies in the future. Weak signals and scenario building reflect the fears and hopes which we place on AI technology in the society. Methodologically, we conducted horizon scanning by systematically collecting media signals with focus on AI and potential societal impact, risks and opportunities, and analyzing them in expert workshops, resulting in publishing a monthly. Signal posts on the project webpage. Based on horizon scanning process also a four scenario framework was created to structure the ethical issues in future AI development and use. Foresight work provides food for thought and vocabulary for understanding the complex phenomena we are facing with AI in the future. The hypothesis is that foresight work makes both AI and society better: fair, just and sustainable. In an intense AI development context, we need to encourage an open conversation about the future and thinking imaginatively and proactively about co-creating it for the next generations also taking advantage of future-oriented ethics.

Participation in decision-making in social and health care: current problems and future possibilities

Presenter: Lotta Hautamäki

Co-authors: Aija Logren & Anna Kork, Kati Rantala, Katariina Warpenius & Anu Katainen

One of the responses to the challenges of attaining a fair, just, and socially sustainable society is to promote citizen participation in decision-making that directly concerns them, to ensure the legitimacy and effectiveness of policymaking. However, to achieve this, diverse forms of knowledge need to be taken into account in the decision-making processes. In this joint presentation by the Strategic Research Council projects Reliable Knowledge for Health Care: Process and Practice of Shared Decision Making (PROSHADE) and Silent agents affected by legislation: from an insufficient knowledge base to inclusive solutions (SILE) we address the problematics of inclusive decision-making in the context of the Finnish social and health care system. We will use two cases at different levels of decision-making: 1) the macro level of law-making processes in social and health care and 2) the micro level of patient participation in clinical interaction. In the knowledge base of these regulatory and care practices the emphasis is on conventional evidence-based research knowledge founded on quantitative assessments. At the same time, the aim is towards greater inclusiveness by stressing participation, shared decision-making, and hearing the everyday experiences of social and health care professionals, patients, and clients. In this presentation, we discuss novel perspectives of the use of experiential knowledge and into the ideal of promoting participation throughout the social and health care system. Theorizing from our two cases, we seek to understand the possibilities of and pitfalls in producing experiential knowledge as reliable evidence at the different levels of decision-making. Furthermore, we explore the possibilities for enhancing participation of those affected by regulation and clinical decision-making.

Developing scientific literacy and science capital with school students

Presenter: Sari Havu-Nuutinen

Co-authors: Mirjamaija Mikkilä-Erdmann, Teija Koskela & Sini Kontkanen

Science capital refers what people know and think about science, how they use scientific knowledge in their everyday life. Science capital also linked to the use of science media, social relations, and

science aspirations. The existing research has indicated the relevance of science capital in society and its connections to behavioral choices done in challenging societal questions. The aim of our study is to clarify school students' science capital and scientific literacy skills to be able to strengthen science capital's role in school teaching. The research questions focused on how students' scientific literacy and science capital change during the intervention and how teachers' can be supported when teaching scientific literacy and science capital. Data has been collected via two intervention studies conducted with 4-6 graders in eastern part and south-west part of Finland during the school year 2021-2022. Totally 157 students and their teachers (n= 8) participated in the study. Science capital survey was collected before and after the interventions. The research results provide support for systematic teaching of scientific literacy and science capital. The experiences were positive and developed material was appropriate to foster the teaching scientific literacy and science capital in Finnish schools.

Ethnography of a place becoming a home

Presenter: Johanna Hiitola

Co-authors: Iida Kauhanen & Fairuz Muthana

This paper discusses methodological perspectives on how safety and trust emerge in everyday encounters in spaces where migrants live their day-to-day lives in Finland. The research is part of a STN funded project, Mobile Futures, that aims to promote a fair and inclusive society through critical, trust-based integration research. To move towards a fairer, more just, and inclusive society, listening to the views of the people who often are left unheard, is essential. Migrants are people, whose views tend to be forgotten in decision-making, in societal planning as well as in evaluation of everyday practices. When doing research with people who are often unheard, it is methodologically vital to utilise methods that make creation of trust possible so that the participants can express their views in a safe environment. In this paper we examine how ethnographic tools can create such a space. We use two different sub-studies as an example: 1) walking interviews with people who have been forcibly displaced from their countries of origin and who have lived in Finland for a long time; 2) A participatory ethnography in a new space that is designed to become a 'meeting place for all people'. This sub-study is conducted in collaboration with Multicultural Centre Villa Victor of the city of Oulu. The research draws from sociology of associations (Latour, 2005). Sociology of associations offers a toolbox through which you can see 'society' like an endless compilation of assemblages and actor-networks that bond together people and things. What is common for all these assemblages is that they consist of heterogeneous human and non-human elements, and they are precarious and processual by nature (Latour 2005; Hiitola & Vähä-Savo 2021). In our study, we aim to connect these assemblages to the discussions of trust and place in 'integration' studies.

Social policy research in a climate emergency context

Presenter: Tuuli Hirvilammi

Co-author: Liisa Häikiö

Social policy has developed to ensure protection from social risks in the era of emerging capitalism and industrialization. While welfare states have been successful at increasing their citizens' wellbeing, they have also contributed to the ecological crisis and overuse of natural resources. This has not (yet) reshaped mainstream social policy research or practice. The major problem is that the knowledge of how to transform welfare states into a sustainable path is to a great extent missing, and especially understanding of how different policies support or not fair, just and sustainable society

is inadequate. With this presentation, we discuss how established traditions in social policy research could provide a solid ground for responding to global crises such as the climate emergency and facilitating the sustainability transformation of society and the economy. The presentation is based on an article manuscript in which we studied together with our Nordic colleagues four research fields central to social policy scholarship to develop an ecosocial research agenda. We discuss classic and climate-adjusted understandings of risks, citizenship, welfare regimes and wellbeing, and open future pathways in the welfare state and social policy research valuable for supporting the effective transition toward a fair, just, and sustainable society. We conclude our presentation by reflecting on how our findings turn into concrete transformative policies.

Does framing a news text on the environmental impact of pharmaceuticals affect sharing intentions in social networks? A factorial survey experiment

Presenter: Lari Hokkanen

Co-authors: Lasse Alajärvi, Aku-Ville Lehtimäki, Janne Martikainen, Johanna Timonen, Kari Linden & Ville Harjunen

Introduction: Pharmaceuticals are essential for improving health, but they might be harmful chemicals when entering the environment. As the wastewater treatment plants are inefficient enough to remove the excreted pharmaceuticals from the sewage waters, influencing customer behaviour is one way to lessen the burden. The study aims to examine the effects of communication frames of a news text about the environmental effects of pharmaceuticals on behavioural sharing intentions on social media. *Materials and methods:* The research design is a survey experiment. The study protocol and hypothesis were pre-registered, and The UEF Committee on Research Ethics granted the ethical approval. The target population consists of the loyal customers of Helsinki University Pharmacy. The study follows a 2x4 design. Each participant is randomized to one of eight groups, each of which represents a combination of factor levels. At the start, each participant is presented with either a neutral prompt or a debias intervention about social media behaviour. Afterwards, the participant reads a science news text representing one of four framings: control, geographically localized, an incentive to action, and combination (localization and action). After these, participants answer a survey. The primary response variable is the participants' intention to share the news text on social media. In addition, several secondary response variables are included. Covariates such as environmental values are used in moderation/subgroup analysis. *Results and Conclusions:* The study was statistically well-powered (N = 3663). Debiasing was not statistically significant, but text framings affected the sharing intention. The effect sizes were rather small. We will present throughout analysis of main and interaction effects, as well as moderation and mediator analysis at the conference. We conclude that even little differences in the framing of communication may impact behavioural intentions with some contingencies. More behavioural research in customer behaviour and social pharmacy should be conducted.

Transformative work and livelihoods in the global north

Presenter: Eeva Houtbeckers

This study turns its attention to work as a transformative force in the era of ecological crisis. In relation to socio-ecological transformations, work is an emerging research context. People need to actively work in transformations and for them. Thus, work is a potential means for solutions and adaptation that can contribute to more just societies, economies, and relationships with more-than-humans in the face of ecological crisis. Processes include designing sustainable careers, developing new professions, and altering workplaces and industries to shifting cultural meanings and impacts of work

in human societies. To find nuances in perspectives studies at the intersection of work and ecological crisis, this project draws on degrowth literature that challenges the centrality of economic growth. This study is conducted from the less common standpoint of workers who engage in transformative work practices. The aim is to map novel work-based solutions for socio-ecological transformations. Empirically, this study explores transformative work in-situ by conducting an institutional ethnography in grassroots initiatives. This includes participant observation, (ethnographic) interviews with workers on lived experiences of transformative work, and analysis of transformative work discourse circulated in selected policy documents. This study provides conceptual, theoretical and methodological contributions for understanding everyday transformative work as a means for just socio-ecological transformation. Moreover, the results of this project are used to develop people's literacy in work-based transformations by compiling a vocabulary of transformative work.

Action oriented knowledge for sustainable management of agricultural peatlands in Finland

Presenter: Ellen Huan-Niemi

Co-authors: Suvi Huttunen, Ari Paloviita, Antti Puupponen, Heikki Lehtonen & Jyrki Niemi

Agriculture is a contributing force to climate change due to unsustainable changes in land use with the usage of peatlands for food production in Finland. In the effort to reduce greenhouse gas emissions and mitigate climate change, notable progress can be made in Finland through sustainable management of agricultural peatlands. This study integrates quantitative method (modelling) with qualitative method (focus groups, stakeholder dialogues, interviews) and uses this integrated knowledge with stakeholders from across the food system activities to create action-oriented knowledge for sustainability. A key feature of mixed methods research is its methodological pluralism, which frequently results in superior research compared to monomethod research. The reasons for integrating the quantitative and qualitative methods are twofold: it can serve for the mutual validation of data and findings as well as to produce a more coherent and complete picture of the investigated domain than a single research method can yield. The iterative process and feedback loops between the quantitative and qualitative methods are not only to indicate the need of modelling results to be assessed by the stakeholders, but also to provide information to the stakeholders for a deeper understanding on the selected measures for sustainable management of agricultural peatlands. There is a clear distinction between the qualitative and quantitative results -- changing farming practices for sustainable management of peatlands are likely to be very difficult at the farm level compared to the modelled projections to reduce greenhouse emissions from peatlands, especially in regions and municipalities with high proportion of peatlands along with poor production conditions and weak employment opportunities. The feedback mechanisms between the qualitative and quantitative methods make the research results more meaningful and action-oriented towards sustainability in the transition to a post-carbon society.

Strategic crisis management in an era of chronic social and environmental disruptions

Presenter: Janne Hukkinen

Co-authors: Jussi T. Eronen Nina Janasik, Paavo Järvensivu & Roope Kaaronen

The unprecedented scale of resources mobilized to manage global crises such as the coronavirus pandemic highlights the need to consider the long-term consequences of decisions made under extreme time constraints. The complexity of the crises would call for ample time and expertise which however are lacking as decisions are required immediately. The danger of making serious policy errors in the rush of things looms large. We develop design principles for a decision platform – the

Policy Operations Room (POR) – that can better cope with path-dependent policy errors. The design principles are based on literature on decision-making, policy analysis and high reliability management, and empirical data from a series of simulation exercises we conducted during 2019-2022 on urgent long-term decision-making in three Finnish cities: Helsinki, Tampere, and Kotka. Simulation exercises offer decision-makers with facilitated learning opportunities for practicing bold decision-making: they are discouraged to engage in defensive decision-making and encouraged to make decisions with long-term path-dependencies in mind. The POR design principles can be summarized as follows: The participants should include both policymakers and sectoral experts to enhance pragmatic interaction between policy and science. Policymakers and experts should be given equal authority to enable the questioning of formal doctrines in the deliberations. The agenda should be structured around scenarios of alternative futures to stimulate the imagination of the participants. Critical questioning of alternative ways to frame the decision problem should be encouraged. Finally, the agenda should discourage defensive heuristics with which decision-makers have been found to preserve their short-term reputation and political tenure.

Tools for forming a knowledge-based personal stance on climate change mitigation: Visual multi-metric analytics about the consequences of emission reductions among Finnish public

Presenter: Mira Hulkkonen

Co-authors: Tero Mielonen, Thomas Kühn, Anton Laakso, Heikki Tuomenvirta & Harri Kokkola

Public perception and acceptability of climate strategic actions are important for successful emission reductions. Yet, information about the full range of positive and negative consequences of action and inaction while considering demographic variation is not readily available. Our work provides a visual multi-metric tool for identifying the impacts of current legislation and enhanced mitigation for different demographic groups among Finnish public. Emission reductions imply changes in atmospheric CO2, meteorological conditions, air quality, and economy. The vulnerability to extreme weather, the health impacts of air pollution, and multidimensional economic impacts vary spatially and between demographic groups. For calculating these metrics, we use scenario models and functions for impact allocation. Firstly, we utilize Global Circulation Model (GCM) simulations of future climatic conditions under different emission scenarios. The exposure to extreme weather is derived from the GCM results and combined with information about population sensitivity & adaptive capacity. Secondly, we model changes in air pollution with a GCM including aerosol chemistry and microphysics. Combining the results with response functions and demographic data yields information about the health impacts of changed air pollution. Thirdly, we utilize the results of a socio-economic model to reveal spatially varying changes in GDP in different scenarios. The three classes of impacts– climate vulnerability, health, economy – are combined as a visual radar chart. The results for 2040 illustrate variation between the impacts 1) of current legislation and enhanced mitigation, and 2) to different demographic groups. Future work involves testing the multi-metric visualization for helping the public to form a knowledge-based stance on climate policies. We hypothesise that obtaining personally tailored information about climate policy consequences affects the perceived legitimacy of climate action.

Just transition and employment. Perceptions of work-related impacts and climate policy preferences

Presenter: Suvi Huttunen

Co-authors: Sanja Tuovila, Anni Turunen, Marja Järvelä, Teea Kortetmäki & Tuija Seppälä

Climate policies cause changes in working life. While the employment effects of climate policies are usually considered positive, the transition to a low-carbon economy moves jobs away from polluting sectors, increases jobs in sectors that reduce emissions and modifies and creates completely new job descriptions. In terms of working life, this means changes in work tasks and the fact that almost no one is completely outside the transition. Harms caused by climate policy can be mitigated for example by investing in education and employment support and pension arrangements. To enable just transition when choosing different policy measures, it is important to know the perceptions of those who are the target of the measures. To shed light on the issue, we conducted a national survey (1030 respondents) among people participating in labor force. The majority of respondents thought that climate policy does not affect their own employment. Considering the general availability of jobs in Finland, 33% of the respondents believed that climate policies will improve the availability of jobs in the next five years and a quarter of the respondents believed that the availability of jobs will decrease. The respondents mostly preferred that employers should take care of employees' opportunities to adapt to changes in the same company, keeping their jobs, for example by training for new tasks. More generally, if climate policies cause loss of jobs, the economic position of employees was thought to be best secured by supporting training for another profession also with public funding. In this context, improving unemployment protection or direct social policy subsidies did not gain wide support. Despite the general tendencies, there was variation in the responses among different respondents regarding for instance gender, age, employment position and climate concern, implying a need negotiate the policies in collaboration with different actors.

Weather and respiratory tract infections in urban areas

Presenter: Henna Hyrkäs-Palmu

Co-authors: Jouni J.K. Jaakkola, Timo T. Hugg & Tiina M. Ikäheimo

We conducted a scoping review on the role of weather on respiratory infections in urban areas. Weather, such as temperature, humidity (precipitation), wind and solar radiation may affect the viability and transmission of viruses and consequently the occurrence of respiratory tract infections (RTI). In addition, various pathogens related to RTI’s exhibit seasonal variation partly related to weather. For example, the optimal survival and transmission of the influenza viruses seem to occur at low ambient air temperatures, as well as low absolute humidity. Air pollution itself can interact with weather parameters and further modify the risk of RTI’s. Furthermore, several host factors, such as the presence of allergies or other chronic diseases increase the vulnerability to infections. Characteristics of the urban built environment can affect how people are exposed to weather conditions, and this way indirectly affect the occurrence of RTI’s. Lowered temperature in cities may reduce the risk of contracting RTI’s, but the results are contradictory. Increased wind speed may lower the risk of RTI’s (for example Covid-19) and partially through removing air pollution from the cities. The urban heat island phenomenon with higher temperature in cities could also affect the risk of RTI’s, though empirical evidence is lacking. Greenness itself has been shown to decrease the risk of COVID-19 infections in densely populated areas. This could be due to either reduced number of human contacts of green spaces or indirectly through improved health and resistance to infections brought by greenness. Finally, weather conditions in urban areas can influence outdoor exposure and this way affect the occurrence of RTI’s. The role of weather should be acknowledged in urban design in tackling future pandemics.

Social rebound dynamics in the transition to circular textile systems

Presenter: Anna Härri

Co-author: Jarkko Levänen

In addition to pursued positive impacts, sustainability transitions can backfire and create new problems through rebound dynamics. The rebound effect is used within the sustainability discourse to describe a phenomenon in which practices aimed at enhancing environmental sustainability end up causing unexpected environmental harm. We argue that similar dynamics operate in the area of social sustainability. The social rebound describes a situation in which unexpected negative social impacts occur due to efforts directed at promotion of environmental or social sustainability. Our research aims to clarify the emerging discussion on social rebound through analysis of the transition to a circular textile industry. A large-scale transition to circular systems in the textile industry implies e.g. spatial reconfiguration of production, which can affect employment and livelihoods, quality of work and gender equality. Social rebound risks are particularly large in vulnerable countries, which lack institutions that could protect textile sector workers, through for example social security and education opportunities. In sustainability transitions, social rebound effect can also mean that existing problems, such as workers' rights violations, continue despite the developmental efforts. Rebound risks here can be mitigated by addressing root causes of these problems, such as power disparities or weak labour rights. Also, novel circular technologies, such as using agricultural waste to produce textile fibers, can have unexpected consequences, such as effects on the farmers health resulting from increased use of chemicals. For our analysis, we use empirical data and literature reviews. We argue that the social rebound phenomenon ought to be recognized and the sectoral sustainability transitions planned in a way to mitigate the rebound effects. Only through ex-ante and proactive analysis of these types of impacts and planning for the change, can we build truly just transitions.

The effect of the COVID-19 pandemic on health service usage and treatment outcomes among patients with type 2 diabetes in North Karelia, Finland

Presenter: Laura Inglin

Co-authors: Katja Wikström, Marja-Leena Lamidi, Piia Lavikainen &Tiina Laatikainen

Aims: The COVID-19 pandemic has challenged health systems and their capacity to deliver essential health services while responding to COVID-19. We examined the pandemic's impact on health service usage and treatment outcomes among patients with type 2 diabetes (T2D) in the North Karelia region, in Finland. *Methods*: We used electronic health records of over 11 000 T2D patients, comprising all T2D-related primary and specialised care contacts. We compared healthcare usage in three different periods in 2020 (before, during and after the national lockdown) with the equivalent period in 2019. In addition, we investigated the pandemic's effect on T2D patients' health service use and treatment outcomes according to their regular use of healthcare services between 2017 and the beginning of the pandemic in 2020. *Results:* During the lockdown period, the number of contacts decreased significantly but quickly increased again to nearly the same level as in 2019. Overall, healthcare usage was lower in the pandemic year, with 9% lower proportion of patients making any contact (59.9% vs 65.8%). The proportion of remote consultations significantly increased from 56.3–59.5% before to 88.0% during the lockdown in 2020. The most affected were patients with more comorbidities and more elevated HbA1c, who used face-to-face services every 0-6 months during the three years before the pandemic. Among this group, the HbA1c and LDL recording rates dropped significantly during the early pandemic phase, but the treatment outcomes seemed not to be negatively affected during or after that phase. *Conclusion:* Despite the COVID-19 pandemic, diabetes care was continuous, and even elderly patients aged ≥70 years accessed the health services. Those with greater service needs were more likely to seek face-to-face care despite the

lockdown. The delivery of many essential services was facilitated by processes that strongly relied on telemedicine already before the pandemic.

Sustainable Diets Across Socio-Demographic Groups of the Finnish Populations- The case Justfood

Presenter: Xavier Irz

Co-authors: Tapanainen Heli, Saarinen Merja, Salminen Jani, Sares-Jäske Laura & Valsta Liisa M.

Dietary changes form a central pillar of the necessary sustainability transformation of food systems, but identifying sustainable diets is difficult because of the near-infinite number of food combinations, the possibility of trade-offs in sustainability dimensions and the need for diets to remain socio-culturally acceptable. Using an optimization model calibrated to different socio-demographic groups of the Finnish population, the research characterizes healthy diets as similar to existing diets as possible but with a reduced climate footprint. Across all socio-demographic groups, we find large synergies between improvements in nutritional quality of the diets and reductions in climate impact. The primary mechanism for reducing greenhouse gas emissions is the substitution of cereals and potatoes for meat. The secondary mechanism is the intra-category substitution of foods, such as poultry for beef within the meat group, and altogether the simulated climate-friendly diets are best described as flexitarian. Moving towards reduced-impact diets would not create major nutritional problems related to protein and fatty acid quality but iron could be an issue for pre-menopausal women. We find that the initial socio-economic gradient in the climate impact of diets is small and that there are only minor differences in patterns of adjustments to climate-friendly diets across socio-demographic groups. We conclude that a one-third reduction in the climate impact of diets is achievable through moderate adjustments in dietary behaviours. The required adjustments are similar across socio-demographic groups and do not raise equity issues. A population-wide policy to promote behavioural change for diet sustainability would therefore be appropriate.

Paradoxes of expertise and the development of situational understanding in evolving health crises

Presenter: Kari Jalonen

Co-authors: Jari Autioniemi, Patrik Nordin, Harri Jalonen & Petri Uusikylä

The global COVID-19 pandemic exacerbated tensions that arise from relying on pluralist expertise (e.g. Feyerabend 1968) in responding to crises. These can be seen as a pluralistic constellation of societal challenges expressed through different institutional logics, which need to be simultaneously managed (Jancsary et al. 2017) since deciding between options is central to policy-making, with uncertainty and viability of alternatives as core influences (Öberg et al. 2015). Drawing on 14 expert interviews of key decision makers and experts, as well as documentary data analysis from two Finnish regions, this paper looks into the national and regional responses to the COVID-19 crisis through the concepts of tensions and paradoxes that influence decision-making and coordination (Putnam et al. 2016). These can arise between the key actors–mainly ministries and national institutions, municipalities, and health care organizations–and manifest themselves across different dimensions: legislative (re)action that is either too slow or hasty to be effective, top-down guidance that is both sought after and seen as too limiting for situational discretion, and the collection of situational data that is simultaneously fragmented and improvised. We illustrate the difficulties inherent in constructing and maintaining collective situational understanding over time by elucidating the role of institutional forgetting (Douglas 1986),the paradox of learning during crisis as opposed to

learning from the crisis (Kakavelakis & Edwards 2011), and the inability to build on previous situational understandings in sensemaking of the pandemic (Weick 1995). These enable understanding of the institutional logics of crisis responses by highlighting the tensions in decision-making. Our analysis clarifies the connections between pluralistic demands arising from the pandemic, the coordination of a collective situational understanding, the roles of different stakeholders and the resulting policy outcomes.

The concept of a 'just transition' in international climate law

Presenter: Vilja Johansson

The term ‘just transition’ is becoming increasingly popular as a policy term for voicing concerns about the unequal social and economic effects that climate change and planned mitigation policies are expected to have. Alongside conceptual debates, just transition has transformed from a political demand into a legal concept within both international and national climate law frameworks. Until now, however, the concept has not received broader attention among legal scholars, leaving it conceptually open-ended. Addressing this gap, my paper offers a contribution to the discussion of what the evolving legal concept of a just transition means, especially within international climate law. I start by contextualizing the legal evolution of just transition by connecting it to the political and legal context in which it has developed. Building on this analysis, I explore the meaning and function of the concept in the Paris Agreement, based on an analysis of the Agreement text, relevant COP decision, UNFCCC documents and submissions from parties to the Agreement. Lastly, I highlight different avenues for the concept’s further operationalization internationally.

Enablers and boundary-setters – the role of local government in sustainability transformation

Presenter: Anni Jäntti

Co-authors: Lauri Lahikainen & Johanna Perkiö

Climate crisis and biodiversity loss have forced local governments to strive for a sustainable future and to adopt sustainability objectives into their policies. Through their decision-making, local governments play a crucial role in both contributing to and combating environmental crises. As cities are estimated to be responsible for 70-80 % of greenhouse gas emissions (see e.g., Hoornweg et al. 2011; IIASA 2012) and as the consequences of global warming and biodiversity loss are felt locally, local governments are key agents in sustainability transformation creating fair, just and sustainable society. In this paper, we study the aspects of the role of local government in sustainability transformation. We frame our article theoretically by combining literature on local governance and agency in sustainability transition. The empirical part of the paper consists of inductive analysis of interview data. The data consist of 22 interviews with local government civil servants in Ii and Lahti, both of which have been active in adopting sustainability policies. In the analysis, we explore the space of possibilities and impossibilities in local government civil servants’ speech about sustainable development. The shift in local governance to new public governance emphasizes the importance of networks, collaboration, and mutual trust. Thus, municipalities are seen as enablers serving as collaborative platforms creating and offering possibilities for other actors who contribute to the policymaking system and public service delivery. (See e.g., Osborne 2006; Stoker 2011; Bao et al. 2013; Dickinson 2016). The enabler role is also important in how sustainably cities are designed, planned and governed (Puppim de Oliveira et al. 2010). Our study shows, however, that in the context of sustainability transformation, the enabler role is not sufficient, but local governments also need to act as boundary-setters to fit their operations and impacts within the planetary boundaries.

CO-CARBON – Systemic approach for climate-smart and just urban green infrastructure

Presenter: Leena Järvi

Co-authors: Ranja Hautamäki, Liisa Kulmala, Christopher Raymond, Harri Mattila, Outi Tahvonen, Seppo Junnila, Rosa Rantanen & Tiina Merikoski

Urban green infrastructure (UGI) can be considered to be a next-generation solution for society to simultaneously deal with climate and social pressures. However, the potential of UGI to mitigate climate change through carbon sequestration and storage (CSS) has not yet been fully harnessed in urban planning particularly when viewed systemically with other socio-ecological impacts of UGI. The main challenges are 1) that CSS is hard to assess due to the large variability of UGI and urban conditions to be covered; 2) that the translation of scientific insights into practical implementation is challenged by the lack of tools; and 3) the fact that different types of UGI with various ownership patterns require engagement of diverse stakeholders using a range of top-down and bottom-up processes. In CO-CARBON our aim is through participatory and collaborative methods, create science-based solutions to support the implementation of carbon-smart urban green infrastructure among the society. We will adopt a systemic approach in which the solutions to maximise CSS are considered together with other environmental and societal factors. The scientific aims are to quantify CSS at different urban scales, and to support the practical applications for the planning and management needs of carbon-smart UGI. We will establish the most effective practices to maximize CSS and the associated benefits of UGI, assess values and preferences for carbon-smart UGI, and engage multiple stakeholders in their policy and decision. We do this by combining novel observations, process-based modelling, life cycle methods and social survey research. In this presentation, the adopted systemic approach will be presented together with the various methods used in the project. Examples of the project results will be presented.

Towards General Theory of Sustainable Development: Systematic Digital Twin Operationalisation of the Grand Sustainability Theory

Presenter: Jari Kaivo-oja

Co-authors: Jyrki Luukkanen, Jarmo Vehmas & Tadht O´Mahony

Across decades of contemporary discussion on sustainable development, a core debate has concerned whether economic development can be made sustainable, environmentally and socially. In recent years, this has become a debate about economic growth versus economic degrowth, whether the former can be environmentally sustainable, and whether the latter can be socially sustainable. In our paper, we develop this discussion further and present a general theory of sustainable development with analytical scenario analyses. This debate can be linked also to the concept of the doughnut economy. This conceptual and theoretical article has used the Sustainability Window, or ‘SuWi’ method, to theoretically determine the sustainable window of economies, as upper and lower bounds of change in GDP, that could be deemed in line with environmental and social sustainability. All theoretically possible development paths are considered, by combining the economic, environmental, and social dimensions, with the environmental and social productivities of GDP. This paper discusses the data-based operationalisation possibilities of the general theory of sustainable development with the idea of digital twins and data-driven computer simulations. The article demonstrates that of the 32 possible combinations (scenarios) that can be hypothesised, only 18 of these are logically possible. In moving to sustainability analysis, through SuWi, it is noted that only four of these logically possible paths could be considered theoretically 'sustainable’, and only if adhering to strict conditions. Two of the hypothesised paths involve economic growth, and two of

economic degrowth. The approach demonstrated has many potential uses in providing analysis and support to 21st century sustainability policymaking, including the UN SDGs.

Just (food system) transition as a transdisciplinary challenge

Presenter: Minna Kaljonen

Co-authors: Suvi Huttunen, Teea Kortetmäki, Jyrki Niemi, Laura Paalanen, Jani Salminen & Theresa Tribaldos

Just transition is a grand societal challenge, which requires transdisciplinary knowledge. In Just food, we have developed a transdisciplinary framework to assess and foster just food system transition towards a sustainable, healthy and climate-wise food system. The framework builds upon transition pathways, which allow the assessment of the distributive impacts of climate actions across the food system. The pathways go beyond the conventional mitigation assessment by integrating the consideration of impacts on agriculture and nutrition across regions, production sectors and socio-economic population groups. The transition pathways are also utilized in structuring and fostering societal dialogue. We have organized policy dialogues and focus group discussions, which have brought together a variety of food system actors to deliberate upon justice issues in different transition pathways and the role of policies therein. The principles and criteria for just food system transition are developed to the weight the different claims and impacts against the different dimensions of justice. The framework for just food system transition is designed to co-create systems, target and transformative knowledge for sustainability transformation, to use the classical distinction of transdisciplinary knowledges in sustainability science. In this paper, we present and evaluate the building of the transdisciplinary framework against these different knowledge types. We show how the framework has facilitated the co-creation of systems and target knowledge fostering the linkages between them. We show also how the production of transformative knowledge requires inclusion of not only food system actors, but also other actors from society. In future, transdisciplinary research on just transition needs to open more to more open-ended speculative knowledges if it is to support finding solutions to current and experienced injustices.

Politicians, political processes and democracy during past and present pandemics

Presenter: Jenni Karimäki

During crises, fundamental rights are assessed in the light of how much control power, based on state coercion, is compatible with democratic principles. However, crisis like a pandemic provides us with evidence of the damage, but not of the cure, and therefore examining the longer-term continuities and changes provides for estimations on the need for legal, practical and/or attitudinal transformations required to secure a just post-pandemic society. The ability to know is increasingly less about learning a list of glorious achievements from the past and has to do, instead, with learning. To understand and predict post crises politics, understanding the pre and during crisis conceptions on democracy and basic rights is of the essence. In this presentation epidemics - AIDS, and COVID-19 in particular - are reflected through the eyes of politicians as well as other societal actors involved in political processes. In dealing with the pandemics, have time-honored rhetoric and past solutions been resorted to, and has the understanding of responsibility changed over time and how? How have individual's claim to autonomy and liberty been reconciled with the community's concern with safety? Are there to be found ideological or partisan differences in how individual rights and the public good are pursued simultaneously? Parliamentary speeches and legislative documents provide a vast primary source for understanding social processes of dealing with crises, and responses reflecting conciliation of individual democratic rights and society's attempts to control an

epidemic. The presentation contributes to literature that tries to understand the variation of (COVID-19) crisis policies within the group of democratic countries. More in-depth, qualitative approach complements studies focusing on measures and cross-country variations arguing that alongside pandemic-related factors the strength of democratic institutions influences how democracies handle democratic trade-off.

Adolescents as critical online readers: Individual differences and instructional support

Presenter: Carita Kiili

Reading in today's online world requires criticality. Readers need the abilities to analyze, evaluate, and interpret information of varying quality and to recognize how different texts can be used to persuade or mislead. This presentation summarizes a line of completed and ongoing research on Finnish students' critical online reading skills. The focus is on students' abilities to confirm the credibility of more credible texts and question the credibility of less credible texts, as well as how well students can justify their credibility evaluations. I will share illustrative examples of individual differences that have shown to be considerable. This will be followed by a discussion about the role of basic reading skills in criticality. Then, I will provide some examples of instructional support designed to promote students' critical online reading skills and discuss their efficacy in light of empirical evidence. I will end my talk with future recommendations.

Critical graph reading: Graphs can mislead adolescents

Presenter: Kristian Kiili

Co-authors: Antero Lindstedt, Jake McMullen, Petteri Muukkonen & Tua Nylén

One of the main challenges of our times is the wide spread of misinformation and disinformation on the Internet. The exposure to false or manipulated information, in conjunction with poor critical reading skills, may endanger citizens' possibilities to form evidence-informed decisions. Manipulation of graphs is one powerful way that has been used to persuade people, particularly people with low graph literacy. In the present study, we focus on adolescents' graph literacy – the ability to read and understand graphs. We investigated how 6th and 8th-grade students (N = 404) can read and interpret well-formed and misleading bar graphs depicting geographical phenomena. A misleading graph is based on valid data, but the visual appearance of the graph has been manipulated to distort the message of the graph (e.g., truncated graphs: the y-axis does not start at 0). The results indicated that most students knew how to read a single data point from a graph. However, students' graph interpretation skills (inferring relationships in the represented data) varied greatly. Latent Profile Analysis (LPA) indicated that only 17% of the students could consistently correctly interpret well-formed and misleading graphs. Notably, the analysis suggested that 35% of the students neglected the numerical information of the graph and based their interpretation only on the visual aspects of the graph, i.e., the height of bars. Consequently, this group of students could interpret well-formed graphs (visual aspects aligned with numerical information) but were misled by visual manipulations leading to faulty interpretations. Further, the analysis showed that 17% of the students had considerable difficulties in graph interpretation, suggesting an overall lack of understanding of how to interpret graphs. In this talk, we will provide more details of the study and present the Media Watch learning game we designed based on these findings.

Urban gradient, climate attitudes and consumption-based carbon footprints – trends in the Nordics

Presenter: Antti Kinnunen

Co-authors: Henna Anttonen, Jukka Heinonen & Seppo Junnila

To meet the climate mitigation goals laid out by international governing bodies and organizations, emission reductions from both public and private sector are necessary. Individual residents represent a substantial portion of the private sector end-use emissions and thus studying their consumption patterns in diverse residential environments has been the focus point of numerous carbon footprint studies to date. However, the role of underlying attitudes guiding these behaviours has been scarcely researched so far. To address this knowledge gap, a monetary consumption-, climate attitude- and climate action survey was published online, and responses collected from all of the Nordic countries. Our initial results indicate that residents of urban areas express a higher participation rate in actions reducing their carbon footprint as well as higher climate-related motivation guiding them. However, while the efficient urban infrastructure seems to lead to lower emissions in the housing and mobility-sections of their footprints, the higher incomes and opportunities for consumption associated with urbanization lead to pronounced good and services-related footprints compared to rural residents. Thus, despite expressing an overall higher participation rate in carbon footprint reducing activities it would seem that the lower consumption-based carbon footprints of urban residents are more so attributable to the passive, indirect impacts of urbanization rather than active conscious effort by the individual consumer.

Visionary Thinking in Sustainable Industrial Development in Finland - The Case of Allied ICT Finland´s Vision Building Process

Presenter: Mikkel Knudsen

Co-authors: Jari Kaivo-oja & Tero Villman

Europe must renew itself to retain its 35 million industrial jobs in an increasingly fierce global competition. The industrial renewal must happen in concerto with bold ambitions for the twin, green and digital, transitions, and it must be executed within the modern VUCA (volatility, uncertainty, complexity, and ambiguity) decision environment, as highlighted recently by pandemics, global supply chain shocks, wars, and energy crises. For Finnish industry, too, the necessity of change and of increased resilience to future stressors and global shocks is clear. “From Industry 4.0 to Industry X” is a new visioning project completed by Allied ICT Finland (AIF) and STN-consortium Manufacturing 4.0. It tackles the above backdrop and prompts joint aspirations of sustainable industrial development beyond the so-called fourth industrial revolution asking Finland to take the role as strategic leader shaping the preferred future. It highlights potential pathways for Finnish industry and steps for Finnish government, businesses, and society. Based on the visioning process, Industry 6.0 is defined as “ubiquitous, customer-driven, virtualized, antifragile manufacturing”. It is characterized by customer-centric, highly customized lot-size-1 thinking and by hyper-connected factories, with dynamic supply chains, and data flows across domains. The role of the human as a production worker changes, with humans needing to handle the digital, optimized production in interconnected environments. The Industry 6.0 visioning paper reflects the joint effort of 56 researchers across 18 Finnish universities and organisations working with the largest Nordic ICT research alliance, AIF. Here, we elaborate the case of building joint visionary thinking in the Finnish ICT industry ecosystem and outline the developed common vision for a future sustainable industry in Finland. This vision has a very high societal importance, as well as important implications for continued scientific developments.

Is there potential in legume production? – comparing the views of producers and consumers

Presenter: Hanna Konttinen

Co-authors: Kirsi Korhonen & Toivo Muilu

Finns, especially men, eat red meat well above the nutrition and food recommendations. The use of plant proteins as a partial substitute for meat has been promoted in several ways, such as expanding the range of plant-based meat substitutes available on the market. As a part of the Leg4Life project, funded by the Strategic Research Council, we are investigating how the legumes which grow in Finland (peas, broad beans, lupins and clovers) are perceived at the beginning and at the end of the food chain. Two electronic surveys were carried out to examine producers' and consumers' views on the potential of legume production. The consumer survey (n=1 000) was carried out in September-October 2020 and the producer survey (n=2 085) was conducted in February 2021. The increasing appreciation of domesticity and local production is also reflected in the legume sector, since 77% of the producers and 72% of the consumers responded that domesticity was important. On the other hand, 70% of the consumers but only 40% of the producers considered organic production of legumes important. This clear difference may reflect a more realistic perception by the producers of the potential of different production methods. Despite the rise of plant-based meat product market, surprisingly few respondents considered the meatiness of legume foods to be an important characteristic, with 27% of the consumers and only 9% of the producers agreeing. This finding is also interesting in the light of a recent report which predicts that the market for alternative proteins replacing animal proteins will multiply in the coming years. Domestic legume farming has grown significantly in recent years and the sector is in a good wind. Our surveys show that there is strong support for the development of domestic legume production at both ends of the food chain.

Towards a Sustainable Portfolio Theory - Foresight driven strategic asset allocation and SDG alignment

Presenter: Ville Korpela

Co-authors: Jari Kaivo-oja, Arne Fagerström & Petri Kuusisto

Modern Portfolio Theory (MPT) has formed the core theoretical basis for asset allocation strategies of institutional investors for several decades. Recently, there have been wider calls among both practitioners and academic community to extend the existing theory to include wider impacts on the societal level, to align investment practices globally with the Sustainable Development Goals (SDGs). In our paper, we discuss an outline for a sustainable portfolio theory (SPT) by extending the existing modern portfolio theory (MPT). This extension consists of three actionable components: 1) focusing on intentionality of investments, i.e., defining impact and financial return; 2) add sustainability information and uncertainty into investment analyses, and 3) replace forecasting with foresight analysis. The three steps facilitate changes in investor mindset that enable sustainable investing and resilient portfolios. Key mindset shift may involve collaboration with other investors. Businesses create externalities that have positive or negative impacts for shareholders and stakeholders. Our objective is to demonstrate that there exists a relationship between the values businesses create and the impact investors are capturing. SPT and introducing foresight practices in strategic asset allocation could have multiple useful applications in the way we make investments, from analyzing public sector infrastructure investments to allowing for innovative public private funding mechanisms to emerge, through enabling communication and collaboration. SPT approach could also benefit smart manufacturing practices, through its emphasis of foresight driven sustainable value creation through the entire value chain of industrial and investor networks.

Trade-offs between biodiversity and carbon values in boreal forests

Presenter: Heini Kujala

Co-authors: Mikkonen Ninni, Heikkinen Risto K., Minunno Francesco, Junttila Virpi, Mäkelä Annikki, Leikola Niko, Virkkala Raimo & Moilanen Atte

Forests play a central role in the global efforts of halting biodiversity loss and mitigating climate change. In Finland, they harbor significant proportion of our nationally threatened biodiversity and act as major carbon sink that balances the national carbon budget. Both forest biodiversity and carbon services are reduced by large scale harvesting of wood. Preventing harvests through forest conservation can therefore have synergistic benefits, and the idea of including areas of important carbon services into protected area designation has been increasingly advocated. Here we explore how well biodiversity and carbon values co-occur in the Finnish forests and what trade-offs might emerge if the emphasis of carbon services is increased in the designation of future protected areas. We used spatially explicit models to estimate carbon and biodiversity values in forest across Finland and created alternative scenarios to meet the EU's 30% protection target, varying the emphasis given to carbon over biodiversity. We found that whereas forests with large carbon storages often also harbor important biodiversity values, there was little to no correlation between forests with largest carbon sinks and biodiversity. The amount of carbon stored and sequestrated by additional protected areas can be increased to a degree but selecting new protected areas purely based on their carbon values produces highly sub-optimal solution for biodiversity. Our results highlight the importance of carefully exploring the trade-offs between biodiversity conservation and climate mitigation and the need to clarify the meaning and role of carbon storages vs sinks when discussing these partly synergistic objectives.

Building tools for social media credibility research

Presenter: Miikka Kuutila

Co-authors: Eetu Huusko, Junhao Li, Simo Hosio & Mika Mäntylä

Much like critical thinking skills have been recognized as crucial skills for any individual, critical reading is one of the essential skills in the digital society of the 21st century. The Web as a commoditized platform where anyone can create information, websites fueled solely by user-created content, and the use of social media as one of the major sources of everyday information has all contributed to a situation where one must be alert to the credibility of the content being consumed. As a concrete example, social media has been weaponized by malicious actors in an attempt to shatter democracy and disturb societal peace. One way to fight back is to cultivate critical reading skills among the general population. Platforms such as Twitter and, more recently, TikTok have seen a phenomenal rise in popularity. The users on these platforms may consume hundreds or thousands of short-form posts daily. In our work, we investigate the credibility of short-form posts. To this end, we are creating a widely scalable solution that is able to provide real-time, artificial intelligence-based assessments of the credibility of public social media posts. In our work so far, we have explored fundamental building blocks for the solution, such as multiple different data annotation and human computation platforms, solutions for creating datasets for training machine learning models, and the individual factors of Twitter-like short-form posts that together contribute to the overall credibility of such posts. We present results from three different studies concerning online social media post credibility and discuss our technological advances toward the final AI-based infrastructure we plan on deploying publicly. Ultimately, we plan to contribute not only easy-to-use software but also datasets that other scholars and practitioners interested in creating future credibility tools can benefit from.

Learning ladder of critical geomedia literacy

Presenter: Panu Lammi

Co-authors: Tua Nylén, Virpi Hirvensalo, Laura Hynynen, Markus Jylhä & Petteri muukkonen

Geomedia, i.e., maps, diagrams, photographs, and other representations of spatial information, is a powerful mean of communication. Children of all ages face geomedia everyday and thus need geomedia skills from an early age, as part of their citizenship skillset. The increasing supply of misinformation in the web demands skills to examine critically geomedia. Our study aimed at supporting an equal and age-appropriate development of geomedia skills in the Internet era. In practice, we aimed at defining the concept of "critical geomedia literacy" and detailing geomedia learning goals. First, we reviewed scientific literature and previous classifications on geomedia education, spatial thinking, and critical literacy. Second, we examined the national core curricula for basic education 2014 and for general upper secondary schools 2015 and 2019 by the Finnish National Board of Education. Finally, we gained insights on the classroom reality by conducting expert interviews of Finnish primary school, middle school , general upper secondary school teachers and teachers with a national-scale perspective on geography education. As a result, we define a concept of critical geomedia literacy as a set of skills to examine, evaluate, and interpret the sources and intentions behind geomedia and the information they communicate. While these include general critical reading skills, critical geomedia literacy also builds upon solid geomedia literacy, i.e., skills to use, create and act upon geomedia, and on thematic geographical knowledge. We propose and subject to further discussion the learning ladder of critical geomedia literacy. It consists of 10 geomedia skill classes that can all be learned at the most basic level in primary school, and deepened e.g. with critical viewpoints throughout learning ladder. We also describe age-specific proficiency levels in using and creating geomedia, dividing an age group into baseline, elementary, intermediate, and advanced level users.

Envisioning carbon-smart and just urban green infrastructure

Presenter: Jussi Lampinen

Co-authors: Oriol García-Antúnez, Anton Stahl Olafsson, Kayleigh C. Kavanagh, Natalie M.Gulsrud &Christopher M.Raymond

To address the inter-connected climate and biodiversity crises, it is crucial to understand how multifunctional urban green infrastructure (UGI) is perceived to contribute to carbon neutrality, biodiversity, well-being, and justice outcomes in cities, and how attitudes towards carbon neutral UGI policies vary across residents. We explore how urban residents understand the potential of UGI to support carbon neutrality, identify core meanings related to carbon that they associate with UGI, and assess how their attitudes towards carbon neutral UGI policies vary across socio-demographics and different ways of valuing UGI. Our findings are based on surveys conducted in Helsinki, Finland (n = 3726), and reveal how core understandings of the potential of UGI to contribute to carbon-neutrality focus not only carbon, but also on biodiversity and broader sustainability outcomes related to UGI. Specific carbon-related meanings associated with UGI were found to manifest at different levels of abstraction, agency, and scale, and to incorporate concerns attributed to the planning, features and functions of UGI. These meanings covaried according to perceived justice concerns and the socio-demographic context of the residents. In addition, perceived trade-offs to well-being or biodiversity, and specific ways of valuing and utilizing UGI, structured the attitudes towards implementing carbon neutral UGI policies. The results illustrate the perceived potential, but also the challenges, for harnessing multifunctional UGI for carbon neutrality. These include navigating the different understandings of how UGI can contribute to carbon neutrality, what co-benefits or trade-offs this

may entail, and according to whom. Our findings suggest UGI can help bridge policy agendas related to carbon neutrality, biodiversity protection, and human well-being in cities, but also call for reflexive urban planning sensitive to concerns of inclusion and recognition to achieve this.

Geographic accessibility of primary health services in Finland

Presenter: Tiina Lankila

Co-author: Harri Antikainen

Long physical distances or travel times may act as a potential barrier for the use of health services, leading to lowered service use and manifesting in poorer health outcomes and health differences between populations and areas. We have studied the geographic accessibility of primary health services in Finland using geospatial analyses. According to our results, geographic accessibility of health centers is good for most people: at least 96 % of people can reach the nearest health center within 20 minutes by car. Accessibility by public transport is significantly lower than by car; however, a bit over 50 % of the population living in the area covered by public transport can reach a health center in 20 minutes, and 68 % in 30 minutes. The results are essentially similar for other types of primary health services, including dentists, pharmacies, and child health clinics. However, there are notable regional differences in accessibility to primary health services. Corresponding to the fact that the largest cities typically have the best public transport systems, public transport accessibility is also the best in regions encompassing large cities. In addition to private cars and conventional public transport, taxis offer an important means to access health services, especially for older adults and people with disabilities. A major downside of taxi transport is its high cost compared to other modes of transport. In Finland, the costs are to a great deal covered by the society in accordance with reimbursement policies. As taxi trips to access health services are often made at the same time and to the same destinations, there is a lot of potential for trip-sharing. In some cases, where a lot of trips are frequently clustered temporally and geographically, new forms of community transport can be considered as a supplement both for individual taxi trips and conventional public transport.

Responsibility in data-driven decision-making — a review

Presenter: Iiris Lehto

Co-author: Katri-Maria Järvinen

Opportunities are increasing for digital data to be used in decision-making in different areas of society. Data-based practices and tools are being developed in areas such as social and health care, education, and public administration, as well as enterprises. Making use of data in a sustainable way requires understanding the starting points and formation of data and, for example, the practices of working with data. Previous research has identified e.g. ethical principles in AI guidelines (e.g. Jobin et al 2019). This presentation examines how responsibility in data-driven decision-making has been addressed in research literature. We identify in which areas and perspectives the responsibility of data-driven decision-making (including social sustainability, ethics, fairness, and justice) has been addressed and what studies denote by responsibility in the context of data-driven decision-making. The literature review is based on limited searches conducted in international social and interdisciplinary databases (Scopus, Web of Science, ProQuest and Ebsco) in May 2022 to search for key research on the topic. Jobin & et al (2019) have identified ethical principles in AI guidelines. We will utilize these principles. The review is part of research carried out in the Data Literacy for Responsible Decision-Making (DataLit) project which is an interdisciplinary research project including researchers in the fields of social science, legal studies, and computer science . One of

the goals of DataLit is to explore the use of data and artificial intelligence models in health and social care decision-making in the public sector in Finland. Focused case studies will help to identify which practices are conducive to the non-invasive and socially sustainable data-based decision-making. The research carried out in the project is used to promote data literacy in society.

Interdisciplinarity in transition knowledge production: Micro-level analysis of a scenario building process

Presenter: Anna Leinonen

Co-author: Corinna Casi

It is common to emphasise the role of interdisciplinarity in the search for solutions and analysis of sustainability transitions. Interdisciplinarity is connected to the need for analysing complex and wicked problems and developing sustainable long-term solutions for them. On the other hand, interdisciplinarity pose a challenge for knowledge creation and the effectivity of knowledge creation processes may decline. To understand the dynamics and limitations of interdisciplinary knowledge production, it is necessary to conduct micro-level analyses of interdisciplinary knowledge creation processes. This paper examines a process of future oriented knowledge creation in a multidisciplinary research project aiming at fostering transitional change of plastics production system. The case project (ValueBioMat) is financed by the Strategic Research Council. We use the case study as an illustrative case for arguing the practical challenges of interdisciplinarity, especially the inclusion of ethics in future-oriented knowledge creation applying a formal scenario method.Through the reflexive and process-oriented micro-level analysis of the case process, we show how ethically important factor (social justice) was first included in a scenario model in the beginning of scenario process in an open project workshop, but later in the process it was excluded from the model by the dedicated working group of researchers. The appearance and disappearance of an ethically important factor in scenario-making was an outcome of the combined effect of social and methodological aspects, including communication and meaning making in the social process of scenario construction, and methodological limitations in combining ethics and formal scenario method. Through the analysis, we can understand better the dynamics of interdisciplinary knowledge production and propose improved approaches to include ethics in future-oriented knowledge creation.

The significance of multimorbidity in the sustainability of the health care system

Presenter: Miika Linna

Co-authors: Katja Wikström & Tiina Laatikainen

Background: Ageing of the population increases the prevalence and co-existence of many chronic diseases, i.e. multimorbidity. In Finland, information on the significance of multimorbidity and its relation to healthcare capacity is scarce*. Aim:* To assess the prevalence of multimorbidity, the transitions between patient groups with and without multiple diseases and associated healthcare cost in 2017-2019. *Methods:* The study cohort includes all adults who used Finnish primary or specialized healthcare services in 2017. Multimorbidity status (non-multimorbid, multimorbid or multimorbid at risk) at baseline was determined based on the recordings of a diagnosis of interest using Finnish Care Register data from the year's 2015-2017. The costs were calculated using the care related patient grouping and national standard prices. Transition plots were drawn to observe the transition of patients and costs between different multimorbidity categories during two-year follow-up. *Results:* Of 3,201,276 patients, 59% were non-multimorbid, 25% multimorbid and 16% multimorbid at risk in 2017. During the follow-up, we found a considerable number of patients moving

from non-multimorbid group both to multimorbid and multimorbid at risk -groups. In 2019, 38% of patients were non-multimorbid, 31% were multimorbid, and 28% were multimorbid at risk of poor outcomes, and 3% had died. The proportion of multimorbid patients at risk increased the most during the follow-up. The healthcare cost depended on the severity of multimorbidity. The total healthcare costs were the lowest among non-multimorbid patients and the highest among multimorbid patients at risk, costing 5660 million euros and accounting for 66,8% of total healthcare cost of this patient cohort in 2019. *Discussion*: Multimorbidity, especially multimorbid patients at risk, is causing a heavy burden and costs for Finnish healthcare. The estimates on its effect on health care usage and costs should be used to guide healthcare planning.

Use of online pharmacy services during the COVID-19 pandemic

Presenter: Kari Linden

Co-authors: Niemi M., Pohjanoksa-Mäntylä M. & Mikkonen S.

The development of online pharmacy services is accelerated by the digitalization of healthcare and the advent of COVID-19 pandemic. We study the effect of COVID-19 pandemic on the use of an online pharmacy and online pharmacy customers' perceptions of the effect of the pandemic on it. In the multi-methods study, data of several University Pharmacy (UP) registers and of a customer survey (N=2615) among the UP online pharmacy customers in August 2020 were employed. The changes in the number of all customers and prescription medicine customers were assessed as an index and linear regression was used. The use of the online pharmacy dispensing and information services increased in 2018 -2020, in particular during the first wave of the COVID-19 pandemic in spring 2020. The changes in the trend of the number of all and prescription medicine customers in 2018-2020 were statistically significant. The number of prescription customers increased most. The impact of the pandemic corresponded to the development of over 3 years in the number of prescription customers and 6 months in the total number of customers. In spring 2020, the number of all and prescription customers was 2.6- and 5.1-fold compared to the previous year. The sales of medicines which were suggested by the media to be used for treatment of COVID-19 increased. The number of inquiries on medicines and other health issues managed by UP Medicines Information and Customer Service Unit (MICSU) increased also sharply and new extended MICSU and logistic organizations were introduced to meet the high demand of the online pharmacy services. The pandemic increased the use of online pharmacy service by older customers (in particular, by over 65-year-olds). Avoidance of infections was an important reason for the online pharmacy use. A "digi-leap" of online pharmacy took place in 2020. COVID-19 pandemic increased the use of online pharmacy services, and engaged new older customers. Obtaining of prescription medicines online become more common. Online pharmacy is an important channel of community pharmacy services.
Key words: COVID-19 pandemic, online pharmacy, medicines dispensing, medicines information, adaptation of technology, linear regression analysis, University Pharmacy

Socially sustainable competence development in Finnish restaurant and property services

Presenter: Sara Lindström

Co-authors: Jarno Turunen & Irmeli Pehkonen

In socially sustainable human resource management (HRM), employees are in the center of management and work practices. In turn, the expectation is that employee well-being leads to benefits also for employers. In society at large, sustainable HRM can provide means to wider societal benefits such as lower unemployment, work-related illness and disability. Competence development is an essential practice of sustainable HRM as it supports organizational development in the long run as well as protects and enhances employees' employability and career development in the future. However, extant research in sustainable HRM has largely targeted high-skilled and paid professionals and neglected how lower paid occupational groups such as cleaners and restaurant workers experience practices of sustainable HRM. In this presentation we discuss preliminary findings from our on-going study focusing on competence development during the Covid19 pandemic. This is a multiple case study conducted in four large companies situated in the Finnish restaurant and property services. The empirical materials comprise two different survey data collected among a) managers and employee representatives responsible for socially sustainable HRM (N=254) and b) employees in these companies (N=1245). As qualitative data, we use notes generated during company workshops where we discussed competence development with a range of internal stakeholders. In our study, we combine management and employee viewpoints to shed light on competence development as a part of socially sustainable HRM. We analyse differences and similarities between a) how the persons responsible for HRM in the companies intend practices of competence development and b) how employees perceive these practices. These practices include, for example, the prediction of competence demands and possibilities to use and develop one's strengths at work.

Exploring the role of legumes in a healthy and sustainable diet grounded in Finnish consumers' preferences

Presenter: Chiara Lombardini

Co-authors: Rachel Mazac, Matti Sihvonen, Niina Kaartinen, Satu Männistö, Xavier Irz, Kari Hyytiäinen, Teppo Mattson &Hanna Tuomisto

The need to transition to healthier and more sustainable diets is widely recognized. However, there is uncertainty regarding a healthy and sustainable diet that would be also culturally acceptable to the Finnish population. This study aims to identify such a diet by characterizing dietary clusters that summarize the main diets already adopted by the Finnish adult population taking into account both diet quality and environmental impacts. Among the clusters, the best compromise between diet quality and dietary environmental impacts is identified. The clusters were formed by running multiple factorial analysis and hierarchical clustering on the dietary data of the National FinHealth 2017 Study gathered using a validated food frequency questionnaire (FFQ, n= 5125). FFQ data were harmonized with life cycle assessment data on food products from Agribalyse 3.0 and Agri-Footprint. Selected nutrients intake and environmental impacts (global warming potential, land use, marine eutrophication, freshwater eutrophication) were used as active variables in the analyses. The intake of food groups, diet quality indexes, socioeconomic variables, health and lifestyle factors were used as supplementary variables to aid the interpretation. We found that none of the five clusters had both the lowest environmental impacts and highest nutritional quality. The best compromise cluster had the highest dietary quality and the second lowest environmental impacts. It represented 20 % of the individuals in the survey. Individuals in this cluster had the highest Baltic sea diet score, highest

intake of fiber and lowest of saturated fats. They also consumed the least beef and the most fish and legumes. This good “compromise” diet does not require to eliminate any food groups to achieve a significant reduction in greenhouse gases emission: if the Finnish population represented by the other four clusters were to adopt the best compromise diet, greenhouse gases emissions would decrease by 12 %.

Policies and pathways to increase legume production and consumption in Finland

Presenter: Chiara Lombardini

Co-authors: Marjukka Lamminen, Sari Bäck, Sanna Hietala, Kari Hyytiäinen, Niina Kaartinen, Sirpa Kurppa, Marjukka Lamminen, Rachel Mazac, Satu Männistö, Anu Reinikainen, Matti Sihvonen, Asko Simojoki, Timo Sipiläinen, Frederick Stoddard, Karetta Timonen, Anna-Liisa Välimaa, Aila Vanhatalo & Anne-Maria Pajar

Four key challenges face the Finnish food system: reducing the environmental impacts of food production, transitioning to healthier and more sustainable diets, increasing food and nutritional security, and increasing the profitability of farming. Legume production may play an important role in addressing these challenges. Legumes can reduce greenhouse gas emissions and nutrient emissions from agriculture by diminishing the need for synthetic fertilizers. Domestic legumes can also reduce the dependence on imported inputs such as those needed for animal feed or synthetic fertilizers. Partial substitution of red and processed meat with legumes can reduce the environmental impacts of individuals’ diets. Moreover, it can improve nutrient profiles and decrease the risk for chronic diseases such as cardiovascular diseases, type 2 diabetes, and colorectal cancer. Current legume production and consumption, however, is very low. Finnish adults consume 12-13 g/day of legumes on average and 1.6 % of the agricultural land area was sown to grain legumes in 2021. The Finnish Cereal Committee has set the objective of reaching a fivefold increase from the 2018 level in domestic grain legume production in the following 5-10 years. Unfortunately, the cultivation of legumes is falling behind this target: since 2018, the cultivation area of pea and faba bean has increased the cultivation area of pea and fava bean has increased only about half of the target. This study identifies alternative pathways for increased domestic legume production and consumption in Finland. The paths are examined in light of the current literature on policies affecting legume production and consumption. The paths followed in Canada and Lithuania, countries that have been successful in expanding legume production and export, are discussed and contrasted with the alternative pathways. The impact of increased legume production on the profitability of farming and food and nutrition security are also addressed.

The role of fundamental and human rights law in realizing the Doughnut economy

Presenter: Anu Lähteenmäki-Uutela

Co-authors: Turunen, Topi, Ott, Anna, Ituarte-Lima, Claudia, Lonkila, Annika & Haukioja, Teemu

We combine the Doughnut economy model with fundamental and human rights law to present a normative vision for sustainability transitions that makes moving towards a safe and just space a duty for States. The Doughnut economy model (Raworth 2012) is a vision for sustainability transitions. Planetary boundaries are the ecological limits for humanity representing the outer boundary of the Doughnut, and social justice is the inner boundary. Together, the environmental and social boundaries define a ‘safe and just operating space’, where ‘safe’ means that the economic

system respects the planetary boundaries, and 'just' means it satisfies basic human needs and promotes social justice. Fundamental and human rights law also presents visions for humanity. Law adds to the Doughnut model by making it a duty for States to move towards the safe and just space. Fundamental and human rights law is an important lever as it has courts and compliance mechanisms that can make governments act. The inner boundary of the Doughnut is largely covered by existing rights: access to a basic standard of living, equality, and public participation are recognized in UN agreements and in most constitutions. The practical realization of the 'just space' rights should be improved, however, for example concerning children's rights, indigenous rights, and workers' rights in global supply chains. Legal rights concerning the planetary boundaries are strengthening as witnessed in climate cases. Substantive environmental rights need to be further specified to create clearer legal standing and justification for legal demands. The Paris Agreement, the Convention on Biological Diversity and the anticipated Global Ocean Treaty provide substantive yardsticks for rights-based approaches. Humanity can reach a safe and just space through acknowledging everyone's rights in global economic systems.

False thinking and climate change

Presenter: Mari Myllylä

Co-author: Pertti Saariluoma

Climate affects practically every person today. In open societies, lay people's thinking is crucial in determining what people privately and politically do with the climate change. It is a complex phenomenon, but the ultimate explanation for it is what people do and this depends on how they think. Therefore, it makes sense to study how people think on climate change. Climate change is complex phenomenon and human thinking is not free from errors. Human mental contents can be false and information processing fallacious. Consequently, what they make are errors. Yet, the role of human thinking is seldom discussed as one of the root sources of climate change. However, we argue and illustrate how human thinking and mental contents concerning the climate change can be investigated by using concepts and methods of content-based cognitive scientific analysis of human information processing. For example, analysis of social media discussions show that argumentation fallacies are common and claims easily oversimplifying. People's postings can be illogical and based on false or inadequate information. The arguments on climate change tend to confirm person's existing beliefs and match to their interests. Thinking is also easily biased by unconscious hopes and fears that motivate people to think and act in certain ways. Wrong actions, or in other times the inability to act, have caused severe problems in local and global levels. Thus, we can claim that a class of root causes for climate change can be found in the illusory and risky way people think about climate issues as their thinking guides human activity.

Continuous cover forestry (CCF) for drained peatlands – impacts to emissions and harvesting

Presenter: Raisa Mäkipää

Co-authors: Aleksi Lehtonen, Kyle Eyvindson, Kari Härkönen, Kersti Leppä, Aura Salmivaara, Mikko Peltoniemi, Olli Salminen, Sakari Sarkkola, Samuli Launiainen &Paavo Ojanen

Current climate change policy places mitigation targets also for forests. Different stakeholders would like to simultaneously have timber revenues, carbon sinks, reduced nutrient loading and improved biodiversity from forests. Continuous cover forestry (CCF) has been promoted as a practice to reduce harmful environmental effects from petland forestry. Here, we simulated future pathways for Finnish forests under scenarious (i) clear-fellings are prohibited (CCF is allowed) on fertile drained

peatland forests (Sompa) and (ii), where current forest management regime is applied (BAU). The simulations were conducted with MELA simulator coupled with SpaFHy-peat hydrological model, Yasso07 soil C model and with GHG exchange models. Our simulations showed that with actual felling levels (mean fellings 2016-2018) Sompa scenario produced ca. 1 Mt CO2 eq. higher carbon sinks compared to BAU scenario with equivalent harvesting amounts. This reduction of emissions can be mainly attributed to avoidance of N2O and CO2 emissions immediately after clear-felling. When Sompa and BAU scenarious were compared at the maximum sustained harvesting levels, we found that additional constraint in Sompa scenario (no cleaf-fellings on fertile drained peatlands) reduced annual fellings by 2-3 mill m3y-1 from 89 to 86 mill m3y-1 during 2028 - 2037. Our results show that regions are different, while some have high potential of increased C sinks, while others have hardly any climate benefits with CCF management on fertile drained peatlands. Also temporal dynamics of climate benefits vary, some regions produce immediate benefits and in some cases earlier benefits are offsetted by the emissions later. Various stakeholders, like Metsähallitus and forestry companies have adopted CCF practices on fertile drained peatland forests recently. This study quantifies future regional climate benefits for the Finnish society with the scenario, where CCF is adopted across fertile drained peatland forests.

Organizational tensions in the introduction of socially sustainable AI

Presenter: Mika Nieminen

Co-authors: Marinka Lanne & Jaana Leikas

Introduction of artificial intelligence (AI) technology is expected to have diverse social and organizational implications. It is a generic technology, which development will intertwine practically with all the aspects of organizational life. The implementation of new, complex technology together with the increasing social complexity of operating environment, as well as social and environmental challenges generate often conflicting requirements and dilemmas in organizations. One of the major questions is “how do we implement AI in socially, environmentally and economically sustainable way”. In this paper, we study organizational tensions in public organizations, which plan to use or have already experimented AI. We analyse interviews with AI development specialists from 36 Finnish organisations. On this basis, we reflect AI related tensions with general organizational tensions. Challenges and tensions may relate, e.g. to such questions as how detailed and transparent information stakeholders should have of AI, and how AI ethics related questions should be administered and measured as part of the existing corporate social responsibility schemes. Tensions also emerge when individuals operate between new and traditional methods and technologies. Ethical AI principles are also subject to various interpretations creating ground for tensions. By identifying and understanding AI related tensions, organizations may implement AI in more acceptable and desirable way, but also learn of AI´s positive and negative social, environmental and economic impacts affecting sustainable uptake of AI.

Social justice for farmers through private sustainability initiatives: developing carbon neutral dairy production in Finland

Presenter: Anna Ott

Co-author: Annika Lonkila (first author)

Both academic and governmental actors have begun to pay increasing attention to the justice implications of various climate actions. The concept of just transition aims at ensuring that no one is left behind in the sustainability transition by acknowledging and alleviating unwanted consequences

of low-carbon policies and other climate measures. Yet, the role and responsibility of private actors as well as the interplay between private and public actors in just transition has remained understudied, specifically in relation to the food system. We examine the carbon neutrality program of the largest dairy company in Finland in order to understand the transformative potential of private sustainability initiatives and make sense of the responsibilities of private actors in just transition. Building on 27 interviews with farmers, dairy advisers and Valio officials, we analyse the motivations behind developing the program to evaluate how social justice for farmers is being defined and promoted through the initiative. We highlight the program's impacts on the (re)distribution of resources in the dairy chain and farmers' recognition in society. We also discuss the potential of agricultural cooperatives in safeguarding procedural justice in sustainability transitions. We argue that private sustainability initiatives in the agricultural sector can have a crucial role in foregrounding and addressing specific justice impacts of transition policies and practices affecting actors in their value chains. At the same time, critical analysis of private sustainability initiatives is needed to examine their potential use for protecting vested interests and maintaining existing power relations within the food system.

Homes and the development of critical reading skill

Presenter: Leena Paakkari

Co-author: Minna Torppa

Learning by reading requires today that we analyze, evaluate, and interpret information that is readily available but varies in quality and trustworthiness. That is, we need to be critical readers. Critical reading skills are needed already in childhood and families can have a key role in supporting the development of these skills. This presentation summarizes research evidence on the home environment factors that are associated with developing critical reading skills among children and adolescent.

Integrating justice perspectives and policy mixes for food system transition

Presenter: Ari Paloviita

Co-authors: Suvi Huttunen, Minna Kaljonen, Teea Kortetmäki

The academic debate on sustainability transitions has shifted the attention to the role of policy mixes speeding up the change in socio-technical systems. Meanwhile, wider policy frameworks are called for to ensure that no one is left behind in just transition. In this paper, we align the discussion on policy mixes and just food system transition for exploring just governance mechanisms. In developing the framework for just governance mechanisms, we draw from the literature on policy intervention points and just transition perspectives. Policy intervention points reflect different roles of policies in facilitating transitions, when stimulating the variety of niches, accelerating niches, destabilizing the regime, addressing the broader repercussions of regime destabilization, providing co-ordination to multi-regime interactions and tilting the landscape. In this paper, we integrate justice perspectives in all policy intervention points. The just transition perspectives draw attention to how distributional, procedural, recognition and cosmopolitan justice as well as capacity building and ecological integrity and justice to nonhumans are considered in different policy intervention points. We develop the framework with empirical analysis on just food system transition in Finland. We explore how the different food system actors assess the fairness of policy interventions of reducing the climate impacts of food system concentrating upon land-use transition, dietary transition, agricultural technology transition and food technology transition. The pathways were discussed in

thirteen focus group discussions, with 71 participants during 2021. In analyzing the discussions, we identify the most relevant justice considerations for each of the transition pathways and policy intervention points. We conclude that justice perspectives require attention with respect to all the intervention points, but the differences between various transition pathways should be acknowledged.

Vertical distribution of CO2, CH4 and N2O concentrations in peatland forest soils are associated with water table and forest management

Presenter: Mikko Peltoniemi

Co-authors: Qian Li, Pauliina Turunen, Boris Tupek, Päivi Mäkiranta, Kersti Leppä, Mitro Müller, Antti J. Rissanen, Sakari Sarkkola, Markku Koskinen, Paavo Ojanen, Mari Pihlatie, Elisa Vainio, Raija Laiho, Aleksi Lehtonen & Raisa Mäkipää

It has been suggested that peatland forest CO2 emissions can be reduced by transition from rotation forestry to selection harvesting. Canopy cover of the forest would be maintained at the level allowing sufficient transpiration, drainage, and regeneration of the stand without the need for repeated ditch network maintenance. The method raises water table (WT) level of the stand, with subsequent impacts on the GHG emissions, and underlying distribution of sources and sinks of GHG inside soil. We studied GHG (CO2, CH4 and N2O) and O2 concentration gradients in peat soils and evaluated how the concentrations and GHG sink-source distribution changes when forests are selection harvested. Gas concentrations were measured with gas permeable silicon rubber tubes at different depths (down to 80 cm below soil surface) at two drained Norway spruce dominated peatland forest sites in southern Finland. CH4 and CO2 showed remarkable vertical concentration gradients, with very high values in deepest layer. Upwards fluxes from deeper horizons, however, remained low, which can be explained by low gas permeability of wet peat matrix. CH4 was efficiently consumed in the soil layer just above the WT both in the control and harvest treatment where WT was 14 cm higher, on average. Topsoil contributed the most to CO2 efflux to atmosphere, but deep soil showed increased contribution in one harvest treatment. No consistent differences were observed in N2O emissions, which seemed more site and C:N dependent. CO2 concentrations were slightly impacted by CH4 concentrations, CH4 and CO2 associated with O2, and all gases were closely associated with the proximity to the WT. We conclude that selection harvesting does not have large impacts on the existing CH4 sink in peatland forests and that it has a moderate or small impact on the existing CO2 source because most emissions are generated in topsoil.

The experiences of distance learning due to the COVID-19 pandemic of students with different psychosocial well-being

Presenter: Sanni Pöysä

Co-authors: Eija Pakarinen & Marja-Kristiina Lerkkanen

Despite on how the Convention on the Rights of the Child set that children have a right to be heard when making decisions that matters them (United Nations, 1989), it has been noted that children's voices can easily be left unheard when societies face global crises, such as COVID-19 pandemic (Finnish Government, 2021). In order to find ways to enhance just and sustainable society, children's voices need to be heard. Moreover, when hearing them, it is central that children are not seen as homogeneous group, but their different situations and capabilities to face crisis such COVID-19 pandemic are taken into consideration (Finnish Government, 2021). This study aims to enhance the just and sustainable society by focusing on students with different psychosocial well-being and

examines their experiences of distance learning followed from the COVID-19 pandemic in Spring 2020. Participants of the present study were 46 Grade 4 students whose prosocial behavior, externalizing problem behaviors and/or internalizing problem behaviors were rated by their teacher as higher than that of other students participating in large research project. The data were collected with thematic interviews and analyzed with thematic analysis. The results showed that students with different psychosocial well-being described both positive experiences, such as the possibility to schedule the day freely, and negative experiences, such as the lack of social interactions during the distance learning time. While most of the students did not prefer the distance learning in the future, that did not apply to all participants. Moreover, the results suggested that experiences of distance learning might somewhat differ according to students' psychological well-being. In general, the study set children's voices as central, and provides research-based view that could be used when searching solutions for the challenges that enhancing just and sustainable society set for the future.

The regional migration system as a lens for studying migration and development: New agency and capabilities for responsible economic migration

Presenter: Mika Raunio

The paper revisits the migration-system approach, offering a more nuanced conceptual device for focused study of migration and, especially, regional development. The tentative conceptual lens formulated for studying the role of migration in regional development, and vice versa, is the regional migration system (RMS). In RMS approach, the focus is on regional capabilities to orchestrate and absorb migration. The paper explores the capabilities (e.g. policy tools) of the new regional agency in the context of RMS framework to produce trust and diminish the obstacles from the regional labour markets. New agency is partly a result of the converging goals of migration and regional economic development goals and related actors at the national and regional levels. Recent examples include also convergence of competence and protection aspects (e.g. "complementary pathways for those in need of international protection"). These, among the others, reflect the new forms of policy tools and capabilities that enhance transformation or even transition, from traditionally divided model separating the protection and economic based migration systems, towards more integrated model of responsible economic migration system, and policy. In RMS approach the shape of a regional migration system, system drivers, agency and capabilities are in the focus. In this paper, the focus is on qualitative data and emergence of new agency fostering (responsible) economic immigration in Tampere-region, and in Finland. Also, the paper shortly discusses the contributions of transition-based approach to the RMS concept. The conclusions point to several further applications for the conceptual framework introduced.

Parental job loss and child fertility

Presenter: Krista Riukula

This paper studies how economic shocks in childhood affect fertility outcomes in adulthood. Using plant closures from the years 1990-93 in Finland, I find that maternal job loss increases the offspring's probability of being a parent, or having a child by the age 40, while paternal job loss decreases both the number of children and the probability of being a parent for sons, but not for daughters. Father's job loss results in lower education level, earnings, employment and the probability of having a spouse for sons, but not for daughters and these effects might be driving the effect on sons' fertility outcomes too. 13-year-old sons are most sensitive to both maternal and paternal job loss in terms of fertility outcomes.

How does human activities and living environment affect the health-associated microbiome and are the impacts unequally distributed?

Presenter: Marja Roslund

Co-authors: Anirudra Parajul, Riikka Puhakka, Anna-Lea Rantalainen, Heli K. Vari, Mira Grönroos, Olli H. Laitinen, Noora Nurminen, Juho Rajaniemi, Heikki Hyöty & Aki Sinkkonen

Social policy, human activities, and biodiversity loss limit how microbial communities assemble and interact with people. These factors determine how different social groups are exposed to beneficial and/or harmful microbes, meaning microbial exposure has an important socioecological justice context. We hypothesized that urbanization and biodiversity loss is associated with shifts in microbial communities transferred indoors, and that the differences are evident in bacterial taxa and richness that have previously been associated with dysbiosis and non-communicable diseases. We also hypothesized that pollutants in ambient air and surface soil are associated with the health-associated bacteria in the living environment and on human skin. Finally, we assumed that pollutant levels are associated with endocrine disruption potential of vulnerable social groups. The results support our assumptions. Urbanization reduces the exposure to diverse health-associated microbiota. Pollution levels that are considered safe may alter both environmental and human commensal bacterial communities and interfere with endocrine signaling by commensal microbiota. Interestingly, air purification by broad-leaved and mixed forests may alleviate the endocrine disruption potential of pollutants. The results and social importance will be discussed in the contexts of pollution, biodiversity, human health, and urban planning.

Epistemic Properties of Data Visualizations

Presenter: Anna-Mari Rusanen

The societal decision-making is becoming more and more data-driven. This requires novel expertise and literacy skills from policy makers, decision-makers, as well as citizens. For instance, it is important to understand, how data is being collected, curated, processed and analysed. Further, it becomes equally significant to comprehend, how the displays of data affect the epistemic uses of data. Data visualizations are graphic displays, which are used to present data in a more comprehensible format. They allow people to explore, interpret, reason and communicate information drawn from data in a very efficient way. Visualization, however, are not cognitively or psychologically neutral. Instead, they are affective. For example, people have excessive reliance on visualization, and they carry a rhetorical weight of reliability and truth (Tat et al., 2016), feeding the “fantasy of knowing” (McCloskey et al., 2014). Even the presence of a visualization can nudge users (Andrade 2012; Tang et al., 2021). Moreover, the design of visualizations often sacrifices accuracy and realism for cognitive usability. The datasets are often too massive to be presented in a full fidelity, and overly realistic visualizations lead to visual clutter that decreases performance (Alhadad 2018). The design practices take also the aesthetic aspects into account, and designers utilize cultural codes and narratives for making the visualizations more intuitive (Ambrosio 2015). The factors that direct the visualization practices are not typically made explicit, and the users have access only to the surface of visualizations. Contemporary algorithmic visualization methods often amplify this opacity. Thus, it is becoming more and more important that the users of visualizations have sufficient skills for estimating these aspects visualizations, as well as their epistemic properties. In this talk, I´ll analyse these properties.

Shaping sustainability from the grass-roots: A perspective from Global South innovation communities

Presenter: Hanna Saari

Co-author: Maria Åkerman

Sustainability transition in the Global South differs from Global North in many aspects. One of them is the key role that grass-roots communities play in shaping societal and technological transformations. Grass-roots innovation communities, often discussed under the umbrella term makers, are crucial in solving local problems and making new solutions available in communities that are affected by resource scarcity and unreliable electricity supply. In EU Horizon 2020 funded project Critical Making, we explore how the global maker movement can contribute to sustainability transformations with a particular interest in the ways maker communities work. Our study is based on group interviews with 14 makers from Africa, South America and Europe. Our initial results indicate that grass-roots innovators in local communities of the Global South hold significant agency in bringing about a fair and sustainable technological transition, especially when they are connected to global maker networks online. These people with Internet access, IT-skills and knowledge of English can act as links between the global maker movement and local communities, thus holding important positions in building the capacities of these communities. Based on our interview data, grass-roots innovators of Global South also deeply care about the environmental aspects of their products and are ambitious in working towards social justice. In our presentation, we will discuss about the potentials and barriers for the maker practices to empower the resource scarce communities in the Global South and about the lessons that the welfare societies of the Global North can learn from these global networks.

Assessing the biodiversity impacts of foods and diets

Presenter: Merja Saarinen

Co-authors: Venla Kyttä, Terho Hyvönen & Katri Joensuu

Biodiversity loss is one of the most critical environmental impacts, while agriculture is one of the major drivers for it. Life cycle assessment (LCA) is a widely used method for assessing the environmental impact of products but the method to assess the complexity of biodiversity in LCA is still emerging. We reviewed the related literature to analyse the coverage and applicability of the methods and to identify shortcomings and development needs. We also applied two land use-based assessment methods to assess the biodiversity impacts of the Finnish diets on a global scale. We integrated the assessment of biodiversity impact into the FoodMin model, which has previously been created to simultaneously assess the climate impact and nutritional quality of diet. The assessment was carried out for the current Finnish diet and four scenarios in which the intake of animal source foods was gradual reduced. According to the results, the biodiversity impact of the Finnish diet decreases when the intake of animal source foods is reduced, and a great majority of the impacts are externalized, ie. they are associated with imported products. However, the distribution of externalised biodiversity impacts between product groups changes with the reduction of animal source foods. The results show that the biodiversity impacts differ depending on the assessment method, The methods used was based on impact of land use to species richness (potential species loss) in a global context covering only agricultural land use. According to the literature review, the methods used here do not cover the complexity of biodiversity, although one of them is a recommended method in some LCA guidelines, neither do other available methods. Particularly, in

addition to the fact that the global drivers of biodiversity loss and the stages of the life cycle are not fully covered, the specificity of the methods in terms of spatiality and agricultural practices is still low.

The global sustainability development plan and the risk of an uneven development

Presenter: Emmanuel Salami

There have been widespread efforts around the world to adopt sustainable practices towards the preservation of the environment. Developed countries have championed this course with the introduction and adoption of laws, policies, and position papers geared towards the promotion of sustainable practices. It would appear that these sustainability efforts have the tendency to weaken those of developing countries thereby elongating their journey towards the attainment of sustainability. Sustainable development in developed countries typically requires the abandonment of certain products such as plastic, technology, cars, etc. that are deemed unsustainable. In some cases, developed countries require use-reduction, reuse, or outrightly ban such products. These products are usually shipped in whole or as part of other manufactured products to developing countries with weaker laws and policies on sustainable development where they are well received and incorporated into the society, thereby fostering a poor sustainability culture. With a focus on the importation of plastics to developing countries, this article argues that if environmental sustainability will truly become a global movement, it is necessary to incorporate an end-to-end and global approach to sustainable development. This article considers how the lack of an end to end implementation of sustainable practices from developed to developing countries threatens the attainment of global environmental sustainability.

COVID-19 and learning loss - implications for resilience

Presenter: Timo Salminen

Co-authors: Tanja Kirjavainen, Juhani Rautopuro

The presentation focuses on discussing students' learning losses caused by the pandemic. By reviewing several empirical studies, the learning deficits have evidently been observed, for example, in mathematics and reading. However, the effect sizes are in some cases rather small and they also vary by education level. In addition, some studies do not find any major drops in learning, or the negative effect has decreased compared to the spring of 2020 and later during the pandemic. Some studies also show the appropriate means to prevent learning loss, for example, by using adaptive ICT when students practice mathematics. Therefore, it is important to consider whether the impact of the COVID-19 pandemic on learning outcomes is long-term or temporary in nature. This situation also set demands to clarify factors that might affect learning loss or possible gains due to the pandemic when assessing changes in learning outcomes. We must also bear in mind that the trends in student performance have been descending even before the pandemic, for example PISA results in Finland. In the EduRESCUE project (https://edurescue.fi/en) we will explore the pre- and post-pandemic development of learning outcomes with datasets of Functional Numeracy Assessment for 3-9th graders (FUNA) and with international assessment data (PISA and PIRLS). Based on the results, we will develop tools for better detecting, catching up and preventing learning discontinuities to strengthen the resilience of the Finnish education system.

The building blocks of a fair, just, and sustainable school and their related challenges

Presenter: Anne-Elina Salo

Co-author: Anu Kajamies

Teachers' skillfulness in observing and meeting their students' individual needs, along with expertise in inclusive practices, are the fundamental building blocks of a fair, just, and sustainable school and society at large. The EduRESCUE and TOVE projects aim at strengthening the resilience of the Finnish education system. They are working in close cooperation with third sector organizations to account for students' individual needs and to ensure equal opportunities for all. We will provide illustrative research examples to present the following concerns that have arisen: (i) some student needs are at risk of becoming hidden in the classrooms through being unseen, unheard, or misunderstood, and (ii) classroom practices sometimes stem from a narrow and superficial understanding of participation and inclusion. Based on these concerns, we will discuss how to develop tools and practices that: (i) promote future teachers' growth toward a deeper awareness of and dynamic reflections on their students' individual needs and (ii) encourage inclusive practices that instead of "fixing" or changing individual students acknowledge the social embeddedness of vulnerabilities. We call for a sensitive adapting of the classroom interactions and learning environments to enable the accessible and meaningful participation of all students. For this to be realized, it is necessary to: (i) place teachers' emotional and interaction competencies at the center of the learning aims extending across the teacher education curriculum, (ii) strengthen teachers' sense of community and multiprofessional collaboration, and (iii) ensure that teachers, schools at large, and teacher education have appropriate (multi-layered) resources. These all are important components for fulfilling teachers' and students' rights and well-being. We will discuss how these efforts lie at the heart of meeting the major challenges stemming from increasing uncertainty, inequality, and exclusion.

How different compositional changes in the workforce contribute to sickness absence trends in Finland?

Presenter: Laura Salonen

Co-authors: Taina Leinonen, Elli Hartikainen, Eira Viikari-Juntura, Svetlana Solovieva

On the long term, sickness absences have decreased in Finland. Factors driving this trend are not fully understood. We assessed whether trends sickness absences are explained by observed and unobserved compositional changes in the workforce. Utilising register-based panel data on Finnish private and public sector employees aged 30-62, we examined annual changes in the onset of compensated full sickness absence (granted after 10 working days) in the period 2005-2016. We applied random effects models adjusting for changes in observed sociodemographic factors of the employed population. We also applied fixed effects models, with corrections of the estimates for cohort ageing, to additionally account for unobserved time-invariant characteristics of individuals belonging to the employed population over the years. Of the observed factors, increases in educational level partly explained the decreasing trend in sickness absences, and more so among women than men and among private than public sector employees. Changes in occupational class and industrial sector played little role in the public sector and only slightly further explained the sickness absence trend in the private sector. The decreasing trend in sickness absences appeared to be largely explained when further accounting for unobserved individual characteristics. The decrease in sickness absences appeared to be more strongly influenced by compositional changes in factors that are established before fully entering the labour market — such as educational level as well as unmeasured individual characteristics that remain unchanged after childhood and early adulthood — than in the work environment or other factors contributing at working age. The contribution of these compositional changes may have been driven either by actual increases in the prevalence of factors that reduce the likelihood of sickness absence or by the exclusion of individuals with a high likelihood of sickness absence from the workforce.

Climate impact of diet and adherence to dietary guidelines and recommendations: regional distributions illustrated on maps

Presenter: Laura Sares-Jäske

Co-authors: Tommi Härkänen, Heli Tapanainen, Jani Salminen, Peppi Haario, Laura Paalanen, Merja Saarinen & Liisa Valsta

Background: Climate impact of diet varies between population groups and regions. On the other hand, adherence to dietary guidelines and recommendations (DGR) appears to be more common in the capital region of Finland and in the biggest cities. No studies have compared these two by illustrating them on maps.Objectives: To illustrate regional distributions of climate impact of diet on maps and to compare them to maps of adherence to DGR in Finland. *Methods:* Habitual dietary intake data was collected using food frequency questionnaires in the FinHealth 2017, FINRISK 2012 and Health 2011 surveys (n=14 692). Food consumption was classified at ingredient-level. Greenhouse gas emission (GHGE) coefficients, obtained from the Finnish Environment Institute, were linked to ingredients, and individual-level dietary GHGE sums/day were estimated. Statistical analyses were based on 10x10 km map square data and on Besag-York-Mollie regression model. For each square, age-adjusted predictive means of the GHGE sum were estimated. Visual comparison was conducted between GHGE maps and separate food and nutrient based index maps (DGR) of men and women. *Results:* The GHGE sum was the lowest in Uusimaa and in some surrounding areas in southern Finland, but in men also in the eastern North Ostrobothnia and in south-eastern Lapland. Higher levels appeared in men especially in Central and western North Ostrobothnia, and in North Karelia, where the DGR levels were lowest. Those living in the capital region appeared to have both healthier diets based on the DGR indices and lower climate impact from diet. *Conclusions:* Level of climate impact of diet and adherence to the DGR show inverse regional patterns across Finland apart from some exceptions. Sociodemographic and food culture-related differences across regions probably explain part of the differences. Improvement in adherence to the DGR could both lower climate impact of diet and decrease regional health inequalities.

Towards sustainability in metal industry using 3D printing

Presenter: Jyrki Savolainen

Co-authors: Ilkka Poutiainen, Marika Hirvimäki, Kari Ullakko, Ville Laitinen

The interest in additive manufacturing (AM) has grown strongly over the last decade. AM is a novel way to produce unique parts offering new business opportunities and improved environmental sustainability of production. Even though AM has been studied since the 1980s, the industrial use of it has been marginal in Finland. The major slowing factors include high equipment prices, a limited material range, and the shortage of additive manufacturing experts. The current literature of AM emphasizes its positive effects on sustainability of global production supply chains. We claim that the AM design and production can either have a positive or a negative influence on the overall cost and resource efficiency of the final product. In traditional manufacturing predetermined raw material and tools forms and shapes are used as design starting points, AM loses its main advantage, which is the freedom of shape. Using AM leads for these applications leads to increased energy demand compared to traditional machining, casting, and molding as less energy-efficient power sources like lasers have to be applied and the build rates of objects are slow. Metal powders for AM are expensive, and manufacturing of the powders consumes significantly more energy than sheet or bar materials. In this paper, we discuss how the cost-effectiveness and sustainability are only achieved

when parts are redesigned using e.g., lattice structures, an optimal printing position and minimizing the need for post-processing. The leading industrial sectors which use AM in their applications are aerospace, followed by medical and automotive. These applications often take advantage of complex structures and light-weight parts. AM offers new sustainable solutions for many other industrial sectors as well, such as separation technology and water purification. Recent developments have expanded the potential to develop new AM applications and advanced materials that were earlier impossible to manufacture.

Understanding of scientific concepts and everyday decision making

Presenter: Jaana Simola

Co-authors: Caitlin Dawson, Hanna Julku, Milla Pihlajamäki & Johanna K Kaakinen

In the current information era, everyone has access to varying qualities of evidence. The spread of misinformation underlines the importance of discerning good quality evidence to steer personal decisions. In the FINSCI project we examine how science capital is associated with the understanding of scientific information and the ability to make use of it in everyday decision making. The results of the Finnish Science Capital Survey (N=1508) indicate that science capital consists of four interrelated factors: attitudes towards science, science identity, early encouragement to science, and science-related behaviours. Interestingly, when controlling for age, gender and education level, we found that science capital correlates with numeracy skills like understanding the concepts of probability and randomness as well as the experimental method. These results are in line with earlier research that has shown a link between numeracy skills and ability to evaluate information and resist misinformation. In a follow-up online experiment (N=163), participants completed a large set of questionnaires and cognitive tasks, including a decision-making task related to a citizens' initiative. We studied how and why people seek information, how new information interacts with prior beliefs, and how individual differences in cognitive and personality profiles predict different patterns of interaction with scientific evidence when making a real science-related decision. Our preliminary results suggest three to six factors that describe different attitudes and approaches to information seeking. In the next phase, we examine the predictive power of these factors on behaviour in a realistic decision-making task. We aim to address gaps in the literature using a focus on individual differences, data-driven exploratory analysis, and a naturalistic complex decision-making task intended to activate prior beliefs, emotional responses, and evidence evaluation skills.

Rewilding urban space for wellbeing of humans and nature

Presenter: Aki Sinkkonen

Co-authors: Damiano Cerrone, Heikki Hyöty, Laura Kummola, Anna Luukkonen , Olli-Heikki Laitinen, Noora Nurminen, Juho Rajaniemi & Marja I. Roslund

Comparative studies have revealed associations between environmental and human health. Typically, while urban dwellers and diseased participants suffer from dysbiosis and immune system disorders, healthy controls and rural populations do not show signs of dysbiosis. Despite decades of research, human interventions were missing. We have organized randomized intervention trials in which microbial biodiversity was intentionally added to urban living environment. The first generation of trials consisted of open and double-blinded short-term intervention trials both outdoors and indoors. In five trials, we tested the effects of biodiverse versus microbially poor soil and rewilding of daycare yards. We measured shifts in environmental and human microbiota and various markers of immune response. The second generation of intervention trials consists of several years long trials

that target for wellbeing of both humans and urban ecosystems. In the short-term trials, extra biodiversity resulted in shifts in commensal microbiota in 2-4 weeks. The shifts were connected to immunomodulation in every experiment, no matter how biodiversity was added. In the first one of the long-term trials, over 100 children have finished the double-blinded and placebo-controlled intervention period and are now followed up. This allows the presentation of the first interim results. Based on the data available, daily exposure to microbial biodiversity changes immunomodulation. From the biodiversity perspective, rewilding urban space enriches environmental microbiome, which is the basis of healthy ecosystems.

Enabling holistic sustainable transformation through informed food consumption by using Distributed Ledger Technologies: A pilot use case in Unicafe, Helsinki

Presenter: Shreya Sood

Co-authors: SM Amadae and Ruta Jumite

As individuals today make decisions that best suit their self-interests of consumption and material wellbeing, it has resulted in the overshoot of the planetary boundaries. The Food Futures team of EU ATRACA has developed a context-embedded digital ecosystem that visualises the impact of individual choices at a collective scale to enable individuals to make informed consumption choices. This is achieved by visually communicating the effects of protein sources in the meals served in public cafeterias through our 'The food Wellbeing and Suffering Index'. The index is a holistic representation of effects on variables such as carbon emissions, water use, land use, animal welfare, nutrition, material use and packaging waste to address a broad spectrum of sustainability concerns that overcomes the limitations of carbon-tunnel vision. Unlike the popular carbon footprint calculators, the Food Futures application is an action-oriented tool that empowers consumers to bridge the gap between their sustainability philosophies and their actions. By giving actionable means to consumers, our research aims toward achieving sustainability transitions. We use distributed ledger technologies to aggregate individual choices so their combined impact becomes apparent. This use case has already generated proof of concept by running a pilot at Unicafe, Helsinki to test the viability of our digital application which visualises, records and measures the individual and collective impact of food choices. The overarching goal is to remedy the tragedy of the commons through informed meal choices and further SDG 12 — 'responsible consumption and production' to mitigate climate change in a democratic way.

What did COVID-19 do to democracy?

Presenter: Ville-Pekka Sorsa

Co-author: Katja Kivikoski

Pandemics pose major challenges for democratic governance. Democratic governance typically involves clear procedures and deliberative balancing between policy options. When a new health threat emerges, decision-makers usually have at their disposal neither time to maintain longer procedures nor clear policy options to tackle the threat. Can democracy survive and sustain under these conditions? How will democracies react to the new threats in the first place? In our presentation, we discuss the impacts of democracy to the COVID-19 pandemic and vice versa and outline the key lessons of these impacts to the governance of future health crises. The analysis is based on a scoping review of early research on democracy and the COVID-19 pandemic. Early evidence suggests that 1) democracy has a significant impact on the epidemiological characteristics of and policy responses to pandemics, 2) some principles of democratic decision-making are likely

to be temporarily abandoned under a pandemic, 3) pandemics create adverse but not insurmountable conditions for maintaining democratic institutions, and 4) pandemics are likely to deepen democratic backsliding in fragile democracies. Early research suggests that most democratic institutions have proved resilient under the COVID-19 pandemic. However, research has also observed some developments under that can have negative impacts to democracy in the longer term. This suggests that the sustainability of democratic governance may be gradually compromised by pandemics without further balancing actions.

Personal Identity and the Transition to Parenthood

Presenter: Florencia Sortheix

Co-authors: Rasmus Mannerstrom & Katariina Salmela-Aro

We analyze how personal identity processes of rumination and commitment relate to the transition to parenthood in young adulthood. Employing the DIDS (The Dimensions of Identity Development Scale; identification with commitment, and ruminative exploration subscales) in a sample of Finnish young adults (measured at age 22/25, 27/30 and 31/34 years; N =1018- 795, 63% women). Personal identity commitment is understood as having certainty in future in life versus being doubtful and confused about one´s plans. Results of this study suggest that identity commitment was related to a higher likelihood of having children We analyze separate models for women and men and discuss differences in work status. The results support the idea that identity has important consequences after adolescence and for family formation. We discuss practical implications for social security provision in an increasingly precarious labour market. Political decisions that support young adults' trust and certainty in the future and a sense of continuity by strengthening different forms of social security are called for.

Trust, institutional encounters and forced migration in the Finnish welfare state

Presenter: Liselott Sundbäck

Trust, identified as an important component in democratic, well-functioning societies has been emphasized as essential in the resettlement of forced migrants. While previous research valuable has measured levels of trust, little is known about how trust and distrust is shaped in what I refer to as series of institutional encounters, present in everyday life of forced migrants settling in the Nordic welfare state. A prerequisite for gaining access to services related to the welfare system, such as integration plan or social benefits is the encounter between the migrant and a representative of the public institution. Institutional encounters are, thus, an important part of everyday life of migrants. However, since the 2015 migration flow to Northern Europe, constructed as the "migration crisis", little is known about everyday experiences of asylum seekers encountering and navigating the welfare state institutions. Drawing on interviews with clients with forced migration background and welfare professionals, this research contributes with unique top-down and bottom-up perspectives on trust in institutional encounters. The data consists of interviews with professionals at institutions pivotal for forced migrants settling in Finland. Leaning on the notion of street-level bureaucracy, but also critically scrutinizing how migration governance is "made" in these series of institutional encounters, this presentation explores the notion and shaping of trust and distrust from several perspectives. Emphasizing the dynamic features of trust, I ask how trust and distrust is shaped in the institutional encounters. I further argue that trust in institutional encounters cannot be examined without scrutinizing power asymmetries and intersectionalities.

The role of information in the planning processes of pandemic-resistant cities

Presenter: Anna Suorsa

Co-authors: Anna-Maija Multas, Heidi Enwald, Anelma Lammi, Päivi Pyykkölä, Emilia Rönkkö & Eevi Juuti

COVID-19 will have significant implications on how cities are planned against uncertainty. Planning solutions should be based on systematic knowledge and informed insights from diverse disciplinary perspectives. This proposal examines the role of information in the urban planning process with the aim of developing more resilient urban environments to anticipate infectious diseases. New scientific knowledge is needed on information practices, collaboration structures and integration of health perspective to multi-professional urban planning work. Thus, we combine information studies and studies on evidence-informed urban planning processes. People make decisions based on information. They operate in information environments formed by various sources of information, other people, and physical and virtual conditions. Information practices developed in information environments can support the use of information. However, knowledge gaps may hinder informed decision-making. This is highlighted when processes cross boundaries between organizations. The lack of cooperation and interaction can also create obstacles to decision-making. The research is based on participatory design methodologies and real-world piloting. The knowledge gaps of urban planners and other municipal domains, their information needs related to health and wellbeing, and current information practices are studied by interviews conducted in Oulu and Kuopio. Data is also co-created through interaction concepts: research seminars, co-creation workshops with stakeholders, and hackathons with citizens. These work as testing environments for evidencing planning decisions and developing best practices in stakeholder interaction. The findings provide conceptual and methodological tools for evidence-informed and resilient urban planning. The ultimate aim is to outline policy recommendations for a post-pandemic urban future and society's transition towards One health and comprehensive societal safety.

Carbon neutral construction with wood?

Presenter: Ilmari Talvitie

Co-author: Seppo Junnila

Cities around the globe are currently experiencing heavy urbanization. At the same time most of these cities are aiming for carbon neutrality. These two driving themes are at a crossroads since urban development generates a substantial negative environmental impact. This study estimates the carbon neutrality potential of current residential development schemes in the city of Espoo for a period of 20 years. The study is conducted in three phases. First, we estimate the greenhouse gas (GHG) emissions of wooden and non-wooden buildings. We then adapt these results to analyze future residential construction scenarios regarding their cumulative GHG emissions. Finally, we compare the results to carbon reduction goals set by the construction industry for carbon neutrality. This study uses data on predicted residential building construction of the study area. The data is provided by the regional authority. According to our findings neither the current residential development scheme nor the increase of wooden construction can achieve current carbon neutrality goals. Switching to wooden construction has a clear climate benefit of decreasing GHG emissions by 0.08–0.11 Mt CO2e in the studied region. However, this decrease only amounts to 26–33 % of the carbon neutrality goal set by the industry. The study argues that increasing wood in construction is only one step towards carbon neutrality and that more actions are required for a more low-carbon future. The findings are beneficial for cities using wooden construction as a tool towards carbon neutrality and have access to sustainable forestry practices.

When an objective is shared, but frames and understandings differ - Examining stakeholder engagement in promoting a circular economy

Presenter: Riikka Tapaninaho

Co-authors: Johanna Kujala, Anna Heikkinen, Annika Blomberg, Maili Marjamaa, Heta Leinonen & Lotta Sihvo-Matikainen

The circular economy (CE) is considered a potential pathway towards more sustainable societies. A sustainable CE refers to the reduction of natural resources, closing of material, energy and nutrient loops and maintaining the value of products, materials and resources for as long as possible. A sustainable CE actualizes in collaboration of businesses, cities and other organizations, and requires broad collaboration on different levels of society. The promotion of a CE necessitates that the economic, ecological and social impacts of all activities are considered from the viewpoint of different stakeholders both now and in the future.

Finland has an ambitious objective to become a global leader in a CE by 2025 and key CE stakeholders share a joint objective of promoting the CE and sustainability at the national and European Union level. However, while key stakeholders share a joint interest to advance a CE and multi-stakeholder collaboration is often successful, stakeholders can also hold differing frames and understandings regarding the CE. The diverse frames and understandings may influence collaboration and its outcomes in various ways. The different frames are also connected to possible futures of the CE, hence, affecting the strategic objectives of Finland on its way towards a CE and sustainability. This paper aims to analyse and identify differing frames and understandings regarding the CE in Finland. This paper draws on multiple studies that have been conducted on stakeholder engagement enhancing a CE as part of the CICAT2025 Circular Economy Catalyst: From Innovation to Business Ecosystems research consortium between 2019–2022. The differing frames and understandings include how the CE is understood and how the key stakeholders conceptualise business around a CE and sustainability, who are accounted as responsible stakeholders and change agents to promote a CE, and what kinds of future images the current understandings of the CE convey.

Proactive Pursuit of Recovering Off-job Activities during the COVID-19 Crisis: The Health-protecting Effect of Off-job Crafting among School Principals

Presenter: Hiroyuki Toyama

Co-authors: Katja Upadyaya, Lauri Hietajärvi, Miika Kujanpää, Jessica de Bloom & Katariina Salmela-Aro

Due to the unprecedented school crisis led by the coronavirus pandemic, school principals' workloads have escalated at an alarming rate. Hence, it is particularly important for them to sufficiently recover from work stress during off-job time. This study focuses on principals' proactive pursuit of off-job activities for recovery, i.e., off-job crafting. Given the increasingly challenging job framework of principals, such proactive efforts may be particularly important for their health and effective functioning. The primary aim of this study was to investigate the health-protecting role of off-job crafting. To this end, we, first, examined whether off-job crafting is related to burnout and work ability. Second, we examined the role of work demands as a boundary condition in the association between off-job crafting and these outcomes. Finally, we investigated the moderating effect of off-

job crafting on the link between job demands and burnout and between job demands and work ability. For this study, two samples of Finnish school principals collected in 2020 (n = 632) and 2021 (n = 495) were analyzed using latent moderated structural equation modeling. Similar results were found across both samples. First, off-job crafting was negatively associated with burnout and positively associated with work ability. Second, off-job crafting interacted with job demands in predicting these outcomes. Off-job crafting was related to lower burnout and higher work ability when job demands were relatively high, while job demands were related to lower burnout and higher work abilities when off-job crafting was relatively high. However, additional analysis using longitudinal data in the samples (n = 143) showed the non-significant effect of the interaction. Altogether, these findings suggest that off-job crafting may serve to protect principals' health, yet the salutary effect may be short-lived.

In-demand green skills – a survey study in the Finnish service industry

Presenter: Jarno Turunen

Co-author: Fanni Moilanen

Transitions towards a sustainable society call for investments in human capital. Indeed, climate change mitigation and adaptation change the skills demanded in the labour market (ILO, 2019). The demand for green skills goes beyond the green jobs. Increased employer efforts to operate environmentally responsibly suggest that there is an increasing demand for green skills in service industry jobs. This demand calls for various institutions to enhance the skills of workforce. Work and employees in different occupations provide a fruitful, yet less studied area for both research and policy making on sustainability and climate change. Our aim was to shed light on the association between climate change related efforts of service industry employers and the green skills demanded from employees*. Methods:* We sent online surveys to random samples of Service Union United PAM members in 2021 and 2022. A total number of 6539 employees representing retail trade, property services, security services as well as tourism, restaurant, and leisure services responded to the surveys. They were asked whether their employers' have taken efforts towards climate change mitigation, and whether these efforts play a role in skills demanded from employees. *Results:* According to the respondents of the 2021 survey, 47% affirmed that their employer had taken active efforts to mitigate climate change. Furthermore, this had introduced new in-demand skills for 42% of them. In 2022, 24% of all respondents recognized the demand for new skills in their work. The demand for new skills was more apparent among older age groups and those working in metropolitan area. *Conclusion:* The employers that conduct active mitigation efforts demand new, green skills from their employees. Skills demanded distribute unevenly among employees. This poses a challenge for investments in human capital among the work force.

Ecosystem approach for co-creating systemic transition towards sustainable futures of plastics

Presenter: Katri Valkokari

Co-author: Inka Orko

Preparing for, and enabling, a sustainable future requires a multidisciplinary approach. It calls for bringing together different stakeholders who share an interest in exploring elements of systemic transition towards more sustainable futures. An ecosystem approach requests for bringing together different, even conflicting, agendas of key stakeholders. This is a starting point for co-creating knowledge about a more sustainable society. Therefore, the value of ecosystemic collaboration need to be addressed from the perspectives of all actors. It is crucial to make visible the dependence of actors on the current state-of-art, which is related to if and how the performance of the actor is connected to that of the ecosystem and thereby what is their willingness to change the status quo. Different transition paths can be used as forward-looking narratives for aligning systemic change efforts between different stakeholders. The paper presents a case study of making sense of systemic change towards sustainable plastics ecosystem. The research process has involved multiple methods. The key challenges in creating more sustainable plastics ecosystem(s) are linked with diverging targets and interests at the practical level. Furthermore, regulation may create an artificial market element, as well as different incentives. The key lessons learnt highlight that ecosystemic work is slow and therefore the first concrete steps need to build commitment of all stakeholders. These success stories are needed for continuity and to push forward, and accordingly a strong stakeholder with a spirit for system collaboration can help. On the other hand, ecosystems are living organisations and may develop into varied activities within some groups of participants (sub-systems within an ecosystem). Thus, emerging technologies, players or changes in business environment may reformulate the system; in the context of plastics ecosystem chemical recycling or price of oil are such “wild cards”.

Any respect? Fragile sense of belonging in everyday work

Presenter: Sari Vanhanen

There are constant changes in the Finnish work life due to its increasing ethnic diversity. Yet, employees with immigrant background or from racialized minorities, face inequalities, discrimination and many ‘mis’-issues everyday work: misunderstandings, misinterpretations or ‘mis-expectations’, even lack of mutual interaction.To tackle these biased experiences, we need to scrutinise at the options – or obstacles – to promote a sense of belonging of people in work. However, a sense of belonging is not only an individual but also a shared experience at the work community. It means looking at the professional norms and institutional features or practices that remain silent or invisible. Along with the sense of belonging, a feeling of dignity frames one relevant part of employee engagement: to be ‘one of us’ in the team and to be respected among colleagues. Emotions are essential, and partly regulated or formulated in the organisation. In my research, the aim is to study how a fragile sense of belonging is experienced and how it may remain silent. How the feeling of dignity, or the shortage of it, is confronted at work? What are either concrete or emotional elements of being an outsider? In addition, if you find yourself in a subordinate position, how the sense of belonging may be strengthened, and by whom? Moreover, the research discusses the promises for collaborative learning within and crossing institutional frames, and the possibilities to learn during working in the moments when the new knowledge is needed. Yet, employees talk about ‘throwaway knowledge’ or ‘half-learning’. These refer to knowledge that is poorly utilized in busy daily work, where deeper learning is not possible to happen. Methodologically the research applies the key ideas of institutional ethnography. In practice, it is implemented together with peer-researchers from four different organisations during 8/2022 – 7/2023.

Consulted and heard: towards more meaningful and impactful youth (e-)participation in societal decision-making

Presenter: Jari Varsaluoma

Co-authors: Guna Spurava & Henna Juusola

Even though legislation in Finland supports youth participation in social decision-making, prior studies indicate that the role of youth in legislative processes is inadequate and the threshold for youth to participate in these processes is high (Meriläinen et al, 2020). The ALL-YOUTH project (https://www.allyouthstn.fi/) seeks to address these issues by studying youth involvement to secure a sustainable future. Considering that online participation services tailored to young people's needs can enable youth involvement in societal decision-making, a digital platform or virtual council for youth e-participation, Digiraati, has been developed. The prototype of the virtual council was designed based on the results of a study (2019) focusing on youth e-participation needs. Semi-structured group interviews were conducted with young people (age 16–27, N=74) in workshop settings. Findings supported previous research highlighting the importance for young people of ""having an impact"" and the confidence that their opinions are considered in the decision-making process. Participants expected that officials actively participate in discussions and give feedback on the impact of their contribution. As stated by Koskimaa and Rapeli (2020), to evaluate the demand and supply for deliberative democratic innovations, it is necessary to consider the wishes of citizens and decision-makers concurrently. Thus, in ALL-YOUTH decision-makers and facilitation sub-study is carried out in 2022. Initial findings from interviews with representatives of ministries (with Digiraati experience) are consistent with results from a study of youth. Officials are advocating for meaningful youth participation in societal decision-making, highlighting the importance of the impact and considering opportunities to make an influence of purpose as significant preconditions for participation. Moreover, preliminary findings suggest that facilitators are important element in supporting the Digiraati-discussions.

The challenges of long-term development for Finnish education and education policy to meet demands of the Manufacturing 4.0

Presenter: Maarit Virolainen

Co-author: Juhani Rautopuro

Demands set for citizens’ skills and competencies alter due to the changes of technology, production and global context. The emerging new knowledge and transformation of societal challenges and goals create incentives for developing education. The education system, as well as the regulation, legislation, infrastructure and expertise, which enables the running of the education system have been built and reformed in the past. Several industrial revolutions have already demanded reforms for the education system, as the Finnish elementary school was initiated in the 1860s, and the matriculation examination of general upper secondary schools in the 1850s. The post-World War II industrialization and urbanization accelerated the building of the network for vocational schools across the country in the 1950-60s. Also, the latest industrial revolution, the so called Manufacturing 4.0, sets needs to reform education, and they relate to following three points: (1) to define, picture and design what kind of reforms and for which parts of the education system and curricula are needed to instil fair, just and sustainable society and adapt to the change of technology in society, (2) to assess and evaluate, if the targeted change has been met in the learning of various learner groups before and after the reform, (3) to implement the designed reforms and evaluate them. The presentation discusses the latest reforms of compulsory and upper secondary education and what

kind of obstacles we see for research in serving the need to reform education vis-à-vis multidimensional demands.

Silent agents in legislation, article manuscript

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This article is part project SILE, an STN funded project that studies silent agents in legislation. Despite a strong normative basis that stresses the participation of all those concerned in lawmaking, many are excluded from being heard. We ask who these 'silent agents' are, why they are silent, and how their position varies based on the type of legislation. We define them as people whose capability to function in society is limited regardless of lawmaking processes but the nature of lawmaking also restricts their possibilities to participate in it. We characterize silent agents against the frameworks on relational agency, recognition, representation, paternalism, and epistemic struggles. We also ask what to hear from or about them, in relation basing participation on the principle of equality versus equity. We introduce 'conscious lawmaking' as logical solution for the minimal form of consideration of silent agents in lawmaking. The article is co-written, it's theoretically based and is currently within the submitting process. More on project SILE at https://www.hiljaisettoimijat.fi.