# WHY RESPONSIBLE INNOVATION?
## *THE DEFICITS OF THE R&I SYSTEM*

- Need for governance mechanisms for outcomes of Science, Technology and Innovation
- Address market failures in order to deliver on societally desirable innovations
- Align science, technology and innovation policy with broadly shared public values
- Shift focus from technological potentials to societally desirable objectives
- Shift to open scholarship in order to make science better by improved reproducibility, efficiency and more responsiveness to societal challenges
- Implement anticipatory governance mechanisms in the policy making process by using a combination of foresight, technology assessment and normative (participatory)-value sensitive design.

*Dr.Dr.phil. René von Schomberg*

*European Commission, DG RTD*
*Guest-Professor, Technical University Darmstadt, Germany*
*(and sometimes elsewhere)*
***Speaks in private capacity***

***Presentation is based on 'Why Responsible Innovation' in: International Handbook on Responsible Innovation (Von Schomberg/Hankins eds). Cheltenham: Edward Elgar Publishing***

# 1.FIRST DEFICIT: NO GOVERNANCE OF SOCIETALLY DESIRABLE R & I OUTCOMES

Three Market hurdles and *technology neutral* approach, with focus on safety and risk

No specific entry for public opinion in policy making

**Contrasts with**

*Technology specific* funding with a view on Economic benefits

Benefits= relative success on the Market

**Professional bodies for Risk Governance but not for 'Benefit' Governance**

# DEFINING RRI (VON SCHOMBERG, 2012)

*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) outcomes and impacts*

# 2. MARKET FAILURE: NO DELIVERY ON SOCIETALLY DESIRABLE OUTCOMES

- 10% of the world's health research funding goes to 90% of the world's disease burden
- Reliance on philanthropy to compensate market failure: for example Malaria (Gates Foundation
- Negative relationship between strong patents and innovation (Stiglitz et al)
- Practice of weak patents and over patenting frustrates innovation (Stiglitz et al)
- Shrinking of knowledge commons
- Markets deliver only well on technologies with increased efficiency, not for transformative changes needed, notably with Sustainable Development as goal
- **Responsible Innovation, needs public investments to compensate for market failure**

# 3. NO ALIGNMENT WITH PUBLIC VALUES/EXPECTATIONS

Scientific and Technological advance: goal in itself
Innovation seen as inherently steerless and 'good'
Macro-economic justification of Research and Innovation

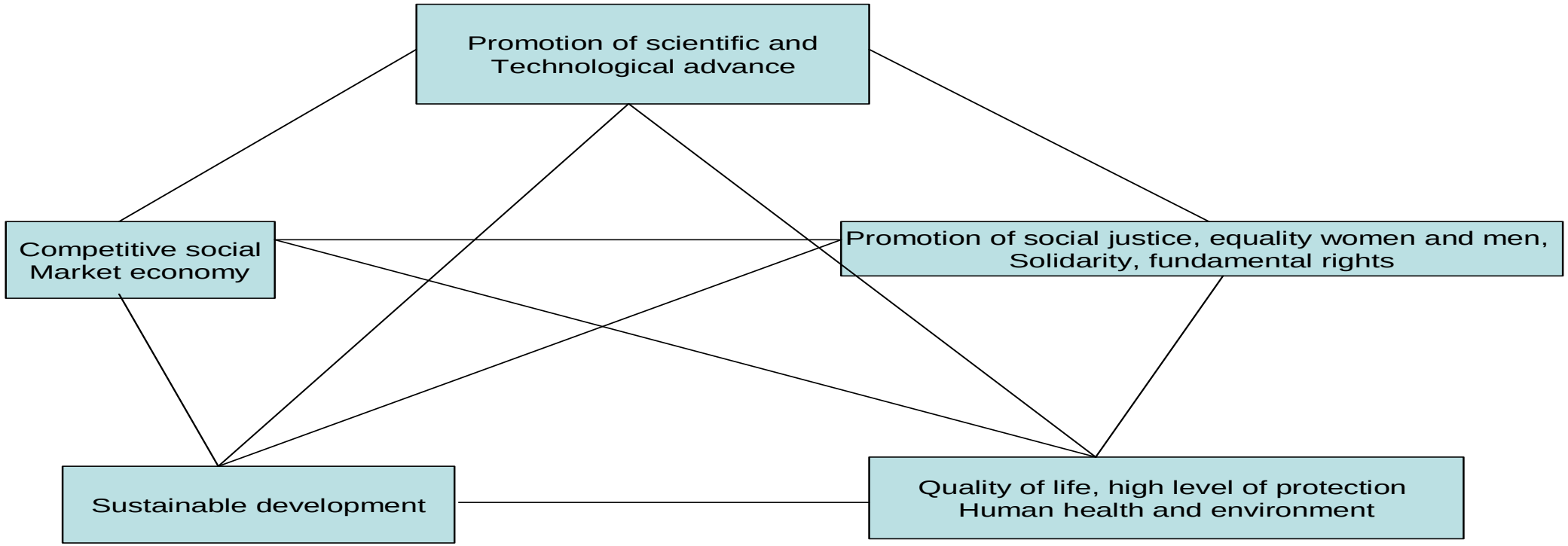
**No justification for neither direction of R & I nor its purpose**

**Responsible Innovation directs innovation towards societally desirable outcomes: innovation = manageable and (re-) directable.**

**Innovation to be aligned with public values which also drive other policies:- Quality of live, High level of protection of the environment, social market economy, sustainable development etc.**

**Grand Societal Challenges-SDG's- can serve as a focus**

*Figure 1. Normative anchor points derived from the Treaty on the European Union (Von Schomberg, 2012)*



# 4 FOCUS ON SOCIETAL OBJECTIVE RATHER THAN TECHNOLOGICAL POTENTIALS

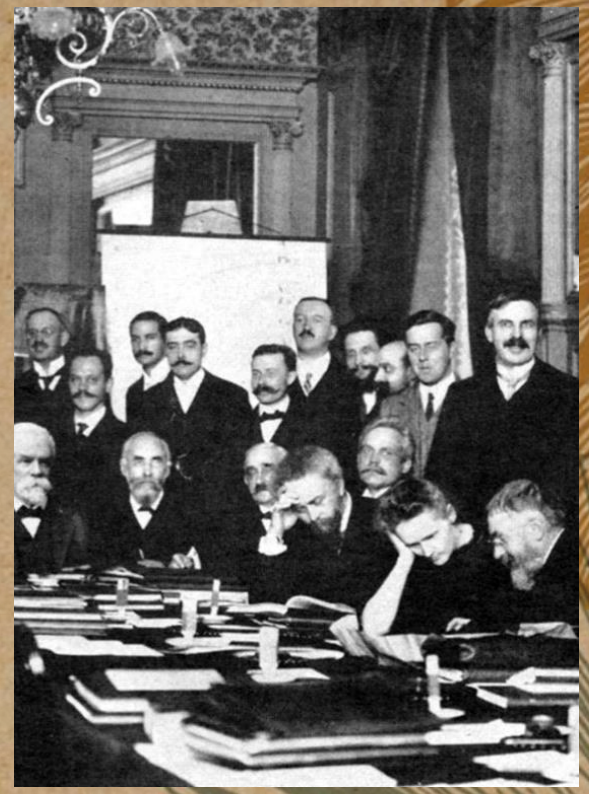
| Responsible Technology Focus | Responsible Innovation focus |
|---|---|
| Identification of ethical, legal, social issues<br>exploration of technological potential | Anticipatory governance: foresight on transformative change of sectors: energy, mobility, agriculture etc. |
| Stakeholder participation | Deliberative governance and commitment on societal objective |
| Identification of knowledge gaps and regulatory needs | Collective co-responsibility: codes of conduct, allocation and enabling of responsibility of actors |
| Ethics of constraint (prohibition, what we should *not* do) | Normative Design (what we do want and should do) |

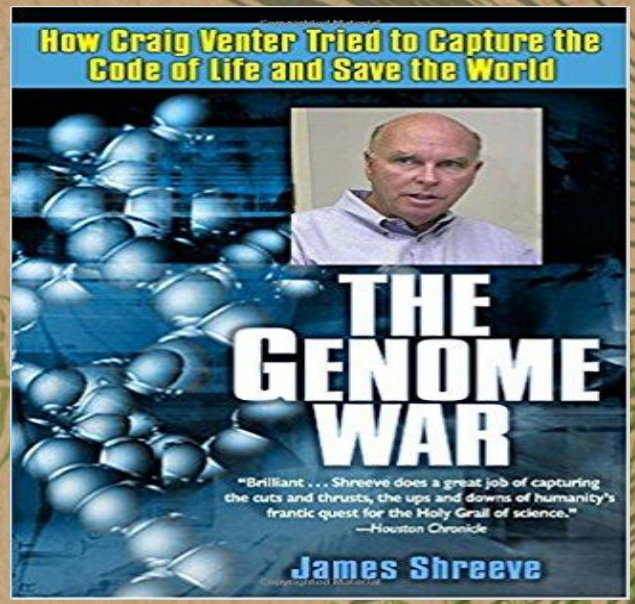
# 5. FROM (TOO) COMPETITIVE SCIENCE TO OPEN RESEARCH AND SCHOLARSHIP

- *Reproducibility Crisis in Science* : Survey of Nature (2016): 70 percent could not reproduce data of colleagues)– 'Science goes Wrong'(lead article Economist): 90 percent of snd stage clinical trials 'fail'.

*Productivity Crisis in Science*:

- The number of drugs approved by the US Food and Drug Administration (FDA) per US dollars(inflation-adjusted) spent on R&D has halved roughly every 9 years since 1950 (Bountra et al, 2017).

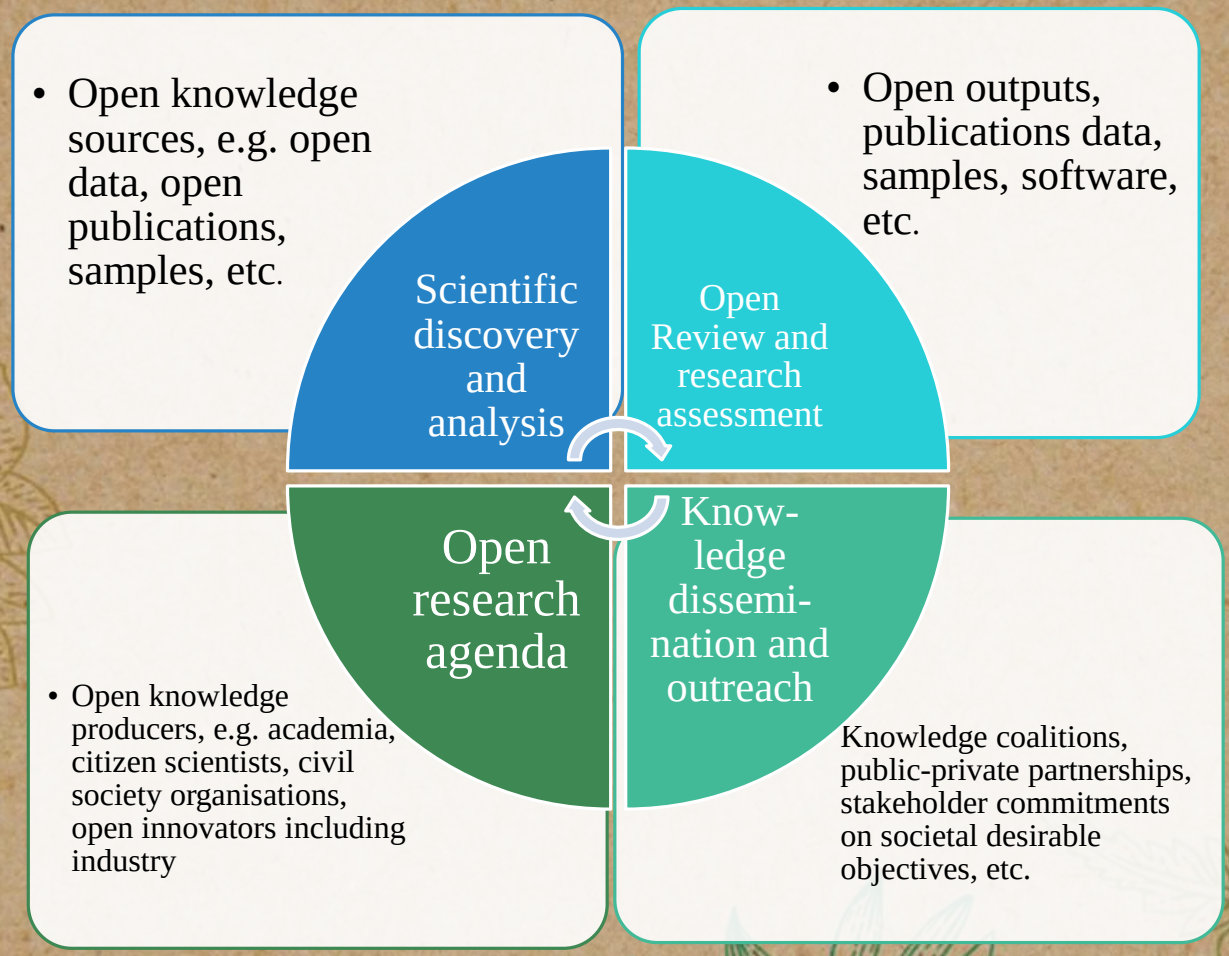




# TOWARDS OPEN SCHOLARSHIP, CONTINUED

- Multiple causes for both crises in Science:
  - No Openness= no good verification
  - No Openness= no societal robustness
  - Productivity in ‘Excellence’ means- no productivity of societal relevant outputs- publishing in high impact journals takes precedence over societal relevance
  - Competitiveness narrows range of societal relevance ( big pharma studies only 50 out of 500 relevant kinases for diseases-Edwards(2016)

# OPEN RESEARCH AND SCHOLARSHIP



# STEP UP PROCESS: RESPONSIBLE RESEARCH:

‘*GOOD SCIENCE ANYWHERE IS GOOD FOR SCIENCE EVERYWHERE*’

*Credible reseach*:

Standards of scientific integrity, codes for good research conduct

*Responsive research*:

open, collaborative and networked science

*Responsible research*:

anticipatory on outcomes and impacts

# STEP UP PROCESS: RESPONSIBLE INNOVATION

*'GOOD INNOVATION ANYWHERE, MIGHT BE BENEFICIAL FOR MANY, SOMEWHERE'*

*Credible innovation*:

international standards, codes of conduct, ethical guidelines

*Responsive innovation:*

open innovation with broadly composed knowledge coalitions

*Responsible innovation*

mutual responsiveness among stakeholders with a normative commitment to address (a) societal desirable objective(s)

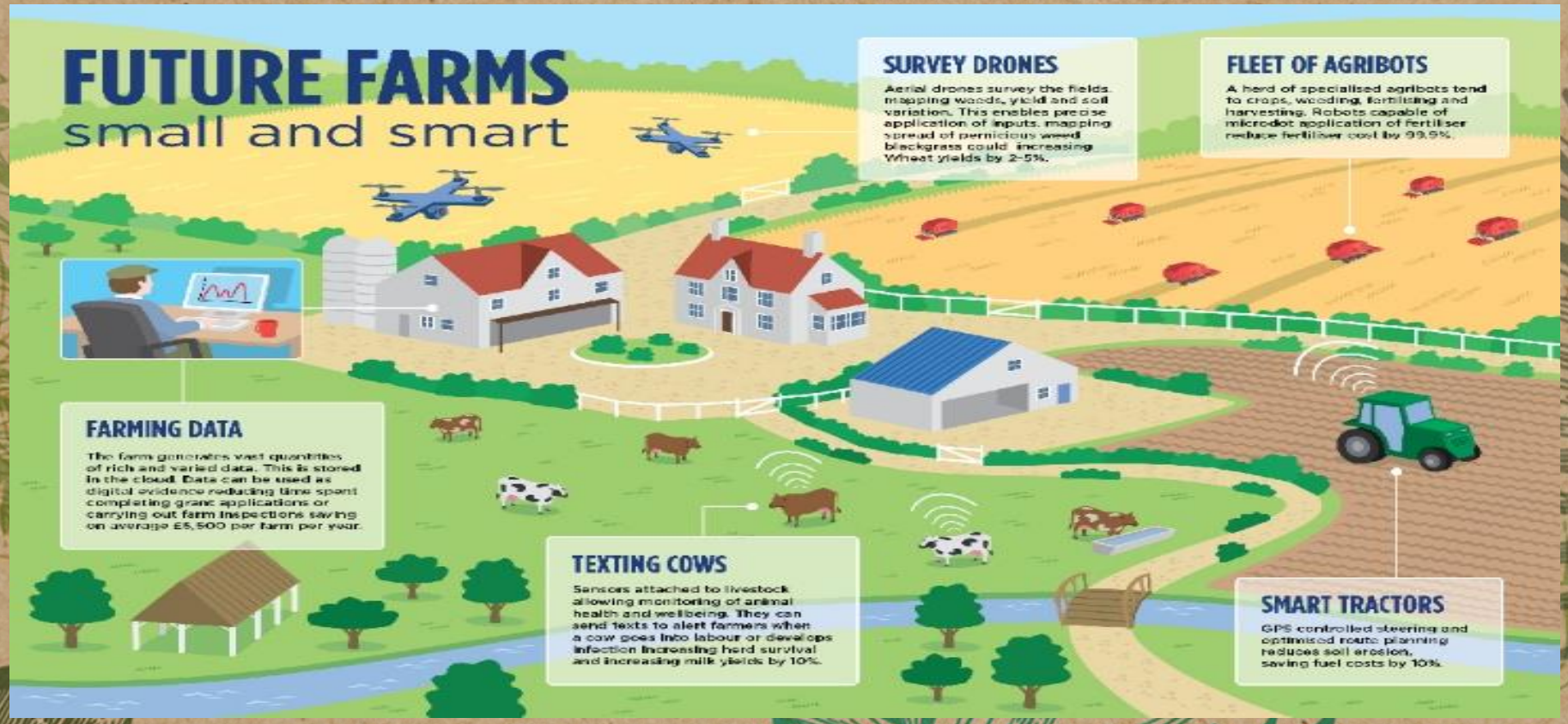
# OPEN RESEARCH AND SCHOLARSHIP

- Open research and scholarship as a remedy for:
- Efficiency of Science
- Reproducibility of Science
- Productivity and Societal Responsiveness of Science

- Definition: ‘sharing knowledge and data as early as possible in the research process in open collaboration with all relevant knowledge actors’. (von Schomberg- Handbook on RI, 2019)

# 6 LACK OF FORESIGHT AND NORMATIVE DESIGN

Alternative shaping of technology by Foresight



# ALTERNATIVE SHAPING OF PRECISION AGRICULTURE

| Factors for 'shaping' the technology | 'Responsible Innovation' | Global-market driven innovation |
|---|---|---|
| Stakeholder involvement | Involving all producers/users | Technology push by big agribusiness |
| Societal objective | Determined by common stakeholder commitments | Technology and market-efficiency driven |
| Overall-technology design | Normative design with determining factors such as data ownership, scale of use, privacy by design approaches etc. | Fragmentary, sequential technology introduction whenever they become available |
| Access to resources | Public authorities enabling access to resources including to small farmers | Resource access inequalities remain unaddressed |
| Data- access and ownership | Data ownership with farmers | Data ownership primarily with big agribusinesses |
| Economic policy | Aligned to socio-economic needs, business models based on sharing of data | Business models based on centralised data systems in big agri-businesses, early technological fixes |
| Governance | Codes of Conduct, Public-Private Partnerships | Global markets driven |

| | ‘Responsible’ State | ‘Responsible’ Market | Responsible Innovation |
|---|---|---|---|
| Scope of Responsibility of Government | Outcomes and Risks | Risks | Outcomes and Risks |
| Regulatory oversight | State | Market-hurdles | Public-Private |
| Socio-economic assessment for Governance | Benefits for the State | Macro-economic/competitive advantage | Social desirability |
| Governance priorities | Control/Security/Access to resources | Speed of innovation uptake | Responsive to public values |
| Research/Inno-vation Policy | Technological superiority over competitors | Key-Tech oriented | Societal challenge oriented |
| Threats for ‘irresponsible innovation' | ‘Policy Pull’<br>Lack of Foresight | Technology Push, Ignorance of Ethical values | Collective Co-Responsibility! |
| Ethical constraints | Moral constraint of the ‘governor’ | Ethical constraints of the market | Ethics as driving force! |

| *Process dimen-sion* | **Pro duc t dim ensi on** | **Technology Assessment and Foresight** | **Application of the Precautionary Principle** | **Normative/eth ical principles to design technology** | **Innovation governance and stakeholder involvement** | **Public engagement** |
|---|---|---|---|---|---|---|
| *Technology Assessment and Foresight* | | X | Development of Procedures to cope with risks | Which design objectives to choose? | Stakeholder involvement in Foresight and TA | How to engage the public? |
| *Application of the Precautionary Principle* | | Identification of nature of risks | X | Choice and development of standards | Defining proportionality: how much precaution? | How safe is safe enough? |
| *Normative/ethi cal principles to design technology* | | "privacy" and "safety" by design | Setting of risk/ uncertainty thresholds | X | Which principles to choose? | Which technologies for which social desirable goals? |
| *Innovation governance models and stakeholder involvement* | | Defining scope and methodology for TA/Foresight by stakeholders | Defining the precautionary approaches by stakeholders | Translating normative principles in technological design | X | How can innovation be geared towards social desirable objective |
| *Public Engagement and Public Debate* | | Defining/choic e of methodology for public engagement | Setting of acceptability standards | Setting of social desirability of RRI outcome | Stakeholders roles in achieving social desirable outcomes | X |

# RESPONSIBLE INNOVATION: THIS WOULD BE IT!

- Redefining Public-Private Relationship to address Market-failure, notably on public goods
- Commitment of stakeholders on societal desirable goals(not achievable through Market-innovation only)
- Implementing Foresight (e.g. Anticipatory governance within policy making for alternative shaping of socio-technological systems, e.g. Agriculture, Mobility, Energy
- Co-designing and Co-development of open research agenda's and open collaboration
- Normative- value sensitive-design of technology: Ethics as driving force!
- Organising collective-co responsibility: Codes of Conduct, Standards, Certifications, Third-party verifications
- (Long-term) Sustainability-Compliance (so not internal system efficiency innovations through the market)


**International Handbook on Responsible Innovation**
***A Global Resource*** ***(Currently on Google Play, e-book for 30 Euro)***

*Edited by René von Schomberg, Directorate General for Research and Innovation, European Commission, Belgium and Guest Professor ,Technical University Darmstadt, Germany and Jonathan Hankins, The Bassetti Foundation, Italy*

The Handbook constitutes a global resource for the fast growing interdisciplinary research and policy communities addressing the challenge of driving innovation towards socially desirable outcomes. This book brings together well-known authors from the US, Europe and Asia who develop conceptual and regional perspectives on responsible innovation as well as exploring the prospects for further implementation of responsible innovation in emerging technological practices ranging from agriculture and medicine, to nanotechnology and robotics. The emphasis is on the socio-economic and normative dimensions of innovation including issues of social risk and sustainability.

*The International Handbook of Responsible Innovation is thus a guidebook for a shift in stance toward collective accountability for the products and consequences of our own ingenuity.'*
*- Daniel Sarewitz, Arizona State University, US*

RENEVONSCHOMBERG.WORDPRESS.COM

On Responsible Innovation, open science and ethics: please send me your comments!

*Thanks for your attention*