



3<sup>rd</sup> European  
Technology Assessment  
Conference

MAY 17 TH - 19 TH 2017, CORK, IRELAND



## Book of Abstracts



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## Welcome Message

### *On behalf of the Program Committee*

*Sergio Bellucci, Christian Büscher, Ciara Fitzgerald, Lenka Hebakova, Geert Munnichs, Constanze Scherz, Mahshid Sotoudeh*

Welcome to Cork and the 3rd European Conference on Technology Assessment. The aim of the conference is to discuss how technology assessment and related activities such as science and technology studies, responsible research and innovation (RRI), public engagement, and foresight can strongly contribute to knowledge-based policy-making on science, technology and innovation, to engage policymakers and stakeholders in this endeavour, and to learn from each other's perspectives. Science and technology are central elements in the policy response to the 'Grand Challenges'. The conference sessions contribute to discourses in these fields, e.g.: Technology and Work Environment Relations; Digital Health Data; Socio-technical Transitions of Energy and Transport Infrastructures; Technology in Prenatal Healthcare; Ethics Assessment of Research and Innovation; Genetic Tests During Pregnancy; Bioeconomy in the Spotlight; Data Protection and Privacy Impact Assessments, Assessing technologies for Health Quality and an Independent Life.

Technology Assessment (TA) aims at knowledge generation about the consequences of technology as basis for informed decision making. Therefore TA aspires to initiate and maintain inter- and transdisciplinary research, include non-scientific actors, and communicate with the general public. To achieve these goals TA needs to reflect its own identity i.e. standardization of theories, concepts and methods. Simultaneously TA seeks to introduce normative orientations in

processes of knowledge production, which could support the desired impacts of research and innovation. As a consequence, in order to operationalize concepts like RRI it is not only necessary to ask for the potential desired or undesired impacts of research and innovation, but also for the conditions for introducing normative criteria in the different stages of knowledge production in complex and dynamic innovation processes. TA often addresses early stages of the transformation of socio-technical systems, meaning technical developments in their earliest stages, as visions or expectation statements. Some of these visions are far reaching with potentially high impact on society at large. Therefore, TA has to find means to assess these developments even though technologies do not exist, yet. The questions are: How is a scientific/technical agenda established? Are visions means of communication between all interested, involved parties? The assessment of consequences of future technologies is demanding in epistemological terms and especially regarding the interaction of stakeholder and TA experts.

The conference offers a platform for researchers to discuss these questions together with practitioners and policymakers from around the world. We expect three days of discussions, presentations, exchanges, networking and exploration. Following feedback from the first and the second successful European Conference on Technology Assessment in Prague (2013) and Berlin (2015) we conceptualized a two-phase session structure. In the first part scientists are invited to present and discuss their interdisciplinary research. The second part is organized to nurture an interactive dialogue between scientific scholars, stakeholders, policymakers and the audience. We wish all participants of the conference a good discussion in an inspiring atmosphere.

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## Keynote Speakers



Professor Mark W.J. Ferguson commenced as Director General of Science Foundation Ireland in January 2012 and as Chief Scientific Adviser to the Government of Ireland in October 2012. Mark is currently Honorary Professor of Life Sciences at the University of Manchester. Mark has been President of a number of Learned Societies eg European Tissue Repair Society, chaired the first UK Government's Health and Life Sciences Foresight Panel, and served on many committees eg the UKTI Life Sciences Marketing Board, the Committee of Safety of Medicines Biological Subcommittee and the European Space Agency. He has served on the Board or Scientific Advisory Board of a number of International Biotechnology and Pharmaceutical Companies. Mark has a deep interest in translating scientific research findings into successful commercial entities.

For more info, see: <http://www.sfi.ie/about/organisation/sfi-directors/prof-mark-ferguson.html>



Professor Sabine Maasen works at Technical University of Munich and is a Friedrich Schiedel Endowed Chair in the Sociology of Science since 12/2013. Her core interests are in the field of social science research. Her current work focuses primarily on the sociology of technoscience and society. She also conducts research in the field of technoscience. Professor Maasen studied sociology, linguistics and psychology at the University of Bielefeld. In 1996 she earned her PhD in sociology and in 2001 she acquired her postdoctoral teaching qualification (habilitation). Between 1988 and 1994 she was a research assistant at Bielefeld University's Center for Interdisciplinary Research and from 1994 to 2001 research coordinator at Max-Planck Institute for Psychological Research. In 2001 she was appointed professor of scientific research/ sociology of science at the University of Basel.

For more info, see: <https://www.professoren.tum.de/en/maasen-sabine/>

Programme – Day 1

Day 1	Wednesday 17 <sup>th</sup> May 2017					
1.00–1.45pm	Registration					
1.45-2pm	Welcome Address – Professor Patrick O’Shea, President, University College Cork {G01}					
2-3pm	Keynote - Professor Mark Ferguson, Science Foundation Ireland {G01}					
3.15-4.45pm Afternoon Presentations	<u>Session A1-1 {301}</u> (Chairs - ITAS_KIT & FCT-UNL)  Assessment of the Technology and Work Environment Relations	<u>Session A2-1 {121}</u> (Chairs - ITA-OEAW, DBT, TC-ASCR)  Co-creating responsible research agendas	<u>Session A3-1 {122}</u> (Chairs - Rathenau Institute)  Linking science and society to policymaking–How to serve policymakers’ needs?	<u>Session A4-1 {101}</u> (Chairs - HISRC, UCC)  Crossing the CHASM to Digital Health Data	<u>Session A5-1 {302}</u> (Chairs - ITAS-KIT)  Socio-technical transitions of energy & transport infrastructures	<u>Session A6-1 {102}</u> (Chairs – INFANT, UCC)  Technology in Perinatal Healthcare: Helping Mums and Babies
4.45-5.00pm	Break – CHASM Poster Session {101}					
5-6pm Afternoon Dialogues	<u>Session A1-2 {301}</u> (Chairs - ITAS_KIT & FCT-UNL)  Dialogues on A1-2	<u>Session A2-2 {121}</u> (Chairs - ITA-OEAW, DBT, TC-ASCR)  Dialogues on A2-2	<u>Session A3-2 {122}</u> (Chairs - Rathenau Institute)  Dialogues on A3-2	<u>Session A4-2 {101}</u> (Chairs - HISRC, UCC)  Dialogues on A4-2	<u>Session A5-2 {302}</u> (Chairs - ITAS-KIT)  Dialogues on A5-2	<u>Session A6-2 {102}</u> (Chairs – INFANT, UCC)  Dialogues on A6-2
6.30 – 8.30pm	Welcome Reception – Aula Maxima, The Quad, Main Campus, UCC					



Programme – Day 2

Day 2	Thursday 18 <sup>th</sup> May 2017					
9.30-11.00am Morning Presentations	<u>Session B1-1 {101}</u> (Chairs - TA-Swiss, ITA-OEAW)  Parliamentary Technology Assessment – Genetic tests during pregnancy	<u>Session B2-1 {302}</u> (Chairs - HFHR)  Ethics assessment of research and innovation – the SATORI project	<u>Session B3-1 {121}</u> (Chairs - ITAS-KIT)  The Politics of TA	<u>Session B4-1 {122}</u> (Chairs - IIT)  Horizon Scanning: an instrument for early detection	<u>Session B5-1 {102}</u> (Chairs - ITAS-KIT)  Towards a Global TA – Possibilities and Challenges	<u>Session B6-1 {301}</u> (Chairs - Rathenau Institute)  Round 1 A role play in TA practices: ways to shape the interaction between science and policy
11.00-11.15am	Break					
11.15-12.15pm Morning Dialogues	<u>Session B1-2 {101}</u> (Chairs - TA-Swiss, ITA-OEAW)  Dialogues on B1-2	<u>Session B2-2 {302}</u> (Chairs - HFHR)  Dialogues on B2-2	<u>Session B3-2 {121}</u> (Chairs - ITAS-KIT)  Dialogues on B3-2	<u>Session B4-2 {122}</u> (Chairs - IIT)  Dialogues on B4-2	<u>Session B5-2 {102}</u> (Chairs - ITAS-KIT)  Dialogues on B5-2	<u>Session B6-2 {301}</u> (Chairs - Rathenau Institute)  Round 2
12.15-1.30pm	Lunch					
1.30-2.30pm	Keynote – Professor Dr Sabine Maasen, Technical University of Munich {G01}					
2.30-4.00pm Afternoon Presentations	<u>Session C1-1 {102}</u> (Chairs – Zoya Damianova, ARC-Fund)  Making Sense of Public Engagement in Creating Knowledge for Decision-Making on Science, Technology and Innovation	<u>Session C2-1 {122}</u> (Chairs - ITA-OEAW)  Untamed participation? The role of bottom-up engagement in Responsible Research and Innovation	<u>Session C3-1 {302}</u> (Chairs - Ministry of Infrastructure and Environment, The Netherlands)  Knowledge for policymaking – organizing the use of best available knowledge	<u>Session C4-1 {101}</u> (Chairs - University of York)  Valuing and evaluating regenerative medicine's healthcare potential	<u>Session C5-1 {121}</u> (Chairs - ITAS-KIT)  Bioeconomy in the spotlight	<u>Session C6-1 {301}</u> (Chairs - Rathenau Institute)  Round 3
4.00-4.15pm	Break					
4.15-5.15pm Afternoon Dialogues	<u>Session C1-2 {102}</u> (Chairs – Zoya Damianova, ARC-Fund)  Dialogues on C1-2	<u>Session C2-1 {122}</u> (Chairs - ITA-OEAW)  Dialogues on C4-2		<u>Session C4-2 {101}</u> (Chairs - University of York)  Dialogues on C4-2	<u>Session C5-2 {121}</u> (Chairs - ITAS-KIT)  Dialogues on C5-2	<u>Session C6-2 {301}</u> (Chairs - Rathenau Institute)  Round 4
7- 9pm	Conference Dinner - Devere Hall, Áras na Mac Léinn, Main Campus, UCC					

Programme – Day 3

Day 3	Friday 19 <sup>th</sup> May 2017					
9.30-11.00am  Morning Presentations	<u>Session D1-1 {301}</u> (Chairs - European TA Communications (ETAC))  Getting the Story across – Challenges and Benefits of Communicating Technology Assessment	<u>Session D2-1 {102}</u> (Chairs - Fraunhofer ISI, ITA-OEAW )  Data protection and privacy impact assessments	<u>Session D3-1 {302}</u> (Chairs - ITA-OEAW, UCC, TC, IHST-TPU)  Mutual Learning of Stakeholders and Citizens for a Sustainable Development	<u>Session D4-1 {121}</u> (Chairs - ITA-OEAW, ITAS-KIT)  Assessing technologies for health quality and an independent life	<u>Session D5-1 {122}</u> (Chairs - University of Natural Resources and Life Sciences, HDA, Germany)  The extensive potential of gene drives based on the newly developed CRISPR method	<u>Session D6-1 {101}</u> (Chairs – UCC EnRRICH project)  Responsible Research and Innovation: Perspectives from active and live RRI projects in Higher Education
11.00-11.15am	Break					
11.15-12.15pm  Morning Dialogues	<u>Session D1-2 {301}</u> (Chairs - European TA Communications (ETAC))  Dialogues on D1-2	<u>Session D2-2 {102}</u> (Chairs - Fraunhofer ISI, ITA-OEAW )  Dialogues on D2-2	<u>Session D3-2 {302}</u> (Chairs - ITA-OEAW, UCC, TC, IHST-TPU)  Dialogues on D3-2	<u>Session D4-2 {121}</u> (Chairs - ITA-OEAW, ITAS-KIT)  Dialogues on D4-2	<u>Session D5-2 {122}</u> (Chairs - University of Natural Resources and Life Sciences, HDA, Germany)  Dialogues on D5-2	<u>Session D6-2 {101}</u> (Chairs – UCC EnRRICH project)  Dialogues on D6-2

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List of Sessions

No.	Title of Workshop	Chair
A1	Assessment of the Technology and Work Environment Relations	António Moniz, Bettina Krings, Linda Nierling
A2	Co-creating responsible research agendas	Niklas Gudowsky, Lars Klüver , Lenka Hebáková
A3	Linking science and society to policymaking How to serve policymakers' needs	Leonie van Droogen
A4	Crossing the Chasm to Digital Health Data	Dr Ciara Heavin, Dr Yvonne O'Connor, Dr Wendy Rowan & Ms Laura Lynch
A5	Socio-technical transitions of energy and transport infrastructures: Co-evolution and complexity as challenges for TA	Jens Schippl, Christian Büscher
A6	Technology in Perinatal Healthcare: Helping Mums and Babies	Charles Garvey
B1	Parliamentary Technology Assessment: Genetic tests during pregnancy	Dr. Sergio Bellucci, Dr. Michael Nentwich
B2	Ethical Impact Assessment for Research and Innovation	Zuzanna Warso
B3	The politics of TA	Leonhard Hennen & Linda Nierling
B4	Horizon Scanning: an instrument for early detection	Sylvia Veenhoff
B5	Towards a Global TA- Possibilities and Challenges	Miltos Ladikas, Michael Decker, Julia Hahn, Constanze Scherz
B6 - C6	A role play in TA practices: ways to shape the interaction between science and policy	Leonie van Drooge, Patricia Faasse: Anna van Saksealaan
C1	Making Sense of Public Engagement in Creating Knowledge for Decision-Making on Science, Technology and Innovation	Zoya Damianova
C2	Untamed participation? The role of bottom-up engagement in "Responsible Research and Innovation"	Anja Bauer, Alexander Bogner, Daniela Fuchs
C3	Knowledge for policymaking How to organize the use of best available knowledge?	Lilian van den Aarsen, Gert-Jan de Maagd
C4	Valuing and evaluating regenerative medicine's healthcare potential	Prof Andrew Webster
C5	Bioeconomy in the spotlight: TA-perspectives in a contested terrain of transformation	Carmen Priefer, Stefan Böschen, Rolf Meyer, Sophie Kuppler
B6 - C6	A role play in TA practices: ways to shape the interaction between science and policy	Leonie van Drooge, Patricia Faasse
D1	Getting the Story across – Challenges and Benefits of Communicating Technology Assessment	European TA Communicators
D2	Data protection and privacy impact assessments: An instrument foreseen by the new European data protection regulation	Michael Friedewald, Johan Čas, Walter Peissl, Raphael Gellert, Nils van Dijk
D3	Mutual Learning of Stakeholders and Citizens for a Sustainable Development	Mahshid Sotoudeh, Niklas Gudowsky, Ciara Fitzgerald, Lenka Hebáková, Tomáš Ratering, Natalia Goncharova
D4	Assessing technologies for health quality and an independent life	Leo Capari, Ulrike Bechtold, Maria Joao Ferreira Maia, Bettina Johanna Krings
D5	The extensive potential of gene drives based on the newly developed CRISPR-method – a challenge for Prospective Technology Assessment	Wolfgang Liebert, Bernd Giese, Jan C. Schmidt
D6	Responsible Research and Innovation: Perspectives from active and live RRI projects in Higher Education	Dr Ruth Hally

Room: Brookfield, Wednesday 3.15- 6pm

**Assessment of the Technology and Work Environments Relations**

António Moniz ITAS-KIT and FCT-UNL , Bettina Krings ITAS-KIT, Linda Nierling ITAS-KIT

- Linda Nierling - ITAS-KIT, Germany
- Alberto Cipriani - FIM-CISL, Italy
  - Digitalisation system and people involvement: practices to increase participation on the shop floor
- António Moniz -ITAS-KIT and FCT-UNL, Portugal
  - The relation between technology and humans under automation and Industry 4.0: will work disappear?
- Linda Kool - Rathenau Inst., Netherlands
  - Working on the robot society. It's not about technology, it's about us

Chairs: António Moniz, Bettina Krings, Linda Nierling

Since industrialization, the relationship between technical change and labor structures has been highly complex, and is still being discussed and interpreted today. The use of information and communication technologies has had an enormous impact not only on the reorganization of the service sector; the worldwide integration of technical systems (e.g. in production, logistics, marketing, etc.) has also created new forms of global value chains, leading to substantial changes in the mode of work, worldwide. Today, these changes can no longer be explained by a causal model, but new theoretical approaches are required to integrate the technological dimension into the new globalization debate, the long tradition of organizational sociology, and the debate about "subjectivization" of work. Singular aspects of technologies in the work process which bring about new developments (e.g. to new technologies in health care, cyber-physical systems, Industry 4.0) can be examined in the framework of technology assessment. The technological impacts of these developments in turn are integrated into a conceptual re-evaluation of the relationship between work and technology.



Room: Brookfield, Wednesday 3.15- 6pm

**Co-creating responsible research agendas**

Niklas Gudowsky (ITA-OEAW), Lars Klüver (DBT) (Denmark), Lenka Hebáková (TC-ASCR)

- Lars Klüver (Danish Board of Technology)
- Petteri Repo / Kaisa Matschoss (University of Helsinki, Finland)
- Lenka Hebáková (Technology Centre Czech Academy of Sciences, Czech Republic)
- Francois Jégou, Christophe Gouache (Strategic Design Scenarios, Belgium)
- Tomas Michalek (Slovak Academy of Sciences, Slovakia)
- Adele Flakke Johannessen (Norwegian Board of Technology)
- Arminas Varanauskas (Knowledge Economy Forum, Lithuania)
- Anna Kárníková - Deputy Director of the Department of Advisors to the Prime Minister and Director of the Strategic Governance Section, Czech Republic
- Guiseppe Borsalino – Policy officer, Science with and for Society (SWAFS), DG Research and Innovation, European Commission

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**Co-creating responsible research agendas**

Chairs: Niklas Gudowsky, Lars Klüver, Lenka Hebáková

Current STI governance is heavily challenged to meet demands arising from complex issues such as the grand societal challenges. A stronger orientation of research, development and innovation towards societal needs, demands and preferences has recently become a main argument under the header of RRI (responsible research and innovation) in the EU. Traditionally, expert-based forward looking has been applied to anticipate future challenges, solutions and strategic decisions, but limitations to this approach have become obvious — especially when considering long term perspectives — e.g. failing to include all necessary opinions. Here, advice giving processes opened up to stakeholder involvement, which became a norm over the last decades, yet including laypeople into forward looking science, technology and innovation governance is underexplored. Aiming at producing sustainable strategies for responsible socio-technical change, research funding can benefit from combining forward looking and public participation to elicit socially robust knowledge from consulting with multi-actors, including citizens. Research programme development presents an opportunity for an early entry point of public needs and values into the innovation process. Thus, research agendas are increasingly becoming the target of multi-actor engagement processes aiming at integrating a broader knowledge base. Designing, conducting and analysing such processes entails TA, foresight, design as well as several other interdisciplines.

In this session, we take a deep dive into the ongoing project CIMULACT – Citizen and Multi-Actor Consultation on Horizon 2020. In CIMULACT, more than 4500 citizens, stakeholders and experts from 30 EU countries engaged online and offline to co-create research topics based on social needs as advice for the next round of calls in Horizon 2020, national research agendas as well as the ninth framework programme in the making. Topics addressed include methodological questions, but will mainly focus on outcomes and their applicability to policy making.

**Citizen and multi-actor engagement for responsible research agendas**

*Lars Klüver (Danish Board of Technology)*

The ambitious citizens' and multi-actor engagement project CIMULACT ('Citizen and Multi-Actor Consultation on Horizon 2020') will be presented along with some

of the preliminary results. The project has within one year engaged more than 2000 citizens, along with a wide range of other actors, in redefining the European Research and Innovation agenda in order to make it more relevant and accountable to society. The first phase of the CIMULACT project aimed at revealing citizens' visions for sustainable and desirable futures by more than 1000 citizens from 30 European countries. In the second phase of the project these visions were transformed into research and policy options through a highly participatory process which involved citizens, experts, stakeholders and a variety of other actors. The participants contributed to the process during online and face-to-face consultations taking place in all 30 participating countries. The next steps of the project will be to transform the results of the second phase of the project into research policies and prioritized actions for Horizon 2020. As a part of this process the European Commission has received 23 drafts of concrete research topics based on the citizens' visions. In this way the project demonstrates that engaging citizens in defining research agendas and policies is possible and how higher standards for Responsible Research and Innovation can be achieved.

#### **Lessons learned from a large-scale transdisciplinary visioning exercise**

*Niklas Gudowsky / Walter Peissl / Ulrike Bechtold (Institute of Technology Assessment, Austrian Academy of Sciences)*

In a comparable Europe-wide process, more than 1000 laypeople (citizens) produced 179 visions of desirable futures which content wise built the basis for co-creating potential research topics for Horizon 2020 and possibly FP9. The method for 30 national visioning workshops (EU 28 + Norway and Switzerland) is based on the established CIVISTI-method (Citizens' visions on science, technology and innovation) but was advanced and adapted for CIMULACT. This presentation briefly investigates process adaptations and innovations, showcases the process itself to then draw lessons learned with regard to the visioning process specifically as well as for large scale consultation processes in general.

#### **Cross-national topic analysis of citizen visions**

*Petteri Repo / Kaisa Matschoss (University of Helsinki, Finland)*

Cultural and contextual differences are always difficult to account for when comparing data from many countries. When citizen engagement is of large scale as in the CIMULACT project and creates much data that is complex to analyse,

methodologies prevalent in the digital humanities could be a useful option to rely on. This talk reviews the usefulness of applying an established tool to this aim: the MALLET toolkit for natural languages (McCallum 2002). As data, we use the 179 visions developed in the CIMULACT project by over 1.000 citizens in 30 European countries. The analysis first identifies and defines common topics in the visions and then reviews how the topics are distributed across the citizen panels in 30 countries. This analysis also provides an assessment of how national topics relate to the European overall outlook.

McCallum, A. K. (2002). MALLET: A Machine Learning for Language Toolkit. Accessed 5.12.2016 at <http://mallet.cs.umass.edu>. 2002.

#### **How can citizens enrich research topics online? CIMULACT online consultation results**

*Lenka Hebakova (Technology Centre Czech Academy of Sciences, Czech Republic)*

Results of public online consultation on research programmes within the CIMULACT project shall be presented, followed by a discussion on methodology, mobilisation of respondents, success criteria or results interpretation possibilities and limits. Session shall enable to discuss advantages and disadvantages of an online consultation versus a face-to-face consultation; experts versus citizens' contributions or a common expression of interests in particular social need more than in another one. More generally, session shall discuss approaches towards the use of participatory methods in science-based policy making processes. From the end of August till October 20th the CIMULACT online consultation was running in 30 European countries asking citizens and other actors which direction research should go. More than 3,450 people participated. The online consultation was based on REAL societal needs identified during the previous CIMULACT consultations. Consulting citizens is the backbone of the CIMULACT project. However, in contrast to the earlier CIMULACT consultations that only involved a limited number of citizens selected after a set of criteria, 'Research for Society' aimed at involving a much larger sample of people. Together with a variety of other actors anyone enjoyed the opportunity to evaluate and enrich research programmes that has been further explored as policy options. These policy options – research topics suggestions have been presented as one of the relevant inputs to the European Commission for the H2020 Work Programme 2018-2020 content.

### **Stimulating conversations in citizen-based participative processes**

*Francois Jégou, Christophe Gouache (Strategic Design Scenarios, Belgium)*

Stakeholder meetings, user gatherings, citizen participation processes have to be carefully designed in ways that facilitates engagement, ensures equal deliberation, stimulates interactive and creative exchanges and enables constructive and open dialogue, etc. The tools used to enable a high quality deliberation (Cohen, 1989) should go beyond the now standard facilitation process of the "3P" (Paperboard, Powerpoint and Post-it) and explore new forms of participation. This paper will build on the experiences of the CIMULACT citizen-based participative process to contribute to orient European research policies to show how design-driven approaches can support efficient and creative deliberation. In particular it will describe a series of original facilitation processes tested in the course of the CIMULACT project (i.e. a set of visual inputs to stimulate citizens' visioning activities; a set of social need posters as a basis of interaction between citizens and researchers; a caravan touring stakeholders to interact with them in their own context; an exhibition to stimulate dialogue and involvement of European policy makers in order to illustrate the assets of design for citizen and stakeholder participation:

- \_ Specificity: designing ad-hoc tools that serve the particular purpose and context of the interaction;
- \_ Quality: ensuring a level of relational aesthetic and usability of the interaction materials to value the engagement;
- \_ Originality: innovating in the interaction process in order to place the subjects outside their comfort zone and stimulate their creativity.

The paper will conclude on the stakes and potentials of design-driven approaches to support the co-creation of public policies in general and research agenda in particular.

### **How national visions relate to European ones and vice-versa**

*Tomas Michalek (Slovak Academy of Sciences, Slovakia)*

The CIMULACT project was a great exercise of translation of national citizens visions to the European level. Almost 200 visions were clustered into 12 social needs and at the end resulted in the list of 23 co-created research topics presented to the European Commission. The idea was to present the research topics as based

on the citizens visions and the CIMULACT partners paid due attention not to forget about them during the whole process. But what was the journey of the particular national visions? How were the originally formulated visions embedded in the 12 clusters of needs and how did this narrowing influence the following process steps from the point of view of a particular country? And how are they reflected in the final list of 23 research topics? The reasoning behind these questions is to give also an insight on how "the journey back home" of the particular visions has looked like. In his talk, the author will use Slovakia as a case study in order to find answers to these questions. In his view, the CIMULACT project has a clear mission of translating the national visions to the European level and it clearly succeeded in delivering it. But there is also another outcome hitherto unexplored and it concerns the particular countries, the original providers of the visions. How does the (non)embedding of the original vision ease (or impede) the consequent process steps? What conclusions can be drawn from these findings? And what does it say about the standing of a particular country in the European context?

### **Policy makers as experts – increasing impact through active inclusion**

*Adele Flakke Johannessen (Norwegian Board of Technology)*

The proposed talk will reflect upon the purposefulness of engaging policy makers at an early stage, in order to increase project impact at a national level. In autumn 2016, NBT conducted two workshops as part of the CIMULACT project. Policy makers and experts were invited to enrich the draft research scenarios previously developed by European citizens and experts, based on the citizens' visions. Policy makers were targeted for two reasons. Firstly, we wanted their inputs. By engaging knowledgeable participants within relevant fields, the scenarios were challenged and enriched through focused and rigorous discussions. Secondly, we wanted to create awareness of and interest in the project from policy makers by involving them in it. This facilitated further contact and engagement at a later stage. The talk will present the Norwegian case and briefly discuss the benefits and challenges of this method.

### **Spill over effect of CIMULACT: a case of Lithuania**

*Arminas Varanauskas (Knowledge Economy Forum, Lithuania)*

In Lithuania there is no long tradition of citizen consultations on various topics, including science policy. This is connected with the fact, that after the collapse of

Soviet Union, Lithuanian higher education institutions were granted far reaching autonomy. It was response to the previous science censorship and ideological oppression. With all benefits came and drawbacks: academia closed themselves in Ivory towers and did not engage in active dialogue with social partners. One of main HE pillars - societal mission - of universities faded, thus fostering sceptical views on citizens' engagement and involvement. Several years ago situation began to change. Universities became more open (especially concerning their governance), but still, identification of the problems, research planning and conducting and even disseminating results were solely left for higher education institutions to decide. They did not see the value of the involvement of citizens, though one initiative from Lithuanian Science Council ran. As it was made in academic, not user-centric way, citizens did not engage in it. That strengthened sceptical views of academics and also was the signal for politicians and bureaucrats that this idea may not flourish. This is about time, when the CIMULACT project began. Citizens' vision creation, result and example dissemination in various formats (committees, working groups, etc.) open wider discussion on this matter. This led to Lithuania President initiative to create Lithuanian Science and Innovation Shift Guidelines, which was adopted by Parliament unanimously. One of the main directions stated in Guidelines is engagement of wider social actors in RRI process. In the process of implementation plan creation, the agreement was reached among different stakeholders that new piece of legislation and pilot initiatives will be made to increase citizen involvement on these matters. The process has started.

Room: Brookfield, Wednesday 3.15- 6pm

**Linking science and society to policymaking**  
**How to serve policymakers' needs?**

Chair Leonie van Droogen (Rathenau Instituut)

- Anne-Greet Keizer & Frans W.A. Brom (Scientific Council for Government Policy, WRR)
  - Connecting science and policy is not enough
- Geert Munnichs (Rathenau Instituut)
  - A stakeholder dialogue on the regulation of genetically modified crops
- Gloria Rose & Georg Aichholzer (ITA, Austrian Academy of Sciences, Vienna); Ira van Keulen & Iris Korthagen (Rathenau Instituut)
  - A servant of two masters? Functions of e-participation for decision-makers and the public
- Daniel Ketzer, Nora Weinberger & Christine Rösch (ITAS); Stefanie B. Seitz (DBFZ, UFZ Helmholtz Centre for Environmental Research)
  - The role of inter- and transdisciplinary project consortia in technology assessment – Chances and challenges of closeness to politics
- Wieke Betten & Frank Kupper (Athena Institute VU University):
  - Critical reflections on the use of multi-stakeholder dialogues as a method for mutual learning
- Peter Keet (Ministry of Economic Affairs)
- Lilian van den Aarsen (Ministry of Infrastructure and the Environment)
- Frank Kupper (Athena Institute VU University)

Chairs: Leonie van Droogen

In this session we will explore how the needs of policymakers can best be served by making use of technology assessment and related activities such as science and technology studies and responsible research and innovation (RRI). What methods to integrate scientific findings and societal perspectives into the policymaking process turn out to be useful and successful? What needs do policymakers have? And how could TA and RRI practitioners serve these needs, and at the same time keep their independence? Different methods and best practices from different countries will be compared in order to learn from each other's experiences. The Rathenau Instituut will give a presentation on the stakeholder dialogue as a method to link scientific expertise and stakeholder views to the policymaking process. In 2016 the Rathenau Instituut organized a stakeholder dialogue, commissioned by the Ministry of Economic Affairs, on the hard to handle policy issue how to regulate the cultivation of genetically modified crops on a national level. In the session the method of the stakeholder dialogue will be reflected upon and compared to similar methods that link scientific findings and societal perspectives to the policymaking process.

Room: Brookfield, Wednesday 3.15- 6pm

### **CROSSING THE CHASM TO DIGITAL HEALTH DATA**

Dr Ciara Heavin, Dr Yvonne O'Connor, Dr Wendy Rowan & Mrs Laura Lynch (HISRC, UCC)

- Jennifer O'Callaghan, Clinical Data Sharing Manager, Wellcome Trust
- Dr Barbara Foley, Health Information Manager (Quality), Health Information and Quality Authority (HIQA)
- Dr Grace Kenny - Exploring Citizen-Determined Boundaries For Health Data Dissemination And Usage: A Communication Privacy Management Perspective
- Stephen McCarthy - The Importance of Shared Understanding and Shared Commitment in 'Wicked' Health Information Systems Development Practices
- Yahya Albalawi - Opportunities for Social Media to Support Health Communication in Health Crises
- Dr Wendy Rowan & Ms Laura Lynch - To Join or Not to Join: Knowing the Differences between Health Social Networks and Social Network Sites

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### **CROSSING THE CHASM TO DIGITAL HEALTH DATA**

Chairs: Dr Ciara Heavin, Dr Yvonne O'Connor, Mrs Laura Lynch & Dr Wendy Rowan

There are many ways by which citizen health information may be shared and reused. When patients (users) share personal health information (PHI) with healthcare professionals, online patient communities, or clinical trials, do they give enough consideration to what this means?

When it comes to sharing PHI online, it is important to consider who will have access to this valuable, sensitive data and how it will be used in the future. In reality, it is recognised that huge opportunities stem from sharing PHI online, particularly in terms of the potential to improve overall health outcomes by harnessing the power of 'the crowd'. It is essential that in realising these benefits we consider the broader implications around safeguarding the digital health personas of our citizens. The role of digital technology in driving forward the use of PHI cannot be underestimated.

This workshop aims to explore the opportunities, challenges and ethical considerations regarding patient data, specifically the digitization of PHI. With two subject matter health/clinical data experts we look forward to a lively debate.

### **EXPLORING CITIZEN-DETERMINED BOUNDARIES FOR HEALTH DATA DISSEMINATION AND USAGE: A COMMUNICATION PRIVACY MANAGEMENT PERSPECTIVE**

Privacy has played a fundamental role in healthcare delivery for centuries with patients disclosing sensitive data to health professionals for the sole purpose of receiving treatment. However, the proliferation of information technology in recent years has transformed the nature of privacy in healthcare, facilitating the electronic storage and dissemination of data collected by health professionals as well as leading to the emergence of new players such as health platforms, mobile health applications and tracking devices which empower patients to generate their own health data.



Today, the possibilities for sharing health data generated by health professionals and patients themselves are endless, but what becomes of privacy in this unique context? Existing research supports the continued relevance of privacy with studies showing that citizens continue to view their health data as personal and sensitive (Eurobarometer, 2011), and citizens' health privacy concerns reduce their willingness to adopt health technologies (Angst and Agarwal, 2009), and may lead them to engage in privacy-protective behaviours such as withholding health data from health professionals (Campos-Castillo and Anthony, 2014). Despite growing empirical interest in this area, many gaps in our understanding persist. This study is motivated by the need to understand how citizens make health data disclosure decisions both in the context of receiving care from healthcare professional and when utilising mobile health applications.

The paper utilises communication privacy management (CPM) theory as a lens for understanding how citizens navigate the many health data disclosure decisions they face. To extend CPM theory to this context, the paper adopts a qualitative exploratory approach and conducts 25 interviews with Irish citizens to answer two research questions. The first question seeks to elucidate the underlying rules which citizens rely on to determine what type of health data to disclose, and to what parties. The second question explores citizens' perceptions of collective boundaries created upon disclosing their personal data to another party, and the rules they desire to impose for use and dissemination of data shared within these boundaries.

This paper provides empirical evidence on the barriers created by citizens to govern the disclosure of their personal health data, and citizens' views on how collective boundaries should be respected with strict rules guiding the future dissemination and use of their data by other parties. The paper also extends the CPM theory to the changing healthcare context to understand the different rules governing initial disclosure decisions and the rules created for collective boundaries.

**Keywords:** Health information privacy, health data disclosure, privacy boundaries, Communication privacy management theory.

## **The Importance of Shared Understanding and Shared Commitment in 'Wicked' Health Information Systems Development Practices**

Information Systems development in the healthcare domain presents practitioners with a set of unique and multifaceted challenges. For instance, the healthcare system is a complex and evolving socio-technical environment with multiple stakeholders and numerous constraints (Weeger & Ott-Schwenk, 2017). Consequently, the problems faced by Health Information Systems (HIS) practitioners tend to be uncertain, contentious, ill-structured, and poorly defined, otherwise referred to as 'wicked' problems (Rittel & Webber, 1973). Moreover, the practice of HIS development tends to also be 'wicked', given the considerable complexity faced in determining an optimal approach for tackling problems. As a result, HIS development usually requires the involvement of multi-disciplinary stakeholders to overcome the knowledge gap of any one individual and gain a holistic perspective of the healthcare context.

It is in this scenario that both Shared Understanding (SU) and Shared Commitment (SC) become essential to the success or otherwise of wicked practices. SU refers to the "degree to which people concur on the value of properties, the interpretation of concepts, and the mental models of cause and effect with respect to an object of understanding" (Bittner & Leimeister, 2014, p. 115). Meanwhile, SC goes further and requires stakeholders to utilise time, effort, and resources in line with proposals that have gained SU (Briggs, Kolfshoten, & Vreede, 2005). The concepts of SU and SC are therefore interdependent as both affect the success of wicked practices (Conklin, 2005). SC cannot arise in the absence of SU, yet SU alone is not enough. For instance, SC may not be present, even when multi-disciplinary stakeholders have a SU of the wicked practice. This is particularly true in wicked practices involving multi-disciplinary teams where the reconciliation of the divergent perspectives requires the problem, process, and solution to co-evolve through reflection and articulation.

In this presentation we look at complex evolving journey of SU and SC in wicked practices such as HIS development. In particular, we focus on the five sources of conflict that effect the emergence of SU and SC among multi-disciplinary requirements engineering teams: differences in mental models, differences in resources, differences in individual goals, differences in interests or tastes, and

differences in the meaning (Briggs et al., 2005). These sources of conflict are investigated using the authors' theoretical lens the 'Typology for Shared Understanding and Commitment in Wicked Practices'. Empirical findings from a case study are then presented to illustrate the power of the lens.

### **Opportunities for Social Media to Support Health Communication in Health Crises**

In recent years, there has been significant growth in the uptake of personal communication technologies across the world. This has been largely afforded by the wide availability of social media (SM) and facilitated by the increase in smartphone ownership. However, this growth does not come without disadvantages. For example, there is growing evidence that misinformation generated across SM platforms can generate negative impacts, for example, misinformation relating to people's health.

In this paper, we explore this phenomenon and examine the impact of SM on health communications. Specifically, we present a structured literature review that identifies the key gaps in current literature. Our results indicated that while Twitter is the dominant SM tool in health communications, there is a lack of research on non-English-language contexts. We also found that there is a lack of evidence on identifying the key stakeholders providing health information on Twitter. We explain that due to the spread of misinformation during health crises, there is a need to identify the factors which contribute to improved dissemination of health information.

**Keywords:** Social Media, New Media, Twitter, Health Communication, Risk Communication, Misinformation

### **To Join or Not to Join: Knowing the Differences between Health Social Networks and Social Network Sites Research in Progress**

Recently healthcare providers and patients have identified the benefits associated with using health social networks (HSNs). HSNs provide the opportunity for patient

centric healthcare by facilitating patient empowerment and engagement where health outcomes have the potential to be enhanced by harnessing the wisdom of the crowd. Noteworthy, opportunities have been associated with the provision and sharing of Patient Generated Health Data (PGHD) online. While HSNs appear to benefit users they are not without limitations, particularly given the sensitivity and high value of PGHD being shared by users. Several ethical issues related to online PGHD exist in this new healthcare ecosystem. Certainly, data privacy, data security, informed consent, patient comprehension of the terms and conditions of the HSNs and other online settings selected to share health-related data are areas for further exploration. In reality, when signing up to HSNs (often performed via mobile devices) users provide their digital consent (eConsent) without fully understanding the HSNs privacy policy. There is a dearth of research which examines the decision-making process of HSN users when providing eConsent using mobile devices and existing research indicates that little consideration is given by an individual in terms of the future sharing and usage of their PGHD online. This research explores Social Network Sites (SNS) and how they compare and contrast with HSNs, leading to a discussion on HSNs digital consent (eConsent) process. It is envisioned that this work will contribute to both theory and practice, the output can be built into the design of HSNs privacy policies and deliver insights into an under-investigated area of research and provide significant practitioner guidance in the development of effective and accessible terms and conditions statements, privacy policies, privacy awareness and training programs.

**Keywords:** Health Social Network Sites, Patient Generated Health Data, Informed Consent, eConsent, Control, User Perceptions, Health Data, Social Network Sites

Room: Brookfield, Wednesday 3.15- 6pm

**Socio-technical transitions of energy and transport infrastructures: Co-evolution and complexity as challenges for TA**

Chairs: Jens Schippl, Christian Büscher

- Introduction: Socio-technical transitions of energy and transport infrastructures: Co-evolution and complexity as challenges for TA (*Jens Schippl, ITAS/KIT, Germany*)
- Citizens' view on renewable energy technologies – insights into the complexity of the energy transition in rural areas (*Christine Rösch, Daniel Ketzer, Nora Weinberger, ITAS/KIT, Germany*)
- UK fuel and transport technology: Socio-technical transition or lock-in? (*Les Levidow, Open University, UK*)
- From (co-)evolution to synchrony-a reformulation of TIS according to the manifold shapes of technologies and the time qualities of functions (*Ulrich Dewald, ITAS/KIT, Germany*)
- Technology Assessment Concepts for Interdisciplinary Research on Infrastructures (*Christian Büscher, ITAS/KIT, Germany*)
- Open Discussion about the topics of the session

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**Socio-technical transitions of energy and transport infrastructures: Co-evolution and complexity as challenges for TA**

Chairs: Jens Schippl, Christian Büscher

This session will address the challenge for TA to deal with the complexity of large scale infrastructural transitions in the energy and in the transport system. In both sectors, a broad range of innovative technologies with a high transformative potential are already commercialized or at least emerging. But infrastructures are socio-technical systems. It is widely acknowledged that not only technologies, but a much broader, wider perspective is needed to understand, anticipate, assess and affect the course of transitions in complex infrastructure system. However, already rather traditional, technical-economical conceptualizations or models of infrastructures take into account a variety of rather different factors. Applying a socio-technical perspective and assuming a co-evolution between technical and societal factors, between various innovations, process of institutional change and dynamics in behavioural patterns, appears to add immensely to this complexity.

Several concepts or theories try to address the co-evolutionary dynamics in infrastructural transitions, such as the so-called multi-level perspective (MLP), the idea of technical innovation system (TIS), the concept of large scale technical systems (LTS) or also actor network theory (ANT). Further approaches are emerging, for example the idea of understanding socio-technical system as a socio-technical problem that can be related to three different but interrelated dimensions: structure, institution and operation. In the field of scenario studies, the idea of adding a socio-economic context to the traditional technical-economical scenarios has recently gained on importance, with the help of the so-called cross-impact method. Story-and simulation approach follow a more simple approach, by adding societal context in form of storylines based on intuitive logics.

Whilst all this approaches are more or less established in their respective field and have their communities, it usually still is a kind of challenge to use them in the TA context, in an explicit ex-ante perspective, for the anticipation of future processes of change. In this session we want to deal with the question of how to deal with co-evolutionary dynamics in TA processes, without getting too complex on the one

hand, and getting to simplistic on the other hand? Ideas, concept, methods, practical examples, case studies related to the policy-oriented anticipation of socio-technical dynamics are welcome in his session. What are example or best practices for an appropriate degree in complexity in transition-related TA? Which theoretical concepts can serve as a basis for successful approaches? Which degree in complexity is needed in transdisciplinary contexts, in the communication with stakeholders or policy makers, or in the communication with other scientist who might further use such approaches?

***Technology Assessment Concepts for Interdisciplinary Research on Infrastructures***  
***Christian Büscher***

Energy transitions around the world challenge established patterns of technology, business operation and behaviour. Renewable Energy Supply (RES) is widely considered as a new lead technology: the solution for society's manifold problems of energy supply. However, every new technological solution creates new problems. According to Edwards modern infrastructures can be characterized as "linked series of sociotechnical problems." This suggests, first, there are problems which cannot be reduced to merely technical, or merely social variables; second, these problems need constant attention, because they cannot be solved for good; third, these problems have to be solved in the present to sustain current operation and for the future to achieve sustainability of energy supply. In order to understand these fundamental problems they have to be analyzed in the factual (1), social (2) and temporal (3) dimension: (1): We encounter the problem of control despite increasing complexity because more heterogeneous elements and varying interrelations between these elements can lead to emergent behaviour; (2) We encounter the problem of change despite the need for stability, because an overall loss of orientation should not occur in crucial infrastructures; (3) We encounter the problem of sustaining action because the increasing discrepancy between simple interfaces and complicated technological realities in the background leads to the perception of uncertainty and risk.

With the concept of "Socio-Technical Problems" a new analytic pathway will be explored which combines systems theory (Entropy, Contingency), especially concepts of Luhmannian operational constructivism, with contemporary social science research of energy.<<

***From (co-)evolution to synchrony-a reformulation of TIS according to the manifold shapes of technologies and the time qualities of functions*** Ulrich Dewald, Institute for Technology Assessment and Systems Analysis; Karlsruhe Institute of Technology

The TIS debate in sustainability transitions is characterized by an antagonism. On the one side, the functional TIS approach found wide resonance among scholars and politicians. On the other side conceptual core questions are discussed among TIS researchers. Does this indicate discontent even on its epistemological core? Maybe, but given the vast emergence of the TIS approach within only a decade, such discontent is not surprising. It shows that the discussion is advancing from insights in practical fields, thus real innovation systems in sustainability contexts, towards insights or debates on the core questions – in how far the TIS approach advances our understanding of technological progress. Discontent should therefore be welcomed in a common attempt for conceptual advance.

Advancing TIS strives for a better understanding of technological progress. Just repeating the move from empirical insights towards conceptual advance, the aim of this paper is to redraw the functional TIS approach. The insights provided are drawn from investigations with the case of the German photovoltaic TIS (Dewald and Truffer, 2011; Dewald and Fromhold-Eisebith 2015) and recent empirical work on innovation dynamics in a more mature context, namely cement technology (Dewald and Achternbosch, 2016). From the engagement with a mature and emerging TIS, it is obvious that manifold differences unfold e.g. with regard to the contribution of the different functions to the overall TIS performance. For example, the PV TIS is still characterized by a competition of different technological designs, such as thin-film and wafer-based photovoltaics, and this competition now already

lasts for six decades. It indicates ongoing path-changing potential from the generation of new knowledge. On the other side, the cement production system centers on one dominant design according to its core material, which is limestone. A large-technical production infrastructure and a fine-tuned system of institutions such as standards emerged around the core material, which resists change due to such characteristics, which finally shifts attention to the core metabolism of the technological system. Incremental innovations as the primary mode of progress enables to assign the knowledge generation function a path-stabilizing effect in this case. Abstracting from such differences the question arises of how to arrive at other explanations of our objects, which are basically technologies in a time perspective?

Redrawing the TIS approach is based on two refinements, which are first technologies in its manifold shapes, and second technologies in a time perspective. According to the first, a differentiation could specify tools, products, technologies or systems as very different manifestations of a technology, which all differ regarding, for example types of actors, networks and institutions as basic TIS categories (Carlson and Stankiewicz, 1991), but additionally with regard to technological complexity. Due to a fixation in systems thinking, TIS scholars do not properly address the level of tools and products. But it is obvious that the transfer of a technology into a product, by innovation, very much shapes the constellation of functions in a TIS. Being transferred into a product, the technology is then handed over to a business exploitation cycle and dynamics of commodification start to alter the technology, a process which sometimes transfers the beloved artefacts into very unsustainable objects. The first refinement is therefore to differentiate between such shapes of a technology and to investigate, e.g., the transformation of a technology into a product. This adds a dynamic perspective which leads to the second refinement. Here time and synchrony are introduced as alternatives to evolution. A TIS could be understood as a force field, in which simultaneously path-changing and path-preserving dynamics unfold. Some of the functions could be easily assigned to one of these options, e.g. the knowledge formation function as usually a path-shaping process for an emerging technology, and the resources function as maybe path-preserving due to under- or misallocation. A point in time, opposed to a linear understanding, unites in parallel

past and future related influencing factors. In how far a technological path is altered depends on the shaping power of each function and the synchrony of the different functions. A case in point is to be found again in the PV trajectory in Germany. Market formation occurred at a very early stage, and only thereafter an industry cycle emerged, which then ended in a vast shakeout within only a couple of years. A range of asynchronies to what we usually expect in a more linear understanding of technological change characterize the photovoltaic path. This example gives a glimpse of how a time understanding focusing on synchrony could advance our interpretations of technological trajectories. Moreover synchrony allows thinking of all functions bearing their own time qualities. The time quality of the legitimacy function is very much depending on which actors are involved. A technological field which is less exposed to political debate (like cement) might be characterized by a synchronized legitimacy function, simultaneously to other functions, such as market formation. Combined, a smooth development process unfolds which could be disrupted only by external events. In a policy-relevant contested technology like photovoltaics, the synchrony of the legitimacy function with the others might largely disaccord, leading to manifold ruptures, as described with the case of markets preceding industry formation. This is usually called co-evolution, but could maybe better be described by synchrony, especially when engaging in a prospective direction.

The paper explores both differentiations, technologies in its manifold shapes and the time qualities of functions with reference to empirical insights of cement and photovoltaic technology.

**UK fuel and transport technology: Socio-technical transition or lock-in?** Les Levidow Open University

Stimulated by national commitments under the 1997 Kyoto Protocol, the UK government soon recast various policies. In a future low-carbon Britain, renewable energy would power hydrogen fuel cells, thus taking motor vehicles beyond the internal combustion engine as well as beyond fossil fuels. UK academics anticipated a socio-technical transition integrating the fuel and transport sectors along more environmentally sustainable lines. Two decades later, such a transition

can hardly be seen: why? Under the 2009 EC Renewable Energy Directive, the UK had mandatory targets for such energy in transport fuels, which realistically meant biofuels until the 2020 target date. Although some innovators promoted links between biofuels and hydrogen fuel cells, this pathway has remained marginal for several reasons. Through state investment structures, R&D priorities have been shaped by major energy companies seeking functional equivalents for fossil fuels and high-value chemicals. In the name of making UK science more competitive, research institutes re-aligned their priorities towards investment from foreign counterparts and global energy companies, which sought proprietary knowledge for 'drop-in' fuels. Mandatory targets for biofuels were envisaged as a temporary transition pending 'advanced biofuels', yet these have remained elusive. Meanwhile financial incentives have locked in the conventional biofuel industry. Together those forces perpetuate infrastructural dependence on liquid fuel for the internal combustion engine. Beyond the lock-in, what could stimulate a socio-technical transition? Like most of UK industry, the energy and motor vehicle sectors are mainly owned by foreign companies, resulting from three decades of privatisation policies. Their path dependence could not be overcome simply by different market incentives from government policy. A transition would require a political alliance of different forces transforming and re-linking both sectors.

**Citizens' view on renewable energy technologies – insights into the complexity of the energy transition in rural areas** Christine Rösch, Daniel Ketzer, Nora Weinberger

The presentation addresses the challenge to deal with complexity when establishing the infrastructure for a decentralized renewable energy production to support the energy transition. By a better understanding of this complexity, the energy transition in rural areas could be pushed and the controversially discussed expansion of the power grid reduced. Renewable energy plants have a multifaceted character and high transformative potential, as examples of wind farms, solar parks, and biogas plants in combination with widespread maize fields clearly show. In particular, people living in rural areas have to deal with these

transformations and their trade-offs. It is widely acknowledged that citizens should be integrated at different scales into the development of renewable energy technologies and infrastructures, as well as into the design of policies and legal frameworks to support and establish them. In this way a broader, wider perspective on technology and policy design can be achieved and the underlying reasons for social acceptance or resistance can be better understood and considered. However, for laypeople, it might be rather difficult to take into account the many and diverse aspects related to renewable energy technologies such as Agrophotovoltaic (APV) in order to get a systems perspective. The presentation contributes to the discussion on how to deal with co-evolutionary dynamics in TA processes, without getting too complex on the one hand, and simplifying too much on the other hand. With the case study on APV, a practical example is given that links to the policy-oriented anticipation of socio-technical dynamics. In the APV-RESOLA project, a citizens' workshop with 26 participants has been carried out with people living in the surroundings of the APV pilot plant prior to its construction to assess their views on the technology. In focus group discussions, relevant aspects have been collected and then further discussed in the World Café format. The presentation firstly gives an overview on the complexity of the APV technology and its relevance for the energy transition, as well as on the location of the pilot plant in the region of the lake Constance. Then the relevant aspects of the technology identified by the citizens are elucidated. The results show that the citizens are well aware about the complexity of the energy transition in rural areas and the need to appropriately embed renewable energy technologies, while avoiding changes in the agriculture system and the landscape, as well as negative effects on recreation and tourism as much as possible. The participants considered the misbalance between energy supply and demand as crucial challenge for the energy transition and recommended the integration of power storage systems, but also further improvements for energy efficiency and savings in general. In this regard, they postulated to first install photovoltaic modules on any available roof and industrial area before altering agricultural and natural landscapes with ground open space photovoltaic or mounted APV modules.



Room: Brookfield, Wednesday 3.15- 6pm

**Technology in Perinatal Healthcare: Helping Mums and Babies**

Chair: Charles Garvey, CEO of Metabolomic Diagnostics

- Dr Yoke Yin Lim: Leanbh Study
- Caroline Nolan: PARROT study
- Prof Louise Kenny: Overview on Perinatal Research

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**Technology in Perinatal Healthcare: Helping Mums and Babies**

Chair: Charles Garvey, CEO of Metabolomic Diagnostics

The INFANT centre is focused on improving outcomes for pregnant women and newborn babies. Funded by Science Foundation Ireland, the multi-disciplinary team includes clinicians, scientists, engineers, nurses and research support staff. INFANT's mission is to make pregnancy safer and to improve health outcomes for mothers and babies worldwide. INFANT's research studies have a proven national and global impact, combining research expertise with industry partnerships to investigate perinatal healthcare solutions. INFANT's approach on Connected Health combines elements of hardware electronics and software with clinical applications. They aim to provide local and remote monitoring solutions for the monitoring of pregnant women and newborn babies. By facilitating personalised healthcare in the home and community, INFANT meets the challenges facing early diagnosis of birth complications. Our collaboration with IBM, using their InfoSphere Streams Technology, has resulted in projects like Babylink providing decision support for the neonatal unit by real-time processing of large amounts of anonymised physiological data. INFANT's research has a unique capacity to assist in clinical decision-making across multiple sites, with significant potential for future applications beyond the NICU. The potential of the research is both medical and commercial.

LEANBH (Learning to Evaluate Blood Pressure at Home) is a study which investigates hypertensive disorders in pregnancy. Hypertensive disorders are a leading cause of mortality and morbidity. Home blood-pressure monitoring (HBPM) is widely available, economical and comfortable. For this reason, many pregnant women prefer it. However, while it has the potential to reduce clinic visits, no trial has been performed to assess the impact of HBPM on maternal or perinatal outcomes. The goal of LEANBH is to design, develop, validate and evaluate a software and technology framework which communicates home BP readings and associated risk factors (history of hypertension, pre-eclampsia, diabetes or renal disease, age, obesity, smoking, multiparity, nulliparity) to relevant healthcare providers e.g. General Practitioner (GP), Midwives, Obstetric team. This

architecture will provide the platform for future electronic maternity healthcare records.

PARROT is an interventional study which involves a randomised control element. Researchers are working towards a better understanding of placental growth factor (PIGF) with a view to reducing maternal illness. In the long term, the PARROT study will use this research to influence clinical practice. Measurement of PIGF will see mothers with suspected pre-eclampsia receive appropriate care. This study will help to identify ways of making sure adverse outcomes are reduced for high-risk mothers, while those with lower risk will be managed without unnecessary hospital admissions or interventions. PARROT will, as a result, have a major impact on how the treatment of pre-eclampsia works.

Room: Brookfield, Thursday 9.30-12.15

**Parliamentary Technology Assessment: Genetic tests during pregnancy**

Chairs: Dr. Sergio Bellucci (TA-SWISS) and Dr. Michael Nentwich (ITA-OEAW)

**Speakers:**

- MP Thomas De Courten, National Council, Swiss People's Party
- MP Min Li Marti, National Council, Social Democratic Party of Switzerland
- Dr. Dorothea Wunder, Centre for Medically Assisted Procreation (CPMA), Lausanne, Switzerland; member of the Swiss National Advisory Commission on Biomedical Ethics (NCE)
- Dr. Erich Griessler, Institute for Advanced Studies, Vienna
  - The clinical and political domain of prenatal diagnosis in Austria. Old debates, new roles, anxieties, pressures and stress
- Dr. Jean-Daniel Strub, Brauer & Strub, Zurich
  - Main results of the TA-SWISS study "Genetic tests during pregnancy"

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**Parliamentary Technology Assessment: Genetic tests during pregnancy**

Chairs: Dr. Sergio Bellucci (TA-SWISS) and Dr. Michael Nentwich (ITA-OEAW)

The new non-invasive prenatal tests (NIPT) can be done early during pregnancy and only involve blood being taken from the pregnant woman. From this are extracted fragments of the embryonic genetic material, which is then tested for possible genetic defects. The new technology of early and easy testing gives new momentum to the general debate on prenatal diagnosis (PND). A key question concerns the need for appropriate, comprehensive consultation that goes beyond the purely medical, which allows the pregnant woman freedom of choice and places no pressure of any kind on her. The TA-SWISS study "Genetic tests during pregnancy" is an example for the parliamentary technology assessment approach, because TA-SWISS has been invited in three political commissions for presentation of the results. A revised version of the Swiss Federal Act on Human Genetic Testing (HGTA) should be ready for deliberation in parliament in the course of this year.

In Austrian maternity care, prenatal diagnosis is routinely practiced, but still – like in many countries – a sensitive and controversial political issue. There are several reasons for this apparent paradox: PND strives to contribute to the birth of healthy children but it also relates to negative and positive eugenics and a society's attitudes towards physically or mentally challenged people; PND can lead to the decision for abortion, which in is a highly controversial practice in many societies. The presentation will address how PND is governed and practiced in Austrian maternal care. Based on qualitative interviews with actors in the clinical and political domain the paper outlines how PND transforms pregnancy and the relationship between the physician and the pregnant women. For both PND provides new chances and certainties but also generates new anxiety and stress as well as mutually enforcing pressures.

Room: Brookfield, Thursday 9.30-12.15

**Ethical Impact Assessment for Research and Innovation**

Chairs: Zuzanna Warso, Helsinki Foundation for Human Rights

- Prof. Philip Brey, University of Twente
  - Ethical impact assessment
- Marlou Bijlsma, Netherlands Standardization Institute
  - Standardizing ethics assessment: process and results
- Agata Gurzawska, University of Twente
  - Responsible innovation and business
- Raija Koivisto, VTT Technical Research Centre of Finland Ltd)
  - Roadmap for the implementation and use of the ethics assessment framework

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**Ethical Impact Assessment for Research and Innovation**

Chairs: Zuzanna Warso, Helsinki Foundation for Human Rights

In this session speakers will present main results of the SATORI project. The aim of the project has been to develop frameworks, good practices and tools for the ethical (impact) assessment of research and innovation in all scientific fields in the European Union and beyond. The session will be moreover used to discuss the possibility to continue the SATORI work by implementing the outcomes

Room: Brookfield, Thursday 9.30-12.15

### The politics of TA

Chairs: Dr Leonhard Hennen & Dr Linda Nierling

- Dr Karen Kastenhofer & Dr Anja Bauer, ITA, Austrian Academy of Sciences
  - Science-based policy advice in TA – implicit paradigms, professional ethos and bones of contention
- Dr Rinie van Est, Rathenau Instituut
  - Thinking technology assessment politically
- Dr Pierre Delvenne, University of Liège
  - Technology Assessment and neoliberal STI policies as dancing partners: critical insights in the new spirit of Technology Assessment
- Mario Kaiser, Avenue jetzt
  - A critique of assessing disruptive technologies
- Gloria Rose & André Gzásó, Austrian Academy of Sciences, ITA, Austria
  - Nano Risk Governance: Participatory processes as part of early stage risk assessment and the role of TA
- Dr Les Levidow, Open University
  - Participatory TA as implicit politics: the case of European agbiotech
- Prof Harro van Lente, Maastricht University
  - Possibilities of Proactive TA
- Stephan Lingner (EA European Academy of Technology and Innovation Assessment)
  - TA on the political arena: being part of the game or restricting itself to the “facts”?
- Dr Helge Torgersen, ITA/OEAW, Vienna, Austria
  - A mythology of neutrality in TA

Chairs: Dr Leonhard Hennen & Dr Linda Nierling

From its beginnings in the 1970s the concept of TA has been strongly bound to and legitimated by the “neutrality” narrative. Being “a-political” in the sense of restricting itself to the role of a “knowledge broker” and refraining from taking a strong political stance in terms of recommending specific political action has been at the core of TA’s understanding of policy advice – in particular in the context of parliamentary TA. We would like to challenge this self-description by asking “Does TA have politics?”

**Science-based policy advice in TA – implicit paradigms, professional ethos and bones of contention** *Karen Kastenhofer, Anja Bauer, Institute of Technology Assessment, Austrian Academy of Sciences*

In summer 2016, the Institute of Technology Assessment (ITA) at the Austrian Academy of Sciences launched its first internal project, ‘Policy Advice at ITA’ or Pol[ITA] – addressing open questions pertaining to the very practice of technology assessment as a hybrid activity combining scientific research, societal reflection and policy advice. The general objective of this project is to address the practice of policy advice at ITA, its diversity and change over time. More specifically, we aim at reconstructing and reflecting prevalent modes and implicit paradigms of advisory activities. Key questions include: Do different modes of science-based policy advice stabilise along specific actor constellations, technological themes or issues? What role do implicit paradigms (like the idea of pure science or the linear model of policy advice), explicit typologies of science-policy interactions (like Pielke’s issue advocate and honest broker or Weimer and Vining’s client’s advocate) and underlying conceptions of a professional ethos play (honesty, disinterestedness) in TA’s advisory practice? What can we learn from these results for the collective development of quality criteria, standards and professional self-understanding? With Pol[ITA], we aim at filling a gap in the reflection of TA practice and identity. Situated at an academic institution, the *scientific* output and quality of our projects and publications is well monitored, *academic* enculturation (including the adoption of a specific ethos) is secured through previous university education of TA practitioners; the *societal and political* impact and the quality of the science-policy interface on the other hand are addressed only for specific projects by specific

actors (as a ministry would for instance feedback in explicit or implicit ways on the policy relevance of a project it co-funded). If there is such a thing as a 'TA ethos', practitioners certainly have to develop it during a further round of socialisation. In May 2017, we will have compiled a list of all projects conducted at ITA and finished a round of qualitative interviews with all TA practitioners at the institute. This will provide us with the opportunity to present a first list of prevalent paradigms and stabilised modes of realising the bridge between science and policy, including the presumably varying roles and standards characterising the diverse landscape of TA in practice.

#### **Thinking technology assessment politically. Rinie van Est, Rathenau Instituut**

Technology assessment (TA), and in particular Parliamentary TA, has a strong political dimension to it. This is because TA deals with the relationship between technological change and social problems. In addition, it is the political system that both enables and constrains the institutionalization and practice of TA. To exist Parliamentary TA needs support from the political system. And to maintain support, the activities of Parliamentary TA should be seen as supportive of the political system. This paper reflects on this two-way relationship between the political system and the practice of TA. For example, could there be a role for TA in an era of fact free politics or alternative fact politics?

To study the political boundaries of the practice of TA, this paper first maps various arguments or framings used by the political system to either legitimize or disapprove of the institutionalization of TA. Secondly, it reflects on the type of inputs that TA organizations may legitimately feed in to political systems.

#### *Political framings that support or reject TA*

Parliamentary TA can only exist when it is legitimized by the political system. The example of OTA in the United States and IST in Flanders show that the political support for TA is not self-evident, and can change over time. TA needs to be accepted by the political system to be regarded as a legitimate part of that system. This relates to the issue of whether TA has a legitimate role to play within the innovation process, the political system, and, more specific, the political decision-making process. Various arguments can be used to either support or reject TA. I will reflect on framings with regard to 1) the role of science, technology and innovation in society, 2) the relationship between the Parliament, government, science and society, and 3) the role of information and debate within the political

debate. With respect to the latter, notions like positivism and constructivism, and political or moral absolutism (if you don't have any doubt about your position, you are not interested in democratic debate) and relativism or liberalism play a role.

#### *Legitimate or illegitimate roles of TA*

When TA plays a part in the political system, its activities are supposed to have an impact on the political system. Not all types of products are legitimate. It would be strongly disapproved when a TA organization would produce an unsound scientific product or a clearly biased political pamphlet. So what kind of TA products or activities are legitimate; which political room for manoeuvre do parliamentary TA organizations have? I will discuss various views on this issue. From a positivist perspective parliamentary TA organizations should deliver 'unbiased information', and map the 'facts' which would be useful for each political position. From a pluralist view TA could provide tailor-made information to various political parties by mapping the various political positions, values and arguments in play, and the related policy options available. From a deliberative point of view TA is allowed to look for middle ground and consensus. I will explore to what extent TA is allowed to go beyond such activities. To what extent, may TA play a more constructive role with regards to politically acknowledged objectives, like grand societal challenges or constitutional or universal human rights. To what extent is TA allowed to bring in new perspectives and opinions, and provide interpretations of the societal meaning of larger scientific and technological trends?

#### **Technology Assessment and neoliberal STI policies as dancing partners: critical insights in the new spirit of Technology Assessment. Dr. Pierre Delvenne, University of Liège**

To paraphrase Luc Boltanski and Eve Chiapello's famous monograph on capitalism (2006 [1999]), this paper hypothesizes that to successfully develop or simply to survive, Technology Assessment needs a *spirit*, that is, an ideology that morally justifies actors' engagement in TA. The corollary of such a hypothesis is that investigating the spirit of TA necessarily involves paying due attention to politics of TA (Delvenne et al. 2015). In this respect, I will ask the questions: is there a new spirit of Technology Assessment as there is a new spirit of capitalism? What does it imply for TA practices, rationales and methodologies? To address these questions, I will explore the tension surrounding two interrelated sets of science, technology and innovation (STI) policies that evolved together in Europe since the 1980s



onward. On the one hand, I focus on the expanding process of neoliberal policies unconditionally supporting STI as strategic resources to generate growth and competitiveness. On the other hand, I link this process with policy decisions to institutionalize Technology Assessment processes and activities to frame and anticipate the potential side effects of STI in newly emerging strategic science regimes. TA and neoliberal STI policies coevolved as “dancing partners” (Rip 1992), relatively independent and closely interacting at the same time. I inquire into the experimental, transforming character of TA by linking its emergence and development to the broader institutional setting of which it is a part. My analysis brings a macro-sociological and political sensitivity to bear on TA and its politics. Rather than conceiving of TA as a mere management tool or neutral governance technique, I suggest that TA processes enact, as well as counteract, dominant innovation policies. Conversely, I look at recent TA de-institutionalization processes in Flanders and Denmark to offer some reflections on the future of TA. Based on previous researches and on participatory observation in a European FP7 project aimed at expanding TA institutions in Europe, I question TA’s ability to exert its critical capacities if it is to survive only as an instrument aligned with recent policy discourses, particularly responsible research and innovation, that emerged in the aftermath of Lisbon’s strategy.

**A critique of assessing *disruptive* technologies.** Mario Kaiser, Avenue – Das Magazin für Wissenskultur

Technology assessment is by far not the only institution aimed at knowing the future before it happens. Together with hazard prevention, economic forecasting, terror defense or demographic prognosis it takes part in overarching assessment regime. Even though this motley crew has various historical origins, diverse political commitments and different adversaries, it shares a professional interest in ‘bad futures’. Apart from sparing no effort in identifying future perils, it develops ever new solutions of how we should to react to problematic futures in the present. In other words, such an assessment regime engages in various forms of chronopolitics. However, two recent developments have shaken the daily routine of chronopolitics, i.e. the daily business of exploring the future and reacting to it. First, an *epistemology of the improbable* has gained acceptance. Quite suddenly, the perception of the future has changed from a reservoir of uncertainties, risks and dangers to that of a Pandora’s box – a future filled with *black swan* events (Nassim Taleb), *unknown unknowns* (Donald Rumsfeld), radical non-knowledge

(various authors) or implications of *disruptive* technologies (Clayton Christensen). Second, the *chronopolitics of preemption* has entered the stage, challenging the traditional chronopolitics of prevention. In the face of dangerous futures, prevention strives for a normalization and conservation of the present. Preemption, however, is geared towards a reformation, if not even a revolution of the present. My presentation aims at an ethico-political critique of the two trends in assessing ‘bad futures’. In my view, the chronopolitics of preemption as well as the epistemology of the improbable do not articulate an adequate answer to future challenges, but a dangerous attempt to undermine present institutions.

Dialogues:

**Nano Risk Governance: Participatory processes as part of early stage risk assessment and the role of TA**

The Austrian nanosafety project „NanoTrust“, mainly funded by the Austrian Ministry of Traffic, Innovation and Technology, was launched in October 2007. The foremost task of this interdisciplinary research project was to identify research and regulatory deficits and to provide reliable and scientifically based information on safety and risk relevant topics regarding the use of nanomaterials. The project has been extended several times, with support broadening through the inclusion of other ministries (M. Health, M. Social Affairs and M. of Environment). Throughout the years a wealth of different instruments and networks has been developed to tackle safety and risk issues. The TA-project „NanoTrust“ plays an important role in establishing and maintaining these processes and helps shape the Austrian Nano Risk Governance Landscape, which encompasses the Austrian Nanotechnology Action Plan (ÖNAP), adopted by the Austrian Council of Ministries in March 2010; the Nanotechnology Information Platform hosted by the Ministry of Health (BMG) which went online in 2012; and the Austrian Nano Information Commission (NIK) of the BMG, founded in 2013 and chaired by the NanoTrust project leader. While originally established as an ordinary TA research project, NanoTrust evolved into a multifaceted hybrid containing scientific and counselling elements showing several peculiarities that may be indicative for TA’s role in assessing emerging technologies. Tasks include the creation and provision of robust relevant knowledge, initiating debates on regulatory issues, serving as an impartial platform for exchange and fostering independent EHS-research. In our understanding, TA

acts as a mediator between available risk-relevant knowledge and risk management needs, offering consultancy services based on scientific criteria. NanoTrust has left behind the role of observer and takes an active role in contributing to pre-emptive risk management as risk evaluators (e.g. through chairing the NIK). A strategy employed to avoid conflicts of interest is ongoing intense discussion with other actors of the risk-governance scene. Interdisciplinary fact-based balanced dialogue is an important way of ensuring “neutrality” of TA and a core element of the project.

**Participatory TA as implicit politics: the case of European agbiotech . *Les Levidow, Open University***

When 1980s expert TA studies sought to inform policymakers in a politically neutral manner, they underwent criticism for narrowly focusing on technology choices and their potential ‘impacts’, thus depoliticizing the issues at stake. As an alternative, participatory TA aimed to open up the issues, in turn informing public debate and thus broadening the policy process. According to a leading proponent, pTA was originally meant to democratize technology design and aims, but later went hand-in-hand with liberalism: politics is seen as an open marketplace of opinions (Klüver, 2006, cf. 1995). As a key aim for public engagement, others have sought to open up multiple futures and democratic accountability for societal choices (Stirling, 2006). By what means? And how do politics enter?

As a neglected feature, pTA has an implicit politics via specific modes of co-constituting publics and issues. Such a pattern arose in national pTA exercises anticipating or responding to controversy over agbiotech (GM products). There were prior disputes over how to structure participation, how the process was meant to ‘represent’ the public, what texts would inform the participants, how the results would relate to state decision-making, etc. The process reproduced political cultures modelling expertise and citizenship in characteristically national ways (e.g. in UK, France, Germany, France). To some extent, the pTA exercises helped citizens to hold governments accountable for regulatory criteria, but not for innovation choices (Levidow, 2007). That boundary later broke down when ‘uninvited participation’ pushed the state to block GM crops and to consider multiple options for a truly ‘sustainable agriculture’ – indeed, a fundamentally different politics of participation.

**Possibilities of Proactive TA. *Harro van Lente, Maastricht University,***

Social studies of technological change have challenged the standard notion that technology is developed to fulfil pre-given needs. Empirical studies show that when technologies are promised, developed and used, many things change in the same movement, including needs and, eventually rights, when new needs have become self-evident. This condition raises questions for the efforts of TA. In this paper I explore the diagnosis that TA (given its institutional support) tends to be reactive: waiting for a technology and then investigate potential directions, problems and benefits. These are measured against existing needs and preferences, in, say, energy, mobility, or food. Yet, when technologies change the world including needs, proactive TA instead of reactive TA is required, which does not start from ‘given’ technologies, but from articulations of ‘the good life’. Proactive TA does not seek neutral representations of ‘consequences’, but political explorations of what is ‘desirable’.

**TA on the political arena: being part of the game or restricting itself to the “facts”? *Stephan Lingner (EA European Academy of Technology and Innovation Assessment)***

Expectations towards the neutrality of TA have been a long-lasting legend put forward by both, TA itself and its addressees. However, past experts’ dilemmas or relevance deficits of ivory approaches tell us different stories. The question is, whether activist “grassroots TA” might be part of the solution as claiming relevance and self-interest while becoming a new player among the political forces. Nevertheless, this growth in power and impetus might cost TA dearly as it would dare losing its role as intermediate endeavour and thus its fundamental mission. Any such “partisan TA” could therefore endanger its advisory credits, leaving itself as struggling voice among other lobbyists on the political arena. The proposed presentation will therefore explain why this path would be circular and resignative w.r.t. the yet accepted and established mission of TA. For this aim, the relevant concepts of objectivity, plurality, rationality and inclusiveness will be critically outlined. Finally, the following theses will be discussed with the audience: (a) TA is neither political by purpose (at least in its analytic part) nor a-politic in its conclusions. (b) Its scientific and/or participatory approaches should not be an aim in itself but a matter of case-specific adequacy of purpose and legitimation. (c) Therefore, there is no best solution for all advisory domains. Instead, the diversity

of TA-approaches correspond to different problem topographies, which is rather an asset than a weakness of TA.

#### **A mythology of neutrality in TA. *Helge Torgersen, ITA/OEAW, Vienna, Austria***

As every institution, TA is predicated, from the very beginning, on a number of ideas that became founding myths. Among the most prominent are neutrality, rationality, and inclusiveness. In the early days, emphasis on them was a prerequisite for implementing TA. Neutrality in particular played a pivotal role in defending it ever since. Understanding these concepts as myths, however, has some implications. A myth (in a Barthian understanding) is a seemingly unambiguous term that carries, a different 'parasite' meaning apart from the original one. This parasite is taken for granted and goes mostly unnoticed. On closer inspection, neutrality in TA carried different implicit connotations as well. Over time and in different contexts, neutrality meant different things without this being made explicit; in other words, its 'mythology' changed.

In this paper, we aim to look for different connotations, or 'myths', of neutrality in TA. We propose at least three distinct but implicit meanings (there may be more) that can be associated with different phases in the historical development of TA. The initial 'OTA'-type phase was characterized by a strong reliance on expert knowledge and stakeholder interests. Neutrality here mainly implied keeping equal distance to opposing partisan interpretations of facts considered to be essentially established. The aim was to arrive at alternative options for action following different mixes of opposing interests for the sake of the common good. With the turn towards participatory activities and the promotion of a public debate as an essential task of TA, neutrality acquired another meaning. It became a prerequisite for, and a tool to, rhetorically steer between and negotiate alternative world-views tending to select different facts. Here, the task was to uphold a fruitful debate mostly as a means in itself, often irrespective of the outcome. When new technology became subject to PR activities in critics' as well as promoters' campaigns – allegedly fostering public debate –, exaggerated futures and a flood of catchy alternative facts rendered assessments difficult. At the same time, constructivist interpretations claimed equal validity to alternative definitions. We may therefore enter another phase of TA now, where the main task may be redefined as a sober reassessment of "what is the case." Neutrality may thus

acquire another new meaning as sticking, as best as possible, to evidence and reason again while being sensitized to the power of particular definitions of 'the truth'.

Room: Brookfield, Thursday 9.30-12.15

### **Horizon Scanning: an instrument for early detection**

Chairs: Veenhoff, Sylvia, German Environment Agency, GE

- Stephan Richter, Tobias Jetzke; VDI/VDE iit, GE
  - Designing, implementing and conducting horizon scanning
- Wendy Schulz, Infinite Futures, UK
  - Scanning Styles: Hand-crafted, Crowdsourced, and Automated. Which suits you?
- Niklas Gudowsky (Niklas Gudowsky, Leo Capari, Mahshid Sotoudeh, Helge Torgersen, Michael Nentwich; all Institute of Technology Assessment, Austrian Academy of Sciences, AUT)
  - What is on the horizon for technology assessment
- Frans Brom, Scientific Council for Government Policy, NL
  - Framing the future; the role of agent-relative expectations of the future in the transfer of the Netherlands' biotechnology trend analysis
- Sylvia Veenhoff, German Environment Agency, GE
  - Transfer of horizon scanning results of German Environment Agency into policy
- Miroslav Havránek, EEA EIONET, Charles University Environment Center, CZ
  - Horizon scanning for emerging environmental issues in EIONET network: Opportunities and barriers

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### **Horizon Scanning: an instrument for early detection**

Chairs: Veenhoff, Sylvia, German Environment Agency, GE

In various countries, horizon scanning has been implemented for years in order to anticipate changes, opportunities and risks at an early stage with the aim of strengthening the capacity of political actors to act accordingly. This session discusses different approaches of horizon scanning and how findings can be transferred into policy making. In the first part (90 minutes) three approaches are presented to reveal and discuss with the audience how policy institutions are working with horizon scanning. The second part (60 minutes) will focus on practical experiences (esp. transfer and policy making). The idea is that initial provocative mini-presentations will stimulate the audience and set a frame for further lively discussions.

Room: Brookfield, Thursday 9.30-12.15

### **Towards a Global TA- Possibilities and Challenges**

Chairs: Miltos Ladikas, Michael Decker, Julia Hahn, Constanze Scherz

- Constanze Scherz & Miltos Ladikas, KIT-ITAS Karlsruhe, Germany
  - Towards a global TA – National perspectives and aims of the session
- Miao Liao, CASTED - Chinese Academy of Science and Technology for Development, China), via Skype
  - TA functions and institutionalization – A Chinese perspective
- Pankaj Sekhsaria et al., Department of Humanities and Social Sciences, Indian Institute of Technology), via Skype
  - TA and Visioning – The India story
- Benedikt Roskamp, SPIRAL ULg & CRIDS UNamur, Belgium
  - The epistemic politics of TA institutionalization and international TA collaboration– A cosmopolitan perspective
- Julia Hahn & Miltos Ladikas, KIT-ITAS Karlsruhe, Germany
  - RRI in Industry – Lessons learned for TA?
- Denis Chaikovsky & Natalia Cherepanova, Technical University Tomsk, Russia
  - The application of TA in the Russian context
- Elena Seredkina (Perm) and Ilya Klabukov (Moscow), Russia
  - Partisan TA from a Russian perspective: the case of the NTI and Healthnet

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### **Towards a Global TA- Possibilities and Challenges**

Chairs: Miltos Ladikas, Michael Decker, Julia Hahn, Constanze Scherz

TA is far from a European or U.S. affair. It has been introduced in a number of countries that represent new hotspots of S&T activity, yet can be very diverse in terms of policymaking settings. A reflection of TA or TA-like activities in different national setting is therefore needed in order to understand developments towards a global level as well as nationally applied versions of TA. Here, exchanging experiences, identifying similarities as well as differences is essential. The similarities in the issues that TA focuses on in different countries and the will to learn from the European experience is evident - also apparent is the need to adapt TA to the unique cultural and political parameters of each country. For example, the idea of Responsible Research and Innovation (RRI) as used in the European context may present useful insights for a global approach towards improving interactions between various stakeholders ranging from civil society to industry. Concerning its topics TA often investigates questions that are global in scope such as sustainability, climate change or societal challenges. Most technologies are also global in the sense that their development, production and regulation are no longer limited to national or binational boundaries. In this context a global level of assessment is needed, which also changes the process of TA itself. Thus, there is a need to reconsider the conceptual parameters that define TA and possibilities of a global TA framework. The session focuses on cultural and political differences as well as a common understanding of TA, even in seemingly very different contexts. The starting point is the assumption that a standardization of concepts and methods is possible. For this we look closer at experiences from around the world in order to shed light on differences as well as similarities in approaches to TA. The session aims at opening up discussions between established forms of European TA institutes and newer approaches from Russia, India, and China.

Final discussion: The required parameters for a Global TA

**Technology assessment and visioning. The India story. Pankaj Sekhsaria, Vanya Bisht, Naveen Thayyil**

The paper presents an initial and preliminary account of technology assessment and visioning exercise in the formal institutional set up in India. The paper is primarily an account of the work of the Technology Information, Forecasting and Assessment Council (TIFAC), an autonomous body under the Department of Science and Technology (DST), Government of India which has the mandate of doing technology assessment and creating technology visions for the country. Set up in the 1980s, TIFAC has undertaken a number of TA activities and also formulated two Technology Visions for India – Technology Vision 2020 that was released in 1996 and Technology Vision 2035 that was released in early 2016. TV 2035 has been articulated explicitly as a vision of, for and by the people and is centred very strongly on the promise and possibilities of a range of ‘new’ technologies. The vision document also claims to be one that was created with substantial participation of the public. In our paper we investigate, for the first time in the Indian context, the processes and claims by which such a vision (TV 2035) was created and also the contents that make up this vision. In the 2nd part of the paper we look at technology visioning exercises in India from a larger historical perspective. We do this by looking at Current Science, India’s premier S&T journal. The paper notes that while technology visioning has been prominent in the mainstream establishment in the country for a long time, discussions and debates that engage with these visions are conspicuous by their absence. The paper reflects/speculates on the reason why this might be the case within the science & technology establishment but also within scholarship in the social sciences that looks at S&T

**The epistemic politics of TA institutionalization and international TA collaboration. Benedikt Rosskamp, SPIRAL ULg & CRIDS UNamur, Belgium**

When addressing the issue of further institutionalization of TA, two assumptions need to be empirically confronted and conceptually revisited. A first one considers the evolution of TA as a linear progression leading to new institutional creations in an increasing number of countries. Despite a series of calls for distributed,

networked, multi-level and multi-actor TA capacities, the idea of creating more single, national, specialized and dedicated TA organizations remains dominant in TA discourse. A second assumption concerns the rationale of Technology Assessment and its performance in terms of “opening up” and “broadening out” (Ely et al. 2014) or “the reflexivity pathway” (Delvenne 2011), notably by resorting to participatory Technology Assessment. Results from case studies in Wallonia, Portugal and the Czech Republic require reconsidering the above-mentioned evolutionary assumptions for a more complex and paradoxical understanding of the future of TA. While the TA achievements in each case study are still uncertain to a high degree, we can sum up these respective TA developments under the banner of “evidence-based governance”. This particular understanding of knowledge and decision-making is coherent with a simultaneous observed shift away from the institutional deficit of TA (creating new institutions in newcomer countries) to a renewed strategy of resorbing a knowledge deficit (making TA knowledge available to a wider number of countries). This renewed approach to TA collaboration and capacity building increasingly gains traction both from a bottom-up perspective where actors try to organize themselves into a critical mass and in a top-down perspective of neoliberal and austerity policies. In such a constellation, positivistic science provides an evidence-base, which supposedly supports multi-level, multi-actor governance as it allows knowledge produced in one place to travel and serve a wide spectrum of actors and decision-making arenas. The consequences of this shift are crucially important to explore the re-makings and futures of Technology Assessment, as they put to the fore the issue of subsidiarity of both the production and the use of TA knowledge. Finally, we identify a shift from coexistence to a cosmopolitan mode of epistemic subsidiarity (Jasanoff 2013, 2014). The latter raises a series of new theoretical, practical and normative questions for the TA community.

### **Towards “partisan TA” from Russian perspective: the case of the NTI and Healthnet Serezhkina E., Klabukov I. (Russia)**

We want to contribute to the destruction of the myth of “neutrality” of Technology Assessment (TA). At least at the present stage of scientific and technological advances the “neutral” (“a-political”) approach in the framework of TA is dangerous. In this regard, we are picking up and further develop a promising concept of “partisan TA” as a “democratic” antidote to technocracy. What gave rise to the need to move to “partisan TA” model? Why TA can no longer be considered just as a policy consulting method or just the theory of providing knowledge how to cope with some problems at the interface between technology and society? The focus of the current TA is not just technology, but innovation. From the perspective of “today” the creators of innovations have nothing to rely on: there are no experimental data, theoretical algorithms and models. Innovation is the design of future, the metaphysical foresight.

The impact of innovation on society grows more ambitious; negative consequences and side effects of innovative development are more difficult to calculate/predict. No wonder scientists and politicians are increasingly talking about profound social upheavals associated with “disruptive innovation” and the Fourth Industrial Revolution (K. Schwab, S. Hawking etc.) All this calls for a new “architecture of participation”) (Tim ‘Rally), which involves close collaboration with the public and representatives of “Citizen Science”. This trend is clearly reflected in the concept of RRI as the extended version of the TA, with an emphasis on the practice developing in transdisciplinary communicative space. Here, morality and social responsibility are top priority. This is an ethical dimension of “partisan TA” (“the precautionary principle”). “Partisan TA” with its emphasis on “Aufstieg des RRI-Ansatzes” has got also an epistemological dimension (“the uncertainty principle”). In recent years, science experiences a clear tendency for erosion of rationality, especially in the TA-studies. This is a kind of transition from the logos to the rhetoric, from episteme – to doxa. The purpose of rhetoric – to convince or persuade the public to certain side. Rhetorician is not seeking eternal knowledge or logical proof, he cannot rely on pre-established truth, and he has to deal with the changing social context. Thus “partisan expert” does not reveal the truth, he creates it. Moreover, such “truth” is

won together. No wonder the scientific discourse begins to use new concept of “post-truth”. On the other hand, the “problem areas” comprise a type of core of “partisan TA” around which scientific knowledge is organized. An expert in TA must find solutions in the face of increasing epistemological uncertainty. TA policy is implemented in a complex social and cultural context as a “rationale gesellschaftliche Technikgestaltung als Lernprozess” (A. Grunwald). We demonstrate the above-mentioned trends in the change of structure of modern technoscientific knowledge on an example of new biology: biology from the traditional science of life turns into an engineering science with a dual orientation on the knowledge and design. As an application study we consider the case of the Russian Model of TA. In particular, we are talking about trying to form a “responsible innovation” program within the National Technology Initiative (NTI) framework. For us, the most interesting is the concept of innovative development of NTI – “funnels” model vs “rockets” model (D. Peskov). Furthermore, the results will be presented in our report on the Roadmap of new biomedical technologies (“Healthnet” NTI) into the contexts of TA/RRI.

**Introduction of the TA principles to Russian research and science community Dr. Natalia Cherepanova, Dr. Denis Tchaikovsky, Dr. Liliya Tukhvatulina. Tomsk Polytechnic University, Tomsk, Russia**

Significant government support for Russian science leads to aspiring scientific projects related to space development devices, to improve the quality and duration of life of the people, as well as projects directly related to the industry. These processes have led to the emergence of many new issues related to responsible research, technology assessment from the perspective of sustainable development. In other words, the question about the active usage of TA in Russian research and educational institutions. The researchers in Russia do practice TA; they even occasionally use RRI tools, but it does not mean they actively use these tools in all their projects; they do that fragmentary, solely for compliance with the formal requirements of the projects or based on their own research experience. They also do not seek help of TA expert associations in this area. The question should be

asked what are the issues for TA implementation in Russia. In Russian practice, the complexity of implementing the principles of the RRI is the following:

1. Lack of a wide traditional practice of including experts for ethical, humanitarian and social assessment of emerging technologies.
2. Lack of institutional requirements to assess the impact of innovation and technologies.
3. There is no unified Governmental regulation of innovation development trajectory.
4. There are no of specialists with theoretical TA background and practical experience in Russia.
5. Low coordination in public activity when it comes to the innovation development.

The need for the introduction of wide TA practice in Russia is clearly visible. It requires involvement of a large number of stakeholders, many of them do not understand what TA can bring in to the innovation development and science.



Room: Brookfield, Thursday 9.30- 5.15

**A role play in TA practices: ways to shape the interaction between science and policy**

Chairs: Leonie van Drooge, Patricia Faasse

FORMAT: A ROLE PLAY (MAXIMUM OF 12 PARTICIPANTS)

We will invite the participants to take part in a role play simulation, based on a concrete case. The participants will alternate between the role of (i) scientist, of (ii) policy maker and/or interest group, and of (iii) TA practitioner. After the role play, we will jointly reflect on the role of the TA practitioner and the choices made.

We intend to run the role play several times during the conference, for two reasons: (1) the number of participants is limited – running it several times will allow more participants to participate, (2) when, at the end of the conference, we have repeated our game several times, we will be able to gain more substantiated insight. We will be able to identify (a) different dynamics in the interactions between the participants, and (b) different roles TA practitioners have played.

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**A role play in TA practices: ways to shape the interaction between science and policy**

Chairs: Leonie van Drooge, Patricia Faasse

To successfully address the grand challenges, politicians, policy makers, and scientists need each other. However, the interaction between policy making and science is challenging. Policy making is a complex process. It is shaped by different interests, divergent views, opposing value systems and various time constraints. For scientific evidence to be useful here, it needs to be adapted to the particular logics/dynamics of policy making. In this context, effectively informing policy through evidence does not equal “simply telling the truth”. Scientists on the other hand, often feel uncomfortable with a position other than “the desinterested scientist”. Their professional identity tells them to stay distanced from the blurry world of policy making and to stick to facts.

TA practitioners, or TA institutes, usually position themselves in the focal point of this interaction. They have studied the complexities of the interaction between science and policy, and have become skilled in recognizing the social, ethical, and political implications and consequences of scientific and policy work. In this session we will explore the various roles TA practitioners can play in this interaction, and in addition, which roles prove to be effective in aligning science and policy.<sup>1</sup>

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<sup>1</sup> See for examples: Hennen, L. et.al., ‘Towards a framework for assessing the impact of technology assessment’, in: Decker, M. and Ladikas, M. (eds.), *Technology Assessment–Methods and Impacts*, Springer, 2004, pp. 57-85

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## Session C1

Room: Brookfield, Thursday 2.30-5.15

### **Making Sense of Public Engagement in Creating Knowledge for Decision-Making on Science, Technology and Innovation**

Chairs: Zoya Damianova, ARC Fund

- Dr. Petteri Repo, University of Helsinki
  - Opportunities for Disruption through Public Engagement
- Mattia Martini, University of Milano-Bicocca
  - How to reach success in temporary networks: the importance of network mechanisms – Mattia Ventseslav Kozarev, ARC Fund
- Ventseslav Kozarev, ARC Fund
  - Engaging Citizens and Experts in Co-Creating Sustainability-Focused Solutions: Lessons Learned from the CASI Engagement Approach
- DBT, Bjorn Bedsted
  - The role of citizen participation in the transition to a more sustainable society
- Jürgen Schultze, TU Dortmund
  - Social Innovation in Designing Nature-Based Solutions

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### **Making Sense of Public Engagement in Creating Knowledge for Decision-Making on Science, Technology and Innovation**

Chairs: Zoya Damianova, ARC Fund

**Abstract:** This session will look into participation-focused approaches (i.e. public engagement) to inform policy-making efforts on science, technology and innovation. As such, its main premise is that public engagement approaches – i.e. reaching out to citizens and experts through a range of proven participatory methodologies in EU-funded projects – can be successfully utilised in order to provide a solid knowledge base for decision-makers when designing policy solutions to issues related to science, technology and innovation. Thus, a peculiar perspective to technology assessment will be explored, which integrates broader engagement of lay publics into a typically expert-driven policy decision processes. Of special interest will be the discussion of opportunities to introduce engagement methods into the planning of solutions to societally controversial and typically long-term challenges (i.e. sustainability, emerging technologies, innovation, etc.).

#### **Objectives:**

- To discuss different participatory approaches to technology assessment and its applications to issues relevant to sustainability, climate change, resource efficiency, and the environment
- To promote public engagement as an integral part of policy solutions to complex societal challenges
- To share lessons learned on public engagement for policy support in R&I through EU-funded projects (FP7 and Horizon2020)

Opportunities for Disruption through Public Engagement – Dr. Petteri Repo, University of Helsinki

Disruption is called for when public engagement targets change. As outsiders, citizens are valuable to engage in that they are prone to challenge incumbent stakeholder arrangements, goals and expertises. Engagement may then result in addition to improved quality of decisions, also to deliberation of a wide range of arguments and plural rationalities. This talk will provide an overview of how the CASI engagement process introduces disruption in research and innovation priority setting. In general, citizens are more concerned with societal issues than other stakeholders. They also prioritise research and innovation priorities quite differently. For research and innovation agendas, citizens provide novel priorities that challenge established stakeholder viewpoints and expertises.

How to reach success in temporary networks: the importance of network mechanisms – Mattia Martini, University of Milano-Bicocca

The study aims at exploring which combinations of network culture, network management and managerial mechanisms can equally lead to the network success in collaborative settings. Semi-structured interviews were conducted on the 19 partners of CASI project, who were the leader of a country-based network of actors, involving private, public and non-profit organizations. Results shed light on two different combinations of factors equally leading to network success. One is characterised by hierarchical culture, managerial strategies establishing rules to govern the partner interaction and formalised coordination mechanisms, while another is characterised by the presence of the group culture. Under the managerial standpoint, our results give public managers some insights about how to behave and act to involve different stakeholders, depending on the characteristics of their network settings.

Engaging Citizens and Experts in Co-Creating Sustainability-Focused Solutions: Lessons Learned from the CASI Engagement Approach – Ventseslav Kozarev, ARC Fund

Citizen engagement in issues related to governance of science, technology and innovation is gaining traction among policy-makers and practitioners. Particularly through EU-funded projects, a number of positive experiences are already available, proving both the scope and breadth of engagement approaches. This presentation focuses mostly on the citizen engagement approach used in the CASI project (FP7), and stresses on some critical considerations for the successful utilization of engagement in policy development. In addition to being a democratic tool, the author argues that engagement of lay citizens has the potential to enrich the perspectives of scientists and experts. Experts and citizens derive their perspectives from completely different sources: experts are trained within a scientific trajectory (or paradigm) whereas citizens are concerned with their own surroundings. Presented are suggestion for combining both perspectives, with recommendations offered for how, when and towards what purpose public engagement can serve best to policy-making.

Social Innovation – the necessary boost for a sustainable future – Jürgen Schultze, TU Dortmund

Social innovation – as the intentional change of social practices – is one key factor for the progress of production and consumption patterns towards a more sustainable society. The transition to sustainability cannot be restricted on technical innovation. The attitudes and behavior patterns of people has to be brought in line with the visions of systemic innovation. CASI and many other projects underline the high potential of social innovation. In a relevant number of cases it could be shown that the impact of social innovation for sustainability exists. Examples of social innovation will be presented that realizes engagement and multi-stakeholder constellation in a co-creation and co-working process.

This contribution emphasizes the difference of the diffusion of social innovation towards technical innovation by using the multi-level approach. It outlines one suggestion how this diffusion leverage can be overwhelmed referring to the bottom up initiatives of living labs. The conclusion is a vision for labs or new suitable platforms on an intermediary level boosting the transition to sustainability.

The role of citizen participation in the transition to a more sustainable society – DBT, Bjorn Bedsted

This presentation will provide a concrete example and method for engaging citizens in defining research topics aimed at bringing about a more sustainable future. The method was applied in the CASI project and the results provide good arguments for including citizen participation in the sustainability toolbox. The presentation will also include examples of and reflections on other applications of citizen participation in assessing the way forward to a more sustainable future.

Room: Brookfield, Thursday 2.30-5.15

**Untamed participation? The role of bottom-up engagement in “Responsible Research and Innovation”**

Chairs: Anja Bauer, Alexander Bogner, Daniela Fuchs (ITA-OeAW, Vienna)

- *Go Yoshizawa, Osaka University*
  - Does a herd of sheep endure hardship? Values in emergent engagement
- *Prof. Bernard Reber, CNRS Paris; Dr Robert Gianni, University of Namur*
  - Enriched communication and responsibility to empower the political integration of bottom-up initiatives
- *Eoin Cullina, Kieran Conboy, Lorraine Morgan; Lero, NUI Galway*
  - Overcoming Barriers to Funding Science Through Crowdsourcing
- *Marc Steen, Nauta, N.J.*
  - Improving Responsible Research and Innovation through connecting to citizens’ ‘untamed participation’
- *Dr. Young-Hee Lee*
  - Politics of Nuclear Waste Management in Korea: Focused on the Roles of NGOs

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**Untamed participation? The role of bottom-up engagement in “Responsible Research and Innovation”**

Chairs: Anja Bauer, Alexander Bogner, Daniela Fuchs (ITA-OeAW, Vienna)

This session explores the tension between forms of ‘invited’ participation as favoured by the RRI discourse and ‘uninvited’ forms of participation. Particularly with regard to emerging and controversial technologies societal movements and non-governmental organizations often assume critical positions in public debates. In addition, Do-it-Yourself communities increasingly challenge established institutions of science and innovation. Contributions in this session reflect upon the role of such ‘uninvited’ engagement initiatives in research and innovation and ask how RRI could take better account of the diverse bottom-up initiatives that already exist.

**Does a herd of sheep endure hardship? Values in emergent engagement . Go Yoshizawa, Osaka University**

Japanese are no longer able to remain silent as a herd of sheep in the post-truth era, but how can they avoid the risk of participating in ‘popular technology assessment’ (Jasanoff 2003)? The Great East Japan Earthquake and the consequent nuclear accident in Fukushima, March 2011 not just boosted public engagement in science but rather made us rethink the meaning of participation. Fukushima has since raised serious tensions, conflicts and emotional gaps between inside and outside as well as within the both sides and at different governance levels or social spaces. Under the circumstances, Safecast as a participatory, open-source, citizen-science-centered radiation mapping solution demonstrates the potential to redefine participation, science and ethics (Brown et al. 2016). Many forms of public engagement – from crowdfunding to whistleblowing, would resolve the asymmetric engagement between scientists and citizens by sharing a sense of ownership, commitment and responsibility in science. Another recent effort is to engage the less-engaged public by means of ‘interactive public comment’. While

40% of the population show an indifference to research and innovation, half of them signal a willingness to engage with science, technology and innovation policy in a certain condition (Kano et al. 2016; Yoshizawa et al. 2016). Where passive, conventional public comment systems face a number of challenges in evidence-based policymaking and public administration, interactive public comment enables us to identify the less-engaged, approach them by focus group interviews and site visits, collect their comments on specific socio-technological issues, submit an arranged set of the comments to societal decision makers, and give a feedback to the commenters (Maenami, Yoshizawa & Kano 2016). For this a series of the Policy Design Workshops informally facilitate knowledge exchange and cultivate intimate links between government policymakers and policy researchers for the sophistication of interactive policy analysis. Similar activities can also be found in universities. Center for the Promotion of Interdisciplinary Education and Research (C-PIER), Kyoto University organised cross-disciplinary exchange meetings, idea competitions for interdisciplinary research, and interdisciplinary joint publication projects. Essential is that C-PIER is always open to any researchers and stakeholders who wish to innovate their ideas and activities in collaboration with others.

What about outsiders? Like in Europe (Seyfried, Pei & Schmidt 2014), Japanese hacker communities such as BioClub (see [biohacker.jp](http://biohacker.jp)) also collaborate with artists and designers, by which stakeholders and citizens are engaged in research and innovation from the bottom-up. Drawing lessons from a study of dual use on synthetic biology, policy discussions tend to focus on rogue outsiders (i.e. amateurs and non-state actors) but not on legitimate insiders (i.e. professionals and state-sponsored activities) (Marris, Jefferson & Lentzos 2014). However, history tells us that legitimate insiders more often posed a threat to biosecurity. Intermediary organisations have thus paid more attention to legitimate insiders and mobilise them to more responsible research and innovation by setting (in)formal transdisciplinary and heterogeneous network between a wide range of researchers, practitioners and stakeholders for the development of various

bottom-up approaches to different social issues in an emergent, contingent and heuristic manner.

**Enriched communication and responsibility to empower the political integration of bottom-up initiatives** *Prof. Bernard Reber, CNRS Paris; Dr Robert Gianni, University of Namur*

Responsible Research and Innovation is a framework that aims at developing research and innovation in a responsible way. If on the one hand research and innovation require technical expertise on the other hand the outcome of those processes will affect society. Thus, RRI is meant to integrate societal values and needs. However, the concept of responsibility entails different perspectives, which makes it hard for the different stakeholders involved to agree and to promote a shared program.

Therefore, one of the strategies in order to include different voices is to enhance participatory processes based on deliberative mechanisms. However, participation in deliberative processes as such does not necessarily guarantee the successful integration of actors in the decision-making process. On the one hand we find instrumental practices of participation leading to a substantial exclusion of 'unwanted' actors. On the other hand, the terms in which the 'discourse' is settled might frame in advance the outcomes of such process, ignoring alternative perspectives. If the former can be tackled by improving the influence mechanisms in participatory attempts, the latter puts in question the basis of deliberation as a rational process. Several criticisms to deliberation question the nature of the discourse highlighting that it implicitly excludes those who are not able or willing to adopt such rationality. Thus, protests and other bottom-up initiatives that do not conform to the rules of public deliberation are often identified as irrational and reduced to the status of illegitimate. Apart from its legal and cognitivist stance, the term responsibility implies that researchers and innovators conduct their efforts according to a set of moral, ethical and existential features, meaning that they need to take into account or promote a set of values and norms present in a given society. Accordingly, defining the addressees, the extension and the modalities of responsibility should not be decided independently from society and the highest number of perspectives should be taken into account. Alternative bottom up

initiatives also generate a methodological tension. On the one hand, often irrational, contingent or even violent forms of disagreement can hardly be integrated in a public deliberation because of their radical criticism to the discourse itself. On the other hand, if we want to maintain its legitimacy and increase its efficiency, RRI cannot and should not ignore these voices. RRI is supposed to be inclusive and this means to integrate the different voices and methodologies arising in society.

One way to tackle this issue is to follow the suggestions highlighted by several promoters of deliberative democracy, which want to redefine the understanding of the rational and argumentative register of deliberation. These authors call for a confluence into one discourse of rationally grounded and personal motives towards forms of narration – or other communicational capacities, as conversation, dialog, interpretation, improvisation - able to express alternative perspectives and at the same time understandable by other actors. In this way we could obtain/achieve two connected objectives. First, we would manage to shape the features of RRI according to historical and societal needs and values, enhancing its efficiency. Secondly we could increase the contribution of alternative and often minority perspectives, increasing the legitimacy of RRI and of democracy in general. Finally, we will open a place for emotions and sentiments in the debate, following the Strawson's interpretation of responsibility. According to him, the attitudes expressed in holding a person as morally responsible are of a wide variety and derive from our participation in personal relationships. Some examples of these attitudes include resentment, anger, disgust, gratitude, happiness and guilt. His approach based on responsibility as a reactive attitude, will be combined with some of the different understandings of responsibility. They will enrich the deliberative requisites to be able to be responsive to untamed participation. This shift could be beneficial in letting changes and needs in society emerge not by taming or neutralizing them but by integrating them through institutional mechanisms.

**Overcoming Barriers to Funding Science Through Crowdsourcing** *Eoin Cullina, Kieran Conboy, Lorraine Morgan; Lero, NUI Galway*

Scientific Research Funding Agencies (SRFA)s, worldwide, are using new methods for engaging participants in formulating (i) science policy, (ii) national scientific research agendas and (iii) funding call processes. Traditionally, SRFAs preselected

participants with specific skillsets in the execution of these works ranging from expert reviewers to policy experts. However, opportunities now exist through the use of crowdsourcing platforms to facilitate both top down and bottom up approaches in participant engagement to facilitate the inclusion of diverse demographics in challenges. Such efforts can facilitate the canvassing of public sentiment on topical scientific issues. To this end SRFAs must overcome numerous types of challenges in the development of crowdsourcing platforms that can facilitate diverse participation. Traditional agency processes can be described over their lifecycle in the stages of input, process, output and outcome. This paper examines the second stage of the crowdsourcing process namely the 'process stage' as it applies to SRFAs. The research assumes an information systems research perspective in examining the literature and data pertinent to this study. In particular this research first examines the challenges faced in participant engagement and second the types of antidotal practices required for use in such crowdsourcing platforms so as to surmount the challenges faced in this stage of the process. The 'process' stage of the crowdsourcing process as delineated by Marjanovic, Fry and Chataway (2012) cites three tasks within that stage namely (a) Management of Innovation Process, (b) Management of Stakeholder Process and (c) Assessment Filtering of Process Solutions. To this end this research identifies the various challenges faced by SRFAs in the execution of these tasks at this stage of the process. This qualitative research herein employs the use of a case study approach. Semi-structured interviews were conducted with managers in one SRFA. Base criteria for selecting study participants included that interviewees hold extensive experience in one or more of the areas of funding agency activities under study or be involved in decisions around strategy. Interviewees were selected who held a minimum of five years managerial experience in SRFA operations. From the interviews conducted, challenges previously identified in literature were confirmed and the use of antidotal practices by the SRFAs at the process stage were identified. Limitations of this research are discussed and further suggested avenues of investigation are put forward.

**Improving Responsible Research and Innovation through connecting to citizens' 'untamed participation'.** *Marc Steen, Nauta, N.J.*

The term 'Responsible Research and Innovation' (RRI) emerged in the context of projects funded by the European Commission; it is 'an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation' (European Commission). Many of these projects aim to involve citizens (and other stakeholders; but we will focus here on citizens), mostly on the basis of 'invited participation', where specialized institutions or experts formally invite citizens to participate. This stands in contrast to 'untamed participation', where citizens are active and creative: active, e.g., in the sense of voicing critique and protest against specific (emerging) technologies, and creative, e.g., in the sense of developing Do-it-Yourself (DiY) solutions for emerging problems (e.g., Eric von Hippel's 'lead users') or innovative products to question common views on technology (e.g., Dunne & Raby's 'critical design'). It is, however, currently unclear how people working in RRI can utilize such active and creative efforts by citizens. There seems to be a gap between 'the RRI project' and the 'real world' (Victor Papanek) of citizens. Our paper aims to further our understanding of the added value of 'untamed participation' in RRI projects. We will review different methods from a project/innovation management perspective; i.e. in terms of their practical benefits and opportunities, as well as the costs and risks involved. We will review, e.g., Lead User Innovation, Participatory Design, Co-Design (see, e.g., Sanders & Stappers, 2008, Co-creation and the new landscapes of design, *CoDesign*, 4(1), 5-18; and Steen, 2011, Tensions in human-centred design, *CoDesign*, 7(1), 45-60) and Social Innovation (Geoff Mulgan). The goal of this review is to support people working in RRI projects to better connect to citizens' 'untamed participation' efforts—without 'taming' them. We (the authors) work at TNO, an independent Dutch research and innovation organization, and in the JERRI project (<http://www.jerri-project.eu/>), a Horizon 2020 Coordination and Support Action. The project aims to 'foster RRI transition in Europe by developing and testing good RRI practices in pilot cases', with Societal Engagement as one of five key dimensions. Our activities include: making action plans for further improving Societal Engagement within TNO, and coordinating the executing of these plans. This is research-in-progress; at the conference, we expect to be able to provide an

overview of these different methods for 'untamed participation', and their different benefits, opportunities, costs and risks.

**Politics of Nuclear Waste Management in Korea: Focused on the Roles of NGOs.**  
*Dr. Young-Hee Lee*

This paper aims to analyze Korean government's nuclear waste management policy considering the role of NGOs and social movements seriously.

Like many countries with nuclear power plants Korean government has been struggling with the challenges of managing nuclear wastes. Major challenges to the government's nuclear waste management policy have come from NGOs and local residents. Until the early 2000s, decision-making on nuclear waste management in Korea had been entirely closed, and extremely technocratic. But after experiencing a huge and severe opposition movement against government's decision on nuclear waste disposal site from the local residents and NGOs in 2004, Korean government changed its nuclear waste management policy towards more compensatory and participatory way. Thanks to the changed policy, Korean government was able to secure the site for the low and intermediate level waste disposal in 2005.

Regardless of the success, Korean society is still confronted with a very difficult task of managing much more dangerous and toxic high-level nuclear wastes coming from 25 nuclear plants. Decision-making on management policy and disposal site selection for high-level nuclear wastes could amplify social conflicts not comparable to low and intermediate level nuclear waste. This is the background of the announcement by the Nuclear Energy Commission in late 2004, that decisions regarding the management of spent nuclear fuel would be made after reaching a public consensus through sufficient discussion. This was a declaration of the government's intent to form and administer high-level nuclear waste management policies with public understanding and participation, not with such high-handedness of the past. Korean government took some follow-up steps after the announcement. One was the official launching of PECOS (Public Engagement Commission on Spent Nuclear Fuel Management) on October 2013. PECOS organized many public discussions and invited NGOs and citizens in the meetings on spent nuclear fuel management issues for 20 months. Does this mean a real policy change from technocratic to participatory risk governance with regard to nuclear waste management policy? What was the role of NGOs in this process?



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Session C3

Room: Brookfield, Thursday 2.30-5.15

**Knowledge for policymaking How to organize the use of best available knowledge?**

Chairs: Dr. ir. Lilian van den Aarsen, Gert-Jan de Maagd

- Lilian van den Aarsen, Ministry of Infrastructure and the Environment, The Netherlands
  - Policy-science interface in the Netherlands
- Nuno F.F.G. Boavida, [Observatório de Avaliação de Tecnologia](#), CICS.Nova, Universidade Nova de Lisboa
  - Limits of evidence-based policy - A focus on the best possible evidence.
- Bert Droste-Franke, EA European Academy of Technology and Innovation Assessment GmbH
  - Applying Methods and Instruments for Improved Scientific Policy Advice
- Graeme Cook, the Centre for Knowledge exchange and Impact, Scotland

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**Knowledge for policymaking**

**How to organize the use of best available knowledge?**

Chairs: Dr. ir. Lilian van den Aarsen, Gert-Jan de Maagd

In this session we aim to explore the current understanding of the policy-science interface on the national policy level, by discussing experiences, best practices, instruments & methods and dilemma's in connecting knowledge and policymaking. The session starts with three short introduction on practices in The Netherlands, Portugal and Scotland followed by a debate with the audience.

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Session C4

Room: Brookfield, Thursday 2.30-5.15

### **Valuing and evaluating regenerative medicine's healthcare potential**

Chairs: Prof Andrew Webster, SATSU, University of York

*A summary of the scientific state of the art in the context of healthcare* – Professor Tony Pagliuca, clinical lead for Regenerative Medicine in the NHS Executive Clinical Reference Group for specialised commissioning.

3 REGenableMED presentations of findings:

1. *Business models* –Geoff Banda/James Mittra
2. *Regulation and HTA* (i.e. NICE & NHSE) *policy*– Aurelie Mahalatchimy /Joyce Tait
3. *Healthcare adoption and payment scenarios* - Alex Faulkner

Roundtable and audience discussion led by the Chair/Discussant to highlight issues of complementarity and tensions between the findings.

Debate: “Society and healthcare system needs in order to benefit from regenerative medicine”.

*Magda Papadaki*, Head of Manufacturing Innovation, Manager of the Medicines Manufacturing Industry Partnership (MMIP), Association of British Pharmaceutical Industries (ABPI) - innovation and industry perspective

*Matthew Durdy*, Chief Business Officer, Cell & Gene Therapy Catapult, London – health economics perspective

*Deborah Morrison*, Senior Scientific Adviser, NICE Scientific Advice, Centre for Health Technology Evaluation, NICE - HTA/health system regulatory perspective

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### **Valuing and evaluating regenerative medicine's healthcare potential**

Chairs: Prof Andrew Webster, SATSU, University of York

Regenerative medicine, consisting of cell therapies, gene therapy, tissue products and biomedical devices, promises to revolutionise medical treatment and is a political priority in UK and other governments' life science health and wealth policies. The field and its innovators face a number of challenges, especially a challenge to the prevailing centralised national modes of health technology assessment and models for reimbursing producers, in conditions of high scientific and clinical uncertainty, heightened by calls to increase the acceptability of 'real world evidence'. Alongside these challenges to evaluation policies and methodologies, the social sciences, notably Science & Technology Studies, have seen a recent turn toward a concern with 'valuation', and the microprocesses, discursive practices, and tools by which the social and economic worth of social goods is constructed and negotiated. This session will showcase recent findings and analysis from UK-focused ESRC qualitative research (REGenableMED: *"Regenerative medicine and its development and implementation: an analysis of emergent value systems and health service readiness"*), which is developing novel approaches to analysing disruptive innovation, including the construction of future business models and value chains in the context of the complex innovation and regulatory ecosystem. The findings will be submitted to detailed stakeholder debate, and act as a case study to bring into dialogue policy debate about valuing innovative medical technology, with academic perspectives on social processes of valuation practices, alongside the entrepreneurial challenges.

**Bioeconomy in the spotlight: TA-perspectives in a contested terrain of transformation**

Chairs: Carmen Priefer, Stefan Bösch, Rolf Meyer, Sophie Kuppler

- Les Levidow, The Open University, Department of Development Policy and Practice
  - European bioeconomy: rival trajectories and difficulties
- Lotte Asveld, Delft University of Technology & Dirk Stemerding, Rathenau Institute
  - Social learning in the bioeconomy: the case of Ecover
- Sina Leipold, University of Freiburg, Chair of Societal Transformation and Circular Economy
  - The Circular Bioeconomy in Policy and Practice – An explorative analysis of Germany
- Christine Rösch, Karlsruhe Institute of Technology (KIT), Institute for Technology Assessment and Systems Analysis (ITAS)
  - Making the Bioeconomy work for Sustainable Development – the Requirements for a Sustainable Bioeconomy
- Thomas Arnold, European Commission, DG Research and Innovation
  - Sustainable Bioeconomy – Looking ahead
- Michael Carus, nova-Institute GmbH
  - Current markets for bio-based products and their perspectives
- Steffi Ober, civil society platform Forschungswende / Nature And Biodiversity Conservation Union (NABU)
  - Sustainable bioeconomy: the need for alternative framings of economy

*Related poster presentation*

- Carmen Priefer, Karlsruhe Institute of Technology (KIT), Institute for Technology Assessment and Systems Analysis (ITAS)
  - Shaping the bioeconomy: Key issues and major lines of conflict in the current discourse

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**Bioeconomy in the spotlight: TA-perspectives in a contested terrain of transformation**

Chairs: Carmen Priefer, Stefan Bösch, Rolf Meyer, Sophie Kuppler

The concept of bioeconomy is one central promise for a sustainable economy. Core idea is the replacement of non-renewable fossil resources used in industrial production and for energy supply by renewable biogenic feedstock. This switch-over should pave the way for a more sustainable, eco-efficient economy and help tackle global challenges such as food security, climate change, resource scarcity, and environmental pressure. Leading to a rising biomass demand, various new interactions and fundamental changes in today's production patterns, the shaping of the concept in current political strategies is controversially discussed among scientists and societal stakeholders. The debate is fueled by quite different understandings of what bioeconomy should be and achieve, which innovations should be promoted as well as which development pathways should be supported. Moreover, the social and political framework conditions for the transition are more or less unclear. In many policy strategies new and emerging technologies like genetic engineering and synthetic biology are seen as key levers for enabling a so-called knowledge-based bioeconomy, while voices in science and society call for supporting smallholder agriculture, changes in consumer behaviour and an orientation of the economy towards the carrying capacities of ecological systems. In a nutshell: bioeconomy is a contested terrain and the societal pathways for establishing such an economy are under construction.

The session aims at reflecting transformative challenges from the perspective of different disciplines and stakeholders. Alternative conceptual ideas, narratives of innovation, chances and limits of the bioeconomy as well as its possible contribution to sustainable development are at the center of the discussion. In the first part of the session researchers give insights into their fields of work. This includes conceptual alternative drafts and rival trajectories in the European debate, social learning in the bioeconomy, the role of circular economy and requirements for a sustainable bioeconomy. Open research questions, conceptual and methodological challenges in analyzing and framing the transition process are

identified. The second part includes statements of practitioners from politics, NGOs and industry on sustainable bioeconomy, bio-based products and their perspectives and alternative framings of economy. Points of consensus, but also controversial views on bioeconomy will be highlighted.

The discussion is oriented towards the following key questions: What are relevant technological as well as social innovations for the bioeconomy transformation and how can their importance and usefulness be assessed in relation to different transformation pathways? Which normative narratives of transformation (e. g., radical change of capitalism, technological progress etc.) are steering the respective ideas of innovation? How could technology assessment contribute to a further development of the bioeconomy and which are fields of priority or high uncertainty?

Important points in the discussion are how the different topics and approaches could benefit from each other and how their problem descriptions can be mapped to an overview about relevant issues to be addressed while observing and designing the transformation process.

The following scientific presentations and stakeholder statements form the basis of the session. In addition, a poster presentation by the organizers is linked to the session.

### Scientific presentations

**European bioeconomy: rival trajectories and difficulties** Les Levidow, The Open University, Department of Development Policy and Practice

Since the European Commission launched the Knowledge-Based Bio-Economy (KBBE) agenda in 2005 (and likewise the OECD), it has gained importance as a wider policy framework. This recast agri-production as 'factories of the 21st century' for decomposable biomass. Alongside this singular narrative of 'the bioeconomy', the concept attracts rival European visions; each favours a different diagnosis of unsustainable agriculture and its remedies in agro-food innovation. As

the dominant vision, Life Sciences combine converging technologies with biomass decomposability; by contrast, a marginal vision combines agroecology with integral product integrity. From these divergent visions, rival stakeholder networks have contended for influence over research agendas and wider policy frameworks.

Within the Life Sciences vision, early biofuels were meant as a transitional stage towards converting waste biomass into 2G biofuels and higher-value products, as well as horizontally integrating several industrial sectors. Yet 2G biofuels remain technically elusive or commercially unviable, dependent on substantial energy inputs. Consequently, transport fuel may be locked into a path dependence on 1G biofuels, with doubtful savings in GHG emissions. More generally, the focus on liquid fuels reinforces the internal combustion engine, by contrast with bioenergy-based fuel cells for electric vehicles.

In the Life Sciences vision, an integrated, diversified biorefinery will convert diverse non-food biomass into valuable products, thus providing input-substitutes for fossil fuels within current infrastructures. Biorefinery innovation trajectories have the same drivers as the current production-consumption patterns expanding global demand for food, feed, fuel, etc. If they ever become commercially-technically viable, then future biorefineries could strengthen financial incentives to intensify resource extraction. Such a techno-fix depends on cheapening resource supplies without paying for their societal and environmental costs.

Amongst various national policies, the UK has most explicitly promoted a waste-based bioeconomy by various means, especially 'emerging technologies' which can more efficiently convert waste into useful outputs. These efforts have encountered difficulties in matching waste with technoscientific capacities and commercially viable markets. Investment decisions remain vulnerable to unstable market conditions. These difficulties arise from a policy framework of ecological modernisation, whereby the state understands obstacles as 'market failures' to be remedied through financial rewards and penalties as incentives for low-carbon technology.

**Social learning in the bioeconomy: the case of Ecover** Lotte Asveld<sup>1</sup> Dirk Stermerding<sup>2</sup>, <sup>1</sup>Delft University of Technology, Department of Biotechnology, Section Biotechnology & Society <sup>2</sup>Rathenau Institute

Aside from promising visions on sustainability, the new technologies that emerge under the banner of the bioeconomy, also bring about new uncertainties. Because of these uncertainties the bioeconomy can be considered a de facto social experiment in which unexpected results may emerge.

Unexpected results is what Ecover and Solazyme, two companies operating in the bioeconomy, experienced. When Ecover, a Belgian company producing sustainable cleaning products, changed one of the ingredients in its basic cleaning formula, it was attacked by environmental organisations whose members used to be among Ecover's most loyal customers, with a prominent position for the Etcetera Group (ETC Group). The new ingredient that invoked all the criticism was oil derived from genetically engineered algae, produced by the US based company Solazyme. In the eyes of the critics the oil produced by engineered algae is problematic in terms of sustainability. To these critics the engineered algae symbolize a socio-technological system that is inherently unsustainable because it reinforces existing economic inequalities. All actors involved learned a lot about diverging perceptions on sustainability related to the engineered algae. However each of them had few options to adapt to these insights or to accommodate them. It would have been desirable for all actors involved to have been able to influence a technology before its stage of commercialisation because once the technology is out there, influence is reduced to either rejecting or accepting a technology.

Therefore instead of this 'learning by doing' in a de facto experiment, all actors involved and society at large might have gained from a form of deliberate learning, which might also be termed learning by experimentation. The questions addressed here is: "How might deliberate social learning have been organised in the Ecover case and what does this imply for the bioeconomy in general?"

We suggest that deliberate social learning should take a midway between learning by anticipation and learning by doing. It should contain elements of learning by anticipation by involving a wide range of perspectives in an early stage of

development. At the same time the technology should be developed on a small scale to enable a realistic assessment of its impacts. Additionally an important element of such a deliberate learning exercise would be to explicate the worldviews on which the actors base their assessment of the technology at hand.

**The Circular Bioeconomy in Policy and Practice – An explorative analysis of Germany** Sina Leipold, University of Freiburg, Chair of Societal Transformation and Circular Economy

Scholarly and political debates on the bioeconomy recently experienced the rise of a novel concept, a 'circular' bioeconomy, particularly in Europe and China. By creating theoretically endless circles of material flows, this concept promises no less than moving our societies beyond the limits to growth. According to political strategies promoting a circular bioeconomy, new business models and practices are crucial for this societal transition. Yet, to what extent has this political debate reached businesses and how does it contribute to technological or business innovation? To answer this question for the case of Germany, the contribution will first introduce current scientific and political understandings of a circular bioeconomy and then present an exploratory study of related business practices in Germany. Based on data from document analysis, a stakeholder workshop, and participant observation of business conferences the analysis maps the political understandings of a circular bioeconomy as well as novel business practices related to this concept. It then scrutinizes which understandings of 'circularity' and which types of practices dominate. The results demonstrate that current business practices focus on technology-driven understandings of circularity, e.g. materials recycling, whereas social innovations and new business models, such as leasing or sharing, remain largely unexplored. Similarly, political strategies promote particularly ideas of circularity that reinforce established practices like waste management or electronic waste treatment and remain very vague when it comes to less established practices or business models. Contextualizing the found business practices and political understandings with core paradigms of a circular economy as brought forward by key scholars, the results show that current ideas and practices largely remain in established paradigms of a linear economy. The presentation concludes with implications of these findings for research and policy

development towards a circular bioeconomy. The analysis contributes to two core questions posed by the session. On the one hand, it maps current innovations and the way involved stakeholders assess their importance and usefulness in relation to bioeconomic transformations. On the other hand, it presents insights into narratives of political and business stakeholders on the transformation towards a circular bioeconomy.

**Making the Bioeconomy work for Sustainable Development – the Requirements for a Sustainable Bioeconomy** Christine Rösch, Karlsruhe Institute of Technology (KIT), Institute for Technology Assessment and Systems Analysis (ITAS)

The concept of bioeconomy is a key element of sustainable economic strategies in Germany and of countries worldwide. However, the bioeconomy isn't a sustainability target as such neither on the national nor on the global level. But around half of the 17 Sustainable Development Goals (SDGs) defined by the United Nations are directly related to the bioeconomy. In particular, six SDGs are belonging to its core objectives: (1) to ensure food security, (2) access to clean water, (3) affordable, reliable, sustainable and modern energy and (4) sustainable consumption and production pattern, as well as (5) to combat climate change and its impacts, and (6) to protect life on land and halt biodiversity loss. The complex nature of sustainable development makes it difficult to assess to what extent the bioeconomy with its current focus on high-tech and biotechnological transition pathways can contribute to these and other SDGs. It can be noted that there is evidence that neither the socio-economic and socio-ecological aspects nor associated trade-offs and target conflicts have been adequately taken into consideration while pursuing the economic objectives of the bioeconomy. This might lead to poor social acceptance or even resistance as the example of maize cultivation for biogas plants clearly shows. The presentation contributes to the discussion on the applicability of sustainability principles, criteria and indicators as tool for assessing the bioeconomic transformation. With a systematic approach based on the SDGs a literature review and expert-based analysis of the general and the specific sustainability targets related to the bioeconomy has been carried out. The presentation will first give an overview on the SDGs and their relevance for the bioeconomy. Then the main requirements for a sustainable bioeconomy will be

elucidated. The results show that the development of a sustainable bioeconomy requires a comprehensive view on sustainability beyond specific environmental criteria such as carbon savings and the protection of biodiversity. Therefore, knowledge from different scientific research disciplines and an appropriate assessment and co-design of bioeconomy strategies and technologies is needed. In this regard, the traditional single-discipline focus may not be appropriate, and a more fully integrated system approach with inter- and transdisciplinary orientation would be desirable. Similarly, political strategies promote particularly ideas of innovative bioeconomy that reinforce established structures and practices and remain very vague when it comes to make the bioeconomy work for sustainable development. Hence, it is questionable whether the bioeconomy will significantly contribute to the transition towards a sustainable economy.

### **Stakeholder statements**

**Sustainable Bioeconomy – Looking ahead** Thomas Arnold, Advisor for Sustainable Bioeconomy in Directorate General Research and Innovation of the European Commission

The 2016 **Bioeconomy Stakeholders Conference**<sup>2</sup> and its delivery of building blocks for a Bioeconomy Stakeholder Manifesto kickstarted a conversation on modernizing the EU Strategy and action plan. While global trends and challenges identified in 2012 remain valid or have become more pressing, the **policy context** has evolved with new ambitious climate targets, the 2030 Agenda for Sustainable Development and the transition towards a circular economy. Food drives **climate change** which threatens food security. Food systems and the bioeconomy are crucial players in the race for climate mitigation and adaptation, stepped up by **COP21**.

The **Sustainable Development Goals**<sup>3</sup> are "*integrated and indivisible*", balancing economic, social and environmental dimensions of sustainable development in five

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<sup>2</sup> <http://www.bioeconomyutrecht2016.eu/>

<sup>3</sup> Transforming our world: the 2030 Agenda for Sustainable Development, [http://www.un.org/ga/search/view\\_doc.asp?symbol=A/RES/70/1&Lang=E](http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E)

critical areas: People, Planet, Prosperity, Peace, and Partnership. The SDGs will be mainstreamed into all EU policies and initiatives, *"with sustainable development as an essential guiding principle"*.<sup>4</sup> Leading on sustainability, Europe can have a global role beyond its numeric weight.

**All 17 SDGs** concern food<sup>5</sup> and bioeconomy. In Rockström's 'wedding cake' vision of sustainable development the *"economy serves society so that it evolves within the safe operating space of the planet"*.<sup>6</sup> Stressed **planetary boundaries**<sup>7</sup> all relate to food. Bioeconomy can drive sustainable development, but must address its unsustainable hotspots<sup>8</sup>, innovate sustainable inclusive<sup>9</sup> business models and move beyond short-termism. Economic sustainability is about long-term viability of resource bases.

The **circular economy** modernises and transforms our economy, shifting towards a more sustainable direction with opportunities for Europe and its citizens<sup>10</sup>. Beyond

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<sup>4</sup> Next steps for a sustainable European future European action for sustainability, Strasbourg, 22.11.2016 COM(2016) 739 final, [https://ec.europa.eu/europeaid/sites/devco/files/communication-next-steps-sustainable-europe-20161122\\_en.pdf](https://ec.europa.eu/europeaid/sites/devco/files/communication-next-steps-sustainable-europe-20161122_en.pdf)

<sup>5</sup> Keynote Speech: Prof. Johan Rockström & CEO Pavan Sukhdev, How food connects all the SDGs, EAT Forum June 2016, <https://www.youtube.com/watch?v=tah8QlhQLQ&feature=youtu.be>

<sup>6</sup> Source: Stockholm Resilience Institute, Retrieved 27/01/2017 <http://www.stockholmresilience.org/research/research-news/2016-06-14-how-food-connects-all-the-sdgs.html>

<sup>7</sup> <http://science.sciencemag.org/content/347/6223/1259855>

<sup>8</sup> See EPSC, Sustainability Now!, [http://ec.europa.eu/epsc/publications/strategic-notes/sustainability-now\\_en](http://ec.europa.eu/epsc/publications/strategic-notes/sustainability-now_en)

<sup>9</sup> In their contribution for this session Lotte Asveld and Dirk Stermerding, Rathenau Institute, refer to a socio-technological system perceived as *"inherently unsustainable because it reinforces existing economic inequalities"*. This underlines the link between inclusiveness of innovation and societal acceptance of technology.

<sup>10</sup> REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on the implementation of the Circular Economy Action Plan, Brussels, 26.1.2017 COM(2017) 33 final, [http://ec.europa.eu/environment/circular-economy/implementation\\_report.pdf](http://ec.europa.eu/environment/circular-economy/implementation_report.pdf)

substituting fossil by bio-based products and making waste a resource, business<sup>11</sup> and consumption practices (closer loops, sharing, diets, food waste, services, less products) need to change.<sup>12</sup>

**Open innovation** in a broad concept includes social, business model or governance innovation. Horizon 2020 requires **embedding social sciences** and humanities. **Challenge driven, transdisciplinary and multi-actor approaches** transgress silos and encourage 360° views. A **systemic approach** to food and nutrition security **connects policies**, considering health, environment, gender, working conditions, animal welfare and more.

**Multi-objective strategies** need multi-target indicators considering negative and positive externalities, including ecosystem services<sup>13</sup>. A narrow technological "climate-smart" focus, only framed as emission intensity per unit produced, ignoring natural and social capital or underrating circular solutions and behavioural change, is counter-productive. Technological breakthroughs (e.g. Carbon capture and usage, cultured meat, Internet of Energy), new societal trends (flexitarianism) or business models ('smart' short supply chains) and general concerns such as peace, democracy, solidarity, inclusiveness, fairness will challenge the bioeconomy concept.

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<sup>11</sup> In her contribution for this session Sina Leiphold, University of Freiburg, highlights that *"current business practices focus on technology-driven understandings of circularity, e.g. materials recycling, whereas social innovations and new business models, such as leasing or sharing, remain largely unexplored."*

<sup>12</sup> SDG 12 Sustainable Consumption and Production is crucial. See also World Resource Institute (2017), Elephant in the Boardroom: Why Unchecked Consumption is Not an Option in Tomorrow's Markets, <http://www.wri.org/publication/elephant-in-the-boardroom>

<sup>13</sup> In her contribution for this session Christine Rösch, KIT, finds that *"the development of a sustainable bioeconomy would require a comprehensive view on sustainability beyond specific environmental criteria such as carbon savings and the protection of biodiversity. Therefore, knowledge from different scientific research disciplines and an appropriate assessment and co-design of bioeconomy strategies and technologies is needed."*

**Acknowledging bioeconomy as contested terrain** between stakeholders with divergent focus and interests helps navigating complexity<sup>14</sup> and experimenting transformative options, conciliating public interest and responsible business. This needs conversations beyond comfort zones, societal and citizen engagement, public-private-societal partnerships, a quintuple helix approach.

**Out-of the box** thinking future-proofs sustainable bioeconomy, protects investments from stranding, spurs research, creativity and innovation towards solutions beyond business as usual. The 'art' of governance is to value contested terrain as an opportunity for **co-creation**, gaining **societal engagement** and raising hope.

**Current markets for bio-based products and their perspectives** Michael Carus, Managing Director nova-Institute GmbH

Bio-based economy shows already today a huge volume of 600 Billion € turnover in the European Union, including pulp & paper and construction. But also the bio-based chemical and plastic sector alone has a yearly turnover of 50 Billion € – almost the same volume as in North America. The main share of bio-based chemicals has the oleochemistry sector, based on the use of plant oils and animal fats. So, we are not starting from scratch, but from a high volume. How can we expand the sector further? There are mainly two developments with a bright future and both are linked together: Biotechnology and new bio-based building blocks and platform chemicals. In biotechnology microorganisms use sugar and starch to produce a wide range of new bio-based building blocks and also drop-ins. The new building blocks are mostly organic acids such as lactic acid, levulinic acid or succinic acid, which are pre-cursor of polymers, surfactants and many more bio-based products with new functionalities and properties. Also the production pathway is much smarter than petrochemical pathways, showing a lower environmental footprint.

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<sup>14</sup> See Megatrends in OECD Science, Technology and Innovation Outlook 2016 at [http://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-innovation-outlook-2016\\_sti\\_in\\_outlook-2016-en](http://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-innovation-outlook-2016_sti_in_outlook-2016-en). The world has become uncertain, complex and interdependent with “*multidimensional, mutually reinforcing, sometimes opposing megatrends*.”

**Sustainable bioeconomy: the need for alternative framings of economy** Steffi Ober, project leader of the civil society platform Forschungswende and consultant for the Nature And Biodiversity Conservation Union (NABU)

Sustainable bioeconomy is a concept full of contradictions. On the one hand bioeconomy should reduce Europe's dependency on fossil-based products and meet the climate change targets. On the other hand the EU 'wants to compete in the global bioeconomy race' forcing growth and competition. The political discourse of bioeconomy is framed by the paradigm of neoliberal economy, which is not open for negotiation. The drawbacks of neoliberal economy are manifold. Neoliberal economy is blind for social and ecological externalities. Market prices are biased, even worse, governments have rather failed to correct the failing of the market. Thus, there is a need to rethink the economy. In order to find a new model for a sustainable economy we have to find answers for the question in which society we want to live in. What are the goals for a sustainable economy respecting the planets boundaries? The aim of economy should be to serve society for the purpose of safeguarding democracy, freedom and dignity for everyone as well as access to nature for recreation.

Hence, there is a need to go beyond moaning about the fact that bioeconomy reinforces existing inequalities and start to imagine alternatives. Without new concepts and narratives for the wealth of nations and human well-being, without a fundamental mind shift of values and paradigms all efforts to shape the dynamic of bioeconomy will only scrape the surface and fail in the long run. As already mentioned in the beginning, sustainable bioeconomy is a contradiction in terms. Bioeconomy is more than changing from non-renewable to renewable resources, but the aspect of transformation is still missing in the bioeconomy discourse, which is dominated by high tech solutions. Transformation would have to imply a broad societal and political debate, a competition over concepts and pathways to a sustainable (bio-)economy. The awareness of the transformation aspect for the whole society is much higher in the Energiewende discourse, another complex and challenging technical and social transformation, even in terms (wende = transformation).



Due to the fact that oil and gas are cheap, there is no need for transformation for the industry and politics. There are no ambitious milestones for facing out of oil and gas, neither economical nor political pressure for a feedstock change in the chemical industry. Last but not least there are far too little societal and scientific actors to set up the agenda how to cope with the need for a new economic paradigm beyond growth and neoliberalism..

### ***Related poster presentation***

**Shaping the bioeconomy: Key issues and major lines of conflict in the current discourse** Carmen Priefer, Karlsruhe Institute of Technology (KIT), Institute for Technology Assessment and Systems Analysis (ITAS)

In view of the increasing depletion of fossil fuel resources, the concept “bioeconomy” aims at the gradual replacement of fossil fuels by renewable feedstock. Seen as a comprehensive societal transition, the bioeconomy is a complex field that includes a variety of sectors, actors, and interests and is related to far-reaching changes in today’s production systems. While there is broad consensus about the objectives pursued, such as reducing the dependence on fossil fuels, increasing the industrial use of biogenic resources, mitigating climate change, and ensuring food security, there is fierce controversy over the different pathways for achieving these objectives.

Based on a thorough literature review, key issues, consensus points as well as major lines of conflict in the current discourse on shaping the bioeconomy are identified. The review mainly represents the European debate and is primarily based on a survey of non-technical scientific articles, but supplemented by the inclusion of political strategies and opinion papers of civil society organizations. Alongside the immediate debate on bioeconomy there are numerous other related discourses that are likewise relevant in the context of the bio-based economy, such as sustainable land use, technological development in agriculture, dietary trends, sustainable consumption, and a circular economy. Therefore, literature on these topics was included as well.

The analysis shows that the following issues are of particular importance in the debate:

- Understandings of the sustainability postulate
- Role of future food security
- Availability of sustainably produced biomass
- Routes to increase agricultural yields
- Perspectives on nature
- Priority setting in research funding and involvement of stakeholders
- Spatial orientation of the bioeconomy
- Role of behavioural changes

Major lines of conflict refer to the strong focus on technology and research in the field of life sciences, the lack of consideration given to alternative implementation pathways in agriculture and behavioural changes, the insufficient differentiation of underlying sustainability requirements and the inadequate participation of societal stakeholders. Assessing the contrasting positions taken on the key issues, two different pathways for shaping the bioeconomy emerge: a technology-based approach, which is the currently prevailing one, and a socio-ecological approach, which gives high priority to sustainability concerns. These two pathways are characterized by the linking of extreme positions. However, they are not always mutually exclusive. Since today it cannot be predicted which pathway will be the most expedient – the technology-based one already being taken or one of the others proposed – it is suggested pursuing a strategy of diversity concerning the approaches to shape the bioeconomy, the funding of research topics, and the involvement of stakeholders.

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Session D1

Room: Brookfield, Friday 9.30-12.15

### **Getting the Story across – Challenges and Benefits of Communicating Technology Assessment**

Chairs: European TA Communicators(ETAC)

- Christine D’Anna-Huber TA-SWISS, Centre for Technology Assessment
- Henry Lau POST, the British Parliamentary Office for Science and Technology.
- Jonas Moosmüller ITAS
- Denise Riedlinger

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### **Getting the Story across – Challenges and Benefits of Communicating Technology Assessment**

Chairs: European TA Communicators(ETAC)

In an era of “post-truth”, communicating research findings and scientific evidence to a broader society is neither trivial nor futile, but can be viewed, maybe more than before, as the social and moral responsibility of science. It might be argued that Technology Assessment, the subject matter of which is the analysis of different kinds of possible technological futures and the ways they can impact society, is intrinsically even more beholden to promote public debates. But to do so, it must be able to communicate its results effectively.

How to best communicate science, how to be sure to be heard – and understood? This session proposes to look at the question from three different angles. The first part will analyze in which way and with what means scientific content can be brought across to an interested but non-specialist audience and also dwell on the question of why it is crucial that this translation process should be undertaken at all – for the sake of science as well as that of society and all the institutions involved. This part of the session will lay the fundament for the next two parts which, in turn, will look at two particular and specific cases of communicating TA, each addressing a different target group: People (society and media) and the Parliament (policy makers).

The subject matter of Part 2 are participative TA-projects, projects i.e. which aim to involve citizens in a dialogue with scientists, policy-makers and stakeholders. It will show that although these methodologically elaborate projects are often very successful in fostering rich exchanges among participants, yet the complexity of sharing the overall results with the media and a larger public is often underestimated. By neglecting what should be seen as a mandatory component of the success of the whole process, participative TA-projects run the risk of remaining largely self-referential.

In the third part we will examine how successful TA is in communicating the results of its studies to policy makers and what kind of impact it can – as one voice in a

whole choir of differently motivated evidence providing bodies – wield on legislative processes.

### **Part 1: Bridging the gap between science and communication – Work modes**

Jonas Moosmüller (ITAS Germany)

Communicating the results and the scientific processes of TA has become a crucial task for European TA institutions. Relying on third-party-funds requires them to improve their visibility for actual or potential cooperation partners, being – predominantly – funded by public sources obliges them to transparency. But above all: TA institutions like the German Institute for Technology Assessment and Systems Analysis (ITAS) explicitly aim to actively contribute to the social discourse on science and technology.

Nevertheless, the everyday communication practice is full of challenges – take for example the tendency to ad-hoc instead of strategic communication of TA projects. Different working practices and preferences of scientists and communication experts in matters of methods, working modes, and – maybe most important – language can pose additional challenges to a successful communications strategy.

The final step will focus on the addressees of TA projects. What are the needs of journalists when it comes to preparing TA content for the internet, newspapers, TV and radio? A final step presents best practice examples from European TA institutions that show following certain rules could be of great benefit for all parties involved in communicating research results.

### **Part 2: A Critical Look at the dissemination of results in public participation projects**

Christine D’Anna Huber (TA Swiss), Denise Riedlinger (ITA, Austria)

A great number of national and international participative TA-projects are quite successful at engaging lay citizens into a meaningful dialogue with scientists, stakeholders and policy makers on the societal impact of technologically driven change. They are, however, much less so when it comes to communicating their processes and results to the media and a larger public.

Using the examples of different ongoing and completed projects such as PACITA, CIMULACT and PROSO, we intend to show that the lack of efficient diffusion is, to some extent, often inscribed in the project design already and has to do with a confusion of roles and a lacking acknowledgment of the importance of professional communication.

We will compare different ways of dissemination – such as electronic publications vs print or the crucial and often overlooked process of defining an own “language” –, and discuss the different definitions of success in science and communication. We will also take a critical look at the misleading notion of the social scientists as communicator. Finally, we will attempt to define parameters for the inclusion of communication strategies into public engagement.

### **Part 3: Studying the Use of Evidence in Parliament**

Henry Lau (POST, UK)

Legislators draw on a wide range of evidence when assessing technology and its implications on society. This evidence comes from a variety of internal and external sources. Across Europe, experts provide advice to legislators on the ethical and legal aspects of new sciences and technologies and possible social, economic and environmental impacts – alongside a focus on the involvement of stakeholders and the wider public. While we know much about the structure and function of the TA bodies across Europe, knowledge about the impact that these bodies have upon legislative processes remains limited.

This paper presents findings from a project undertaken by the UK Parliamentary Office of Science and Technology (POST) in conjunction with University College London. The project examines the impact of POST and the ways that different types of evidence feed into the UK legislature. The premise is that in order to understand how, if at all, knowledge-based policy advice influences legislature, we need to understand how it fits into, and alongside, other sources of evidence.

A mixed method approach uses established social science research methods: A POST embedded researcher is able to go 'behind-the-scenes' and experience legislative processes first-hand. Methods include: a survey, interviews with a random sample of legislators, analysis of internal guidance and procedures, participant observation of core Parliamentary processes, analysis of public and non-public briefing material and semi-structured interviews.

**Data protection and privacy impact assessments: An instrument foreseen by the new European data protection regulation**

Chairs Dr Michael Friedewald, Johan Čas, Dr Walter Peissl, Raphael Gellert, Niels van Dijk

Part 1: Presentations by

- Dr Michael Friedewald, Fraunhofer Institute for Systems and Innovation Research, Germany, Forum Privacy and Self Determined Life in a Digital World
  - Data Protection Impact Assessments: Opportunities, Barriers, Implementation
- Raphaël Gellert/Niels van Dijk, Vrije Universiteit Brussel, Belgium, Brussels Laboratory for Data Protection & Privacy Impact Assessments
  - Defining a risk to a right: Challenges and caveats
- Johan Čas, Austrian Academy of Sciences, Institute for Technology Assessment, Austria
  - An Impact Assessment of Impact Assessments: Can DPIAs really be effective?

Part 2: Round table with

- Andreas Krisch (European Digital Rights/EDRI)
- Massimo Attoresi (European Data Protection Supervisor/EDPS, tbc)
- Amelia Andersdotter (Former MEP/Pirates; dataskydd.net)
- Dr Prokopios Drogkaris (European Network and Information Security Agency/ENISA)

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**Data protection and privacy impact assessments: An instrument foreseen by the new European data protection regulation**

Dr Michael Friedewald, Johan Čas, Dr Walter Peissl, Raphael Gellert, Niels van Dijk

While the proliferation of technological innovation has made the processing of personal data by automated means ubiquitous, the enforcement of the individual's rights has not been at the forefront of concern. Carrying out a Data Protection (or Privacy) Impact Assessment, while keeping in mind its purpose of ensuring the protection of individual rights, is able to bridge this divide. In order to help organizations and enterprises to assess the data protection impact of their processing of data, the new EU General Data Protection Regulation (GDPR), under the conditions of its Article 35, prescribes the execution of a Data Protection Impact Assessment (DPIA). A DPIA is an instrument to identify and analyse risks for individuals, which exist due to the use of a certain technology or system by an organization in their various roles (as citizens, customers, patients, etc.). On the basis of the outcome of the analysis, the appropriate measures to remedy the risks should be chosen and implemented (so called „privacy by design“). Although DPIAs have been discussed for more than ten years there was no standard model of how to carry out such an assessment. Until May 2018 when the GDPR will come into force there need to be DPIA framework(s) which are fulfilling the legal requirements. Currently there are proposals by the French and UK Data Protection authorities, by the German „Privacy Forum“ and others. In the first part of the workshop (90 minutes) researchers and practitioners from several disciplines will present scientific findings on Privacy Impact Assessment and Data Protection Impact Assessment respectively. One aim is to learn from each other's approaches. In the second part (60 minutes) a round table of stakeholders (policymakers representatives of civil society and industry, etc) will discuss their perspectives on the data protection impact assessment and which extent scientific findings may help to deal with societal and political challenges

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Session D3

Room: Brookfield, Friday 9.30-12.15

### **Mutual Learning of Stakeholders and Citizens for a Sustainable Development**

Chairs: Dr Mahshid Sotoudeh and Niklas Gudowsky (ITA), Dr Ciara Fitzgerald (UCC), Lenka Hebáková and Tomáš Ratinger (TC), Natalia Goncharova (TPU)

- Dr Mahshid Sotoudeh, Niklas Gudowsky (Institute of Technology Assessment, Austrian Academy of Sciences)
- Dr Ciara Fitzgerald (UCC)
- Lenka Hebáková, Tomáš Ratinger (TC CAS)
- Natalia Goncharova, Nataliia Kolodii, Zinaida Zavyalova (National Research Tomsk Polytechnic University, Russia (TPU))
- MP Mrs. Petra Bayr, Austria
- Anna Kárníková-Deputy Director of the Department of Advisors to the Prime Minister and Director of the Strategic Governance Section, Czech Republic

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### **Mutual Learning of Stakeholders and Citizens for a Sustainable Development**

Chairs: Dr Mahshid Sotoudeh and Niklas Gudowsky (ITA), Dr Ciara Fitzgerald (UCC), Lenka Hebáková and Tomáš Ratinger (TC), Natalia Goncharova (TPU)

In this session, we discuss mutual learning concepts for sustainable development, based on new participatory methods for technology assessment, foresight and strategic planning. After a general definition of mutual learning for knowledge co-generation among stakeholders and citizens, we will present examples on food consumption and smart cities for implementation of the mutual learning concepts.

The presentations will focus on:

- Citizen and Stakeholder participation for “Mutual Learning on Science, Technology and Innovation”,
- A view on PACITA-Summer schools for stakeholders to propose knowledge and create awareness of the potential of Technology Assessment among various target groups in Europe,
- Improvement of knowledge based decision making of citizens / consumers as one of the non-regulatory tools to sustain our planet for the future generations for food consumption,
- Stakeholder involvement to support a public platform for crowdsourcing solution of the long-term problems of sustainable development of a city.

The corresponding dialogue session will then start with statements of invited policy makers and NGO representatives to estimate the future needs for mutual learning for a sustainable development. In an open space dialogue, participants will be able to take part at the discussion on relevant questions and discuss the most important criteria for a successful mutual learning for a sustainable development for an environmental friendly, economic affordable and social justice way of life.

***Citizen and Stakeholder participation for “Mutual Learning on Science, Technology and Innovation” Mahshid Sotoudeh, Niklas Gudowsky (Institute of Technology Assessment, Austrian Academy of Sciences)***

Mutual learning is a key concept of Sustainable Development (SD), not only for creating public awareness, but also for citizens' and stakeholders' empowerment. The educational and communication concepts based on mutual learning have, however, not yet been well established as it was expected during the UN-Decade for Education for SD (2005-2014). On the other side during the past decades a number of forward-looking research projects with strong participative elements has generated collective knowledge on desirable future to deal with serious societal challenges such as demographic change or resource scarcity and climate change. The EU projects such as CIVISTI, PACITA, CASI or CIMULACT included a number of case studies with participatory foresight elements and opportunities for co-generation of knowledge. In some studies (CIVISTI, CASI, CIMULACT) future visions and scenarios have been developed based on citizens' hopes and concerns about the future in the 40 to 50 years. These projects have provided recommendations for research agendas for a sustainable development with the help of reflexive research and multi-dimensional perspectives of citizens, scientist and stakeholders. Other projects such as PACITA integrated knowledge of experts and stakeholders at EU and national level and developed scenarios on emerging technologies to deal with grand challenges such as ageing society. In this contribution, we will present a scheme for description and comparison of the knowledge co-generation and mutual learning based on forward-looking case studies in the framework of the above mentioned projects. In addition, we will show some characteristics of knowledge co-generation and mutual learning in homogenous and heterogeneous groups. Finally, we will discuss recommendations for the mutual learning for SD in education and research activities.

***The PACITA-Summer School, entitled Challenges and Opportunities of the Ageing Society: Exploring the Role of Technology,*** Ciara Fitzgerald (UCC),

The PACITA Summer School in Cork (Ireland) on June 18-20, 201, was an opportunity for discussing and learning about the potential of Technology Assessment among various target groups in Europe. Participants of the Summer School took part of an international mix of individuals from diverse backgrounds. Lecturers, workshops, and social events allowed participants to discuss, trial, and learn about the usefulness and the relevance of TA activities for their own activities, and in their wider organisational or national contexts. In this contribution

we will reflect on the lessons learned from summer school held as part of the PACITA project which were aimed at teaching TA as well as enhancing mutual-learning activities. The school addressed the topic of Ageing and Technology. We will first briefly describe the rationale and format of the summer school in order to present a comprehensive account of the education activity introducing TA to a new audience. Then, we continue by reflecting on the impact of summer schools as a teaching method to encourage the uptake and use of TA rationale and methods. We argue that as the responsible innovation agenda continues to gain traction among policy makers, societal actors and academics, education initiatives such as the TA summer school can have an important role to play in the future of the governance of science, technology and innovation (STI).

***Improvement of knowledge based decision making of citizens / consumers as one of the non-regulatory tools to sustain our planet for the future generations for food consumption*** Lenka Hebáková, Tomáš Ratinger (TC CAS)

The „Sustainable Food Consumption“ contribution will be based on the SUSTAINABILITY concept as a highly dynamic one, leading not to a concrete form of sustainable life on Earth, but to improving the societal values in order to sustain our planet for the future generations. There is definitely not the only one right way how to improve the sustainability – neither on the global, nor on the local level. Our assumption and approach is that sustainability can be improved by concentrating our capacities and focus on consumption – this can be done not by introducing new and new regulations, but rather through the direct choice of citizens / consumers. Regulations are only based on the debate of policymakers which we voted for in the elections, but the citizen is very far from the concrete decision what will be regulated and what protected. The more liberal and participatory approach is based on the conviction that citizens wish to have the choice and use it. Several current initiatives are the proof of this concept. In order to enable citizens / consumers making the sustainable choices, they need knowledge and trustworthy information on alternatives they have. Alternatives can be understood as alternative technologies with various impacts on consumers, producers and sustainability (mainly environment). Alternatives have their various social significances – the choice made by citizens in consumption somehow

demonstrates their value chains and attitudes in various aspects of social life. This is similar to any other technologies including those that are mainly the products of science, but in the case of sustainable consumption not only the adoption of last science results, but also renewing some older practices is valid. Our contribution shall include examples on public engagements related to food consumption: e.g. European citizen consultation during the PACITA project on 2014, stakeholders and citizens involvements during the CIMULACT project or examples on the national / local initiatives.

***Stakeholder involvement to support a public platform for crowdsourcing solution of the long-term problems of sustainable development of a city (Tomsk's case, Russia).*** Natalia Goncharova, Nataliia Kolodii, Zinaida Zavyalova (National Research Tomsk Polytechnic University, Russia (TPU))

This project involves several approaches: Smart city, Culture-led (leadership through intensive cultural development), Livable city (comfortable city). RRI&TA instruments for the project are used to establish a public platform for crowdsourcing solution of the problems of sustainable development of the city (the attraction and involvement of stakeholders), and introduction of technologies to improve the quality of life of people, living in the Tomsk region. It seems that the choice and implementation of urban policies is not always accompanied by a precise analysis of the resources and capabilities of citizens to participate in these processes. Thus, the general problem to be solved by the project aims can be formulated in the following way: how are people who live in certain city districts evaluate the quality of life generated by the efforts of government, business, city planners and developers relying on the SSS technology (Smart Sustainable City), and whether people are willing to participate in the transformation of the city, and how this willingness can be used to create crowdsourcing and crowdfunding platforms?

The participatory approach is used to create a crowdsourcing platform for addressing city sustainable development issues (recruitment and involvement of stakeholders) and introducing technologies to improve the lives of real people.

The specific goal of the project - to develop the fundamental basis of triple crowdsourcing and based on e-crowdsourcing platform build a system of communication, social analytics, discussion and rating of Smart solutions offered by the scientific and business and other city communities for the spatial development of the city; to establish a system for the Smart expertise preparation and consistent implementation of solutions to urban challenges, which would improve the quality of life of citizens.

Expected scientific results of the project are:

- Development of Citizen Science at the level of a certain scientific "agenda", methods, techniques, participatory technologies.
- A new format of implementation of design solutions to control the spatial development and city planning based on a triple crowdsourcing.
- Development of participatory methodologies for the city management system.
- Development of social analytics on the basis of a multidisciplinary approach (analysis of social media, public opinion polls, simulation modeling, effective communications system "power-planners-science") and its use in cooperation with the city communities.
- The theoretical substantiation of principles of monitoring of urban problems on the Internet, the development of the concept of the website where the city public can voice their interests and proposals, form lobbying groups



### **Assessing technologies for health quality and an independent life**

Chairs: ITA-OEAW (Leo Capari & Ulrike Bechtold) & ITAS-KIT (Maria Joao Ferreira Maia & Bettina Johanna Krings)

- Ulrike Bechtold & Leo Capari
  - Active Assisted Living (AAL) in the light of technical concepts and social attributions – a comparative analysis of 10 “success stories” in AAL
- Maria João Maia
  - Decision-making process on Magnetic Resonance Imaging technology purchase: the example of the Portuguese Healthcare system
- Linda Nierling<sup>1</sup>, Maria João Maia<sup>1, 2</sup>, Johann Cas<sup>3</sup>, Leo Capari<sup>3</sup>
  - Assessing assistive technologies for people with disabilities – user needs and implications for politics and public:
- Erika Mosor& Tanja Stamm
  - Assessing technologies for more autonomy and quality of life by using qualitative research methods:

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### **Assessing technologies for health quality and an independent life**

Chairs: ITA-OEAW (Leo Capari & Ulrike Bechtold) & ITAS-KIT (Maria Joao Ferreira Maia & Bettina Johanna Krings)

There is a long tradition about the application of advanced technologies in human support, medicine and care. Due to scientific advancements new technologies are being developed such as service robotics, neurotechnologies, additive manufacturing, synthetic biology, etc., with the vision of “improving” and “supporting” life and health quality. These visions relate basically to systematic and continuous actions focusing on improvement in terms of effectiveness and efficiency in health and care services and arrangements. Within these discourses, however, a demand-centered approach should be taken into account.

Some of these technologies have already practical applications in the health field, for therapeutics purposes, but also for diagnosis or care and support related activities. For older adults (AAL) and persons with disabilities, for instance, these technologies should furthermore serve to enhance independency. However, their actual effects, their accessibility and usefulness are sometimes surrounded by controversy.

In fact, this topic was already approached in previous European Conferences where several questions emerged in the debates, such as:

- How can indicators for the “quality” of the health and care sector be developed (ELSI)?
- What is the intrinsic motivation for the technology development (e.g. which imaginaries of the future are used?)?
- How can the assessment of a technology be improved?
- How can public engagement be addressed? And how to include the different stakeholders in the assessment process?
- How can emerging technologies be assessed if there is still not sufficient information available? Are there already approaches to assess emerging technologies?

The purpose of this session is to understand how the assessment of (emerging) technologies in health and care sector can be conducted and how can this assessment lead to quality improvements in the lives of their users.

Furthermore this session intends to bring together researchers that can share practical examples and conceptual approaches of the empirical field of such assessments on how these findings can be integrated into scientific and public debates. Therefore we focus on papers which embrace the notion of Responsible Research and Innovation (RRI) in order to discuss conception approaches on RRI with health care sector. In order to promote a vivid discussion on the topic of the session, participants will be invited to take part in a dedicated interactive discussion slot. These discussion shall shed light on the above posed questions.

**Decision-making process on Magnetic Resonance Imaging technology purchase:  
the example of the Portuguese Healthcare system**

**Author:**

Maria João Maia

**Affiliation:**

ITAS – KIT

FCT - UNL

**Abstract:**

Over time, the use of medical technology has been proven to be an incomparable added-value to patient's quality of life improvement, but they are also the cause for increasing health-care expenditures.

Magnetic resonance imaging (MRI) is a recent medical device with a promising future and high cost associated to its purchase and maintenance. Moreover, the success of these decisions depends critically on the skills of the researchers to convey caution and confidence in applying rules of argumentation (Grunwald 2007) and evidence.

The research aims to contribute to a deeper understanding of the decision process characterization, taking the MRI as its object of study. Preliminary results show that there is a market-driven rationality behind the decision process. The patient or group patient associations play no role in the decision process. The decision, is not based on TA studies and although some indicators are regularly used in the process, one cannot say that the decision process is evidence-based. Also the HTA core model for assessing technologies is not fully considered, meaning that besides costs, suppliers and technology characteristics, for instance, the social and ethical aspects should not be ignored when evaluating health technologies in an acquisition decision process.

**Active Assisted Living (AAL) in the light of technical concepts and social  
attributions – a comparative analysis of 10 “success stories” in AAL**

**Authors:**

Ulrike Bechtold & Leo Capari (Both authors contributed equally to this presentation/paper)

**Affiliation:**

ITA-OEAW

**Abstract:**

It is widely assumed among European policy makers and engineers that technologies for „Active Assisted Living“ (AAL) can contribute to tackle the Grand Challenge (GC) of demographic change. The promises of assistive technologies (AT) are manifold: technology shall relieve an economic burden, develop new markets and the European individuals shall enjoy better, healthier and more active ageing. Neven (2015) identifies the so called triple-win rhetoric, which says that there are only winners when technology allows, that the elderly (1) stay longer and (2) with more quality of life at home and so contribute to (3) relief the state budget. So far, it is rarely questioned, whether these promises are merely attributions or if these hopes (of different actors) may become true (for whom)?

To do so, it is firstly important to identify and understand the attributions (hopes and expectations) which are inherent to AAL. Secondly it seems appropriate to take a closer look at the technology development processes and to scrutinize to which extent AAL is developed and applied in regard of these attributions?

To do so 10 „success stories“ of the AAL Joint Programme Initiative (<http://www.aal-europe.eu/>) from 2008 to 2016 shall be analysed. The attributions as found there are highlighted and analysed in the light of the following questions:

- What are the (future) imaginaries which are used for ATs?
- What does this mean for dealing with the GC of demographic change?
- Is the framing of the primary addressees of AAL coherent with the high diversity among older adults?

*Neven, L. 2015, By any means? Questioning the link between gerontechnological innovation and older people's wish to live at home. Technological Forecasting & Social Change 93 (2015) 32-43.*

## **Assessing assistive technologies for people with disabilities – user needs and implications for politics and public**

### **Authors:**

Linda Nierling<sup>1</sup>, Maria João Maia<sup>1; 2</sup>, Johann Cas<sup>3</sup>, Leo Capari<sup>3</sup>

### **Affiliations:**

<sup>1</sup>ITAS - KIT;

<sup>2</sup>FCT - UNL

<sup>3</sup>ITA-OEAW

### **Abstract:**

Assistive Technologies are generally considered to play an important role for the inclusion of people with disabilities into relevant societal fields like independent living, education and employment. However, often the perspective of the people affected is not sufficiently taken into account, leading not only to difficulties to the access but also to barriers in the use of ATs on a daily basis.

A recent broad empirical study combining quantitative and qualitative methods, funded by the STOA unit of the European Parliament, focused specifically on the user's perception as well as needs and opportunities of three specific groups of disabilities – deafness and hearing impairments, blindness and visually impairments as well as autism spectrum disorders. In this presentation, key results of these studies will be presented under the lens of the user's assessment of ATs. Building on these results, ongoing political challenges to further support ATs in the public sphere will be critically reflected.

**Authors:**

Erika Mosor<sup>1</sup> & Tanja Stamm<sup>1</sup>

**Affiliations:**

<sup>1</sup>Medical University of Vienna

**Assessing technologies for more autonomy and quality of life by using qualitative research methods****Abstract:**

The Section for Outcomes Research at the Medical University of Vienna, develops methods to measure, analyse and compare outcomes in health care by using complex scores, patient-reported instruments, multivariate models, Rasch analyses, mixed methods, and activity- and motion-analyses. Data gathering is optimized with sensor technologies and e-health solutions. Furthermore, qualitative research methods are developed and applied. Outcomes include the measurement of clinical signs and symptoms as well as results of medical interventions, but also quality of life, functioning, pain, fatigue and the degree of autonomy in daily life. Those outcomes are most important for patients and should be measured in an appropriate way when assessing new technologies.

In people with acute and chronic health conditions of the cardiovascular system, other internal organs or the musculoskeletal system; in children, in older adults and in socially marginalized groups, it is essential to include the perspective of patients into outcome measurement. Qualitative research methods have an important role to play in assessing the perspectives of those concerned in a comprehensive way when testing and using new technologies. Qualitative research methods are especially effective in obtaining specific information about the values, opinions, behaviors, and social contexts of particular populations. The three most common qualitative methods comprise in-depth interviews, focus groups

interviews and participant observation and are particularly suited for obtaining specific types of data. According to that, there are also different methods for analyzing these data and several strategies to improve and verify the trustworthiness of the qualitative data.

Evidence out of qualitative research is of great importance as it shows the lived experience of those concerned and the people around them, like family, friends, care-giver, health professionals and others. Therefore, qualitative results within technology assessment studies might be of great value also for the health system, for the engagement of patient organizations, society as a whole and political decision-makers.

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Session D5

Room: Brookfield, Friday 9.30-12.15

**The extensive potential of gene drives based on the newly developed CRISPR-method – a challenge for Prospective Technology Assessment**

Chairs: Prof Wolfgang Liebert, Dr Bernd Giese and Jan C. Schmidt

- Dr Bernd Giese (University of Natural Resources and Life Sciences, Vienna, Austria)
- Prof Wolfgang Liebert (University of Natural Resources and Life Sciences, Vienna, Austria)
- René Röspel (Deutscher Bundestag, Germany, member of the Committee on Education, Research and Technology Assessment)
- Claudia Schmidt (European Parliament, member of the STOA-Panel [Science and Technology Options Assessment])
- Renata Briano (European Parliament, member of the STOA-Panel [Science and Technology Options Assessment])
- Dr. Tessa Knox (World Health Organization (WHO), Geneva, Technical Officer, Entomology and Vector Control, Global Malaria Programme)

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**The extensive potential of gene drives based on the newly developed CRISPR-method – a challenge for Prospective Technology Assessment**

Chairs: Prof Wolfgang Liebert, Dr Bernd Giese and Jan C. Schmidt

Manipulating the fate of entire populations of sexually reproducing species can be greatly accelerated by so-called gene drives. In particular gene drives based on the CRISPR/Cas9 tool bear the potential to spread traits rapidly in natural populations and even drive populations towards extinction.

The aim of the session is (a) to analyze the impact of this novel method of advanced biotechnology in particular with respect to infectious diseases like malaria, agricultural usage, or the eradication of invasive species, (b) to consider the classification as a “late-modern technology”, (c) to introduce the assessment needs related to gene drive technology and present first results of a prospective technology assessment. By this the session will focus on technological aspects as well as on regulatory implications and furthermore discuss also the normative dimension of steering the evolution of life on earth.

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Session D6

Room: Brookfield, Friday 9.30-12.15

**Responsible Research and Innovation: Perspectives from active and live RRI projects in Higher Education**

Chairs: Dr Ruth Hally

- Dr Ruth Hally
  - EnRRICH consortium
- Dr Paidi O'Reilly
  - Leanbh Infant Project -
- Dr Siobhan O'Sullivan and Lorna Kenny
  - UCC Learnings Neighbourhoods
- Dr Pdraig Murphy
  - NUCLEUS Consortium, represented by Dublin City University project members
- Erich Griessler
  - MoRRI consortium

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**Responsible Research and Innovation: Perspectives from active and live RRI projects in Higher Education**

Chair: Dr Ruth Hally

**EnRRICH consortium**

*Today's students will be tomorrow's researchers*, therefore, there is growing impetus around developing curricula which embraces the principles and processes of RRI, to equip students to become committed, engaged, critical thinkers. The EnRRICH (Enhancing Responsible Research and Innovation through Curricula in Higher Education) project is tasked with embedding RRI in HE curricula. The UCC EnRRICH team will outline the various trials and techniques employed in an effort to sustainably embed RRI in HE. The presentation will draw on findings relating to how to make RRI and its key concepts 'stick', particularly if the RRI terminology moves on.

**MoRRI consortium**

**Identifying and Measuring the impact of Responsible Research and Innovation for Policy Making.**

Advocates of RRI point out that "RRI is a good policy that is badly needed". It will help to align research with actual societal needs and the grand challenges our globe is currently facing. But is RRI really such a good thing as its advocates claim? RRI also faces concerns and resistance. Its opponents argue that it might, for example, endanger the freedom of research. The EC funded project "Monitoring the Evolution and Benefit of RRI" sets out to address these questions. This paper will present indications of how the recognition of RRI in research projects had an impact in scientific, social, democratic and economic terms.

**Abstract 3 (NUCLEUS Consortium, represented by Dublin City University project members)**

NUCLEUS is a four-year, H2020 project investigating how to make RRI a reality in universities and research institutions. What institutional barriers prevent research organisations from engaging with their stakeholders to align research with society's needs? How can these obstacles be overcome? NUCLEUS not only investigates these challenges, but will also recommend and implement new strategies to tackle them. The international, transdisciplinary consortium is developing new ways to help scientific institutions respond to societal needs and challenges. NUCLEUS will establish 30 international test sites to bring RRI to life, making upstream mainstream. This presentation will outline the key goals of the project, the insights based on NUCLEUS Field Trips as well as the progress made to support a culture change in the 10 pilot institutions to-date.

## **Part 2**

### **UCC Learnings Neighbourhoods - by Dr Siobhan O'Sullivan and Lorna Kenny**

Learning Neighbourhoods, established in 2015, under the auspices of the Cork UNESCO Learning City award, is supported by ACE at UCC. Learning Neighbourhoods assists education networks and organisations to promote and showcase learning and aims to enhance partnerships between higher education and disadvantaged areas. Learning Neighbourhoods is based on principles of equality, inclusion and co-creation and a vision that the university is available to all citizens. Learning Neighbourhoods is committed to building a more responsive university by working in and with the community it serves.

### **Leanbh Infant Project - Dr Paidi O'Reilly**

This presentation focuses on the challenges encountered in applying a Responsible Research and Innovation (RRI) mind-set to messy trans-disciplinary projects involving stakeholder groups with different perspectives and needs. We take a look at a recent connected health project focused on hypertension during pregnancy and describe how the team sought to increase anticipation, reflexivity, inclusiveness and responsiveness in arriving at an appropriate design while

conforming to ethical and medical pathway constraints. We also refer back to some previous technology assessment engagements.