Territorial Innovation Patterns: which Innovation Policies for European regions?

Roberta Capello

Politecnico di Milano

Past-President RSAI

Forum Scientifique regiosuisse 2016, Interlaken,
23 – 24 November 2016

Stylized facts

Europe entered the crisis with a gap in innovation activities with respect to advanced and even emerging countries. The crisis did not allow Europe to regain competitiveness over the past years.

The debate in Europe moves around a major question: which innovation policies should be developed in Europe in a period of economic downturn?

European pre-crisis R&D Gap

R&D / GDP
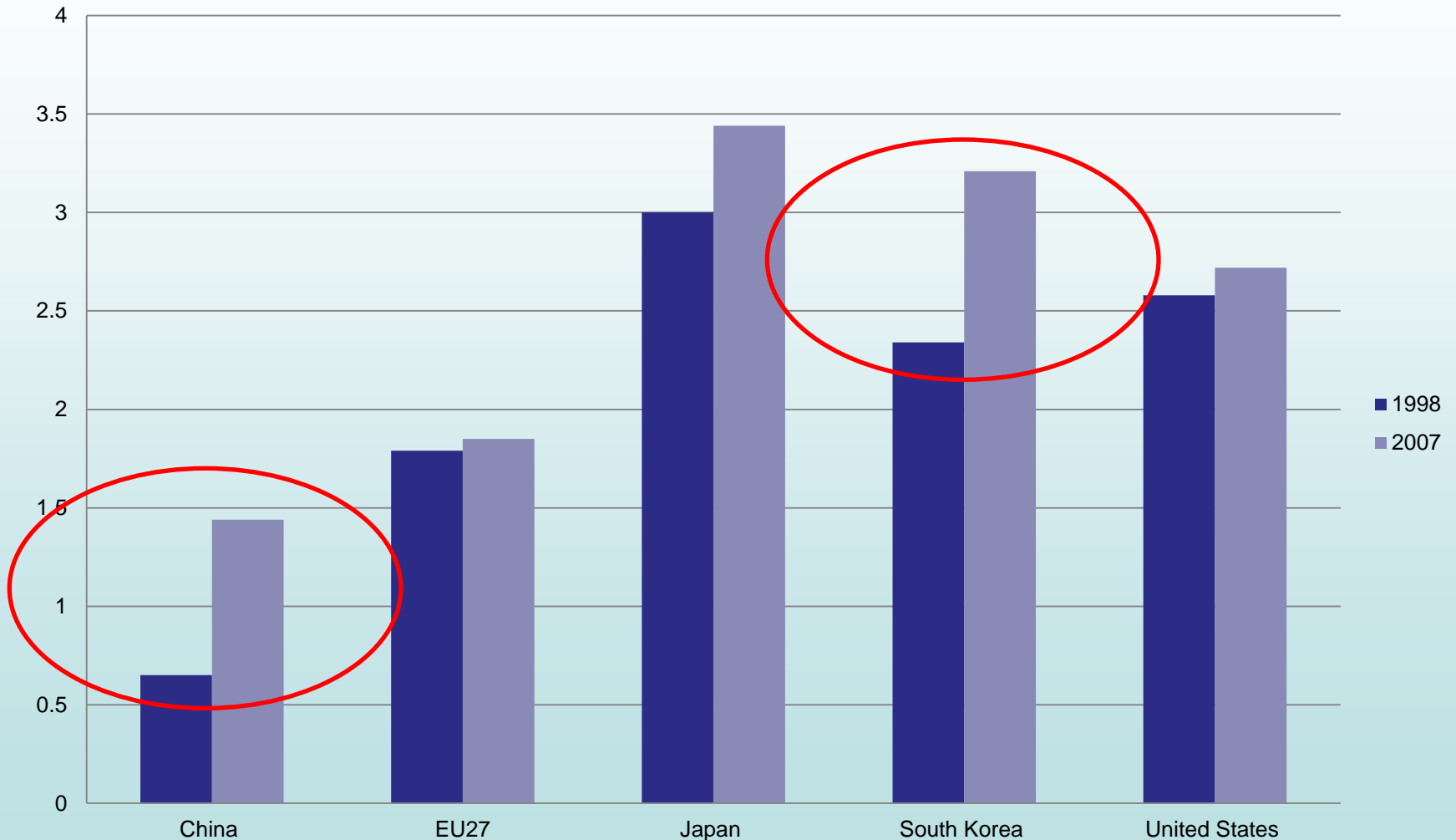
Source: World Bank and Eurostat

Average increase in R&D/GDP 1996-2007

Source: Knowledge, Network and Nations. The Royal Society

Pre-crisis policy recommendations

Recommandations from the EU in the Lisbon agenda in 2000.

Notwithstanding the recommandations and efforts made, in 2009 in Europe R&D/GDP was equal to 1.8%.

Moreover, the ratio has strong national disparities: only Finland and Sweden have a R&D/GDP ratio higher than 3%.

R&D expenditures / GDP
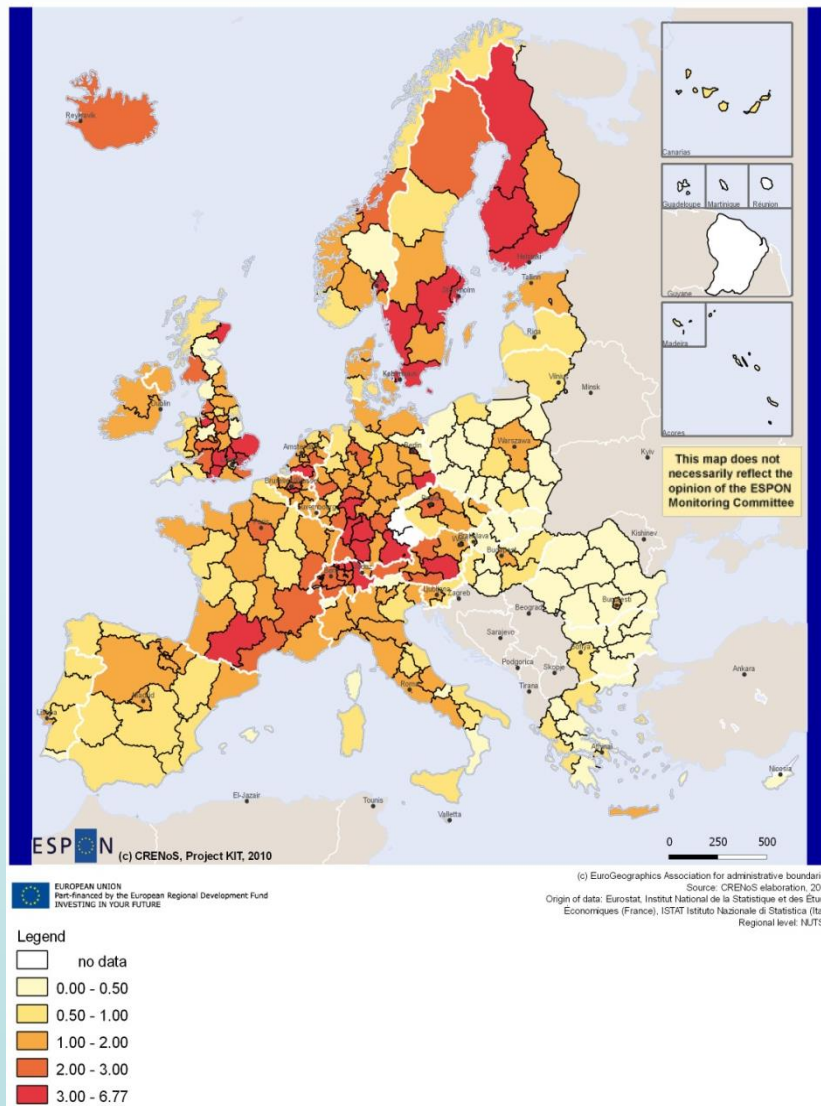
In 2009 regions having reached 3% of R&D expenditures on GDP are 33 (11 per cent of the European NUTS2 regions) and concentrated in a few countries in the North of Europe. Moreover, a very high number of regions belongs to the lowest class, the one where R&D /GDP is lower than 0.5%.

At the beginning of the crisis

In 2010, the EUROPE 2020 Agenda re-launched the same recommandations: 3% R&D/GDP

In 2012, it reached 1.9%.

What can be done? Which innovation policies can be foreseen for Europe?

To reply to the question, we need to

1. present the geography of the knowledge economy in Europe,

2. analyse the theoretical achievements and new reflections in knowledge, innovation and regional growth,

3. so to suggest an innovation policy design.

The geography of the knowledge economy in Europe

The Knowledge Economy in European regions (1)

Basic idea: *knowledge-based economy has not got a unique interpretative paradigm.*

Different approaches are necessary:

A1. Sectoral approach (presence in the region of science-based, high-technology sectors).

A2. Functional approach (presence in the region of functions like R&D, patents, human capital).

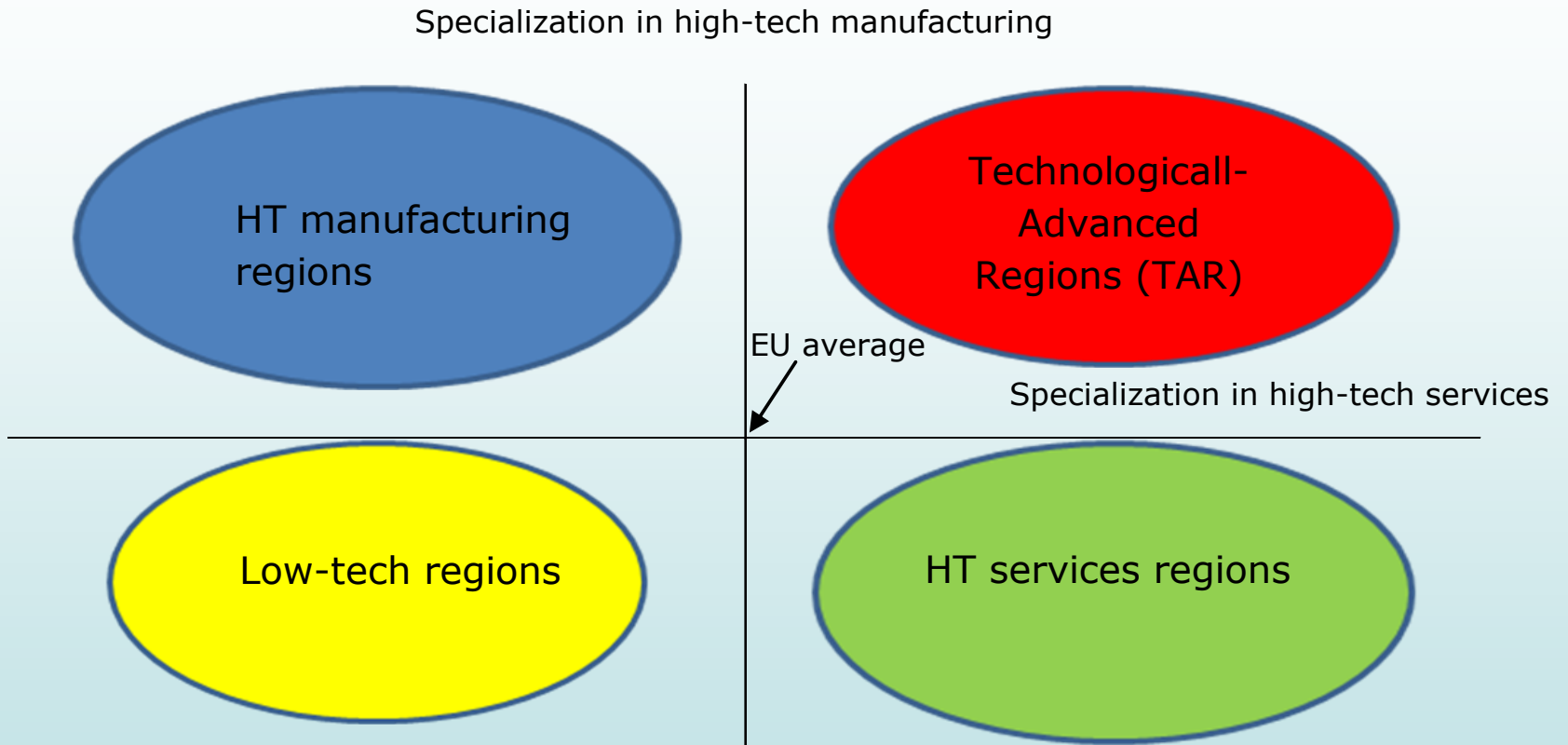**A3. Relation-based approach** (presence in the region of interactive and collective learning processes).

The Knowledge Economy in European regions (2)

Empirical analysis developed in order to identify:

-technologically advanced regions;

-scientific regions;

-knowledge networking regions.
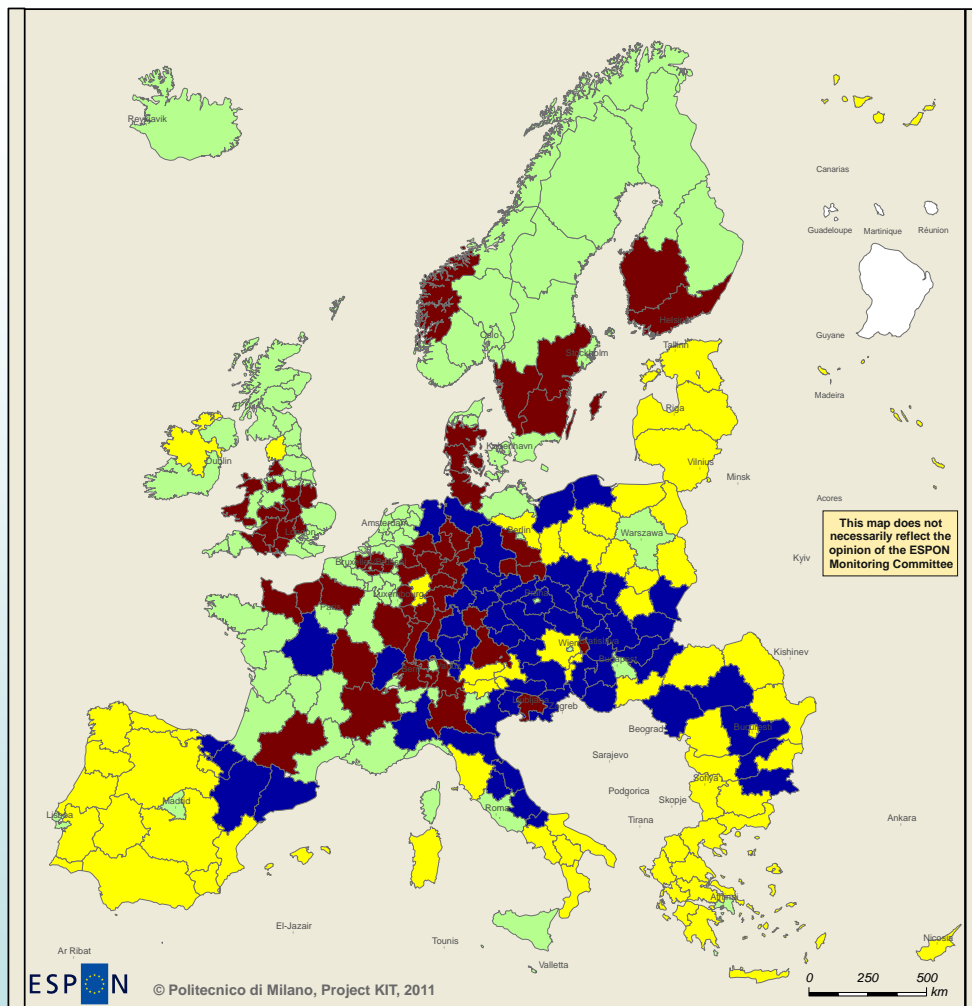
Technologically Advanced Regions

Specialization in high-tech manufacturing

HT manufacturing regions

Technologicall- Advanced Regions (TAR)

EU average

Specialization in high-tech services

Low-tech regions

HT services regions

Technologically Advanced Regions in EU

Technologically-advanced regions
2007

- NA
- Low tech regions
- Advanced manufacturing regions
- Advanced services regions
- Technologically-advanced regions

This map does not necessarily reflect the opinion of the ESPON Monitoring Committee

ESPON

© Politecnico di Milano, Project KIT, 2011

EUROPEAN UNION
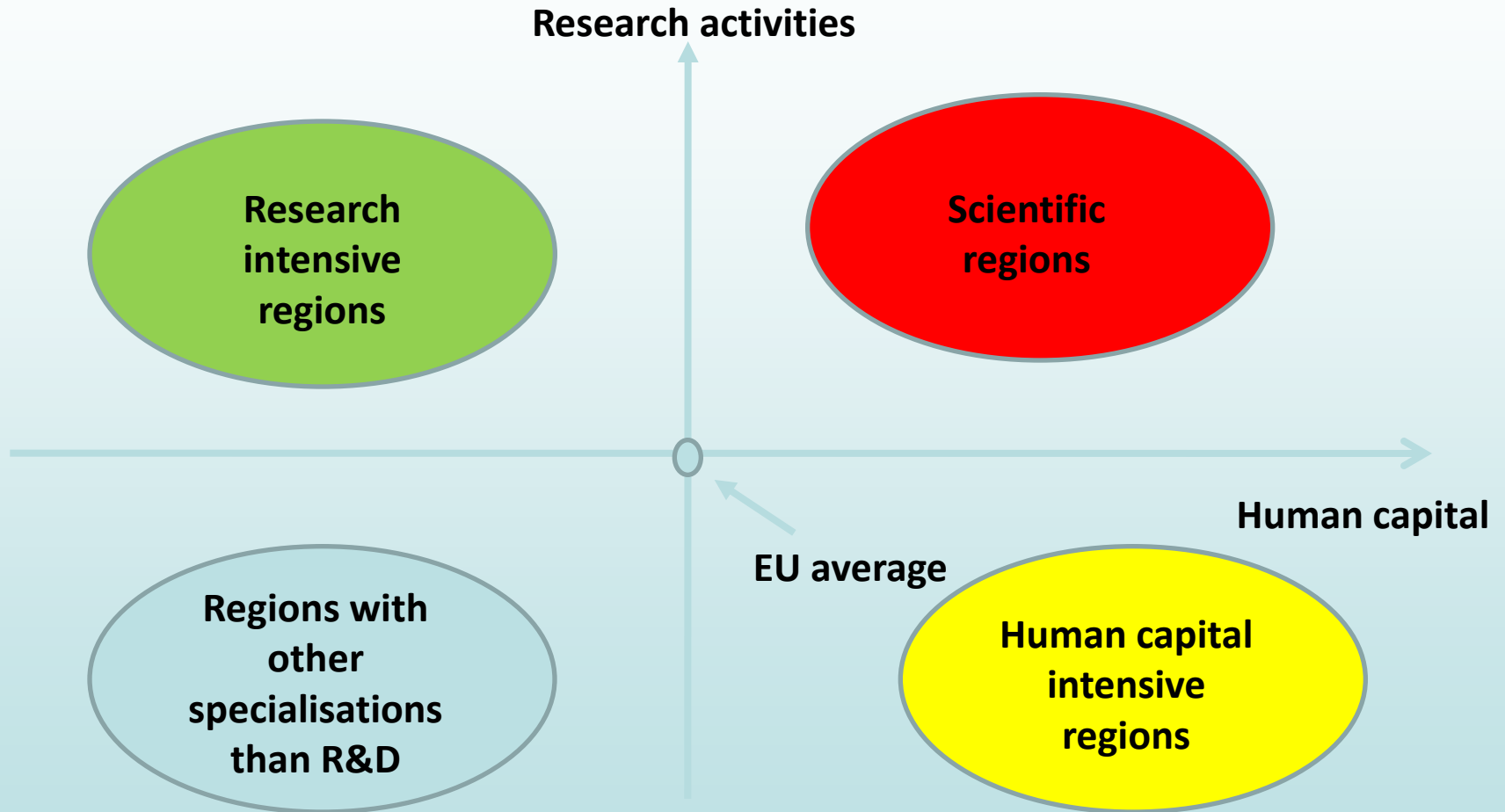Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

Regional level: NUTS2
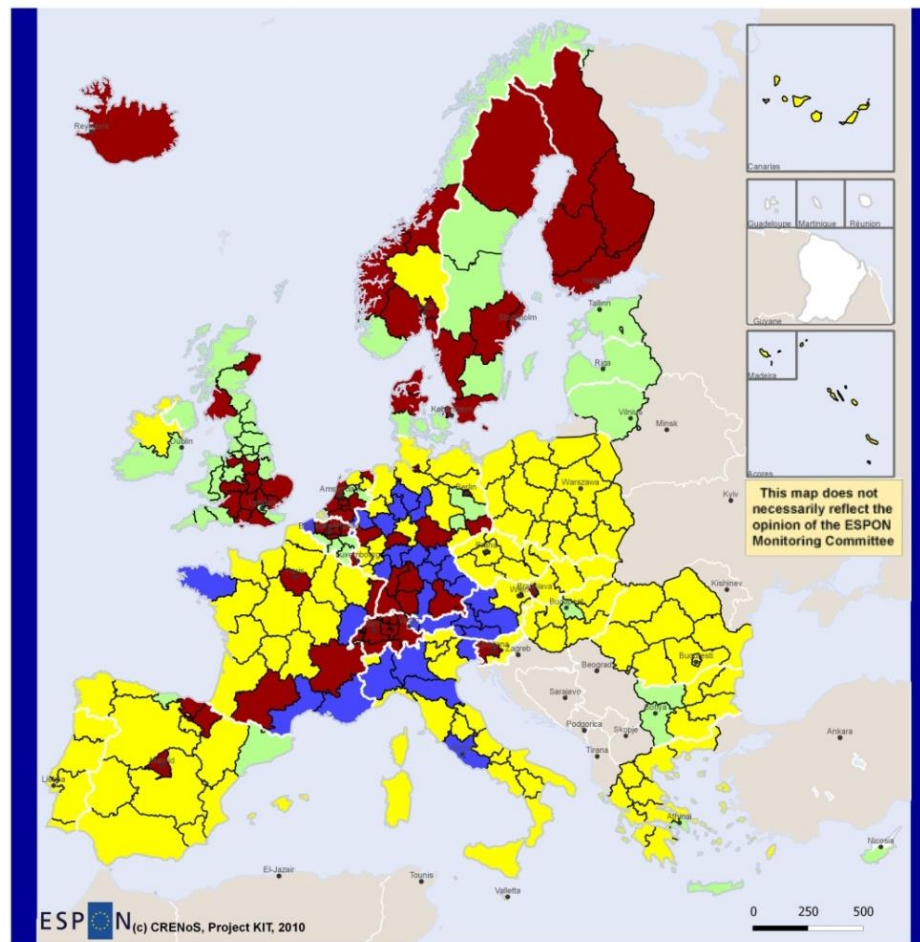*Source: Politecnico di Milano, 2011*
Origin of data: EUROSTAT employment in high-tech sectors
© EuroGeographics Association for administrative boundaries

Scientific regions

Scientific regions

ESPON (c) CRENoS, Project KIT, 2010

This map does not necessarily reflect the opinion of the ESPON Monitoring Committee

EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

(c) EuroGeographics Association for administrative boundaries
Source: CRENoS elaboration, 2010
Origin of data:Eurostat, OECD REGPAT database, ISTAT and
Institut National de la Statistique et des Études Économiques data, CORDIS data
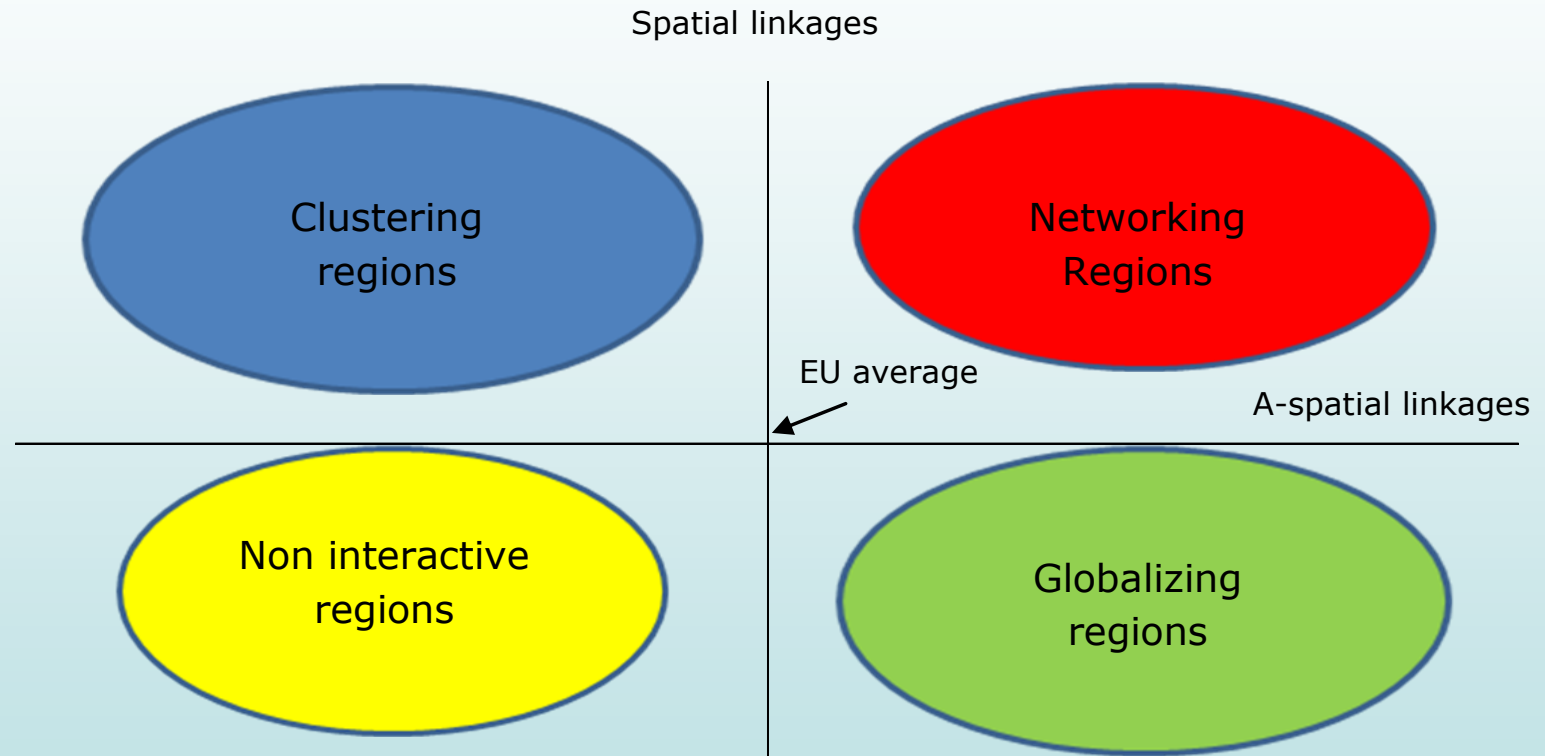Regional level: NUTS 2

Legend

☐ no data

🟥 Scientific regions

🟩 Human capital intensive regions

🟦 Research intensive regions

🟨 Regions witn no specialization in knowledge activities

Knowledge networking regions

Knowledge networking regions

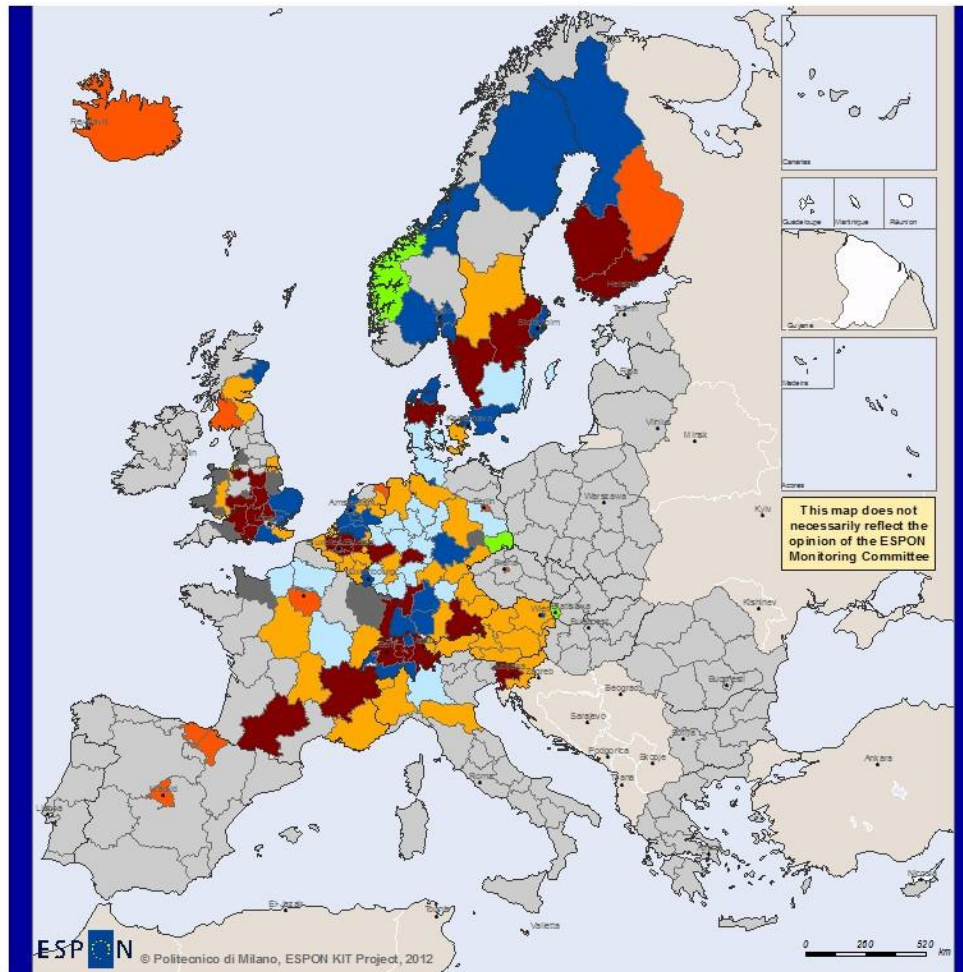| Category	Meaning	Specialization in spatial linkages	Specialization in a-spatial linkages
1	Non-interactive regions	No	No
2	Clustering regions	Yes	No
3	Globalizing regions	No	Yes
4	Networking regions	Yes	Yes

Knowledge networking regions

- Non-interactive regions
- Clustering regions
- Globalizing regions
- Networking regions

The Knowledge Economy in Europe

The Knowledge Economy in Europe is a very fragmented picture.

What is striking from this map is the high number of regions in which the knowledge economy is still in its infancy.

This map does not necessarily reflect the opinion of the ESPON Monitoring Committee

© Politecnico di Milano, ESPON KIT Project, 2012

Regional level NUTS2
Source: Own elaboration, 2011
Origin of data: EUROSTAT and REGPAT, 2007
© EuroGeographics Association for administrative boundaries

EUROPEAN UNION
Part-financed by the European Regional Development Fund
INVESTING IN YOUR FUTURE

Legend

- No data
- None (137 regions)
- TAR only (8 regions)
- Scientific regions only (11 regions)
- Networking regions only (43 regions)
- TAR and scientific regions (3 regions)
- TAR and networking regions (20 regions)
- Scientific and networking regions (29 regions)
- TAR, scientific and networking regions (31 regions)

Spatial trends of innovation in Europe
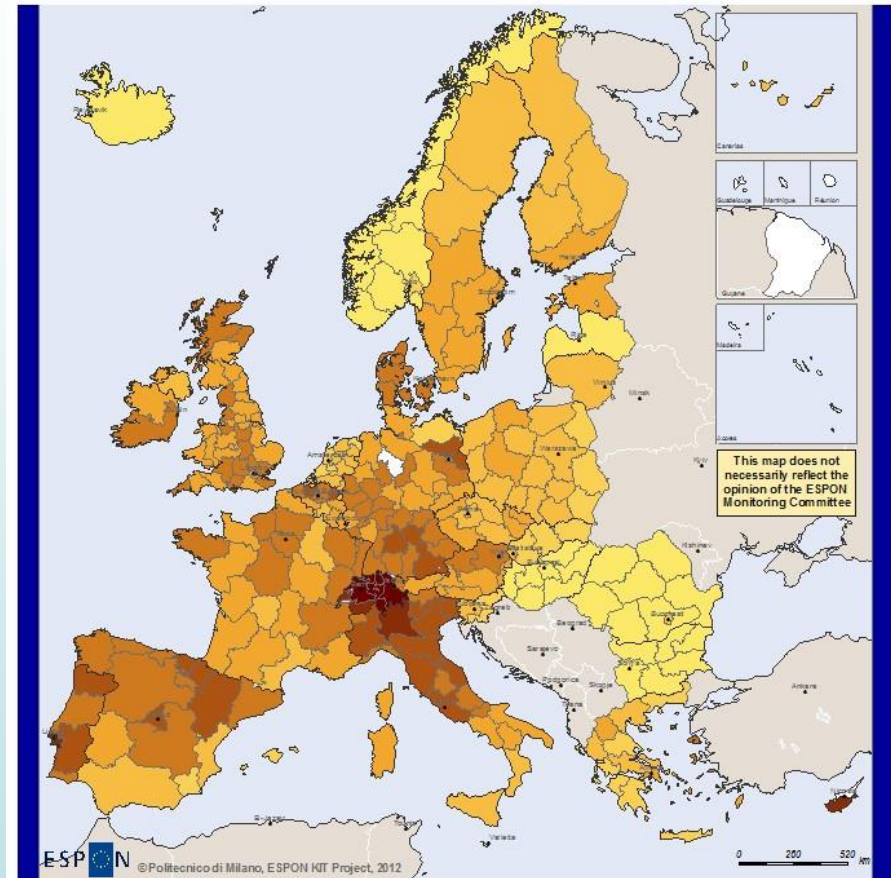
Product innovation only
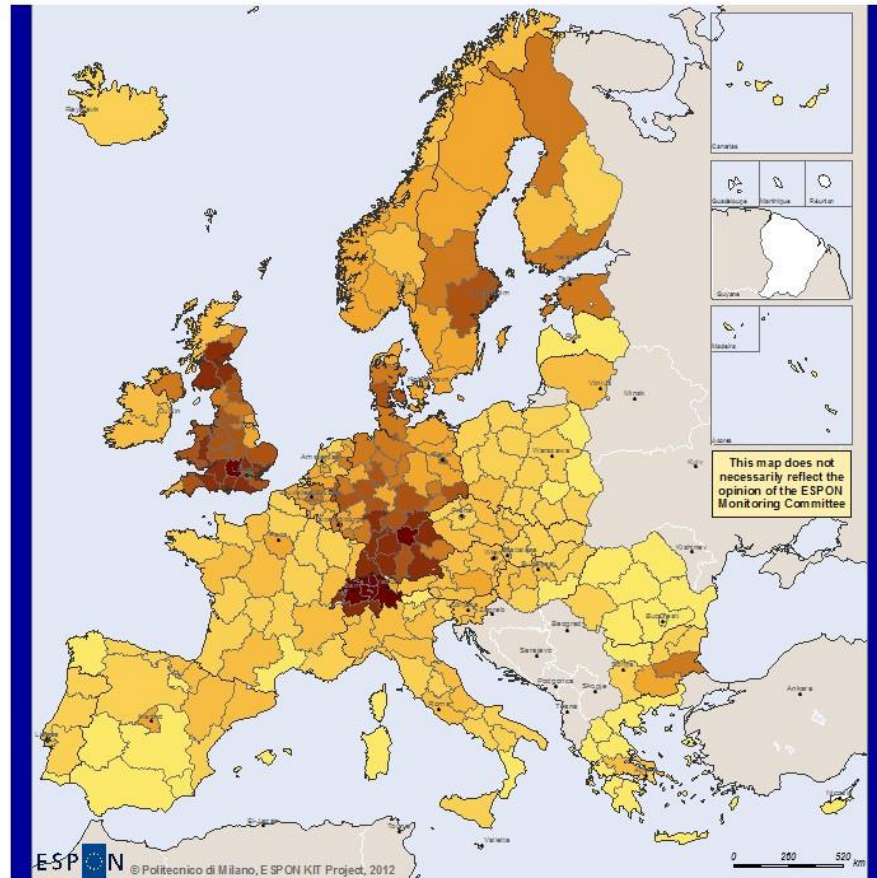
Process innovation only

Open issues

Knowledge and innovation do not always match at spatial level.

Which is the state of the art in the theoretical explanation for this?

Wich are sound innovation policies that can be developed based on an advanced theoretical interpretation of regional growth through knowledge and innovation?

Theoretical achievements and new reflections in knowledge, innovation and regional growth

Common features of existing approaches (1)

All existing theories base their reflections on *one particular phase* of the innovation process, being either knowledge creation, innovation creation, innovation diffusion or knowledge diffusion.

Some theories even interpret knowledge and innovation as coinciding processes, giving for granted that if knowledge is created locally, this inevitably leads to innovation, and growth.

Common features of existing approaches (2)

However, factors that enhance the implementation of new knowledge can be quite different from the factors which stimulate innovation.

The fax machine, first developed in Germany, was turned into a worldwide successful product by Japanese companies.

Anti-lock brake system (ABS) was invented by US car makers but became prominent primarily due to German automotive suppliers.
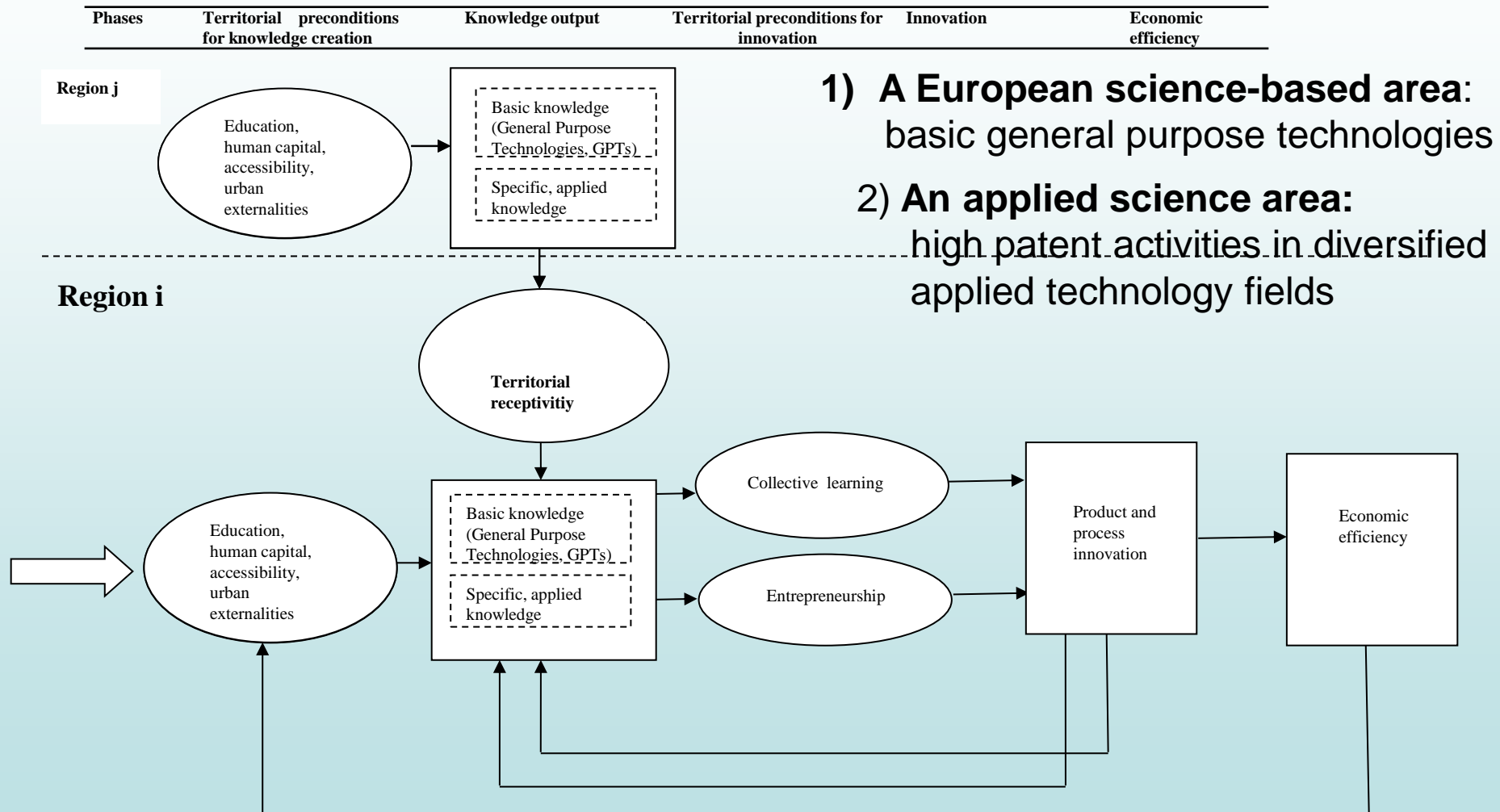
Territorial patterns of innovation

The concept of a *'Territorial Patterns of Innovation'* represents

- a spatial breakdown of variants of the knowledge – invention – innovation - development logical path,
- built on presence/absence of territorial preconditions for knowledge creation, knowledge attraction and innovation.

So that we can have:
- a conceptual distinction between knowledge and innovation;
- an identification of the context conditions, both internal and external to the region, that support the different innovation phases.

# Innovative region taxonomy and a territorial approach (1)

Phases	Territorial preconditions for knowledge creation	Knowledge output	Territorial preconditions for innovation	Innovation	Economic efficiency

Region j

Education, human capital, accessibility, urban externalities → Basic knowledge (General Purpose Technologies, GPTs) / Specific, applied knowledge

1) **A European science-based area**: basic general purpose technologies

2) **An applied science area:** high patent activities in diversified applied technology fields

Region i

Territorial receptivitiy

Education, human capital, accessibility, urban externalities → Basic knowledge (General Purpose Technologies, GPTs) / Specific, applied knowledge → Collective learning / Entrepreneurship → Product and process innovation → Economic efficiency

Innovative region taxonomy and a territorial approach (2)

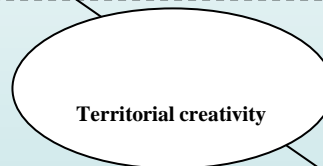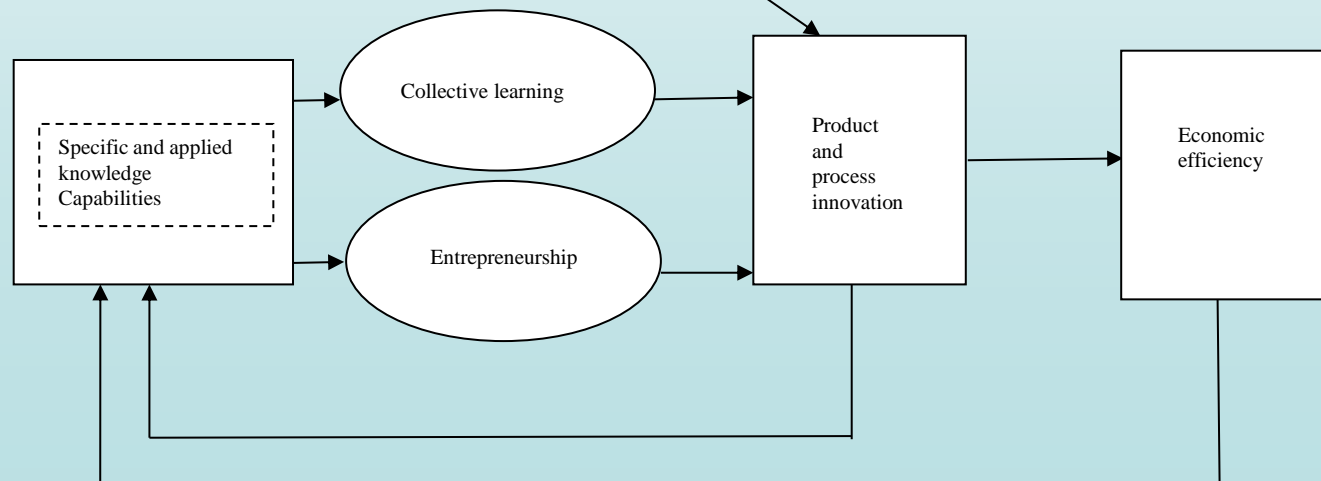| Phases	Territorial preconditions for knowledge creation	Knowledge output	Territorial preconditions for innovation	Innovation	Economic efficiency
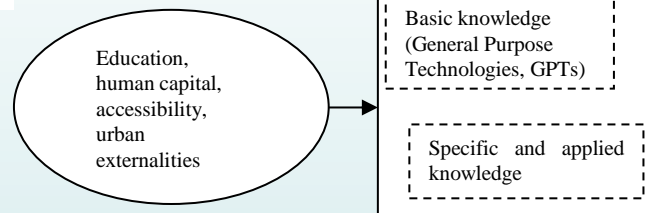
3) A **smart technological application area** External specific technologies enhancing the upgrading of local innovation

4) **Smart and creative diversification area** External tacit knowledge enhacing local innovation
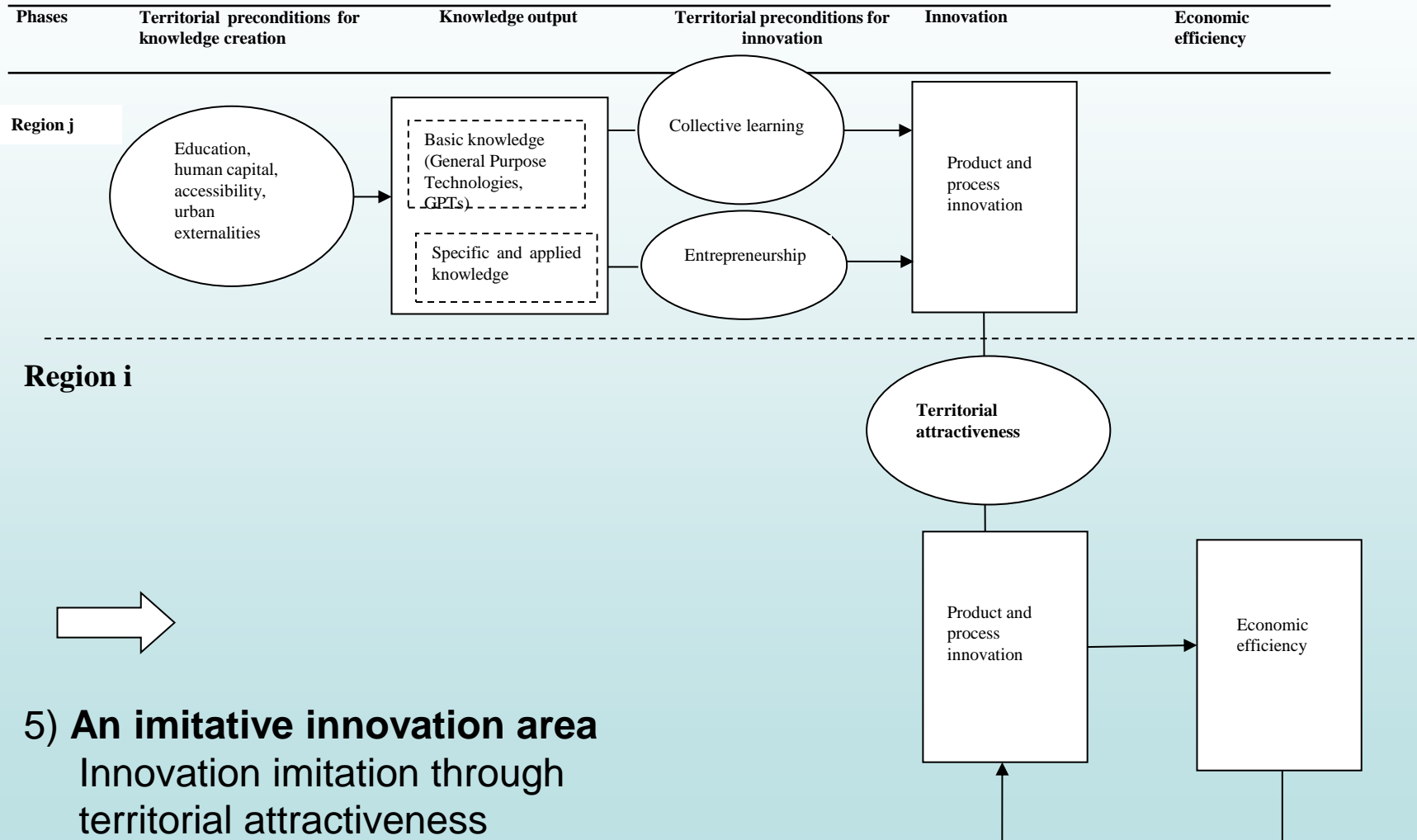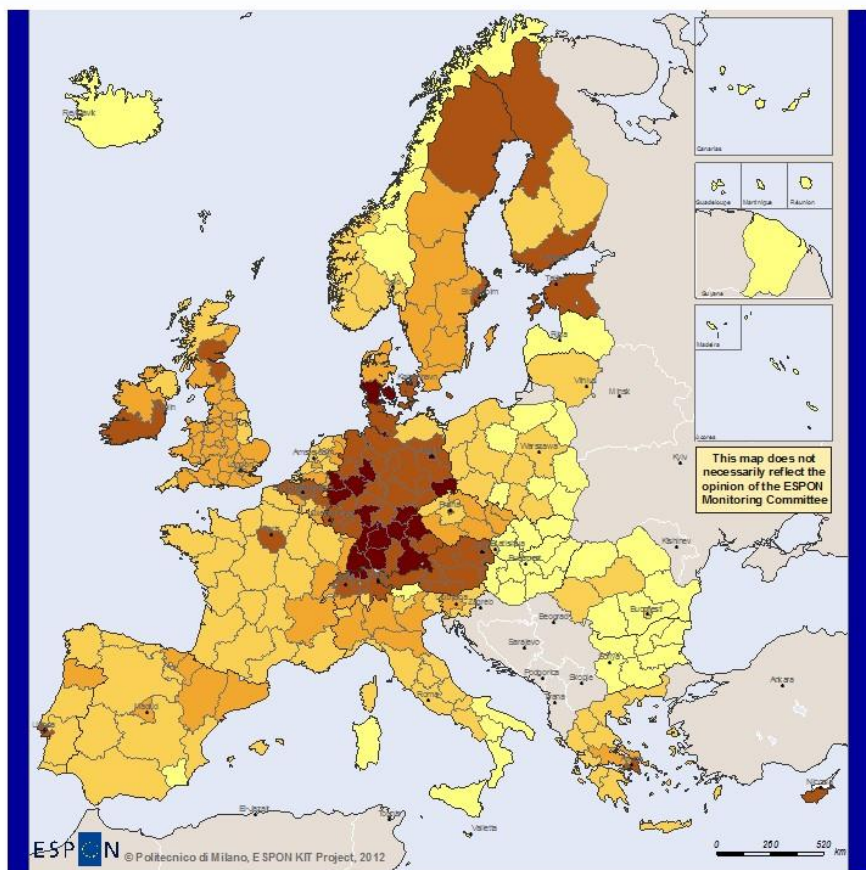
Region j

Education, human capital, accessibility, urban externalities

Basic knowledge (General Purpose Technologies, GPTs)

Specific and applied knowledge

Territorial creativity

Region i

Specific and applied knowledge Capabilities

Collective learning

Entrepreneurship

Product and process innovation

Economic efficiency

Innovative region taxonomy and a territorial approach (3)

Phases	Territorial preconditions for knowledge creation	Knowledge output	Territorial preconditions for innovation	Innovation	Economic efficiency

Region j

Education, human capital, accessibility, urban externalities

Basic knowledge (General Purpose Technologies, GPTs)

Specific and applied knowledge

Collective learning

Entrepreneurship

Product and process innovation

Region i

Territorial attractiveness

Product and process innovation

Economic efficiency

5) **An imitative innovation area**
Innovation imitation through territorial attractiveness

Territorial patterns of innovation in Europe

Pattern 1= A European science-based area

Pattern 2 = An applied science area

Pattern 3 = A smart technological application area

Pattern 4 = A smart and creative diversification area

Pattern 5 = An imitative innovation area

Economic efficiency of the different territorial patterns
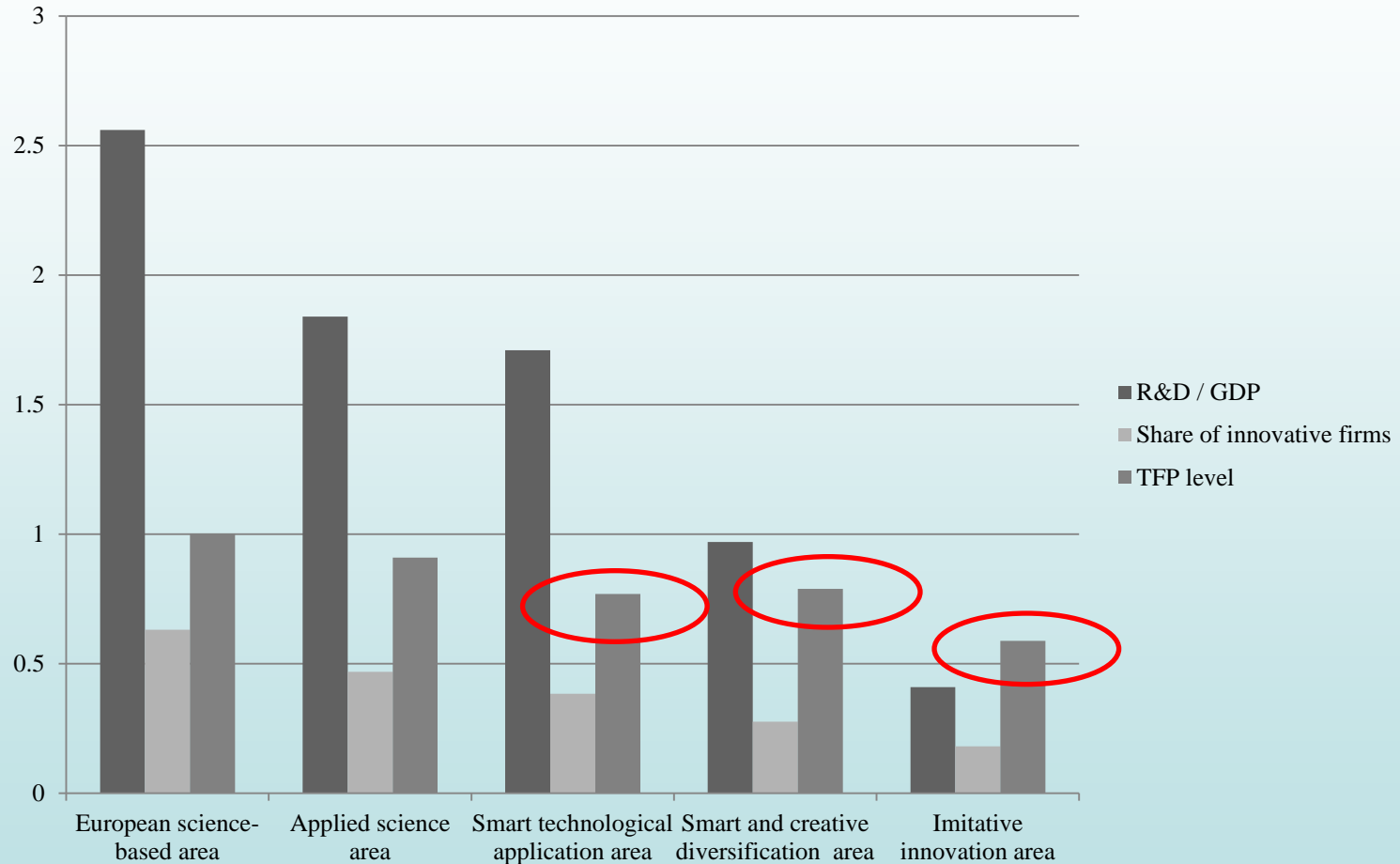
Policy lesson: each pattern of innovation has its economic efficiency.

Elasticity of innovation to R&D

Policy lesson: R&D has not always a positive effect on innovation.

Elasticity of GDP to R&D

Elasticity of GDP to R&D

5

1

2

3

4

R&D / GDP levels
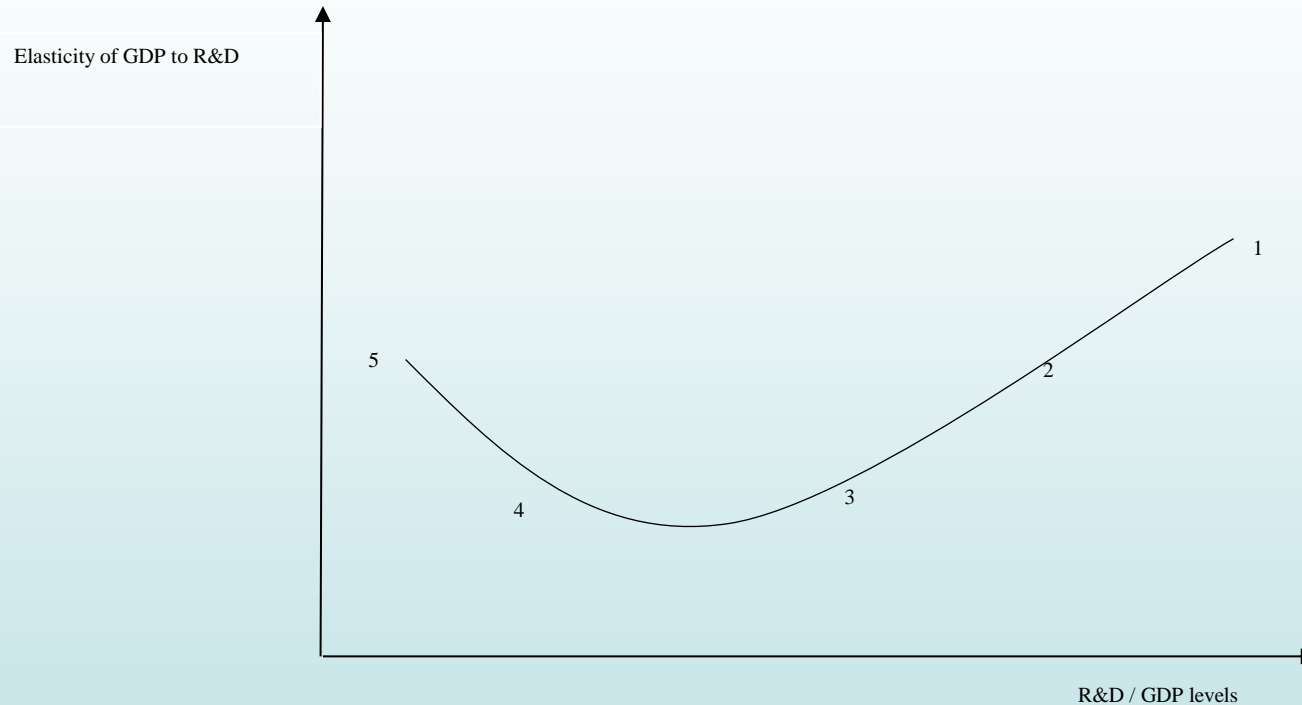
Legend:
1 = European science-based area; 2 = Applied science area; 3 = Smart technological application area;
4 = Smart and creative diversification area; 5 = Imitative innovation area

Policy lesson: R&D requires a critical mass to have an effect on GDP.

Regional Innovation Policy Implications

Where do we stand with regional innovation policy debate?

There is general consensus about the need to avoid one unique (R&D) innovation policy for all regions.

This view is fully coherent with the '*smart specialization'* strategy (RIS3), which advocates differentiated policies:

– in the first phase: between 'core' and 'periphery' regions (Foray et al., 2009);

– in the second phase: for each region according to single specificities (McCann and Ortega-Argìles, 2014; Coffano and Foray, 2014; Boschma, 2014).

Our idea is that innovation policies have to be developed for regions with similar innovation patterns.

Smart innovation policies

'Smart innovation' policies may be defined as those policies able to increase the innovation capability of an area by:

- boosting the effectiveness of accumulated knowledge and

- fostering territorial applications and diversification,

  on the basis of local specificities and the characteristics of already established innovation patterns in each region.

Policy aspects	Territorial patterns of innovation				
	European science-based area (Pattern 1)	Applied science area (Pattern 2)	Smart technological application area (Pattern 3)	Smart and creative diversification area (Pattern 4)	Imitative innovation area (Pattern 5)
Policy goals	Maximum return to R&D investments		Maximum return to applications and co-operation in applications		Maximum return to imitation
Policy actions for local knowledge generation (Embeddedness)	Support to R&D in:		Support to creative application, shifting capacity from old to new uses, improving productivity in existing uses, through:		Fast diffusion of existing innovation Enhancing receptivity of existing innovation
	New basic fields General Purpose Technologies	Specialized technological fields Variety in applications	Incentives to technological development and upgrading Variety creation	Identification of international best practices Support to search in product/market diversification Support to entrepreneurial creativity	Support to local firms for complementary projects with MNCs Support to local firms for specialized subcontracting

Evolutionary smart innovation policies

- Some regions could be able to 'jump' over different and more complex innovation patterns (empirical evidence collected);

- 'evolutionary' policies could support these paths, with extreme attention and careful assessments, provided that context conditions and reliability of actors and strategies/projects could reduce risks of failure.

Conclusions: which reply to the theses of the conference

- Regional innovation strongly depends from a favourable political, social, institutional environment for sure.
  - Mode of innovation is extremely important

- Innovation is by no means obtained by imposing it..
  - The policy aim has to be how to stimulate the right needs of a local economy, avoiding free rider behaviours and lobbying

- Smart specialization strategy is a step in this direction, but it has to be improved.
  - A change from sectoral strategy to a territorial strategy is advocated in this field.

All this and much more can be found in

Camagni R. and Capello R. (2013), «Regional Innovation Patterns and the EU Regional Policy Reform: Towards Smart Innovation Policies», *Growth and Change*, 44(2), 355-389

Capello R. and Lenzi C. (eds.) (2013), *Territorial patterns of innovation. An Inquiry on the Knowledge Economy in European Regions,* Routledge, London

Capello R. and Lenzi C. (2013), «Knowledge, Innovation and Regional Growth Nexus: Spatial Heterogeneity in European Regions», *Journal of Regional Science,* DOI: 10.1111/jors.12074

Camagni R. and Capello R. (2014), «Rationale and design of EU cohesion policies in a period of austerity», *Regional Science Policy and Practice,* doi: 10.1111/rsp3.12047

Capello R., Caragliu A. and Fratesi U. (2014), «Modelling Regional Growth between Competitiveness and Austerity Measures: the MASST3 Model», *International Regional Science Review*, DOI: 10.1177/0160017614543850

Capello R. and Lenzi C. (2014), «Knowledge, Innovation and Productivity Gains across European Regions», *Regional Studies*, DOI: 10.1080/00343404.2014.917167

THANK YOU VERY MUCH FOR YOUR ATTENTION!