Responsible Research and Innovation in ICT:
Challenges and Opportunities

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Facts and Figures:

- Established 1996
- Staff
  - 20 Research active members
  - 15+ visiting profs and research associates
- ETHICOMP conference series
- ORBIT journal / Journal of Information, Ethics and Communication in Society
- ~6 live projects, EU, EPSRC, ESRC

RESEARCH COMMUNITY

RRI is a way to do research that takes a long-term perspective on the type of world in which we want to live

RRI will strengthen research and innovation projects, making them more open, transparent, diverse, inclusive and adaptive to changes

RRI - the Rome Declaration (European Union)

Rome Declaration on Responsible Research and Innovation in Europe

Responsible Research and Innovation (RRI) is the on-going process of aligning research and innovation to the values, needs and expectations of society.

Decisions in research and innovation must consider the principles on which the European Union is founded, i.e. the respect of human dignity, freedom, democracy, equality, the rule of law and the respect of human rights, including the rights of persons belonging to minorities.

RRI requires that all stakeholders including civil society are responsive to each other and take shared responsibility for the processes and outcomes of research and innovation. This means working together in: science education; the definition of research agendas; the conduct of research; the access to research results; and the application of new knowledge in society- in full respect of gender equality, the gender dimension in research and ethics considerations[1].

The AREA Framework

Anticipate – describing and analysing the impacts that might arise.

Reflect – reflecting on the purposes of, motivations for and potential implications of the research.

Engage – opening up such visions, impacts and questioning to broader deliberation, dialogue, engagement.

Act – using these processes to influence the direction and trajectory of the research and innovation process itself.

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EPSRC
Pioneering research and skills

RRI - The 4 Ps

Process: covers all activities in preparing research, undertaking data collection and analysis, storage and presentation of data and interaction with respondents.

Product: can refer to products or services. It includes the consequences of use as well as misuse of research products and the impact that research has on the natural and social environment.

Purpose: covers the question why research is undertaken at all.

People: are at the heart of RRI and need to be explicitly considered.

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RiCT
RESPONSIBLE INNOVATION

|	Process (speed or innovation & diffusion)	Product (Ubiquity & Pervasiveness)	Purpose (Logic malleability)	People (Problem of many hands)
Anticipate (Opportunity)	Is the planned research methodology acceptable?	Will the products be socially desirable? How sustainable are the outcomes?	Why should this research be undertaken?	Have we included the right stakeholders?
Reflect (Considerations)	Which mechanisms are used to reflect on process? How could you do it differently?	How do you know what the consequences might be? What might be the potential use? What don't we know about? How can we ensure societal desirability? How could you do it differently?	Is the research controversial? How could you do it differently?	Who is affected? How could you do it differently?
Engage (Alternatives)	How to engage a wide group of stakeholders?	What are viewpoints of a wide group of stakeholders?	Is the research agenda acceptable?	Who prioritises research? For whom is the research done?
Act (Capabilities)	How can your research structure become flexible? What training is required? What infrastructure is required?	What needs to be done to ensure social desirability? What training is required? What infrastructure is required?	How do we ensure that the implied future is desirable? What training is required? What infrastructure is required?	Who matters? What training is required? What infrastructure is required?

Why RRI for ICT?

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Characteristics of ICT that pose challenges for RRI:

- Ubiquity and pervasiveness
- Speed of innovation and diffusion
- Limitations of extant governance mechanisms
- "The problem of many hands"
- Logical malleability / interpretive flexibility

RRI in affective robots

https://www.youtube.com/watch?v=GctwAff0lZY
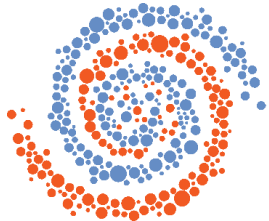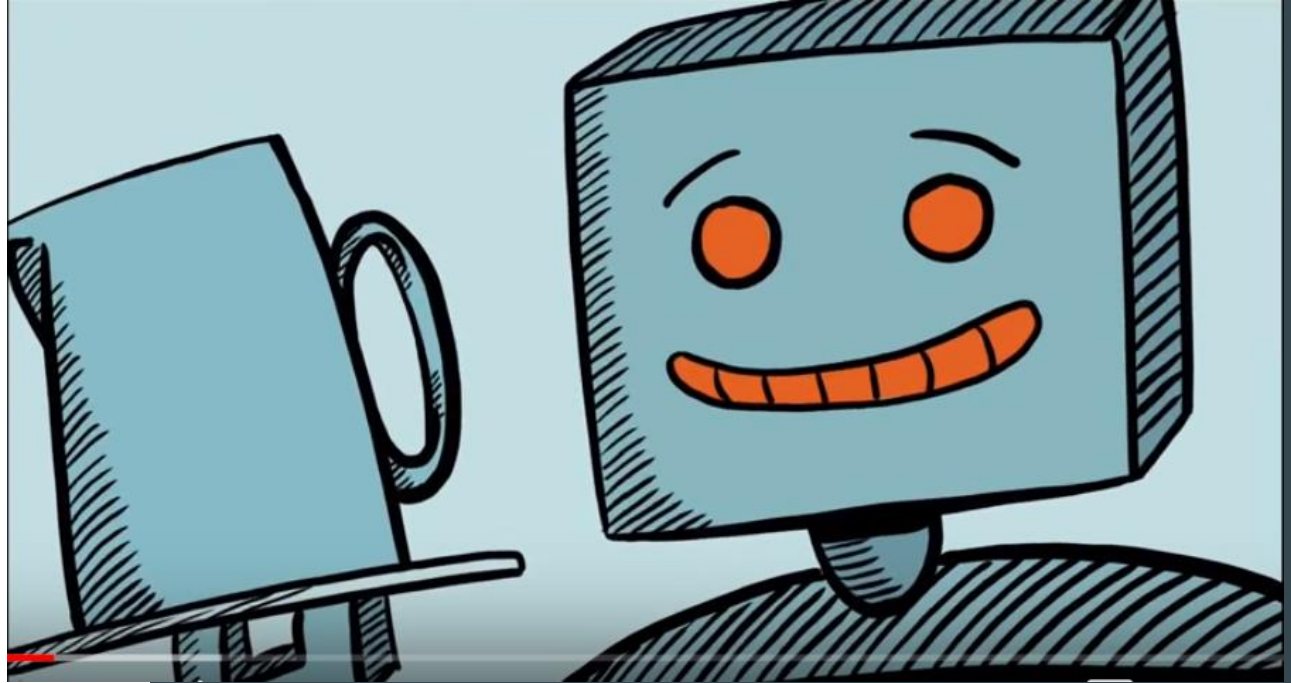
RRI - the European View
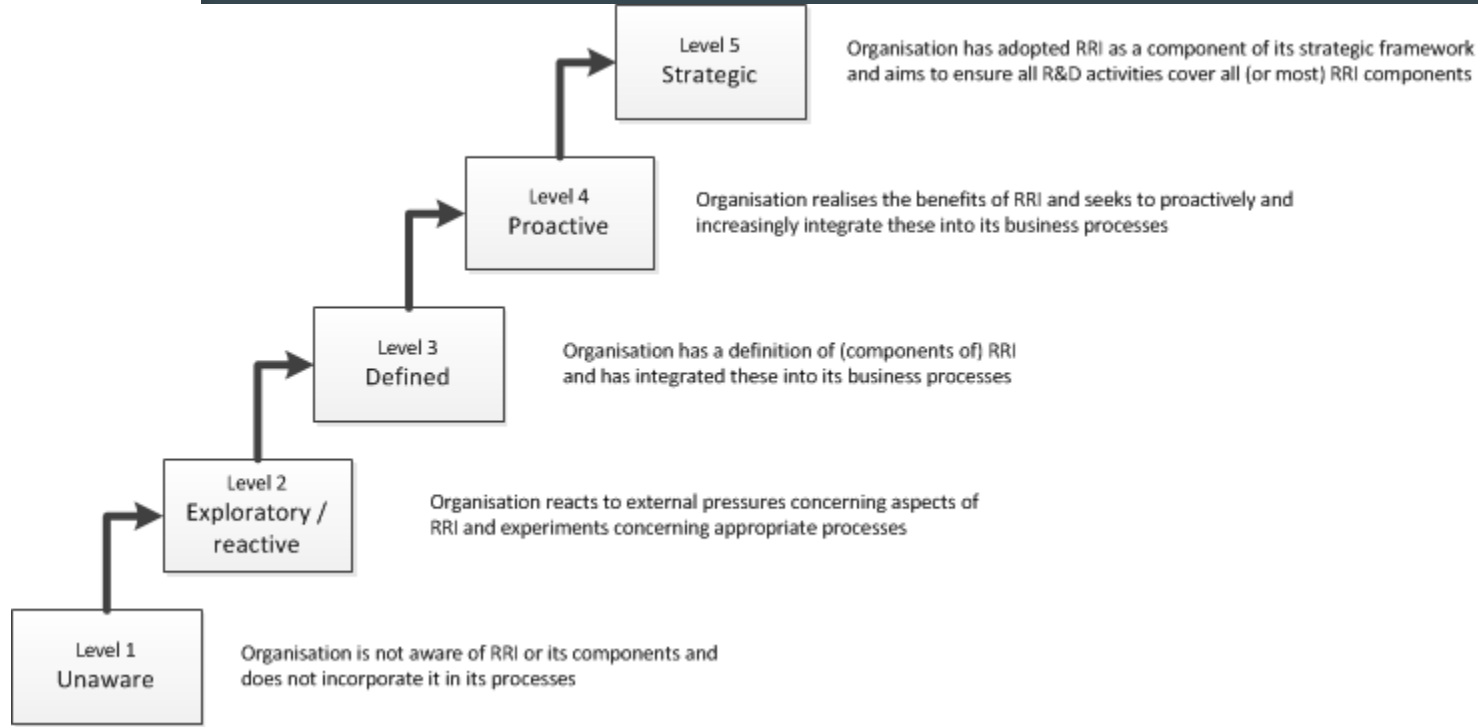
Pillars / policy areas of RRI in the EU

- Ethics
- Gender equality
- Governance
- Open access
- Public engagement
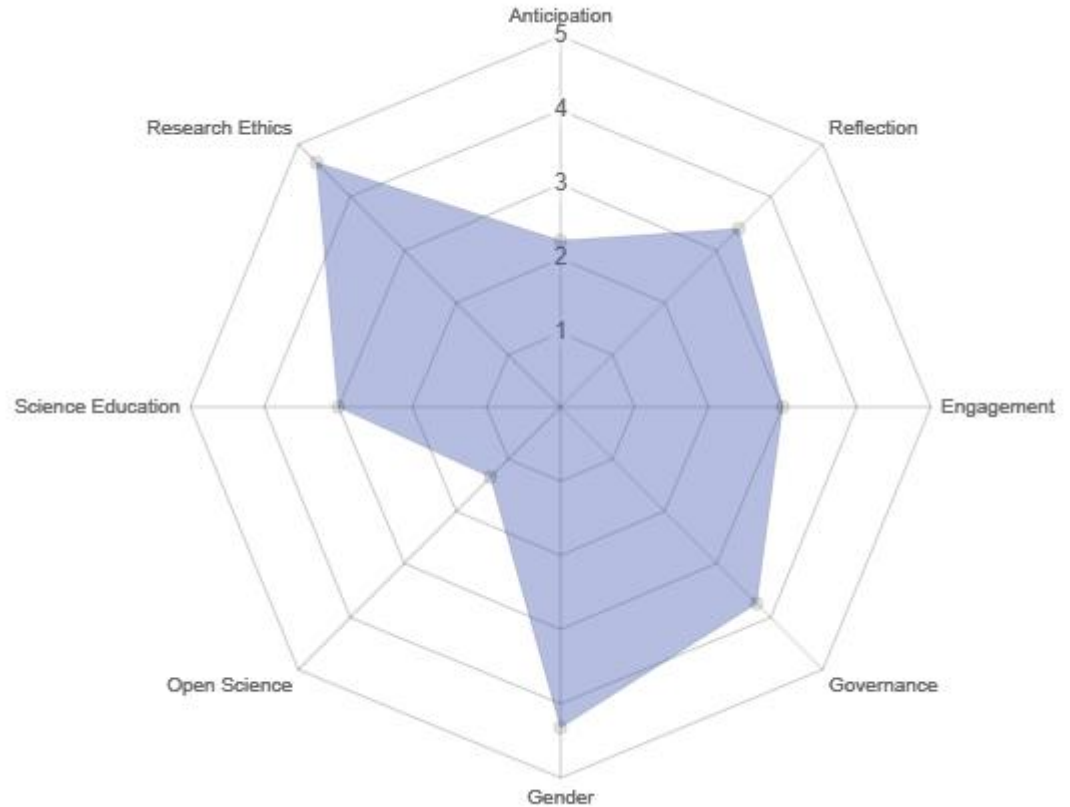- Science education

And sometimes added:

- Sustainability
- Social justice

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EUROPEAN COMMISSION

The RRI Maturity Model

Level 5
Strategic — Organisation has adopted RRI as a component of its strategic framework and aims to ensure all R&D activities cover all (or most) RRI components

Level 4
Proactive — Organisation realises the benefits of RRI and seeks to proactively and increasingly integrate these into its business processes

Level 3
Defined — Organisation has a definition of (components of) RRI and has integrated these into its business processes

Level 2
Exploratory / reactive — Organisation reacts to external pressures concerning aspects of RRI and experiments concerning appropriate processes

Level 1
Unaware — Organisation is not aware of RRI or its components and does not incorporate it in its processes

Explore RRI for your project

Radar chart with axes: Anticipation, Reflection, Engagement, Governance, Gender, Open Science, Science Education, Research Ethics. Scale 1–5.
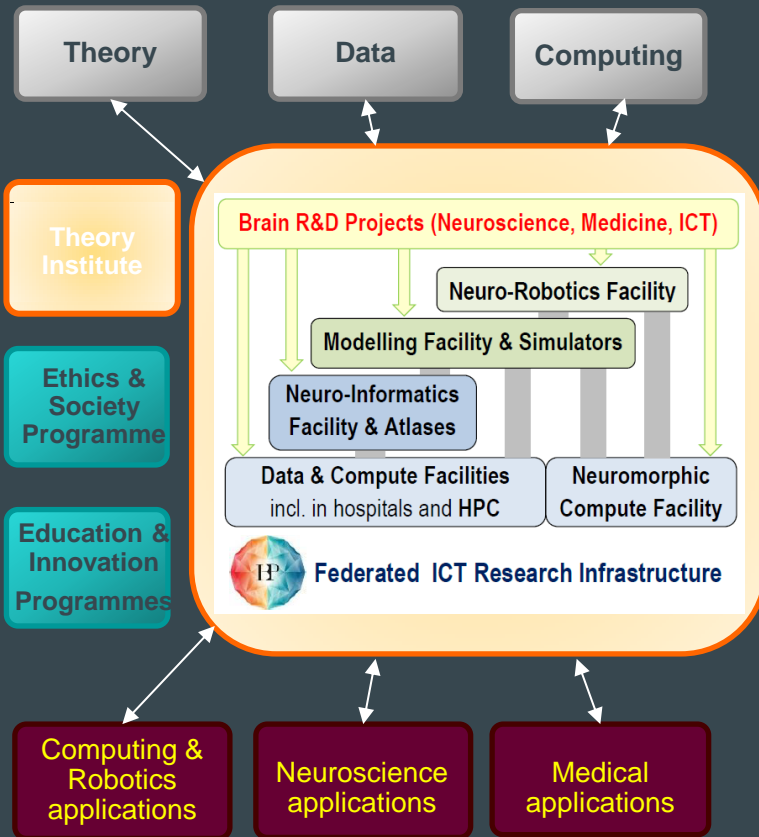
Limits of RRI

RRI cannot

- Predict the future
- Avoid all problems arising from research, innovation and technology development
- Eliminate value conflicts
- Relieve researchers / funders / industry from responsibility
- Be a panacea

RRI can

- Stimulate an intelligent conversation about R&I
- Facilitate second order reflexivity

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Human Brain Project : ICT Infrastructure for understanding the brain

Theory

Data

Computing

Theory Institute

Ethics & Society Programme

Education & Innovation Programmes

A federated ICT infrastructure
for the neuroscientists to collect, share,
integrate and model data about the brain
for understanding the functioning
of the human brain and its diseases

Brain R&D Projects (Neuroscience, Medicine, ICT)

Neuro-Robotics Facility

Modelling Facility & Simulators

Neuro-Informatics Facility & Atlases

Data & Compute Facilities incl. in hospitals and **HPC**

Neuromorphic Compute Facility

Federated ICT Research Infrastructure

Open platforms including a Collaboratory hub to facilitate collaborative science

Computing & Robotics applications

Neuroscience applications

Medical applications

www.humanbrainproject.eu

**More than 400 scientists
from 112 institutions in 24 countries**

Ethical Issues in the HBP

- Research ethics
  - Human research
  - Animal research
  - Human cells
  - Non-EU country
- Research integrity
- Intellectual property
- Data ethics
  - Data protection
  - Data governance
- Social issues
  - Dual use
  - Community building and support
  - Gender and equality
  - Future of medicine
- Philosophical questions
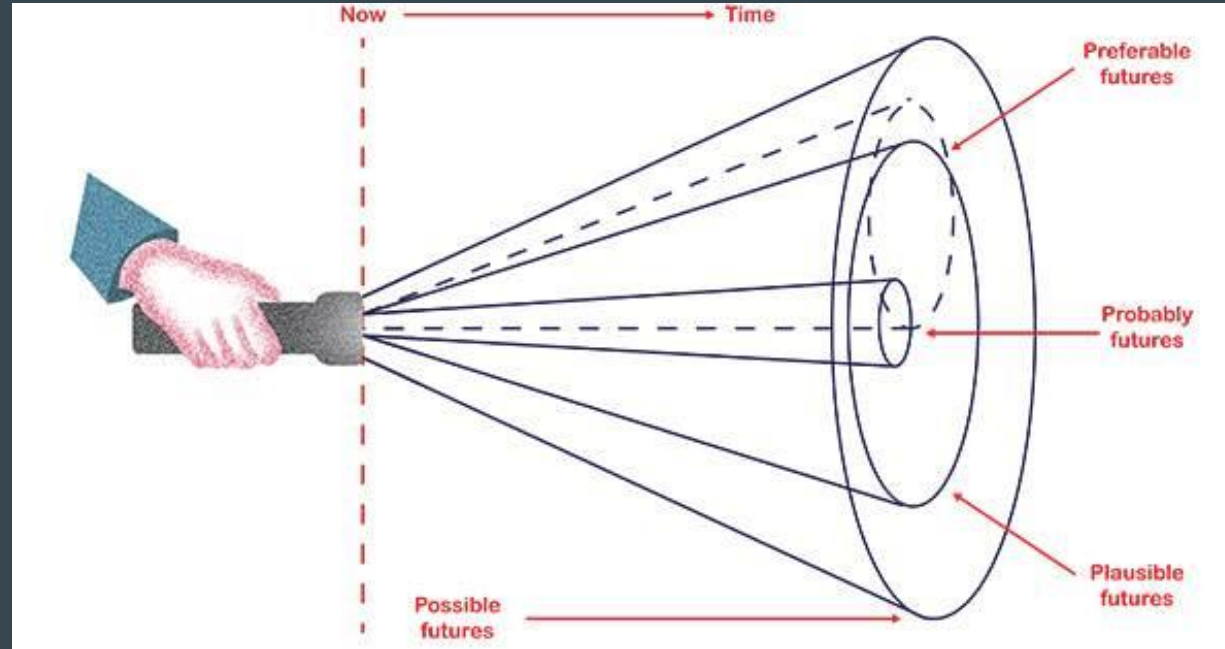 - Consciousness
 - Identity

Responsible Research and Innovation in the HBP
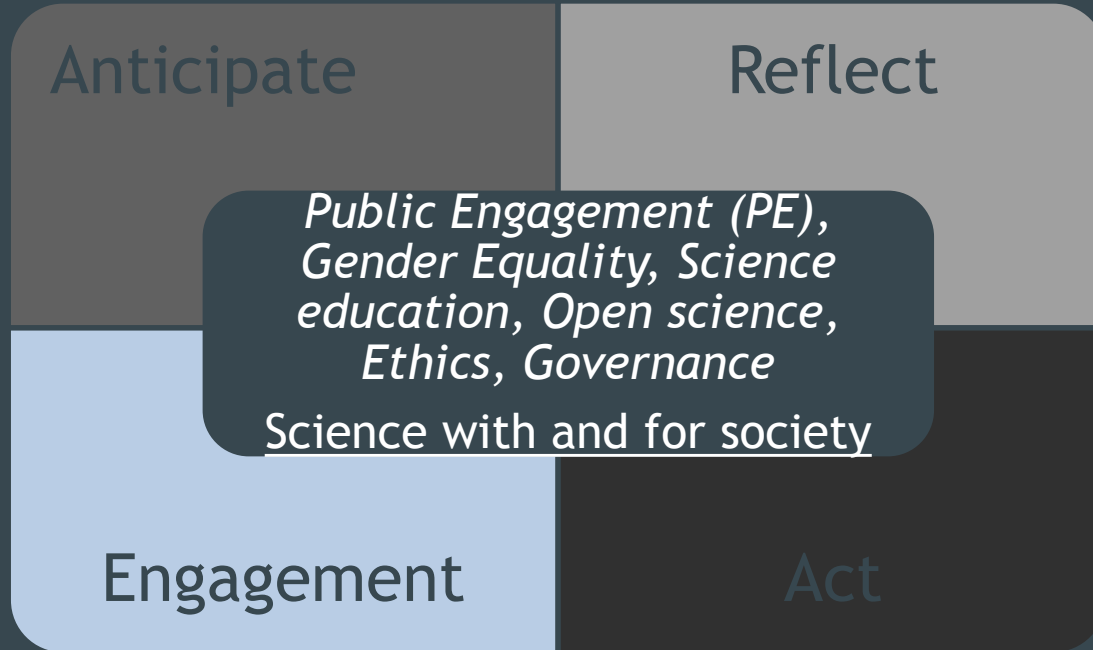
Foresight

- Plausible futures

    - Upstream

    - Increasing readiness

    - Researcher awareness
- Data federation, data protection & privacy
- Disease signatures & personalised medicine
- Future ICT and robotics
- Dual Use

Philosophy and neuroethics

- Conceptual and philosophical implications of brain simulation
- Relationship between brain/mind & consciousness
- Philosophical and ethical reflections on SP12 topics:

  - Privacy and data protection

  - Personalised medicine

  - Dual use...
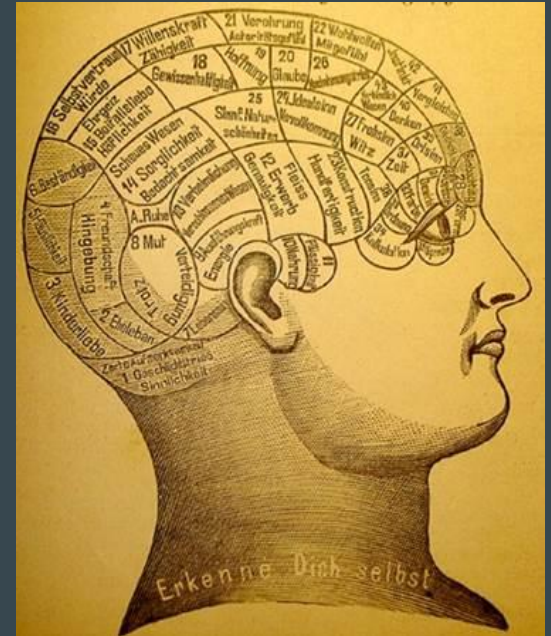
Citizen engagement in the HBP

- Online and Face-to-Face engagement

  - Privacy

  - Dual use

  - Artificial intelligence
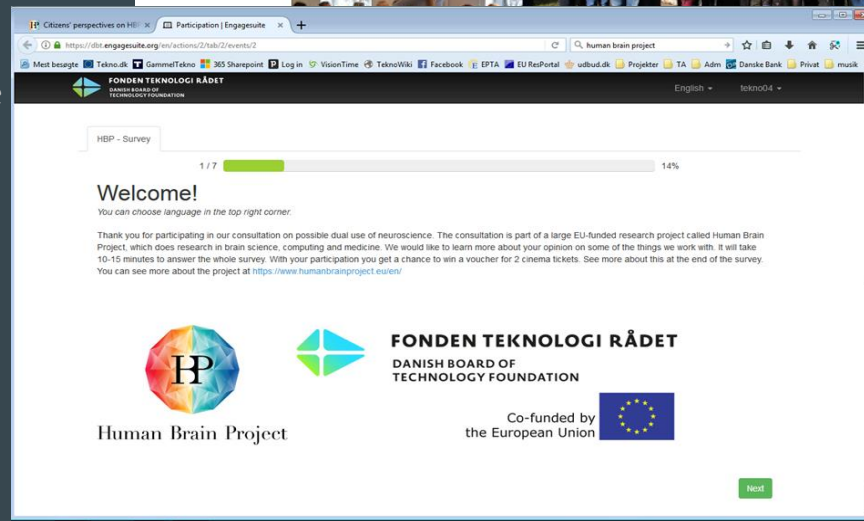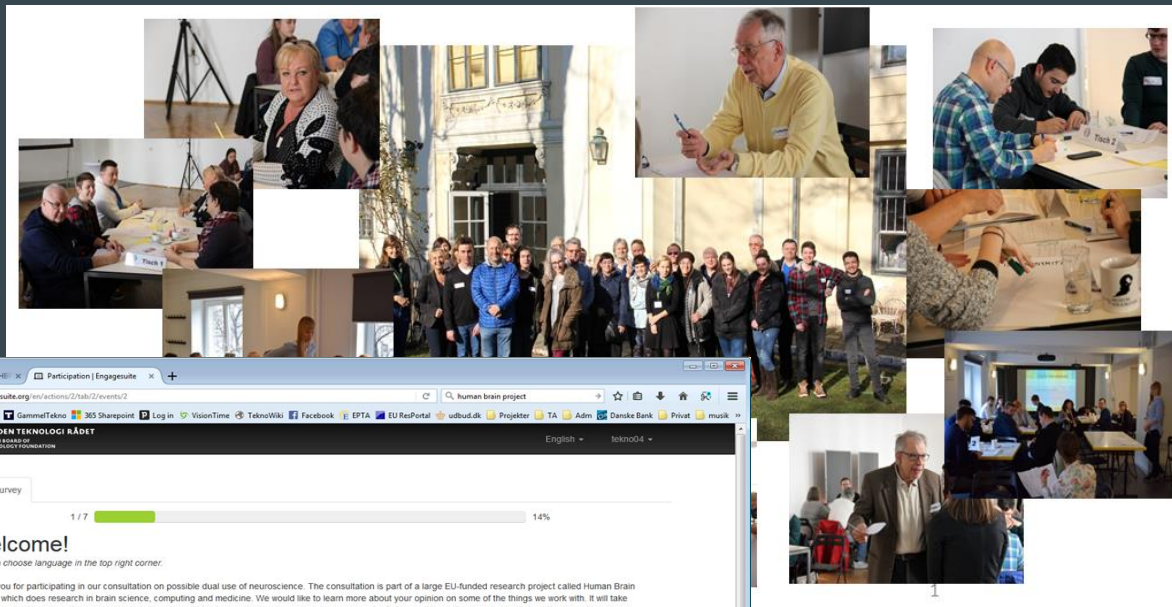
RRI as discourse in the HBP

Lessons from RRI in the HBP

- There is general recognition that science and research must engage with ethics and social concerns.
- RRI can help shape structures to support awareness and reflection; collaboration, communication and awareness
- RRI can include many existing activities (research ethics, impact assessment, integrity, equality,...)

Open questions:

- How to measure impact?
- How much RRI is enough?
- How to link levels/ types of stakeholders?

Science and research need (something like) RRI to understand and engage with societal concerns.

RRI for students

Useful resource for reflecting on RRI

- Cases, examples, other resources
  - https://www.orbit-rri.org/resources/
- AREA-4P Framework
  - https://www.orbit-rri.org/about/area-4p-framework/
- ORBIT journal
  - https://www.orbit-rri.org/ojs/index.php/orbit
- Self-assessment tool
  - https://www.orbit-rri.org/self-assessment-tool-2019/
- HBP Ethics & Society
  - https://www.humanbrainproject.eu/en/social-ethical-reflective/
- HBP Ethics Support
  - https://www.humanbrainproject.eu/en/social-ethical-reflective/ethics-support/

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References

- Jirotka, M., Grimpe, B., Stahl, B., Hartswood, M., Eden, G., 2017. Responsible Research and Innovation in the Digital Age. Communications of the ACM 60, 62–68. https://doi.org/10.1145/3064940

- Stahl, B.C., Akintoye, S., Fothergill, B.T., Guerrero, M., Knight, W., Ulnicane, I., 2019. Beyond Research Ethics: Dialogues in Neuro-ICT Research. Front. Hum. Neurosci. 13. https://doi.org/10.3389/fnhum.2019.00105

- Stahl, B.C., Obach, M., Yaghmaei, E., Ikonen, V., Chatfield, K., Brem, A., 2017. The Responsible Research and Innovation (RRI) Maturity Model: Linking Theory and Practice. Sustainability 9, 1036. https://doi.org/10.3390/su9061036

- Stahl, B.C., 2013. Responsible research and innovation: The role of privacy in an emerging framework. Science and Public Policy 40, 708–716. https://doi.org/10.1093/scipol/sct067

- Stilgoe, J., Owen, R., Macnaghten, P., 2013. Developing a framework for responsible innovation. Research Policy 42, 1568–1580. https://doi.org/10.1016/j.respol.2013.05.008