Open innovation and systems of innovation

Previously on economics of innovation…

- Modern th. Of process of technological change→Schumpeter
  - Invention
  - Innovation
  - Diffusion
- Y=f(K,L,t)
- ΔY>Δf(K,T): At→neutral technological change (exogenous or endogenous?)
- R&D
- Main approaches: induced innovation & evolutionary theory

The linear model of innovation

Basic Research → Applied Research → Development → Production & diffusion

- One of the first conceptual framwork developed to understand the relation of science and technology to the economy
  - **Basic Research**: advances fundamental knowledge about the world (e.g formalization of the centrifugal force)
  - **Applied research**: uses scientific theories to develop technology or techniques to intervene and alter natural or other phenomena (e.g. the washing machine, especially the spin cycle)
  - **Development**: Design, develop and test (e.g. what shape should the washing machine have?
  - Production & Diffusion

R&D

- **Research & Development**: innovative activities undertaken by corporations or governments in developing new services or products, or improving existing ones.

Where new ideas come from?

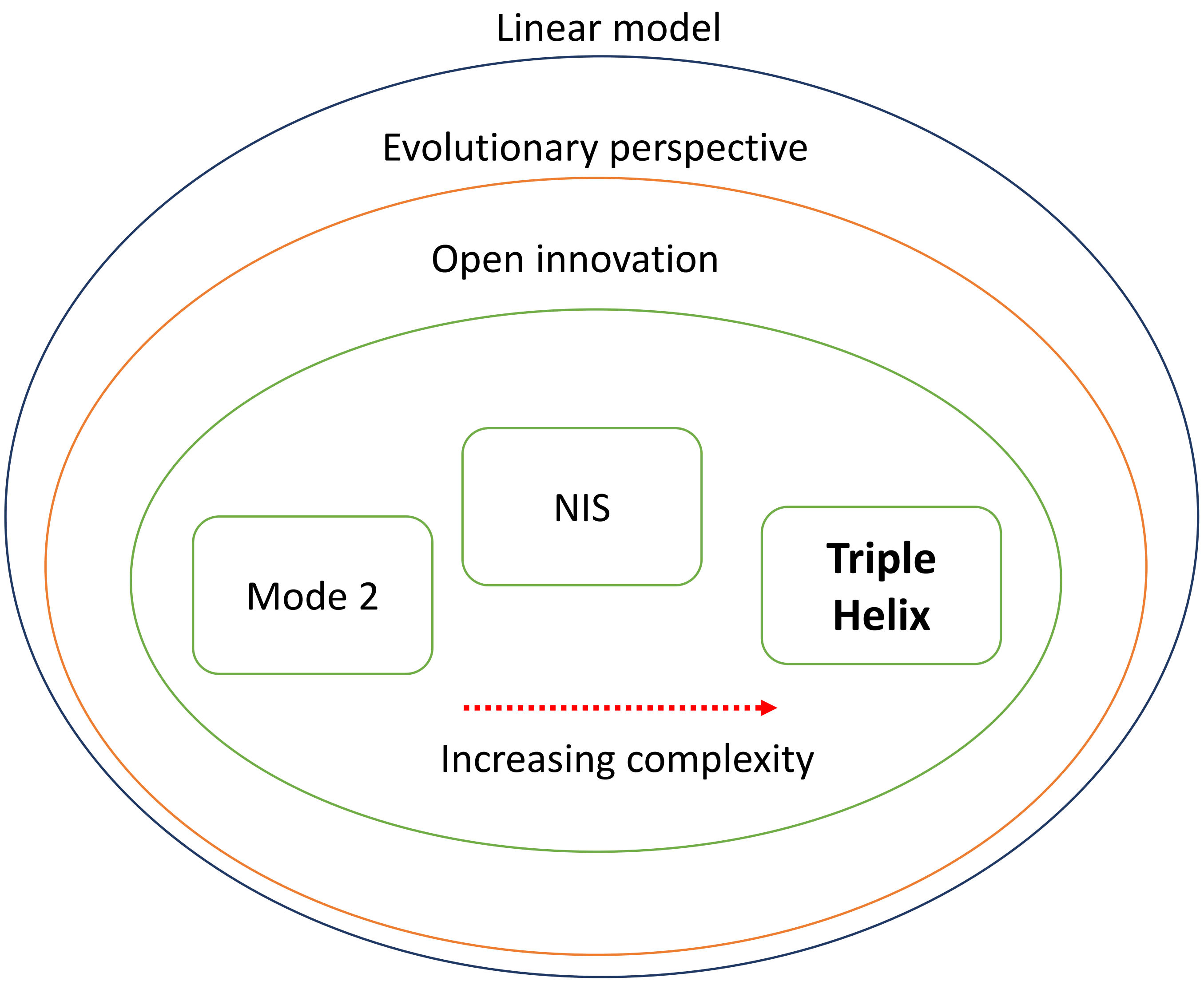
Technology push

Basic Research → Applied Research → Development → Production & diffusion

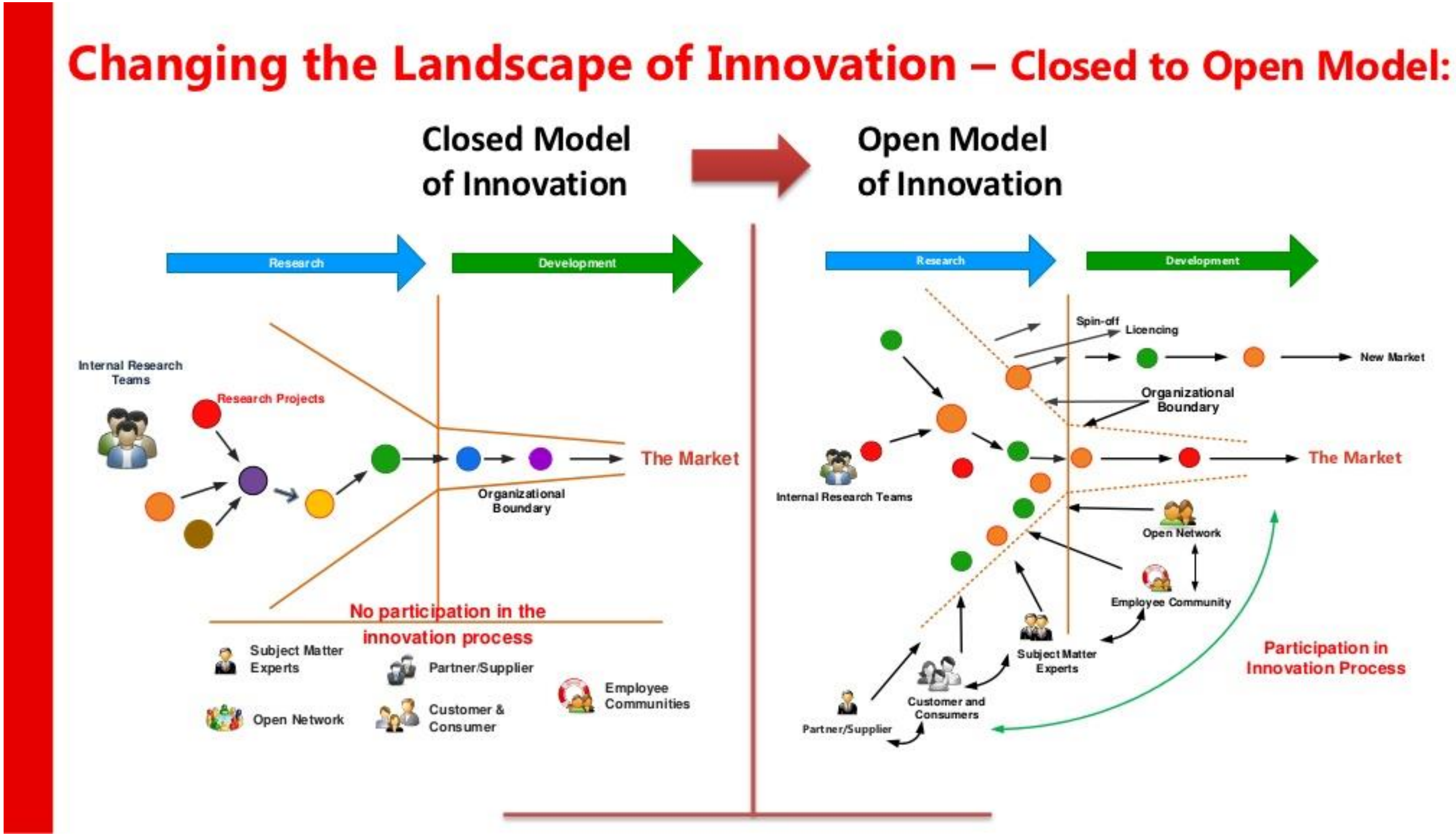
Market pull

Market Needs → Development → Manufacturing → Sales

Innovation systems (a possible view…)



The open innovation paradigm



Source: Fostering Open Innovation and Knowledge Communities with SharePoint 2010

What's different?

External knowledge	New balance of the relative importance placed on internal and external knowledge
Business model	Go to market(s) through a variety of channels
Spillovers	Are an opportunity of expansion
Knowledge	Useful knowledge is widely distributed (not only within the firm)
IP	Intellectual property/patents are not a defensive strategy but signal value
Intermediaries	Diffusion of innovation intermediaries
Performaces	Emerging of metrics for the measurement of innovation performance

Mode 2

- multidisciplinary teams are brought together for short periods of time to work on specific problems in the real world for knowledge production
- Gibbons and colleagues argued that a new form of knowledge production began emerging in the mid-20th century that was context-driven, problem-focused and interdisciplinary
- distinguished from traditional research, labelled Mode 1 which is academic, investigator-initiated and discipline-based knowledge production

NIS

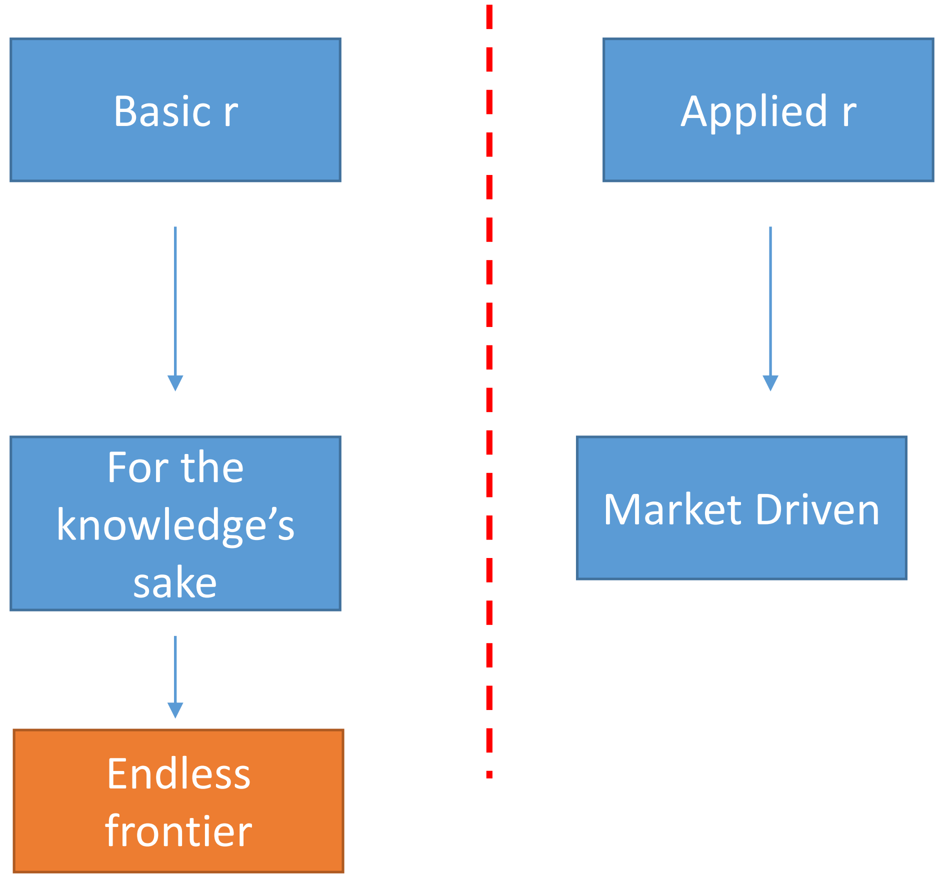
- Originally by Freeman and Lundvall in the late ‘80s
- Freeman: political economy and the rise of Japan as an economic superpower
- Lundvall: social interactions between suppliers and customers and their role in encouraging innovation in Denmark
- «*The concept of national innovation systems rests on the premise that understanding the linkages among the actors involved in innovation is key to improving technology performance. Innovation and technical progress are the result of a complex set of relationships among actors producing, distributing and applying various kinds of knowledge. The innovative performance of a country depends to a large extent on how these actors relate to each other as elements of a collective system of knowledge creation and use as well as the technologies they use. These actors are primarily private enterprises, universities and public research institutes and the people within them.* » OECD (1997)

Triple Helix

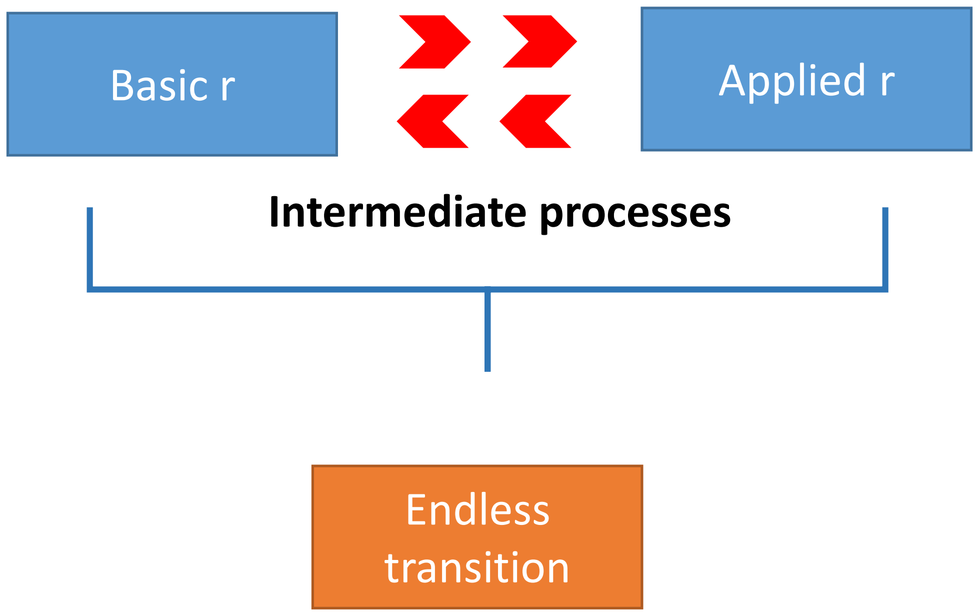
- Emerge as a model at the end of the 1990s
- Emphasis on the role of Univerisities in innovation and increasingly knowledge-based societies
- Focus on the network overlay of communications and expectations that reshape the insititutional arrangements among universities, industries and governmental agencies.
- Can Universities have a third mission of economic development in addition to research and teaching?→ **critique to academia technology transfer**
  - Appropriate dimension
  - Easiest access to funding

Triple Helix

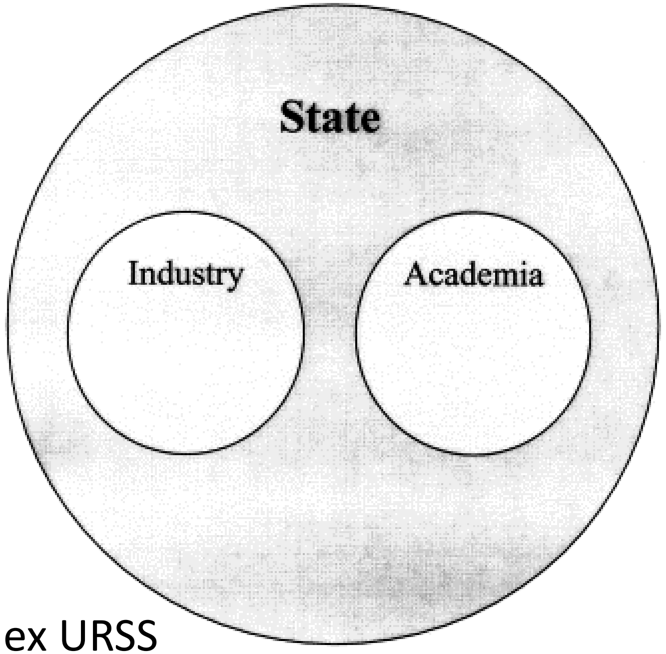
Linear or other models



Triple Helix

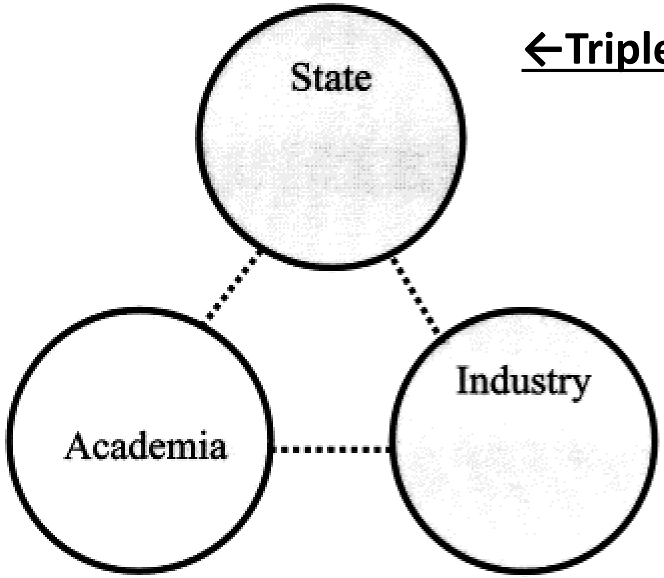


Triple Helix: configurations (source: Etzkovitz & Leydesdorff, 2000)



←Triple Helix 1

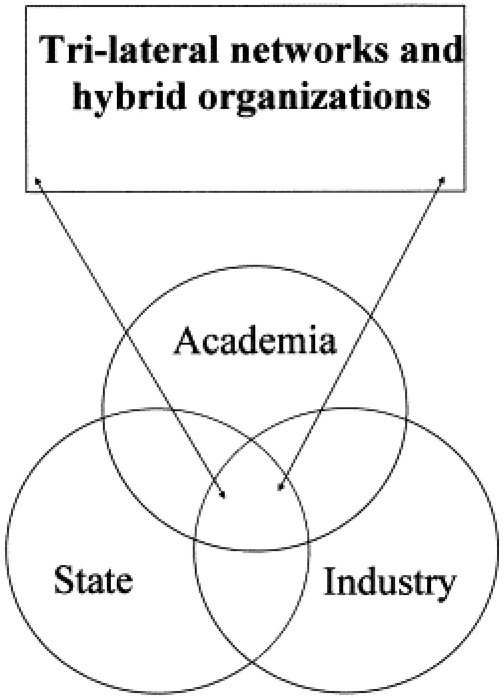
e.g. ex URSS

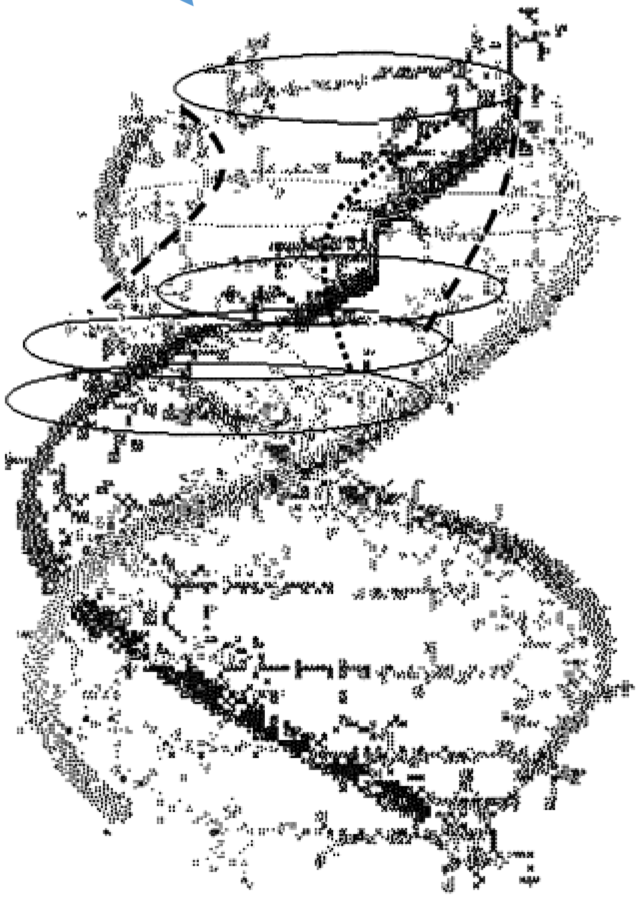


←Triple Helix 2

e.g. US

Triple Helix 3





Implications

- The driving fore of interactions can be specified as the expectation of profits (broad definition)
- Expectations leaves room for uncertainties and chance processes
- Expansion of the higher-education sector has provided a realm in which different representation can be entertained and recombined (e.g. solutions for technological employment)

An empirical example..

- Leydesdorff, L., & Fritsch, M. (2006). Measuring the knowledge base of regional innovation systems in Germany in terms of a Triple Helix dynamics. *Research Policy*, *35*(10), 1538-1553.
  - Study the knowledge base in the economy though the lenses of the triple helix model
  - Case study of Germany, with a focus on medium tech manufacturing and knowledge intensive services.
  - **Research Question**: To what degree is an emerging Triple Helix dynamics conducive to the development of specific regions and nations?

Methodology

- Three dimensions under study in this case will be **geography**, **technology**, and **organization**
- The value of T_{GTO} (computed as a measure of entropy) measures the interrelatedness of the three sources and the fit of the relations between and among them
- Because it is a measure of the reduction of the uncertainty, a better fit will be indicated with a more negative value
- This overall reduction of the uncertainty can be considered as a result of the intensity and the productivity of innovative labor division in a broad sense.

Results

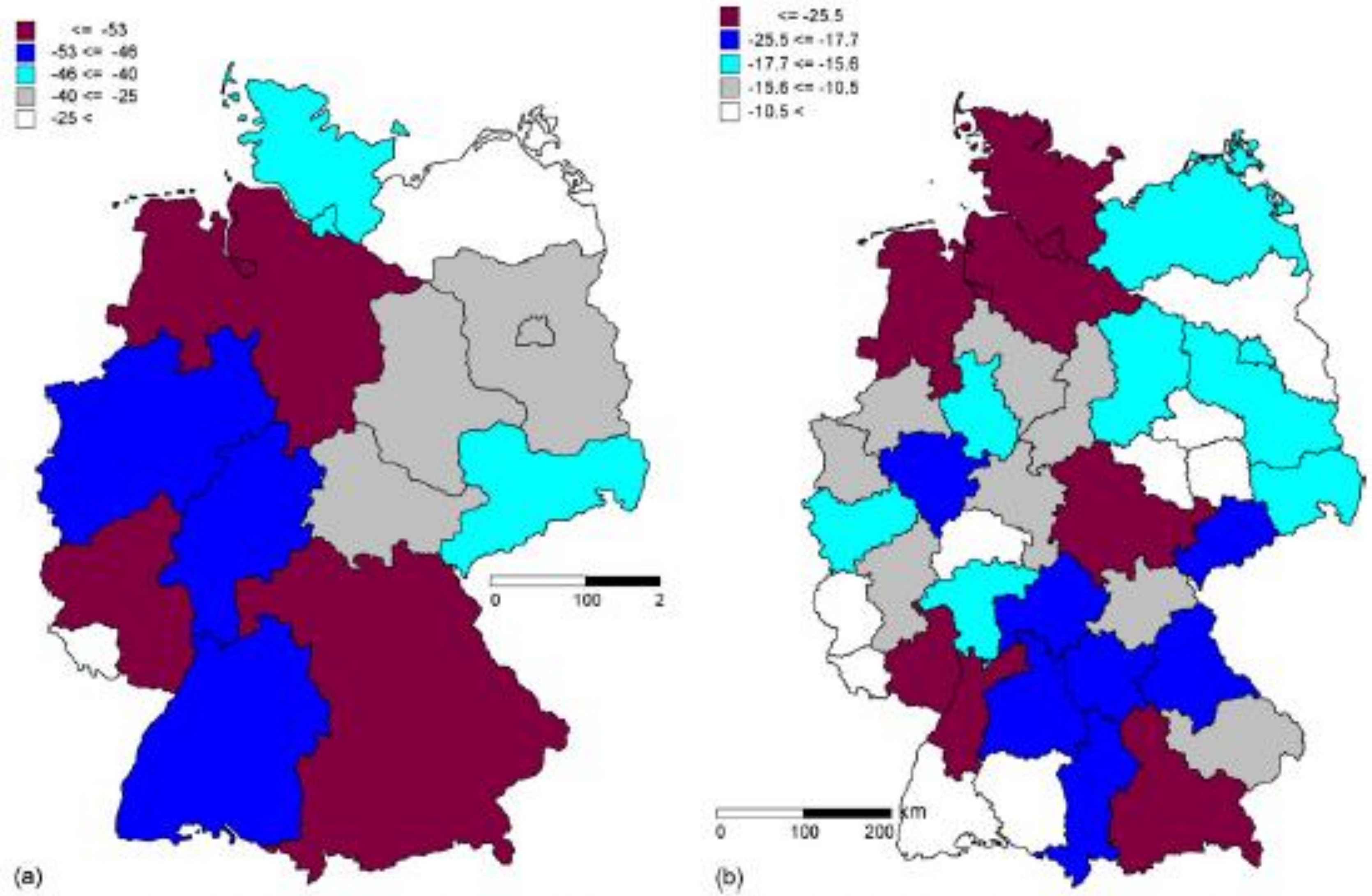


Fig. 2. (a): The mutual information in three dimensions (T_{GTO}) at the NUTS-1 level, (b): idem at the NUTS-2 level.

- Geography→ NUTS1 an NUTS2 region
- Technology→ consider medium tech manuf. & knowledge services
- Organization→ proxied by firm size
- different dynamics in the former eastern and western parts of the country

Results

Table 4
The mutual information in three dimensions statistically decomposed at the NUTS-1 level of the German states (*Länder*)

NUTS 1 (*Länder*)	T_{GTO} in mbits before normalization	ΔT_{GTO} ($= n_i T_i / N$) in mbits of information	n_i
Baden-Württemberg	−474.91	−47.71	44
Bavaria	−412.48	−90.41	96
Brandenburg	−583.86	−25.33	19
Hesse	−778.93	−46.24	26
Mecklenburg-Western Pomerania	−430.28	−17.68	18
Lower Saxony	−632.35	−69.30	48
North Rhine-Westphalia	−404.10	−49.82	54
Rhineland-Palatinate	−647.76	−53.24	36
Saarland	−639.67	−8.76	6
Saxony	−649.83	−43.03	29
Saxony-Anhalt	−600.14	−32.88	24
Schleswig-Holstein	−1102.75	−40.28	16
Thuringia	−619.48	−31.12	22
Germany	−180.08	−180.08	438

Results

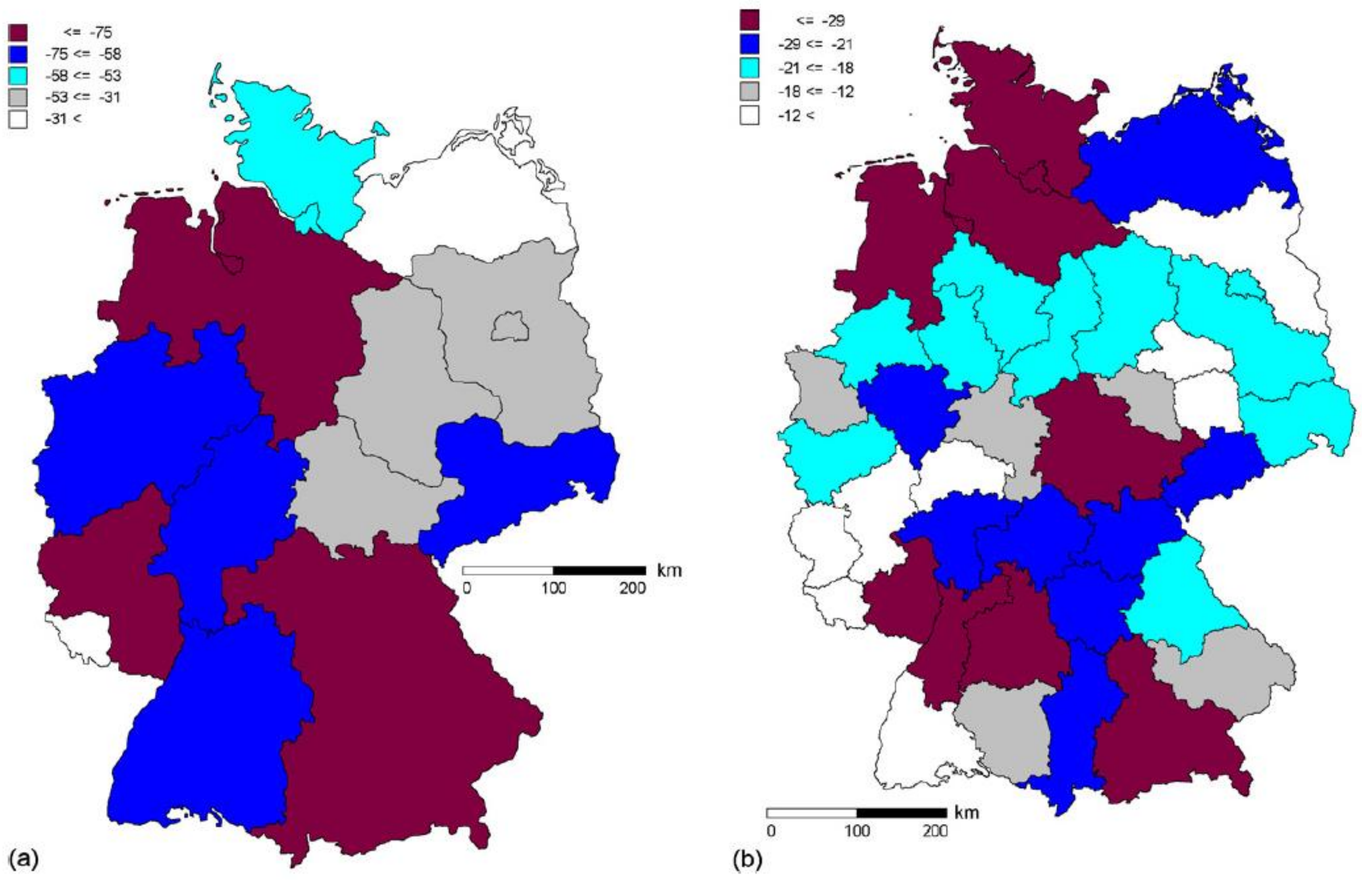


Fig. 4. (a) and (b): Medium-tech manufacturing generates the knowledge base in Germany.

- Some regions are ranked higher focus
- on medium-tech, but the pattern is broadly the same.
- The quality of the regional innovation system
- is more or less completely determined by medium-tech manufacturing.
- High-tech manufacturing reduces the (negative) configurational information more often than not, Medium-tech always make the configurational
- information more negative.
- The configuration medium-tech manufacturing can be considered a better indicator of the knowledge-based economy than that of high-tech manufacturing