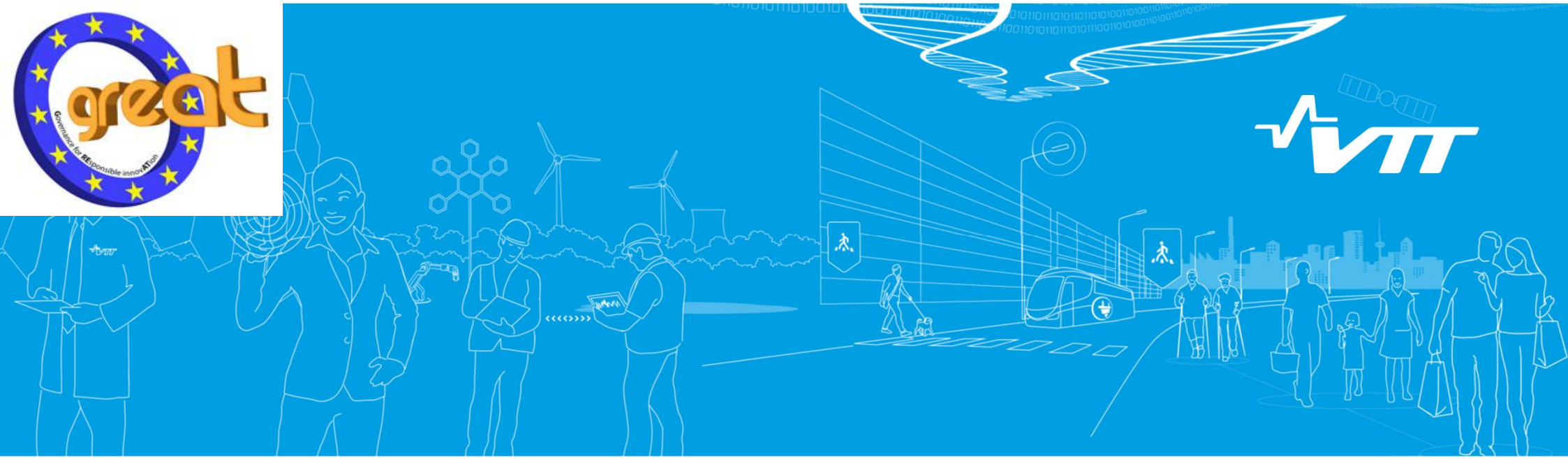


Responsibility for research and innovation: from ethical issues towards the co-construction of Responsible Research and Innovation (RRI).

Veikko Ikonen, VTT Technical Research Centre of Finland

Responsible-Industry

Eesti Teadusagentuuri avatud seminar
'Teadustöö ja eetika', 31.10.2014
Nordic Hotel Forum, Viru Väljak 3, Tallinn

SEVENTH FRAMEWORK PROGRAMME

SCIENCE IN SOCIETY

Background (in user studies, ethics and RRI)

Veikko Ikonen

- Research Team Leader for the Human-Driven Design and System Dynamics –team at VTT, Finland
- mmHACS, KEN, ÄES, Mimosa, Nomadic Media, Minami, IHME, Guardian Angels, ETICA and GREAT Satori and Responsible Industry
- Board member of Corporate Responsibillty Network FIBS (Finnish Business Society), member of Ethics Committee of the Tampere region

Research Focus

- Human Driven Design on
  - Service design
  - System dynamics and modeling
  - Marketing & Consumer Research
  - Responsible Research and Innovation

Customer base

- **Industries:** Customers across industries (B2Bm B2C), Manufacturing industry, Energy (renewable), Bio, Wellbeing, Safety and Security, ICT. Cities, (SHOKs)
- **Customer base:** SMEs, Cities and other public organisations, Large companies, PPP, Enterprise networks, VTT (Internal customer)
- **Geographical markets:** Finland, Europe > Global

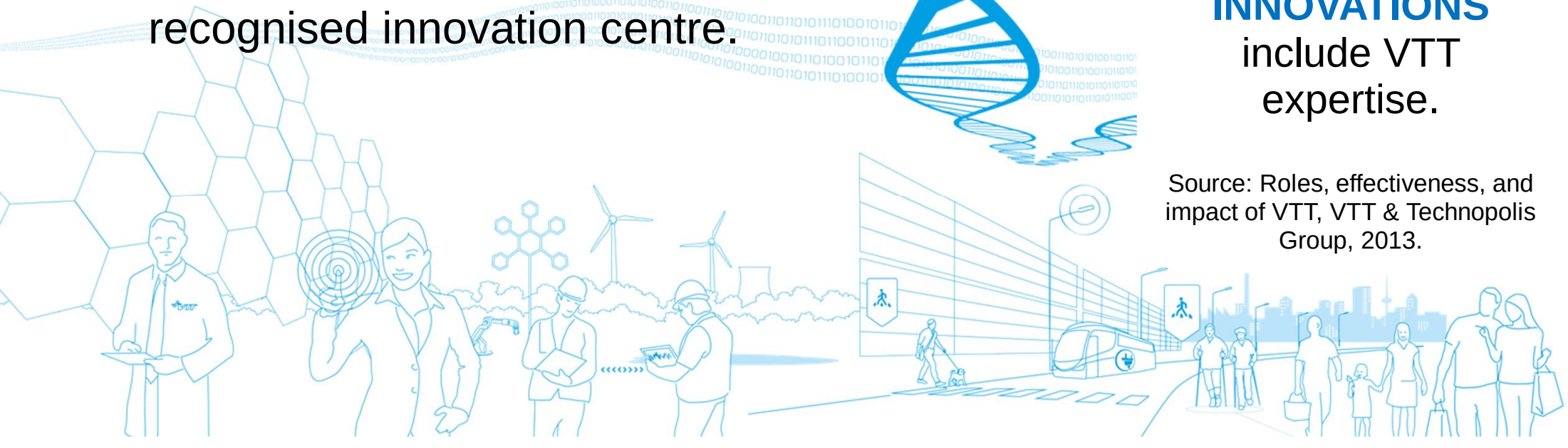
VTT – Technology for business

- We increase competitiveness of companies by creating new technology and innovations.
- We renew industry and create new business opportunities.
- We create new knowledge for the purposes of society and political decision making.
- We help Finland to be a globally recognised innovation centre.

36%

OF FINNISH INNOVATIONS include VTT expertise.

Source: Roles, effectiveness, and impact of VTT, VTT & Technopolis Group, 2013.



Biggest multitechnological applied research organisation in Northern Europe

Resources

- Turnover 308 M€ (2013 VTT Group), personnel 2,900 (31.12.2013 VTT Group)
- Unique research and testing infrastructure
- Wide national and international cooperation network

Services and the way of work

- Cross-disciplinary technological and business expertise
- A not-for-profit and impartial research centre

Customers

- Finnish and international companies as well as public sector organisations

Business areas and VTT companies

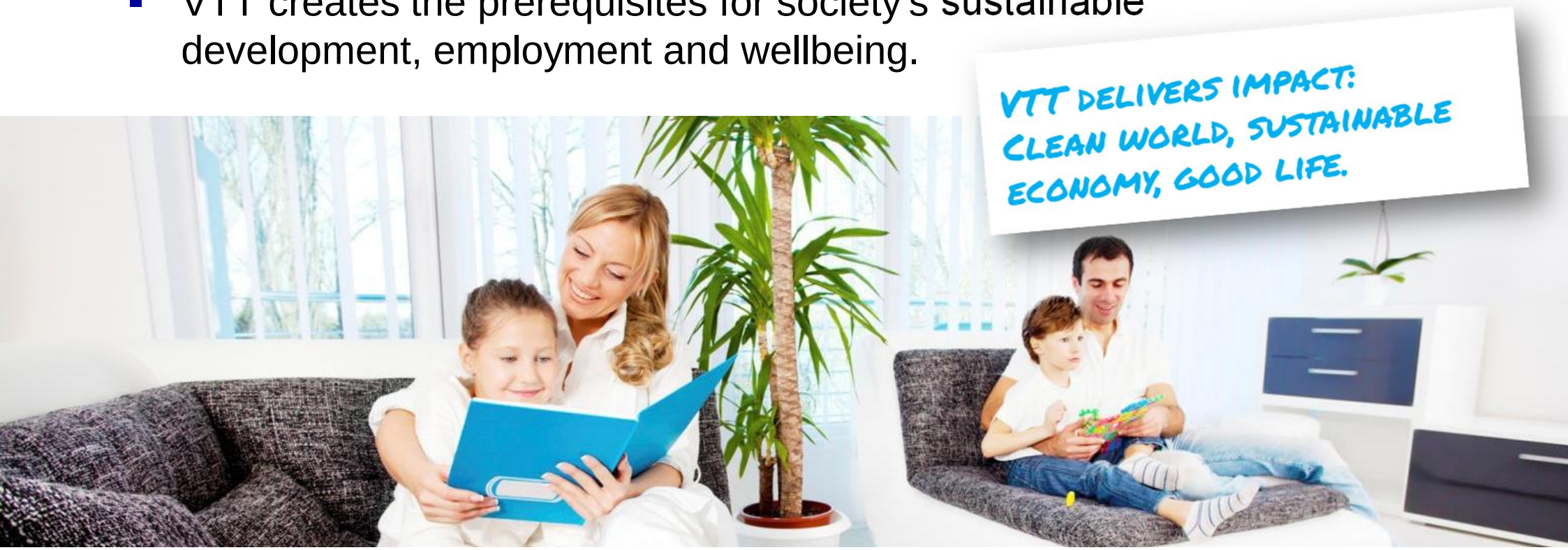
- Knowledge intensive products and services
- Smart industry and energy systems
- Solutions for natural resources and environment

- VTT Expert Services Ltd (incl. Labtium Ltd)
- VTT Ventures Ltd
- VTT International Ltd (incl. VTT Brasil LTDA)
- VTT Memsfab Ltd

*) Source: Roles, effectiveness, and impact of VTT, VTT & Technopolis Group, 2013.

VTT's mission

- VTT produces research and innovation services that enhance the international competitiveness of companies, society and other customers.
- VTT creates the prerequisites for society's sustainable development, employment and wellbeing.



VTT's programme portfolio 2014

Spearhead programmes 2014

- Bioeconomy Transformation – *Jussi Manninen*
- Productivity Leap with Internet of Things – *Heikki Ailisto*
- Smart Mobility Integrated with Low Carbon Energy – *Nils-Olof Nylund*

Innovation Programmes 2014

- Intelligent Energy Grids
- Multidisciplinary and Multiscale Design
- Arctic and Cold Climate Solutions
- Critical Technologies Towards 5G
- Personalised Health and Wellbeing
- **Human Driven Design – "Design for Life"**
- Safe and Sustainable Nuclear Energy
- Mineral Economy

RRI - what? -From Ethical issues, Innovation Policy, Open Science …… to RRI in H2020

- Science with Society, Science for Society, Science with and for….
- Responsible Research and Innovation", often abbreviated to "RRI", is a recent expression that is being used by the European Commission to denote part of its research and innovation strategy. The term is being used in EU policies, funding programs, funded research project, and increasingly also in the academic literature, both in Europe and abroad. **The term is meant to refer to approaches to research and innovation that take into account ethical criteria and societal needs**. A frequently cited definition of RRI is that by philosopher and EC policy officer René von Schomberg:

RRI -what?

- “Responsible Research and **Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products** (in order to allow a proper embedding of scientific and technological advances in our society).” (Von Schomberg, 2011).
- “**RRI is an inclusive approach to research and innovation (R&I), to ensure that societal actors work together during the whole research and innovation process**. It aims to better align both the process and outcomes of R&I with the values, needs and expectations of European society.” (European Commission, 2013)

RRI why? - European Context

- The need to conduct research and innovation more responsibly has emerged from the discussion of particular issues, e.g. GMOs, nanotech, fracking, people tracking (e.g. camera surveillance, behavioural based marketing, physical performance measurement, emotional computing……), health care applications, cloud computing, robotics, artificial intelligence, quantum computing,
- How do actors envisage—and importantly, operationalise—a notion of 'responsible innovation' alongside the twinned and inseparable notion of 'responsible governance'
- Questions of responsibility in the face of inherent uncertainty, risk,

And unanticipated consequences — the fundamental characteristics and governance challenges of emergent science and technology — are not new

= How to ensure that outcomes resulting from R&I will be adequate for society in the long run A ND RESPECT ETHICAL PRINCIPLES?

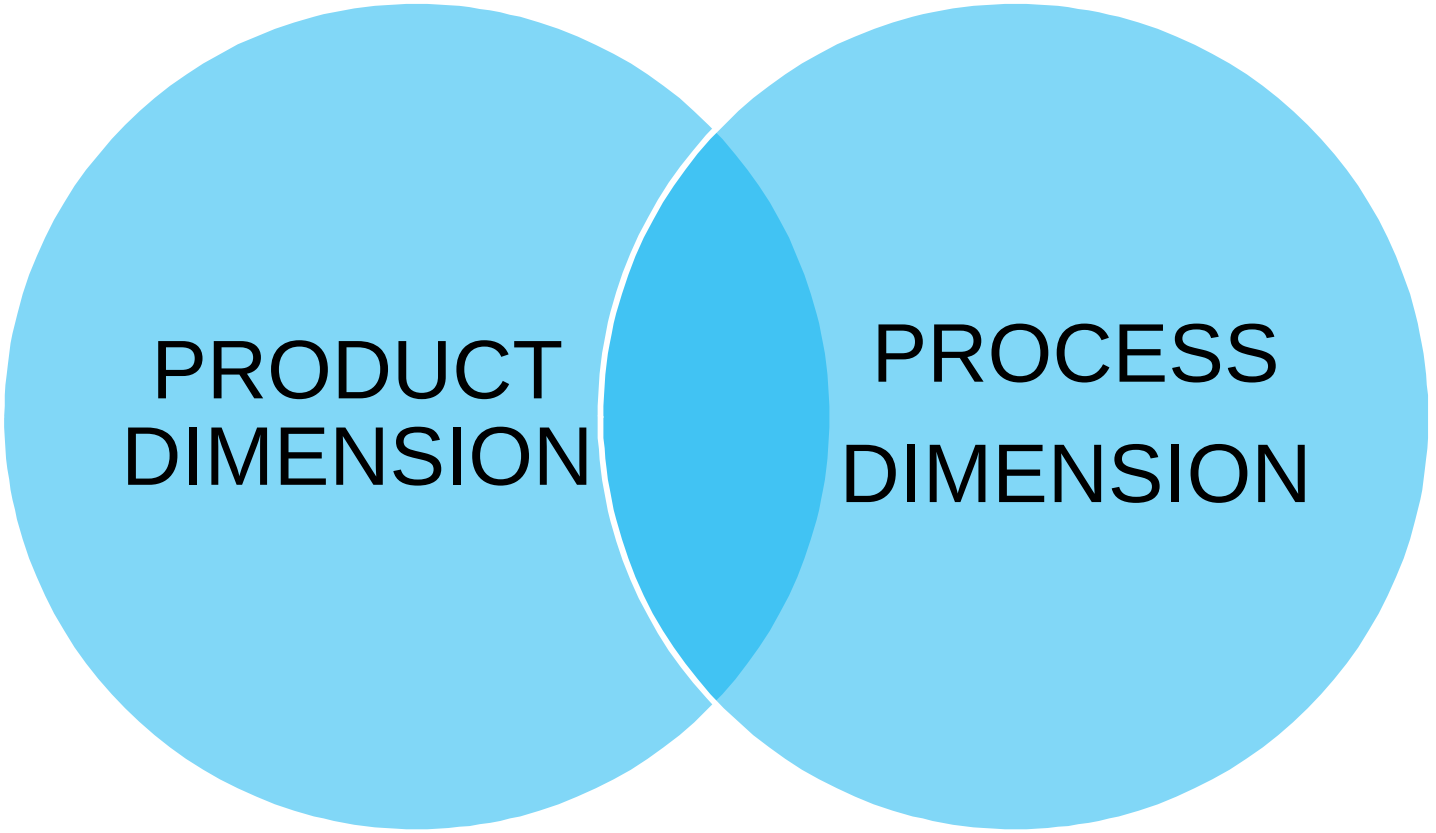
RRI - General Context - Globalisation

- Globalisation
- Competition
- Need for flexibility
- Need to justify increased investment in research and innovation

- Grand social challenges
- Ethical Concerns from the Public
- Increasingly, researchers and policymakers are focusing on real-time responses to real-time diffusion of technologies into societies, in addition to studies concerned with real-time capture and monitoring of commercialisation and governance responses > basic research, applied research and productization are judged betweentimes

RRI – Product and Process Dimension

The broader focus on RRI can be realised by focusing on two dimensions of the innovation process:



RRI – Product Dimension

- Products should be evaluated and designed marketed throughout a transparent process (will) have been defined in terms of safety, sustainability (environmental and economical) and societal desirability, and brought about through:
  - Use of Technology Assessment and Technology Foresight
  - Application of Precautionary Principle
  - Use of demonstration projects: moving from risk to innovation governance.
  - respecting fundamental normative principle (legal and ethical compliance) Charter of CHARTER OF FUNDAMENTAL RIGHTS OF THE EUROPEAN UNION

RRI – Process Dimension

The process dimension posits that the challenge is to arrive at a more responsive, adaptive and integrated management of the innovation process.

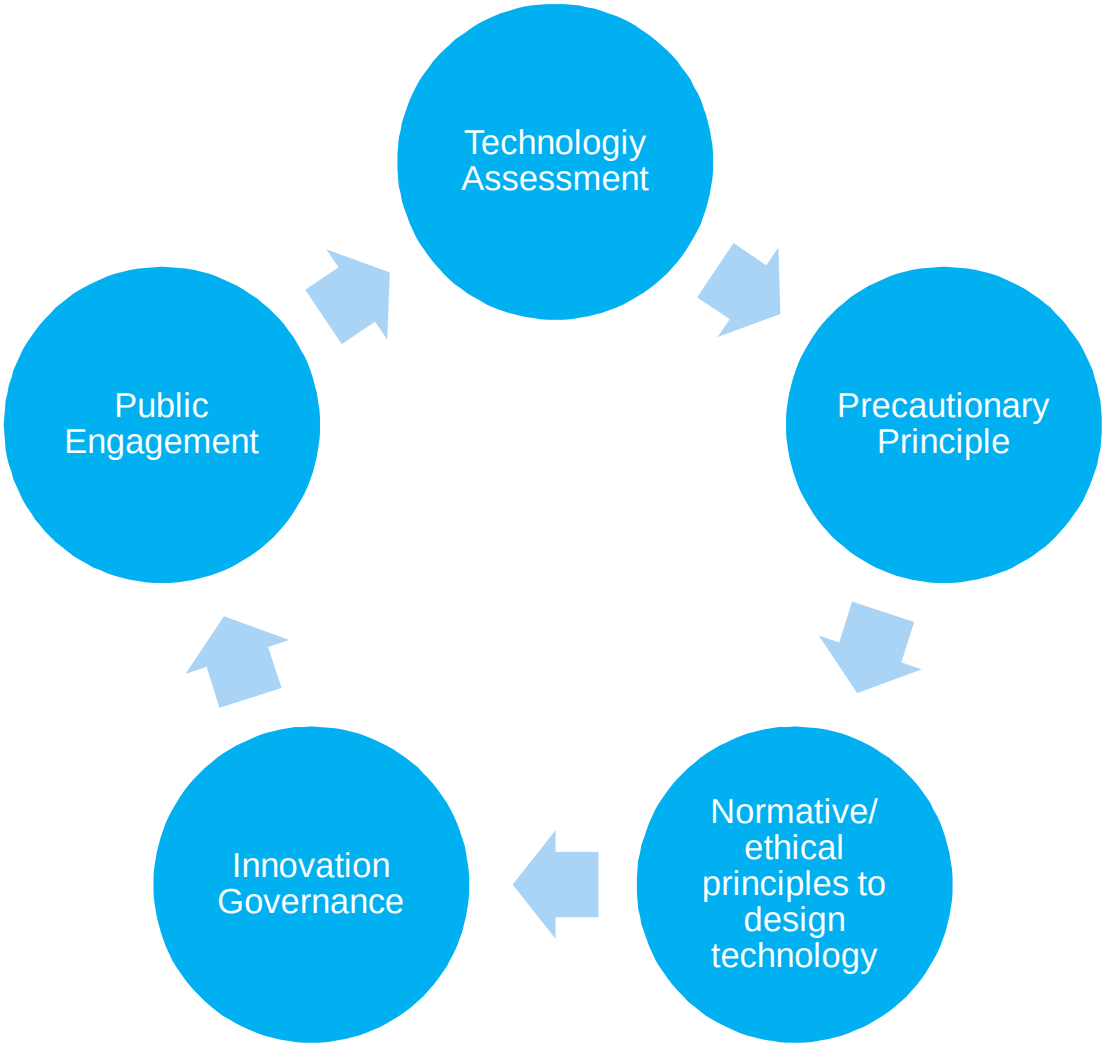
Requirements:

- a multidisciplinary approach with the involvement of stakeholders
- and an inclusive innovation process whereby technical innovators become responsive to societal needs and societal actors become co-responsible for the innovation process by a constructive input in terms of defining societal desirability of products.

These requirements are more likely to be realised through:

- 1. Deployment of Codes of Conduct for Research and Innovation.
- 2. Ethics as a "Design" factor of Technology also in the process
- 3. Deliberative mechanisms for allowing feedback with policymakers: devising models for responsible governance.
- 4. Public debate. (also for decision not just consultation)

RRI – Implementation in Europe



Ethics and research > RRI

ETHICS OF RESEARCH:

- DOING THE RESEARCH (Good scientific practice and procedures for handling misconduct and fraud in science)
- RIGHTS OF THE PARTICIPANTS

(how participants and the data collected from them should be handled)

ETHICS OF OBJECTIVE/DESIGN:

- REQUIREMENTS OF EQUIPMENT/PRODUCT
- REQUIREMENTS OF SERVICE SYSTEM
- SECURITY OF INFORMATION

Main questions for RD or RRI discussion?

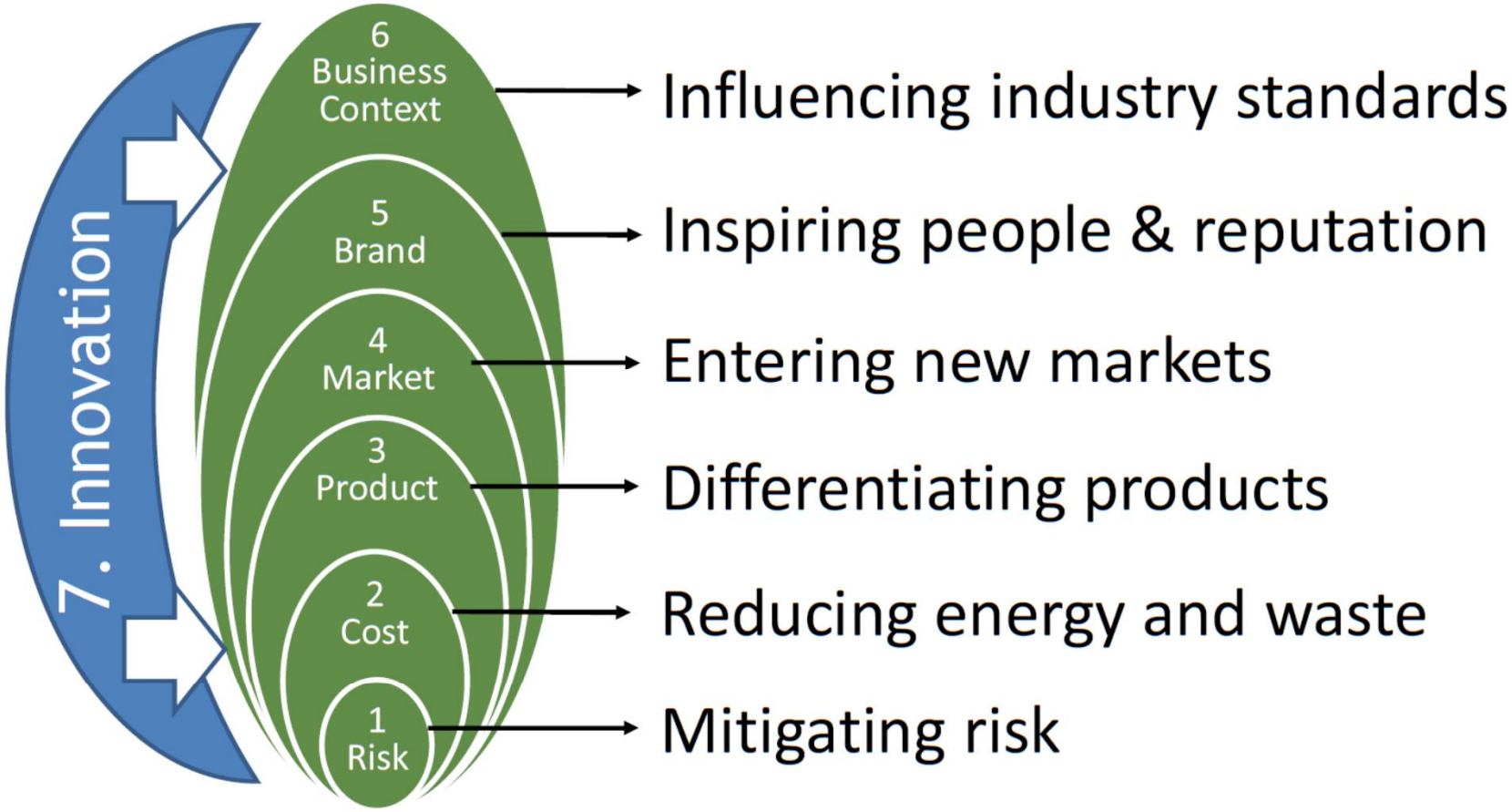
- Who (or what) is designing your future/everyday life?
- Identificatiion of stakeholders - Who are the decision makers? Industry, policy makers, citizens?
- What are their ambitions/goals/intentions and what is behind in those?
- How design decisions are justified – on what grounds?
- What kind of systems are designed (user interface –task – local service system - global ecosystem)
- Do we go to the global level?
- What is Responsible Research and Innovation?
- Is Human-Driven Design an answer for some of the questions?

RRI and academia and Industry – current buzzwords

- Technology and ethics > academic approach
- Research, science, innovation, business ethics > reputation building or being honestly good?
- Ecological thinking > environmental policies > avoiding hazards
- Sustainability (social, economical, environmental) > policy and business approach, but also research aproach
- Ethical design, Ethics by Design > humanistic design approach
- Green – growth, clean tech > business opportunities
- Corporate social responsibility > reputation
- Ethical consumption > looking for new markets, customer insight

Why sustainability, why RRI?

How Sustainability creates business value

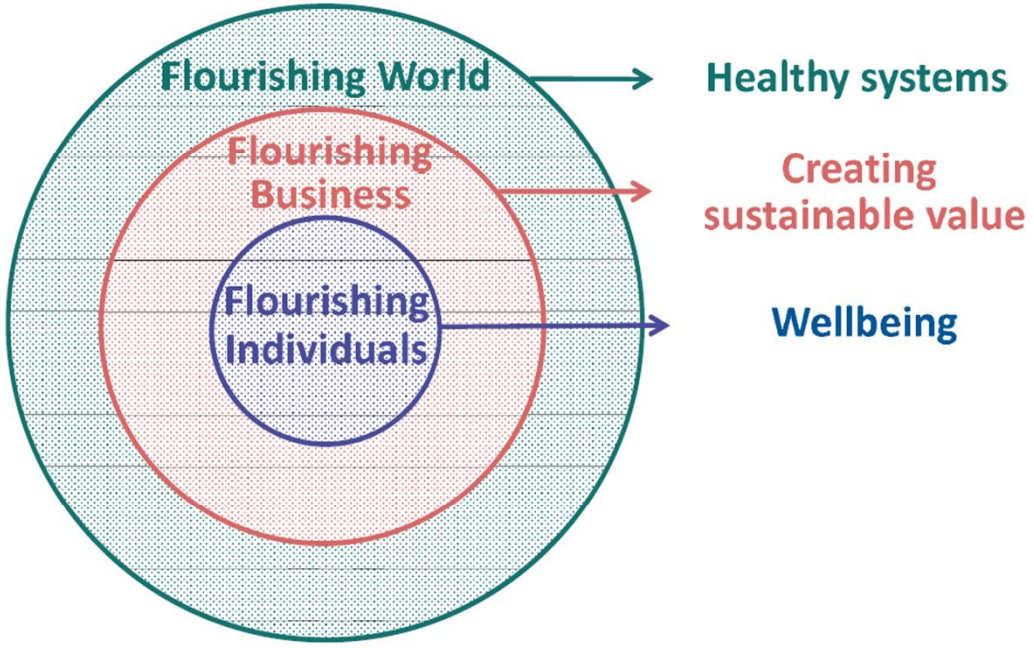


From Laszlo, C. (2003) The *Sustainable Company.* Island Press

RRI as an Empowering activity

From Sustainability to Flourishing

Personal flourishing centers on ***"the basic feeling of being connected with one's complete self, others, and the world"***



What is needed to ”do” RRI?:

- Anticipation
- Inclusion
- Responsiveness
- Reflextivity (reflexsive learning)
- Transparency

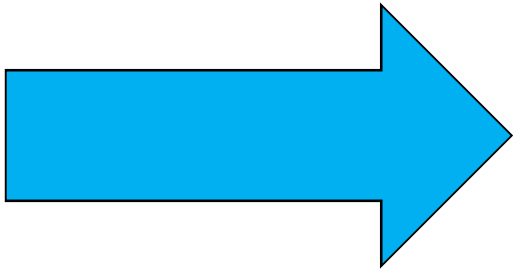
(e.g. Owen et al., Sutcliffe)

- The Engagement,
- Open Access,
- Gender Equality,
- Ethics,
- Science Education
- Governance

(HORIZON 2020, EU)

- Anticipate,
- Reflect,
- Engage
- and Act

(EPSRC, UK)

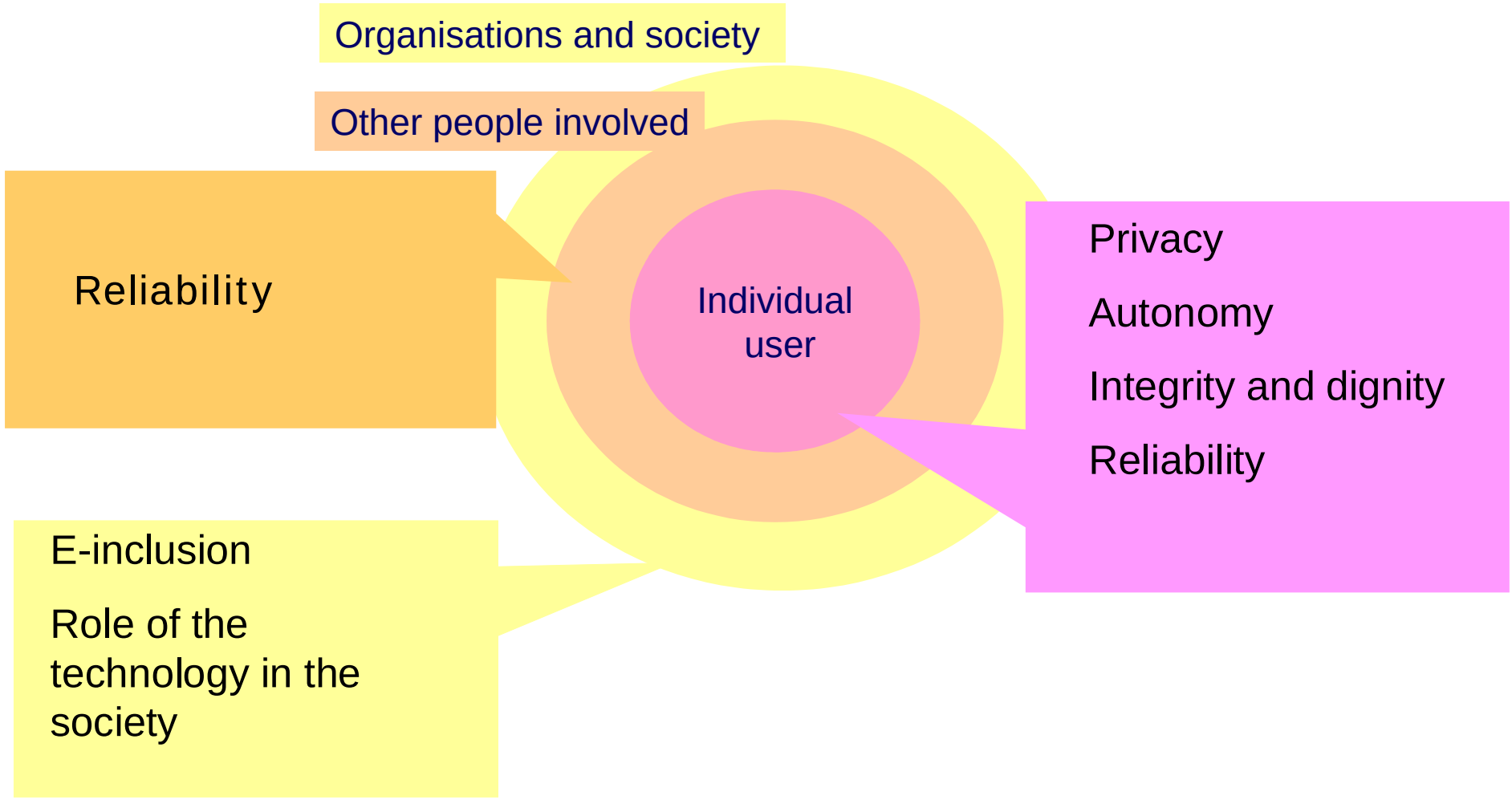


Co-construction

The History of Ethics in Research and Innnovation and RRI - from our point of view

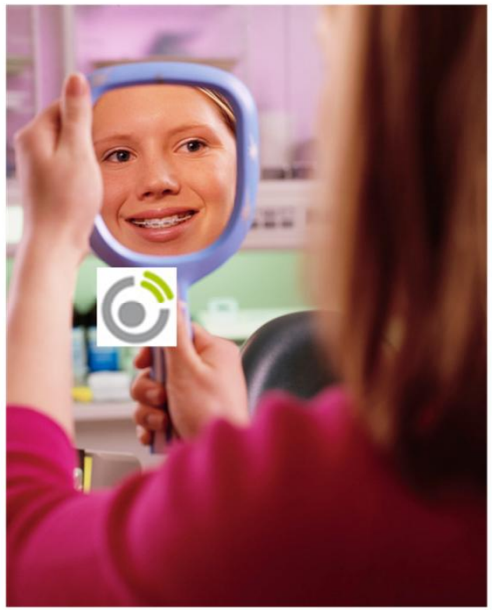
- Participatory design approach (from 60s)
- UCD/HCD appraoch was broaden from UI design to the design of technological environment and services
- Design for All, Inclusive design approaches
- Ethical issues in our work in some level and several technology development projects with industry where ethical issues has been emphasised (mmHACS (OY): MultiMedia HomeAid Communication System (1998-2001) – ethical guidelines / expert based
  - KEN: Key Usability and Ethical Issues in Navi –program (2000-2002) - ethical guidelines / expert based
  - ECG: Ethical Computing Group (2003-) – VTT's network to support researchers when confronting critical/ethical issues
  - EASE, Ecological Approach to Smart Environments – Good Smart Environment – expert based /more general assessment framework
  - NEAT (Jaana Leikas),report on ethics, aging and technology
  - EU -projects (Nomadic Media, Mimosa, Minami, ETICA 2009-2011 Goldenworkers, Guardian Angels 2011 -): ethical issues identified, EAB
  - DfA: Design for All -network
  - Regional ethics committees for the social sciences and humanities)
- > now more holistic view called RRI
- RRI is key concept for EU's HORIZON 2020

Implemantion of RRI - MINAmI ethical principles on different levels of the society



Guardian Angels
for a smarter life

Ethics and acceptance of human-technology interaction



Physical Guardian Angels:

- Long-term monitoring of health parameters to predict and prevent health problems

Environmental Guardian Angels:

- Monitoring natural environment, buildings and traffic for increased safety

Emotional Guardian Angels:

- Enjoyable user experience and increased safety with emphatic technology that adapts to the emotional status of the user

Guardian Angels - Ethical principles from MINAmI project as the starting point

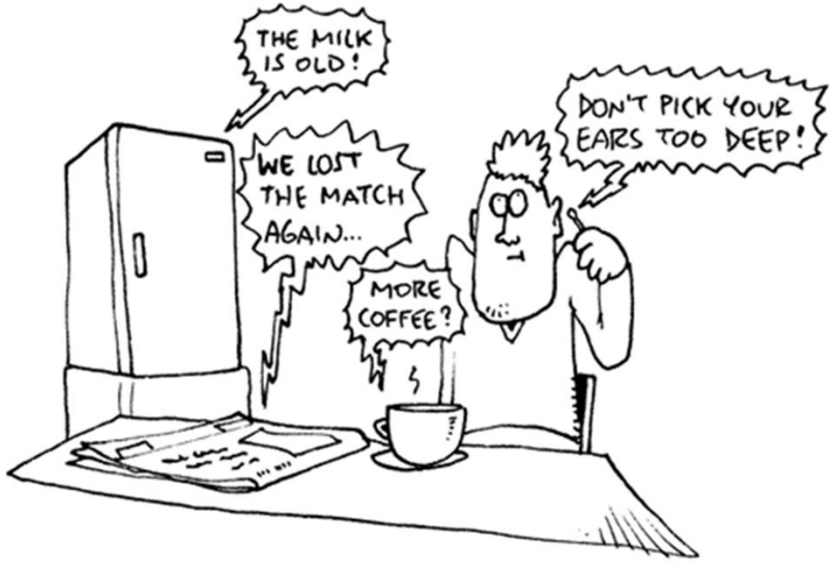
Privacy: An individual shall be able to control access to his/her personal information and to protect his/her own space.

Autonomy: An individual has the right to decide how and to what purposes (s)he is using technology

Reliability: Technical solutions shall be sufficiently reliable for the purposes that they are being used for. Technology shall not threat user's physical or mental health.

Guardian Angels - Ethical principles from MINAmI project as the starting point

E-inclusion: Services should be accessible to all user groups despite of their physical or mental deficiencies.



Benefit for the society: The society shall make use of the technology so that it increases the quality of life and does not cause harm to anyone.

Integrity and dignity: Individuals shall be respected and technical solutions shall not violate their dignity as human beings.

Human-Driven Design as an approach for RRI-Design for life research background at VTT

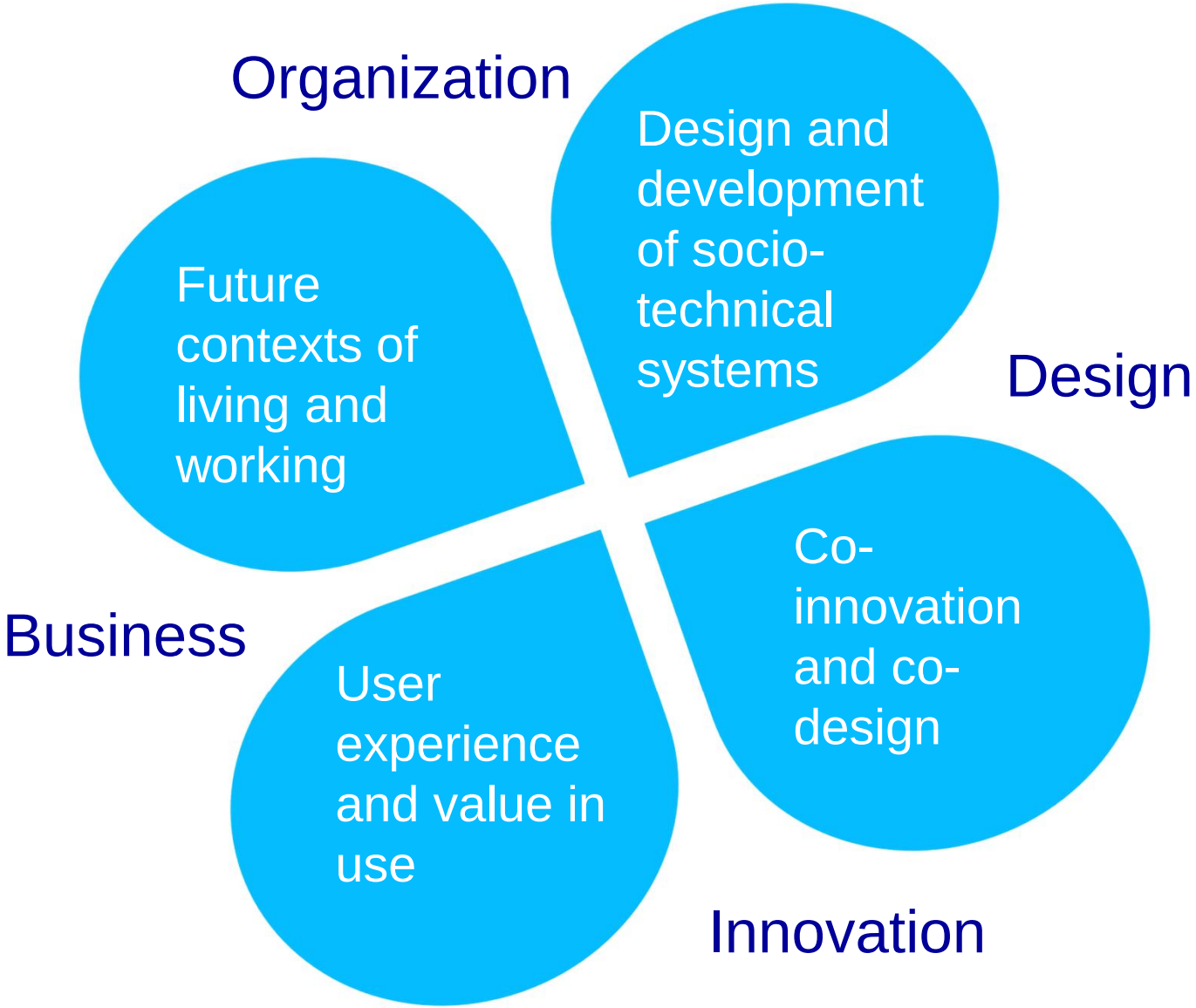
Design for life research activities cover different research areas at VTT

- Systems engineering
- Business and technology management
- Organisations, networks and innovation systems
- Systems research
- Smart interaction solutions
- Digital service research
- Technologies and services for buildings
- Transport and logistics systems

VTT has wide human-driven research competence, distributed in several research teams at VTT.

Human-driven research teams at VTT have identified common research drivers. By orchestrating VTT's competences to solve the common challenges, we can create world class solutions.

Design for life innovation programme



Design for life objectives

Competitive advantage and better productivity by taking human well-being and values as the driving forces

Empowering people to influence their living and working environments.

Finding solutions to big societal challenges together

Enabling human control of complexity

Design for life challenges - Four areas that need renewal

- Understanding **future consumers** and their contexts of living and working as well as value and impacts of technology. Consumer studies must be more foresight oriented to support the design of future services.
- **Coping with complexity** by developing systemic approaches and shared methods to design, based on understanding the interdependencies between technologies and social practices.
- Utilising the **innovation** potential of users and other stakeholders as **co-design** partners by developing understanding of the collaborative processes of knowledge creation and innovation.
- Creating the organizational mindset for user **experience driven business**. Utilizing the full potential of user experience requires changing the mindset of the whole organization in addition to adopting user experience driven design practises.

Understanding future consumers/citizens

- Research in this area includes three perspectives:
  - **Consumer understanding**: Research that aims to understanding consumer activity, culture and values
  - **Foresight activities** that aim to capture impacts of societal and technological transformation on consumer behaviour and values in the future
  - **Reflective approaches** that address consumer behaviour, innovation and technology design from the viewpoint of ethics, responsibility and sustainability.

Research needs for Understanding future consumer/citizen

- Creating a knowledge pool of future consumer behaviour, values and cultures in contexts of living and working
- Applying foresight methods to capture impacts of technology and societal transformation on consumer behaviour. This knowledge can be used to inspire design, development and business from the angle of human well-being.
- Understanding human activity to identify and frame unsolved problems. We shall gather, integrate and analyse research knowledge which reveals future challenges for organisations to tackle in a proactive manner.

Coping with complexity in design

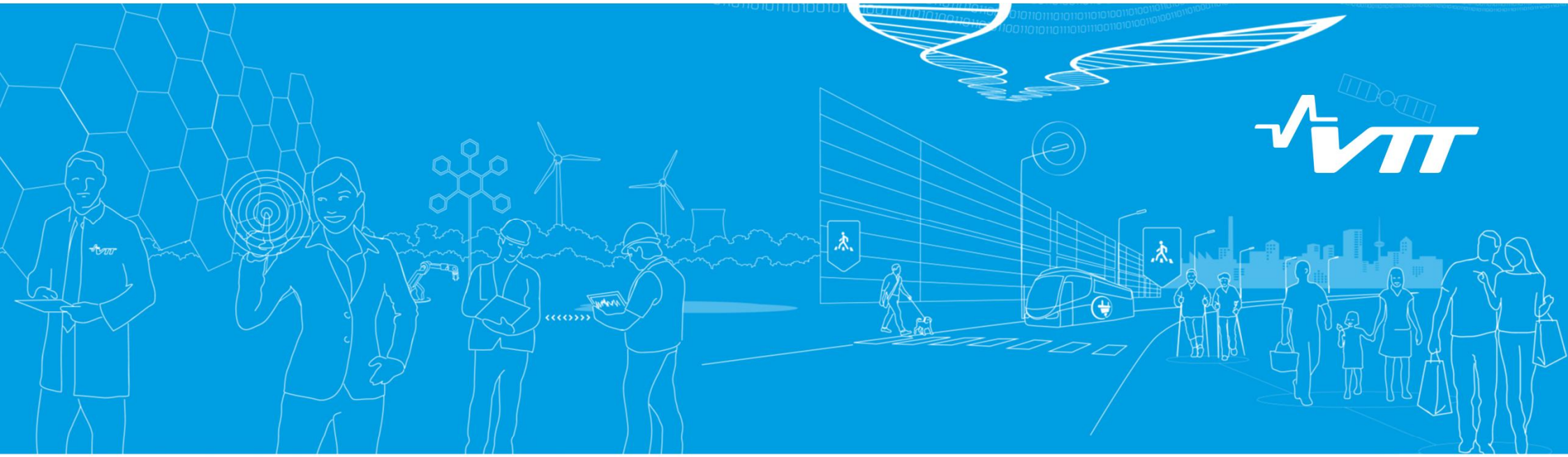
- Complex socio-technical systems are everywhere in the modern society: the entirety of the healthcare system, the food chain “from farm to fork”, energy systems, emergency services, global service business etc.
- Complexity is an intrinsic feature of these systems, especially due to the needs for:
  - balancing between multiple global challenges like well-being, safety, security, environmental and social sustainability
  - adapt to situational variations in the operative environment, i.e. the systems need to be resilient
  - building ecologies of systems: they are systems of systems that are developing both based on design activities and by usage practices
- For a large part, the complex socio-technical systems of today are not designed per se. Instead, they emerge in an interplay of different stakeholders developing their own parts of the system. Thus the systemic entity, the complex whole, may remain completely un-designed and thus its functioning may become ambiguous or unpredictable.

Research needs for Coping with complexity in design

- Systemic design practice which understands the interdependencies between technologies and social practices
- Understanding human activity, decision-making and use of tools in real-life situations, and development of appropriate ethnographic and experimental methods
- Methods and practices of developing perspectives of socio-technical transformations and their long term impacts

Innovation through co-design

- Since products and services are more and more tied together in bigger service ecosystems, companies cannot survive in the competitive markets without collaborating with other stakeholders. Co-design refers to collaborative design activities with customers or other stakeholders across the whole span of the design process.
- Users are the experts of their everyday life and can therefore bring new insights into the innovation process and increase designers' understanding of real user needs and desires. Early user involvement reduces costs later and leads to better user acceptance of new products and services. Co-design also helps in creating a closer relationship with customers.
- For companies, it is challenging to find the customer innovators and establish links with them in a cost-effective manner. User participation in the global context is a particular challenge.



Responsible Innovation through co-design > co-construction of approach

What is co-design?

Involving different stakeholders in the innovation and design processes of new products, services and processes.

Examples:

Consumers participate in service development

Citizens develop their living environment together with the municipality

Companies bring their employees and partners into collaborative workshops

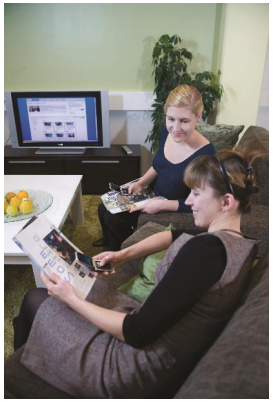
VTT's co-design spaces: ..\..\HDDDFLHTI\videot\VTT_-_co-design_video_(25fps_1080p).mov

Owela

Ihme

HTI Design Lab

Work in the wild lab



Usability lab

Perception lab

Neurosensing lab

Why co-design?

- Co-design helps to identify new strategic **business possibilities**, **improve** existing services and **optimize** internal processes.
- Co-design gives you **deeper understanding** of customers' needs and wishes.
- Co-design helps you **catch the good ideas** that can come from everywhere.
- Co-design in the early phases of the innovation process helps to **avoid costly re-designs** later.
- Thanks to digital technologies, co-design is **easier and cheaper** than ever before.
- Collaboration brings **closer relationship** with customers, who become more **committed** to your services.

Responsible co-design – HDD approach

- We characterise HDD as follows: the human-driven design approach
- 1) takes a human and social view to users of technology as individuals and members of human social groups, such as family, organisation or community, and as consumers
- 2) is responsible in terms of being aware of human, societal and ethical values related to a particular design and reflecting them in the design in order to make the technology support well-being and activities of people as well as sustainability (social, environmental and economic) > RRI

Responsible co-design - HDD

3) is collaborative in terms of utilising and promoting participatory and collaborative design methods to promote equality in design process and design outcomes and to ensure successful design outcomes by means of deep understanding of the user's needs, values and circumstances
4) is future-oriented: the core of HDD is to design concepts for the needs of future sustainable society. The concepts strongly lean on emerging technologies but are formulated by insight of societal phenomena, demands for business solutions and sustainable development, acquired by e.g. foresight methods

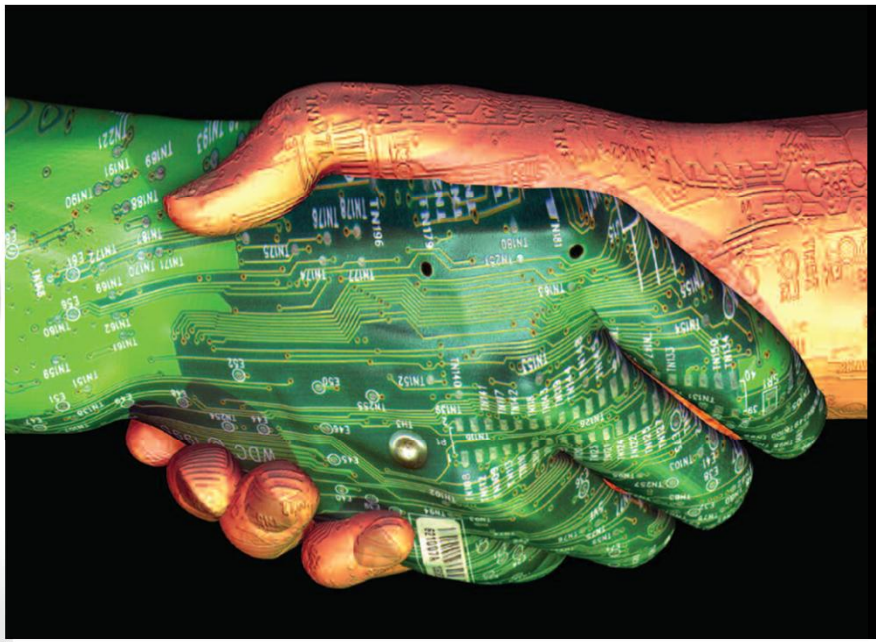
- AIM IS A HOLISTIC VIEW TO THE DEVELOPMENT, NOT ALONE BUT TOGETHER WITH OTHERS

Some points for discussion

- RD is required throughout the product life cycle.
- Theoretical, laboratory and context
- By means of a holistic perspective we can consider the challenges, threats and opportunities in advance when designing new technologies and services for our future everyday environments.
- General guidelines (checklist) never manage to cover all issues because there are also application-specific issues
- Through thorough discussion and communication we can understand better other stakeholder's viewpoint and build together best possible solutions > empowering/deliberative design practise > co-construction of RRI approach
- Including RRi perspective means also increased quality assurance

BASIC STATEMENT(S) FOR RRI?

- The society should make use of the technology so that it increases the quality of life and does not cause harm to anyone
  - Melvin Kranzberg's (1986) first law of technology ”Technology is neither good nor bad; nor is it neutral”



Thank you! Q&A

Acknoledgements:

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- DFL: Eija Kaasinen et al.
- RI: Bernd Stahl, Jaana Leikas et al.
- And many others

Responsible-Industry

TECHNOLOGY FOR BUSINESS

RESPONSIBILITY FOR RESEARCH AND INNOVATION

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