



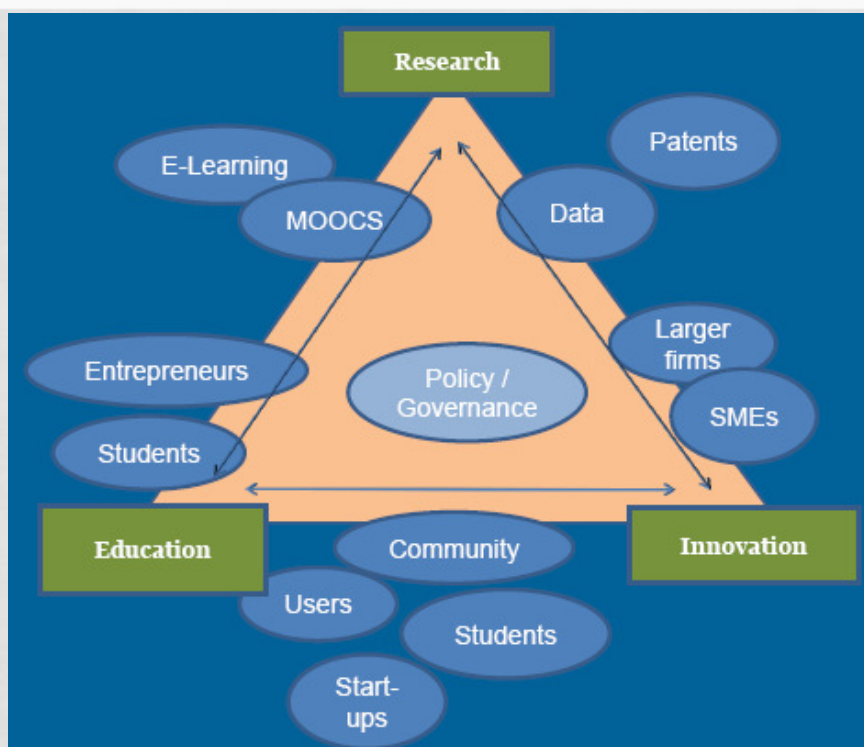
OBSERVATORY OF TECHNOLOGY ASSESSMENT

# SOCIAL FACTORS OF INNOVATION

PHD IN ELECTRICAL AND COMPUTER ENGINEERING  
18H, 26TH FEBRUARY 2019

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## KNOWLEDGE TRIANGLE



# SOCIAL DIMENSION OF INNOVATION

- Agents
- Institutions
- Policies

See Kuhlmann, Stefan, Philip Shapira, and Ruud Smits. 2010. "Introduction. A Systemic Perspective: The Innovation Policy Dance." In *The Theory and Practice of Innovation Policy. An International Research Handbook*, edited by Ruud Smits, Stefan Kuhlmann, and Philip Shapira, 1–22. Cheltenham: Edward Elgar. [http://www.elgar.com/bookentry%7B\\_%7DmainUS.lasso?id=4181](http://www.elgar.com/bookentry%7B_%7DmainUS.lasso?id=4181).

3

# AGENTS

- **Agent** is a participant in a game or in a model
  - The "**agents**" in Agent-based computational economics (ACE) models can represent individuals (e.g. people), social groupings (e.g. firms), biological entities (e.g. growing crops), and/or physical systems (e.g. transport systems).

See Arthurs, Brian, 1994. "Inductive Reasoning and Bounded Rationality," *American Economic Review*, 84(2), pp. 406-411

4

# INSTITUTIONS

- **Institutions are organizations or social mechanisms that control the functioning of society and individuals.**
  - Are products of social interest that reflect quantitative and qualitative experiences and reflect socio-economic processes.
  - Are organized under rules and normative forms, and aim interactions ordering among individuals and between these and their respective organizational forms.

"Social Institutions". In Stanford Encyclopedia of Philosophy. Retrieved 19/02/2018

5

# POLICY PRIORITIES (OECD)

- Identifying the most effective **impact channels**
- Implications of **commercialization** for public research
- Identifying **priority areas** of research in view of industry needs
- Building **absorptive capacities** for firms to use research
- International and national **research priorities**

6

# POLICY AND PUBLIC RESEARCH

- What is the **contribution of public research to innovation?**
- What are **impacts of policy to enhance its contributions?**
- How to **best evaluate impacts?**
- To provide a quantitative picture of contributions and impact mechanisms:
  - Data-driven analysis of public research and its impact
  - Identifying “best practice” used in national policy evaluations and findings

7

# APPROACHES

- **Contributions of Public Research**
  - Matrix linking to firm- and industry-level data on innovation performance and other characteristics
  -
- **Policy Analysis**
  - “State of the art” of national impact assessment exercises
  - Developing policy indicators for quantitative impact assessment based on the OECD Science, Technology and Innovation Outlook

8

# INNOVATION VS. RESPONSIBLE INNOVATION

## Innovation

- State responsibility for risks
- Macro-economic assessment: 'infinite growth'
- steer less, inherently good (benefits=market-success)
- 'the faster, the better'
- Technology-oriented R&D

## Responsible Innovation

- State responsibility for positive outcomes of R&I
- Economic and societal impact of 'knowledge': 'sustained growth'
- responsive to basic needs, reflect basic values (beyond consumer-preferences on the market)
- Innovation is 'managed' (anticipate irresponsible R&I)
- Issue-oriented R&I

9

# DEFINING RRI

**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*

Required

- **Stakeholder commitment** to socially desirable objectives

10

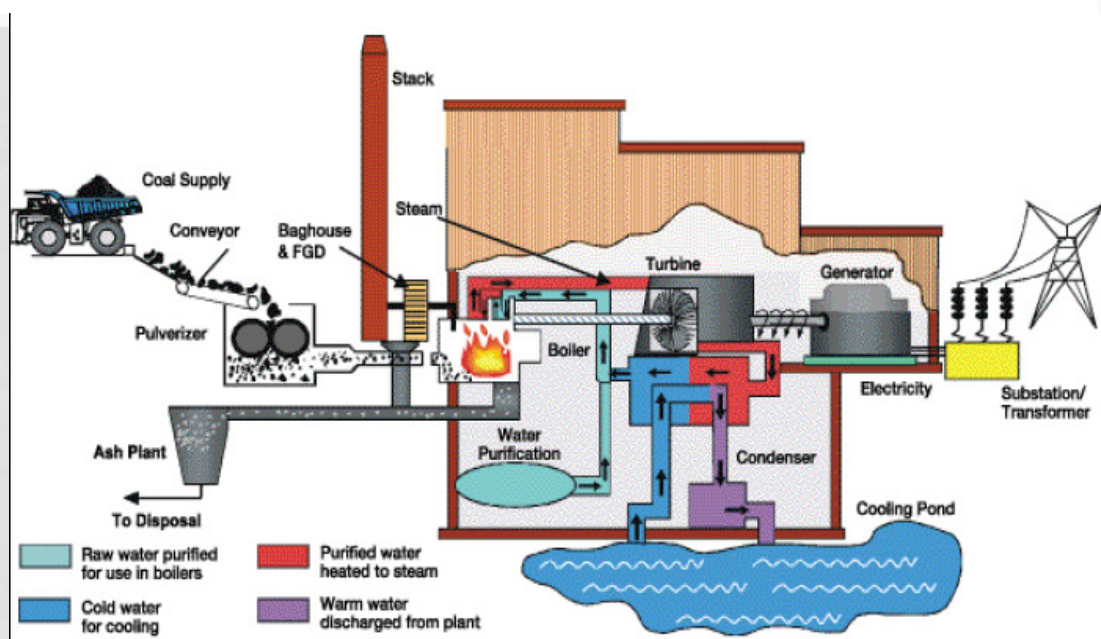
# TECHNOLOGY PATHS

- Subsequent steps of technology development are determined by earlier **expectations** and **investments**
- Is this an **independent dynamic** we cannot escape?
- Is it still people, organisations and institutions which act and decide?
- What **room for manoeuvre** do they have?

See e.g. La Porte, Todd . 1994. "The Challenge of Understanding Large Technical Systems, ". In Social Responses to Large Technical Systems: Control or Anticipation. Dordrecht, Netherlands: Kluwer Academic Publishers

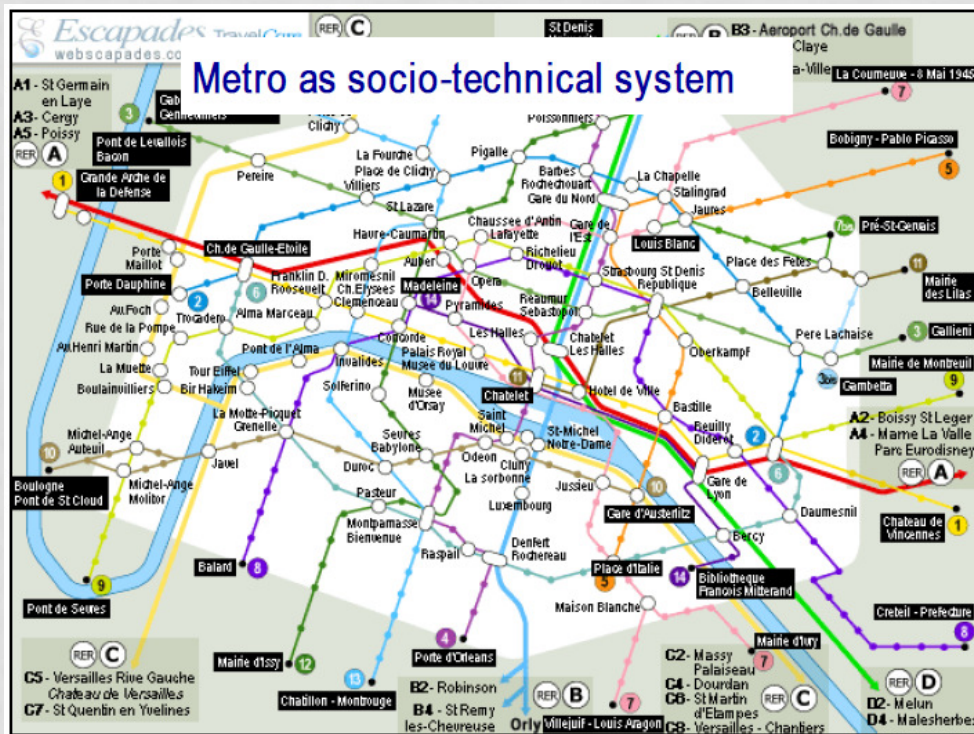
11

# INTERDEPENDENCIES I (COAL)



12

# INTERDEPENDENCIES II (METRO)



13

# INTERDEPENDENCIES III (COMPUTING)



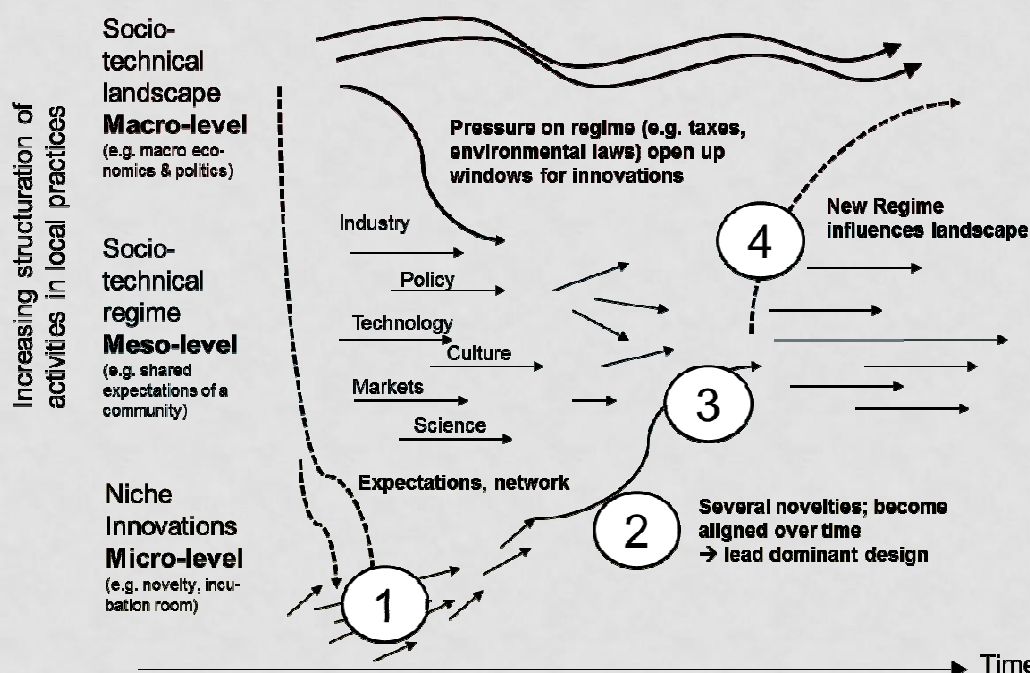
14

# INNOVATION DYNAMICS

- **'Innovation'** = analytical category; no normative destination
- Innovation involves scientific, technological, organisational, financial and commercial activities (OECD, Oslo-Manual, 31; rooted in Joseph Schumpeter, 1934)
- Innovation occurs as a social process within given cultural, scientific, institutional, and technological 'configurations', 'trajectories' and 'regimes' and regime shifts' (see e.g. Nelson/Winter 1977 etc.)

15

## MULTI-LEVEL PERSPECTIVE ON REGIME TRANSITIONS (GEELS & SCHOT 2007)



16



# RESPONSIBLE DEVELOPMENT OF TECH VS RESPONSIBLE INNOVATION

## Responsible Development

- Identification and management of ethical, legal, and societal implications
- Incorporation of safety evaluation of into the product life cycle and allocation of
- Budgets for identification and study of risks
- Identification of knowledge gaps and regulatory needs
- Involvement of stakeholders and engagement in international dialogue
- **Key-tech focussed**

## Responsible Innovation

- Anticipatory Governance
- Deliberative Governance: Early policy responsive and stakeholder commitment
- Ethics of Co-Responsibility
- Ethics as a driving force
- Driving innovation 'societal desirable ends'- Innovation partnerships
- **Societal objective focussed:** whatever it takes as 'means': multitech-social innovation etc
- Transition to Sustainable energy

17

# SOCIAL DIMENSIONS OF INNOVATIONS (AGAIN)

- **Agents**
- **Institutions**
- **Policies**
  - **Let's analyse applications:**
    - Electric mobility
    - Telecommunication
    - Computer sciences
    - Medical devices
    - Etc...
  - **Which agents, institutions and policies can be found in your thesis?**

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18