

WHY RESPONSIBLE INNOVATION?

THE DEFICITS OF THE R&I SYSTEM

- 1. No Governance of R & I outcomes
- 2. Market Failure: no delivery on societally desirable outcomes
- 3 No alignment with public values
- 4. Focus on technological potential, not on societal objective
- 5. Lack of Open Scholarship & Innovation
- 6. Lack of Foresight and normative Design



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Speaks in private capacity

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

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

4 FOCUS ON SOCIETAL OBJECTIVE RATHER THAN TECHNOLOGICAL POTENTIALS.

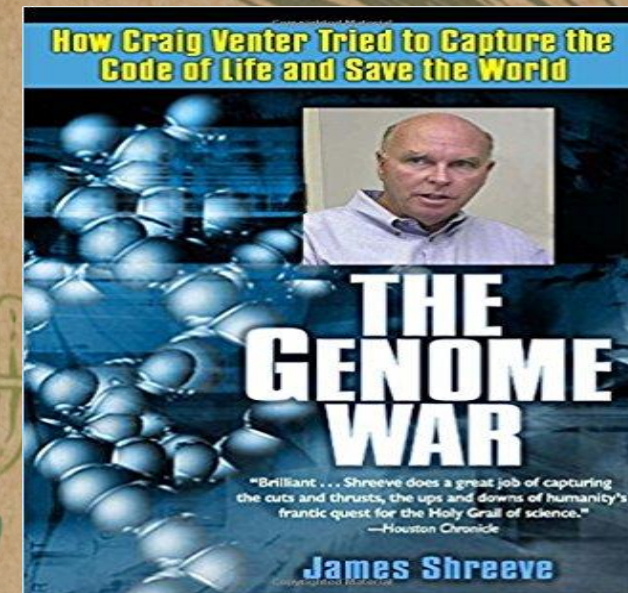
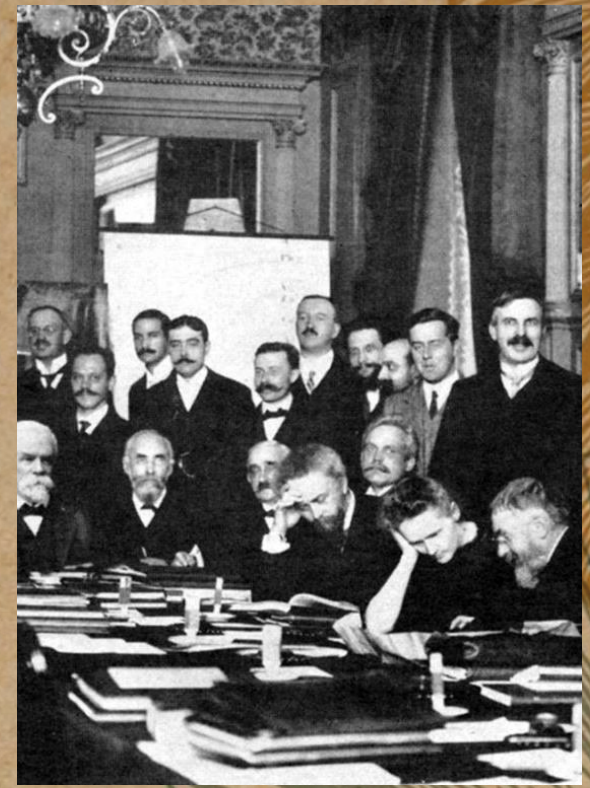
Responsible Technology Focus	Responsible Innovation focus
Identification of ethical, legal, social issues exploration of technological potential	Anticipatory governance: foresight on transformative change of sectors: energy, mobility, agriculture etc.
Stakeholder participation	Deliberative governance 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 <i>not</i> 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’: 90 percent of clinical trials ‘fail’.

Productivity Crises in Science:

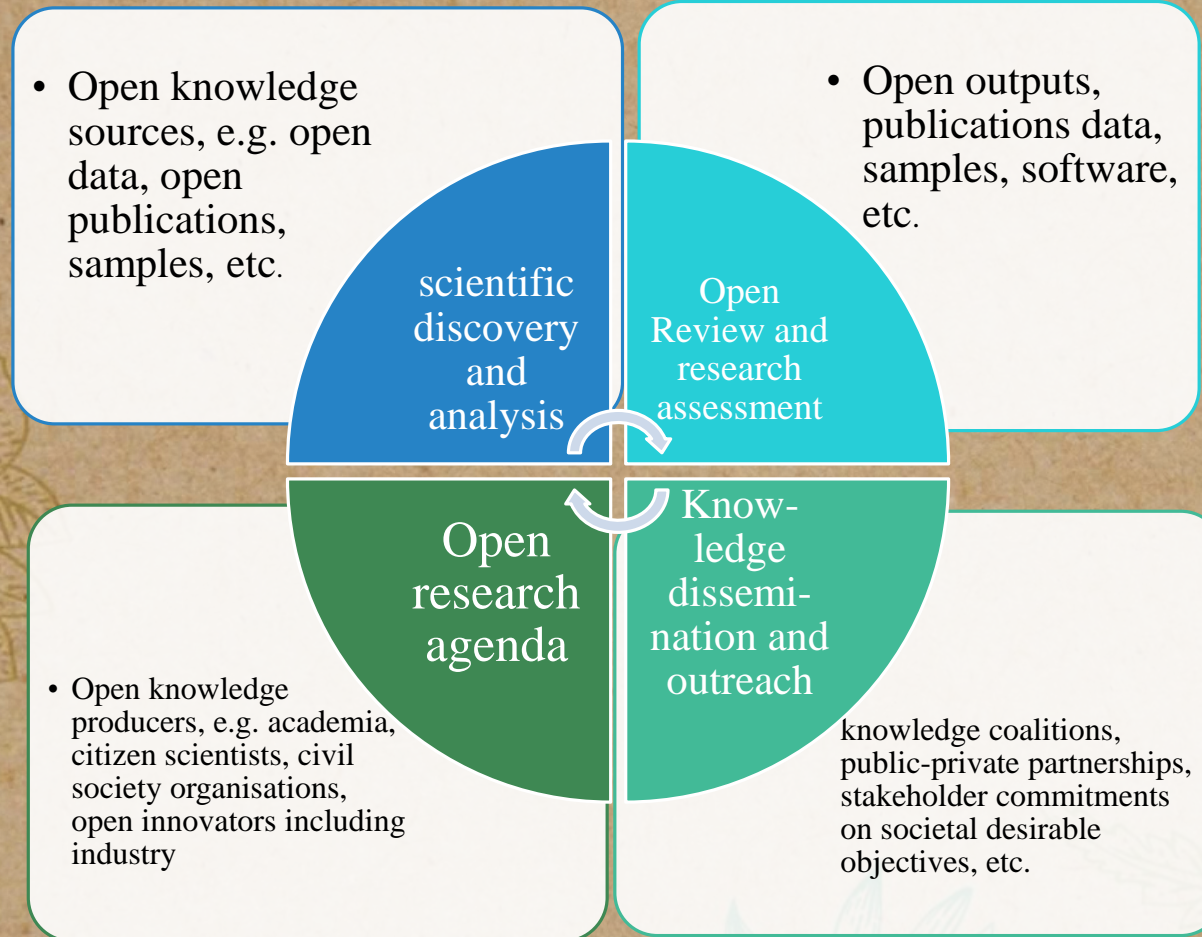
- The number of drugs approved by the US Food and Drug Administration (FDA) per US dollars(inflation-adjusted) spent on R&D has halved roughly every 9 years since 1950 (Bountra et al, 2017).



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 in productivity of societal relevant outputs- publishing in high impact journals takes precedence over societal relevance
 - Competitiveness narrows range of societal relevance (pharma studies only 50 out of 500 relevant kinases for diseases-Edwards(2016))

OPEN RESEARCH AND SCHOLARSHIP

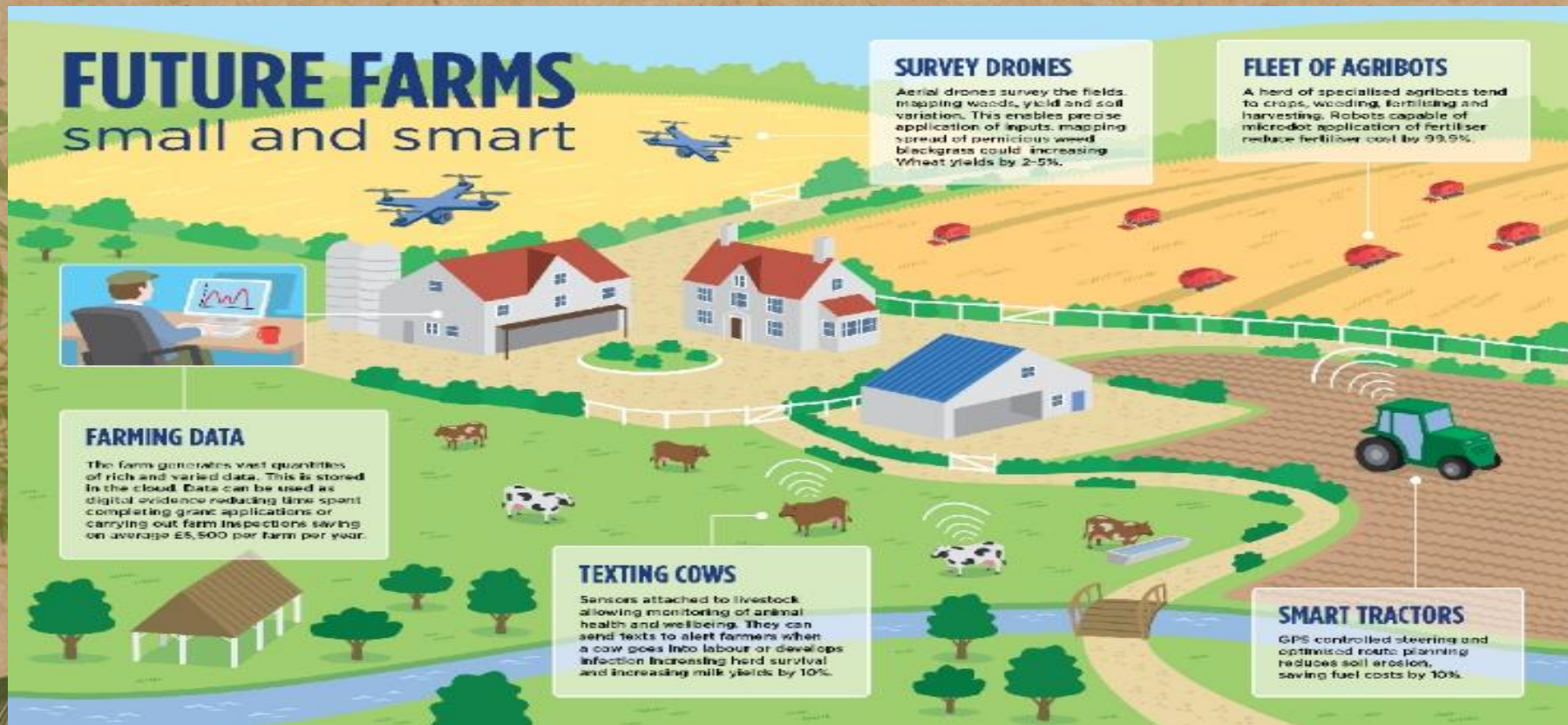


OPEN RESEARCH AND SCHOLARSHIP

- 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

1. Alternative shaping of technology by Foresight



ALTERNATIVE SHAPING OF PRECISION AGRI

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 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 Design of technology: / Normative Design (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)

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

Thanks for your attention