

Industry 4.0 and Implications for European Regions

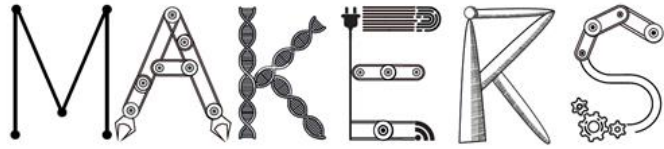
Lisa De Propriis

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RSA Winter Conference 2017

MAKERS - Smart Manufacturing for EU growth and prosperity is a project funded by the Horizon 2020-
MSCA- RISE - Grant agreement number 691192.





Contents

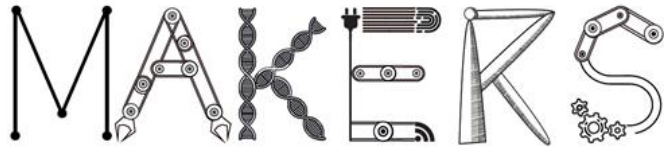
Introduce MAKERS

Define I4.0

Present a broader interpretation of I4.0

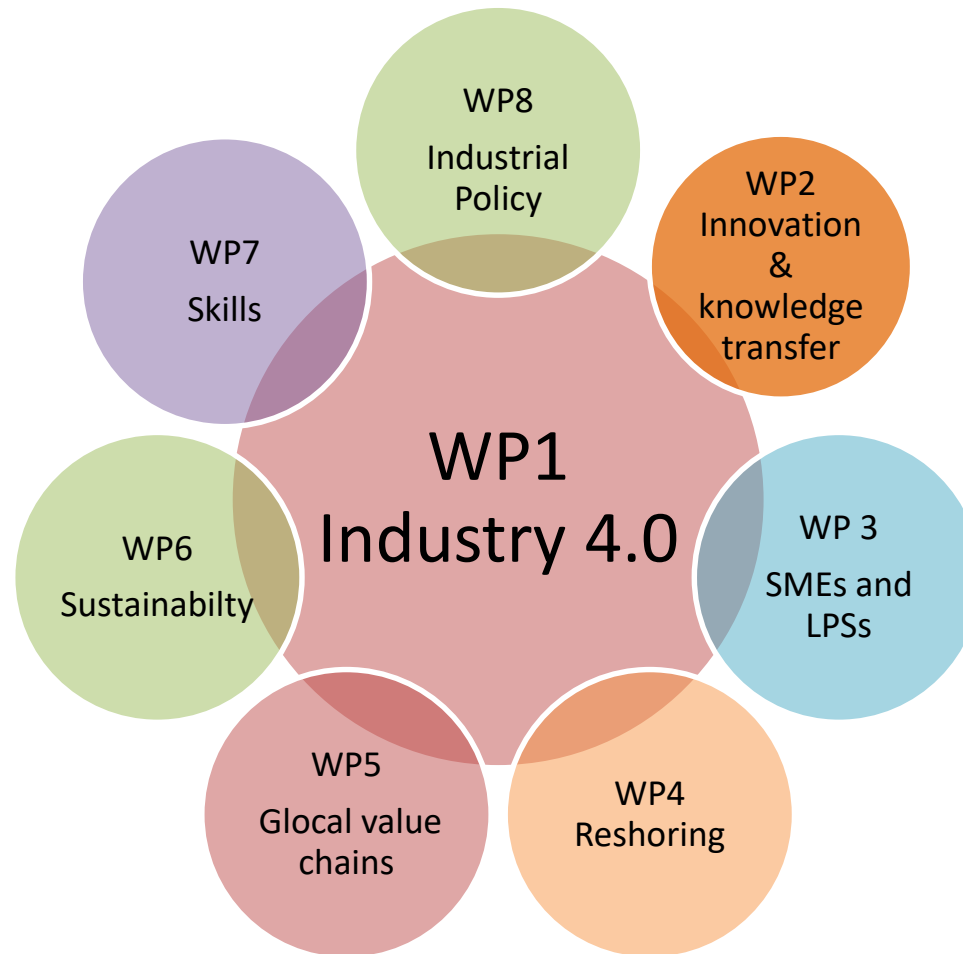
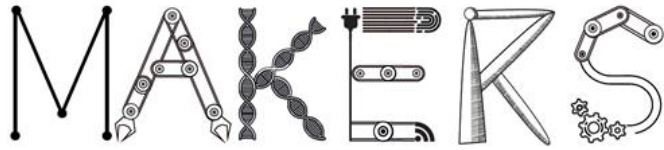
Levels of disruption

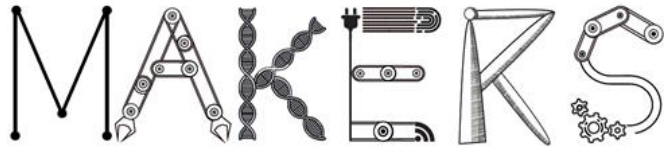
Readiness



What is MAKERS?

- A network of business, academia and policy
- In UK, France, Italy, Spain, Sweden, US, Singapore, Switzerland
- Research agenda: to understand the drivers, enablers and dynamics of a new manufacturing model for Europe.

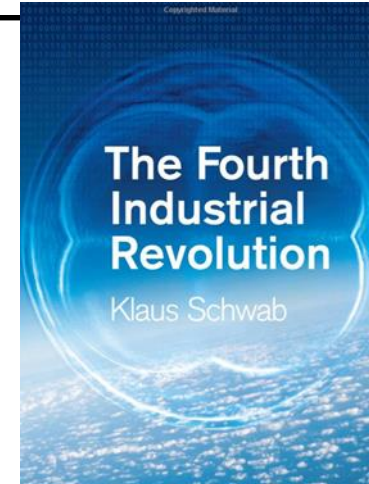




Technological change

MAKERS

Revolution or evolution?



[Agenda](#) [Initiatives](#) [Reports](#) [Events](#) [About](#)

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[Industry Agenda](#) [Fourth Industrial Revolution](#) [Emerging Technologies](#) [Science & Technology](#)

How the fourth industrial revolution is powering the rise of smart manufacturing



Woman shakes hands with a robot.

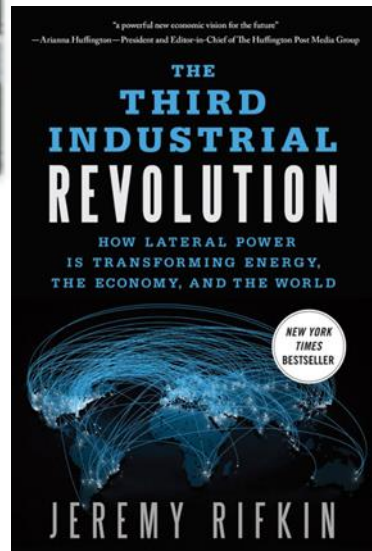
Image: REUTERS/Wolfgang Rat

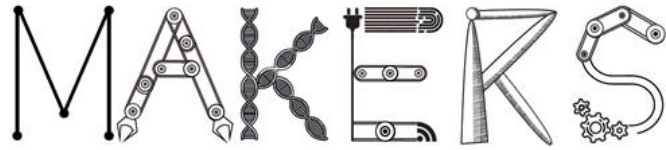
This article is published in collaboration with
The Conversation

MAKERS - Smart
prosperity is a
MSCA- RISE -

Lisa De Propris
Professor of Regional Economic Development,
University of Birmingham

Technology is all around us, and sometimes in us. We experience it daily in the way we stream music, in how we use an app to navigate a museum or a shopping centre, or to check our calorie burning and heart rate. This technology is changing our lifestyle and consumption. There is, of course, a lot more technology around us that we don't see or touch at source. A wave of technological innovation has started to fundamentally alter how we make stuff. And it signals an era of huge change.





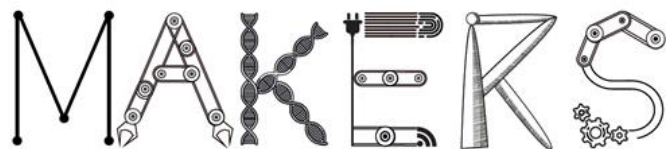
Evolutionary - revolutionary

Schumpeter and Kondratiev (1930s-1940s)

Nelson and Winter (1980s)

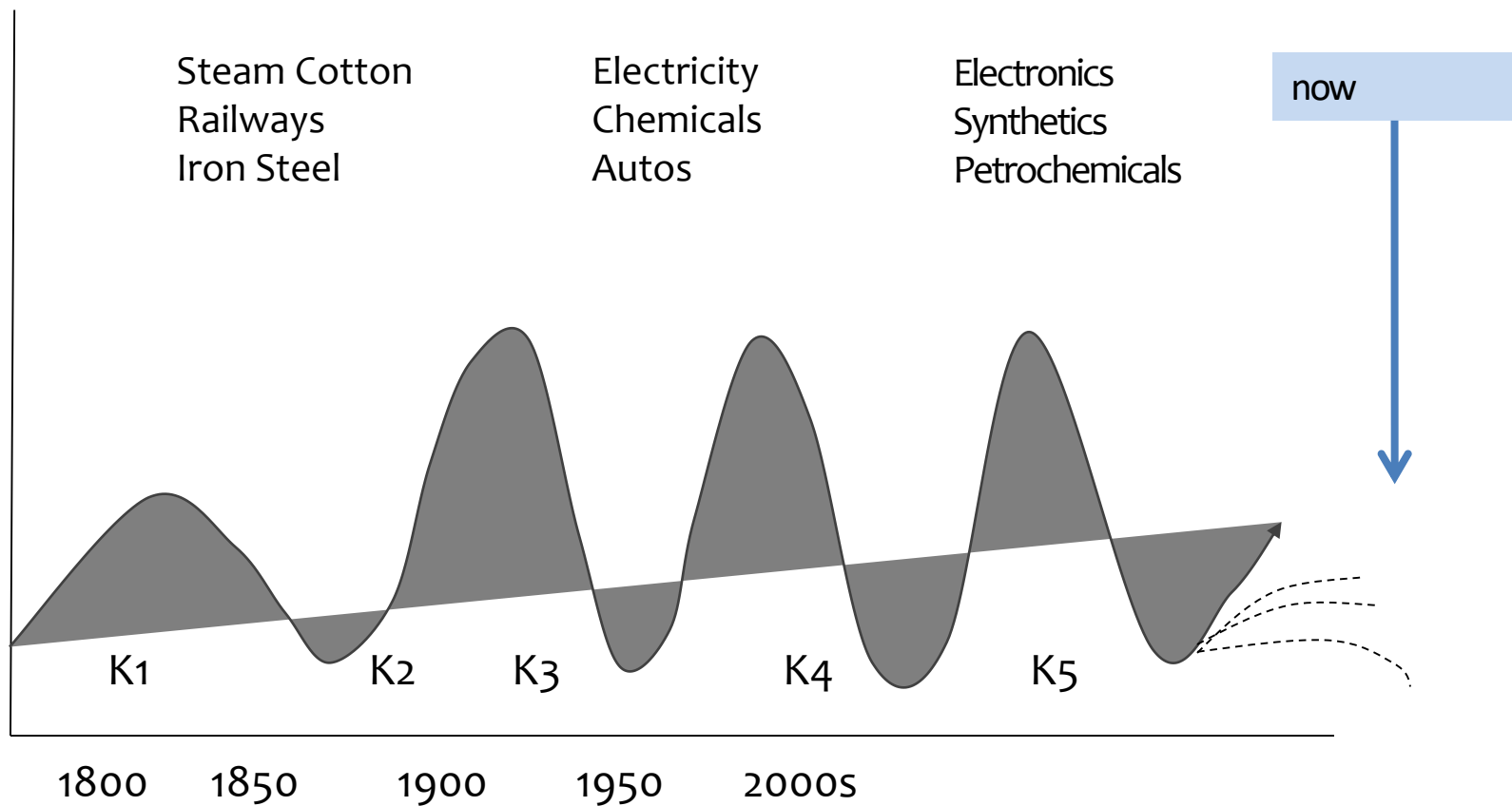
Christopher Freeman and Carlota Perez

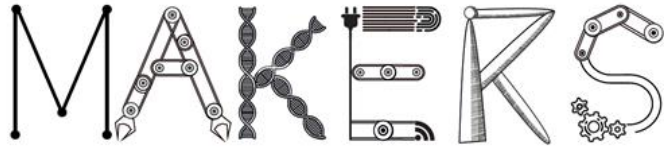
Dosi – technological paradigm



Kondratieff's Long Waves

Indices of
economic
activity

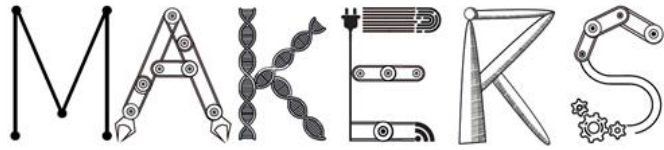




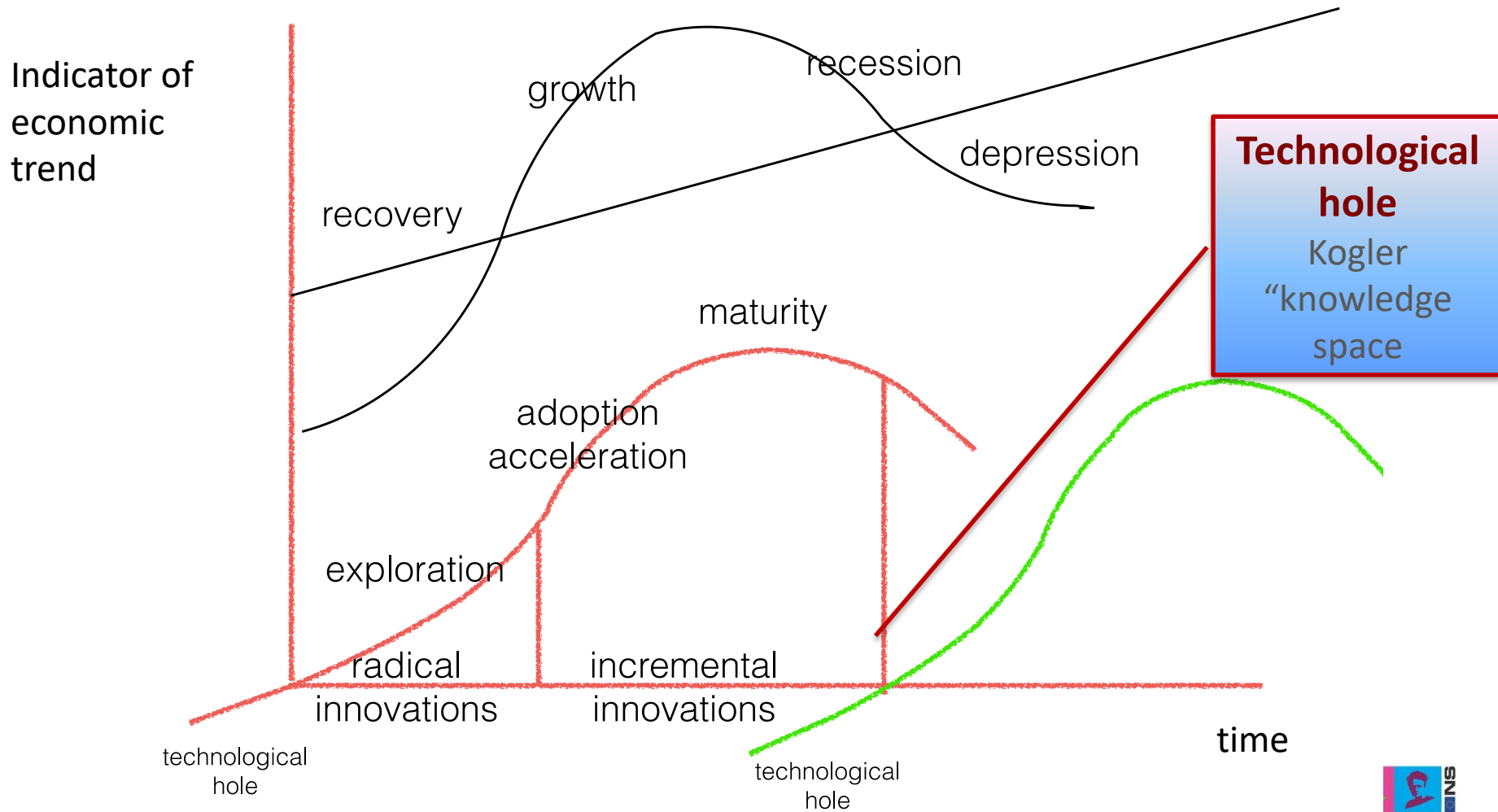
Technological revolution

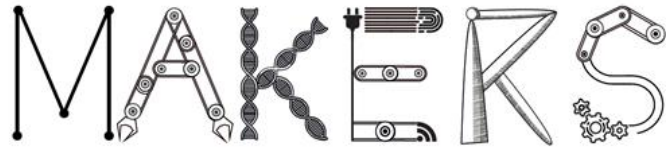
Perez 2004, 2010

- Technology follows a trajectory
- Crucial → time between the demise of the obsoleting one and the emergence of a new one
→ technological hole



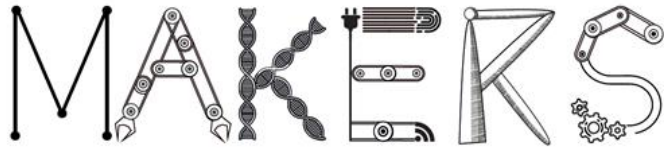
Technological revolution





4th Industrial revolution

**Biotech, nanotech,
neurotech, green &
renewables, ICT & mobile
tech, 3D, AI, Robotics,
sensing & space tech,
drones**



EU def of Industry 4.0

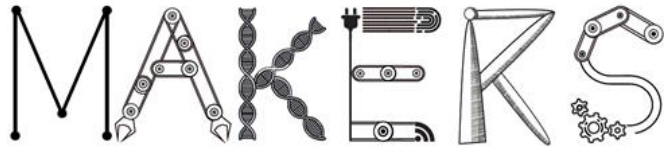
Industry 4.0 describes the organisation of production processes based on technology and devices autonomously communicating with each other along the value chain in virtual computer models.

Industry 4.0 involves a series of disruptive innovations in production and leaps in industrial processes resulting in significantly higher productivity.

Efficiency driven arguments→

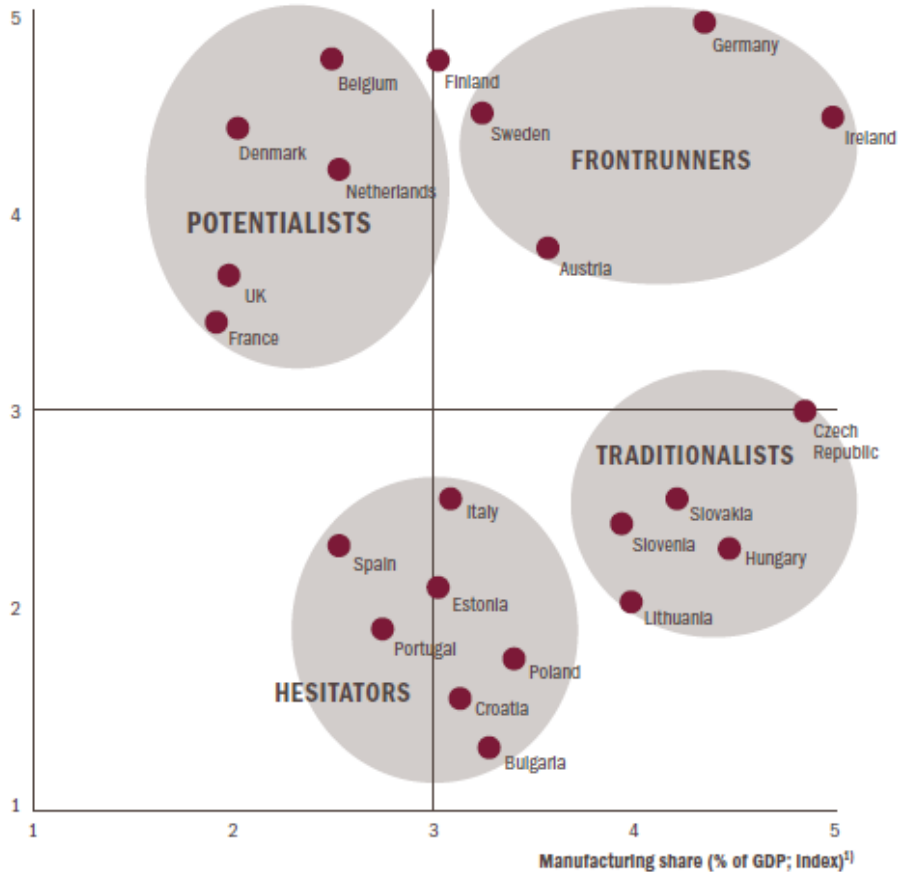
- **Smart and webbed factories**
- Large plants
- Large firms or multi-national firms
- **Mass customisation**

- AI- IoT – robotics- automation
- Cyber-physical systems (smart ordering, scheduling, control and delivery systems, 'big data'.
- New combination capital & labour
- lower inventory upstream, in process and downstream.
- Max productivity



Berger 2014- Industry 4.0

RB Industry 4.0
Readiness Index^{1,2)}



1) 1 - low, 5 - high

2) Adjusted for outliers Cyprus, Latvia, Luxemburg, Romania, Greece

- Industrial excellence
 - production process sophistication
 - Degree of automation
 - Workforce readiness
 - Innovation intensity
- Value network
 - VA
 - Industry openness
 - Innovation network
 - Internet sophistication

Berger 2014

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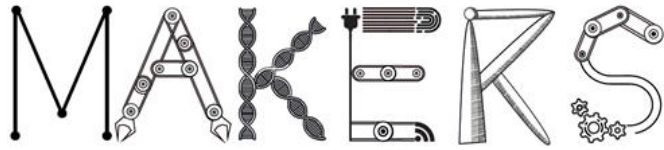
MAKERS

In MAKERS → Broader



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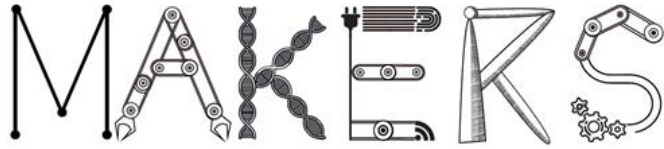




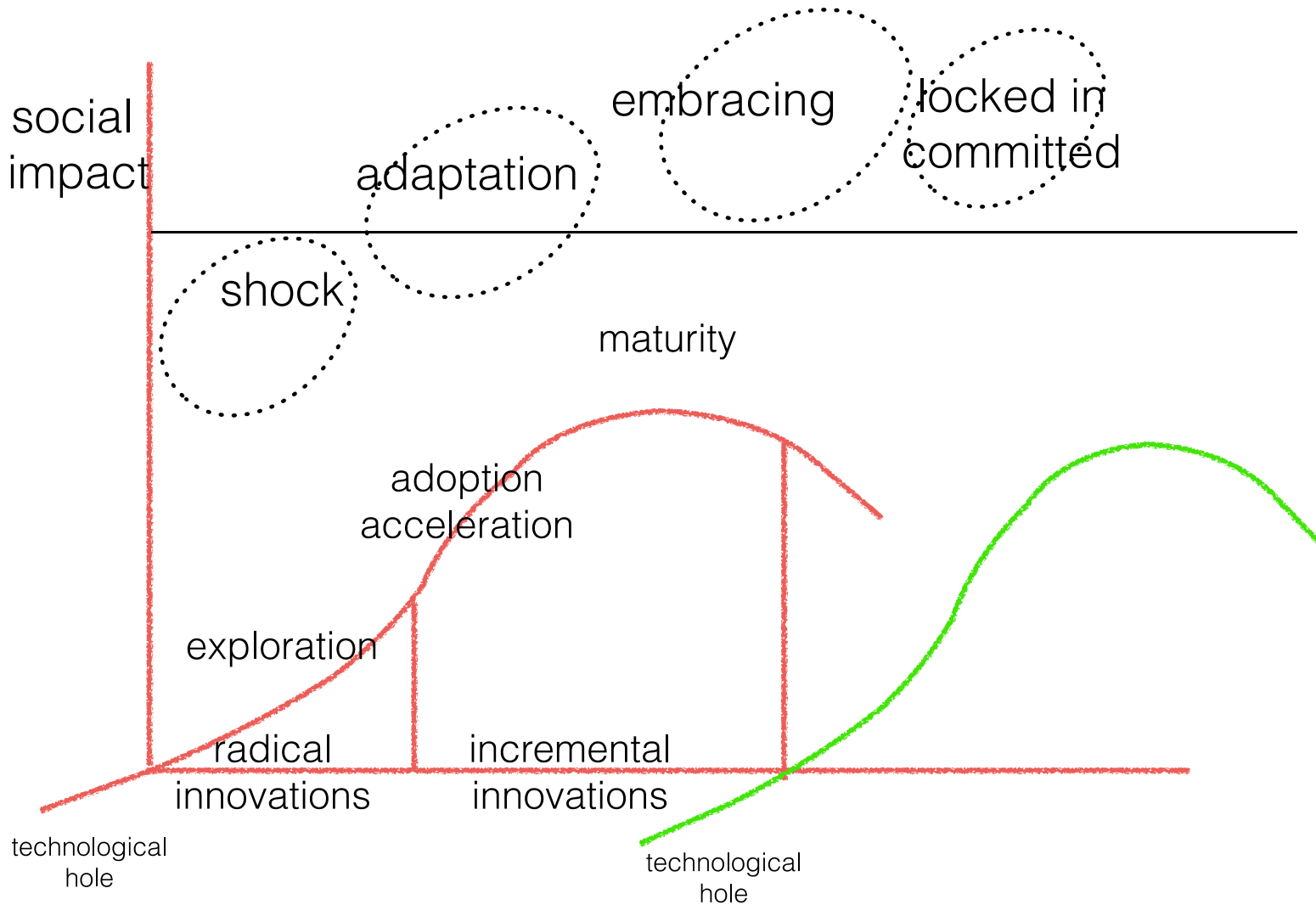
Technological revolution

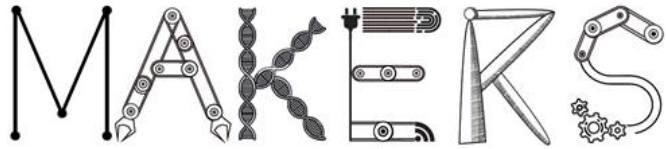
Perez 2004, 2010

- Growth effect depends on impact on economy and society (techno-economic paradigm) → *“the way socio-institutional structures are organised”* (Perez 2010:194)

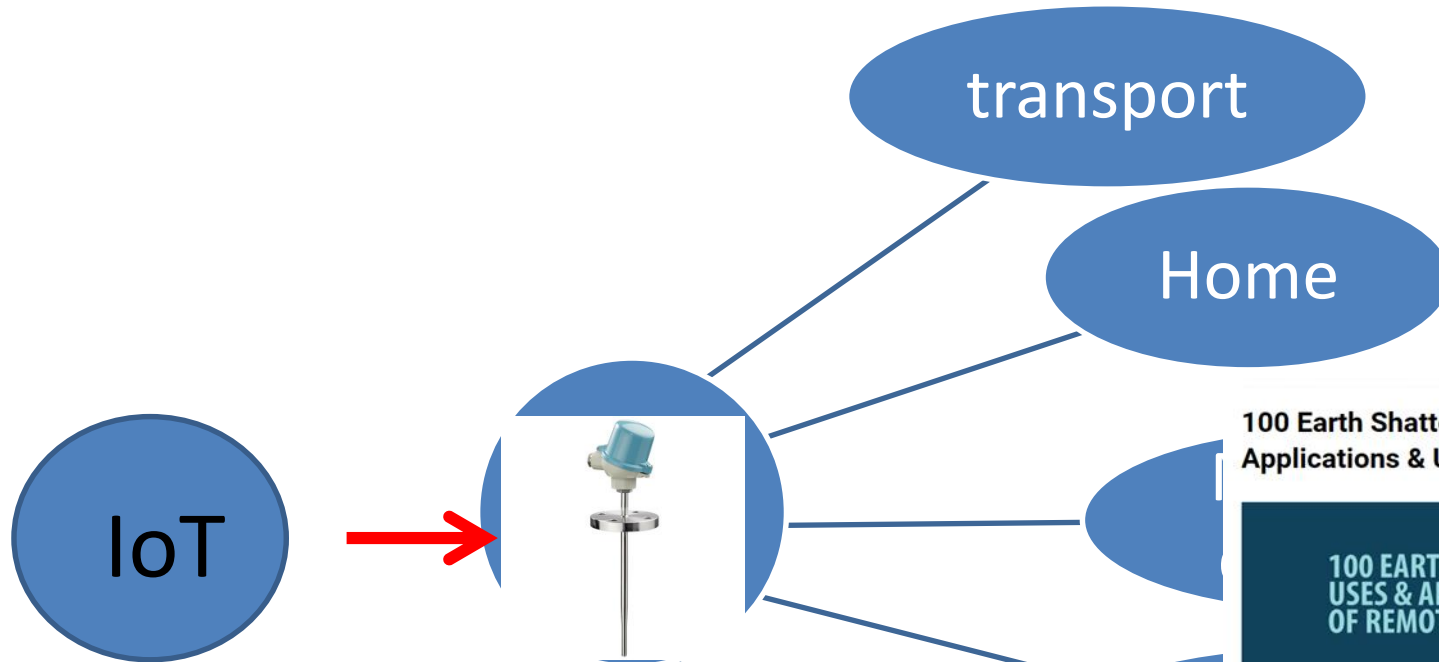
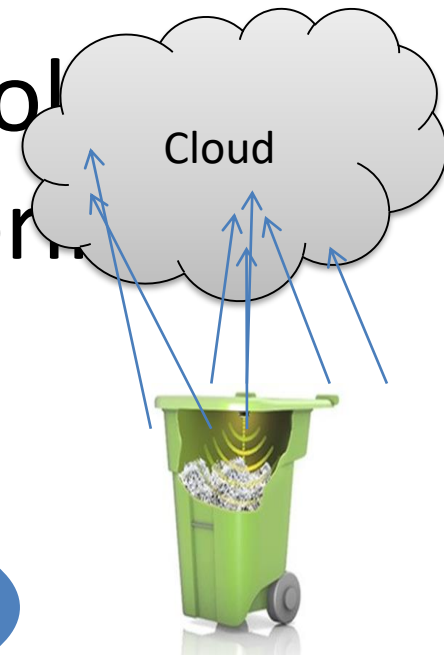


Disruptive change





Take one technology remote sensor



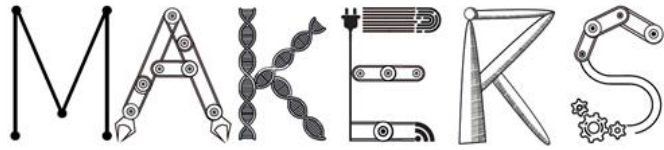
100 Earth Shattering Remote Sensing Applications & Uses



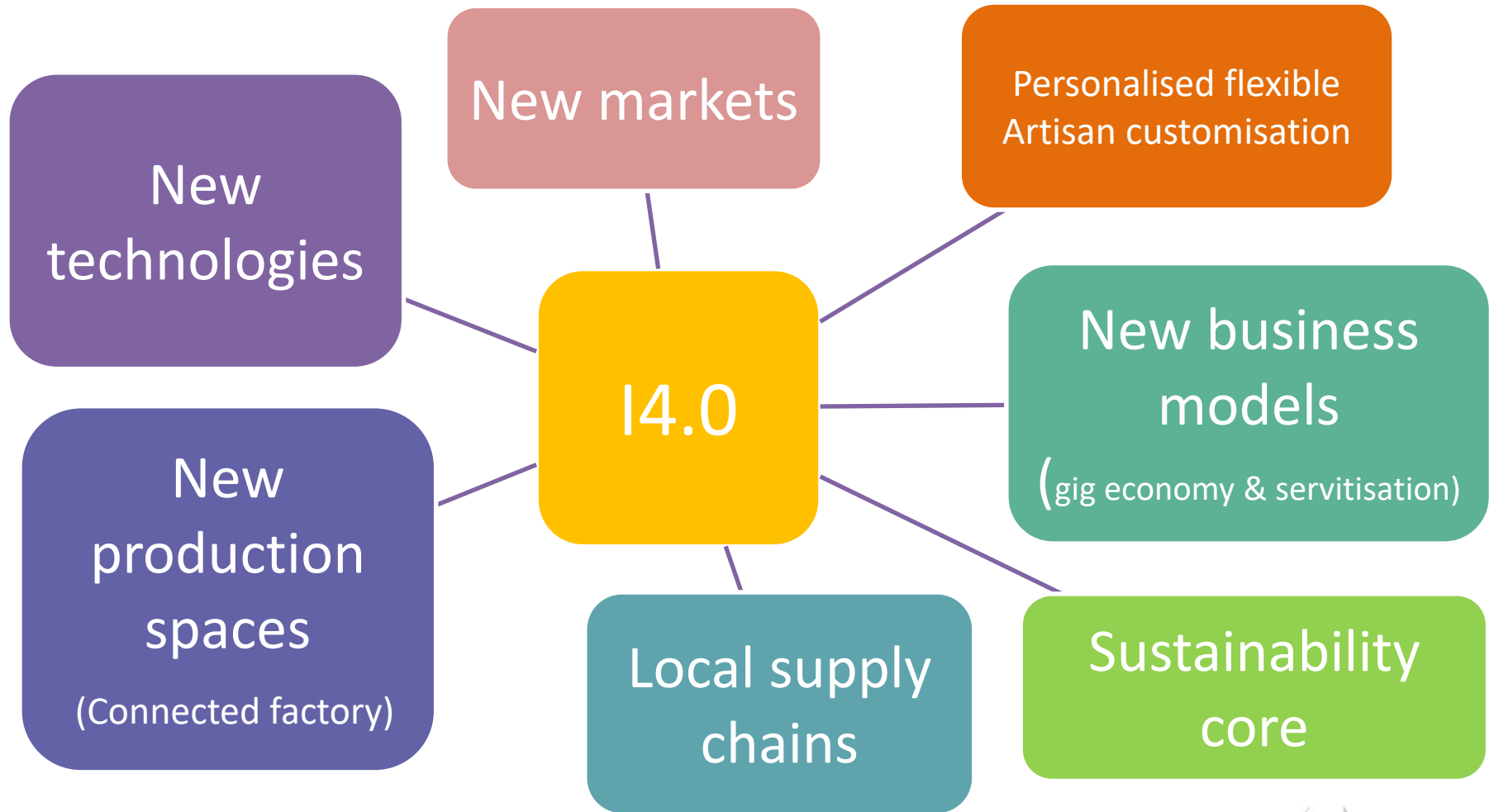
agriculture

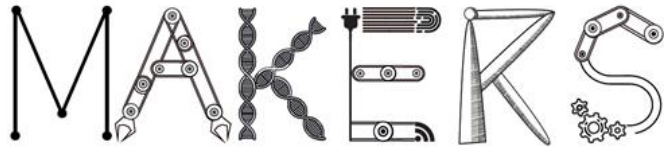
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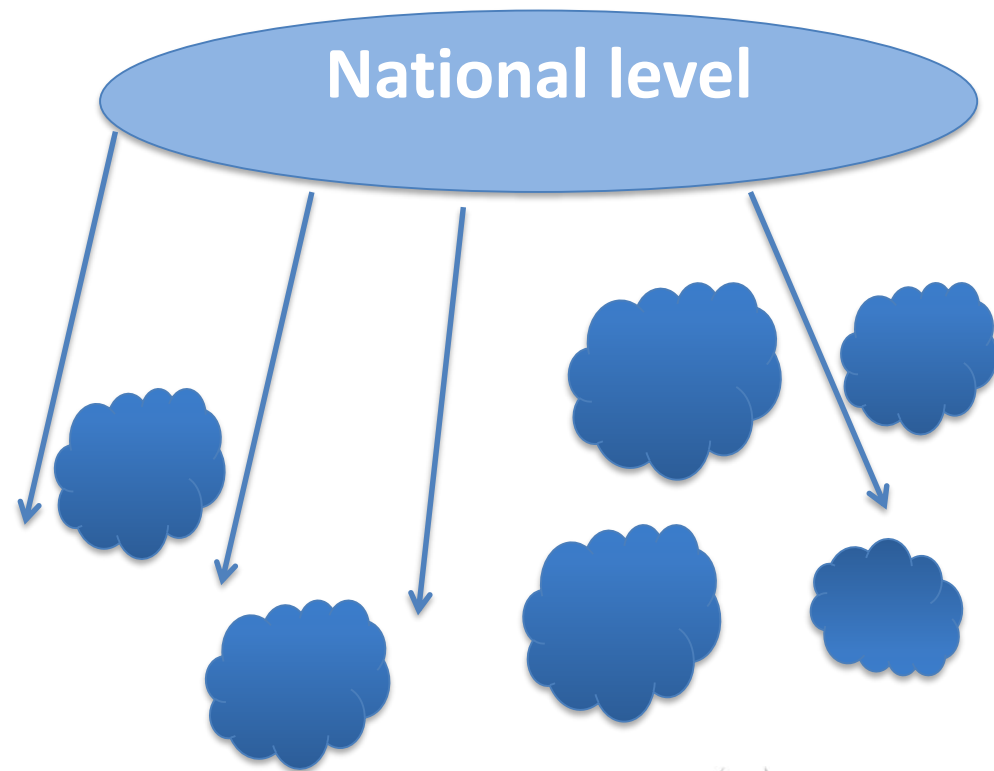


Industry 4.0





Enable disrupting change at regional level



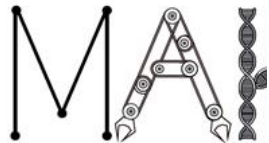
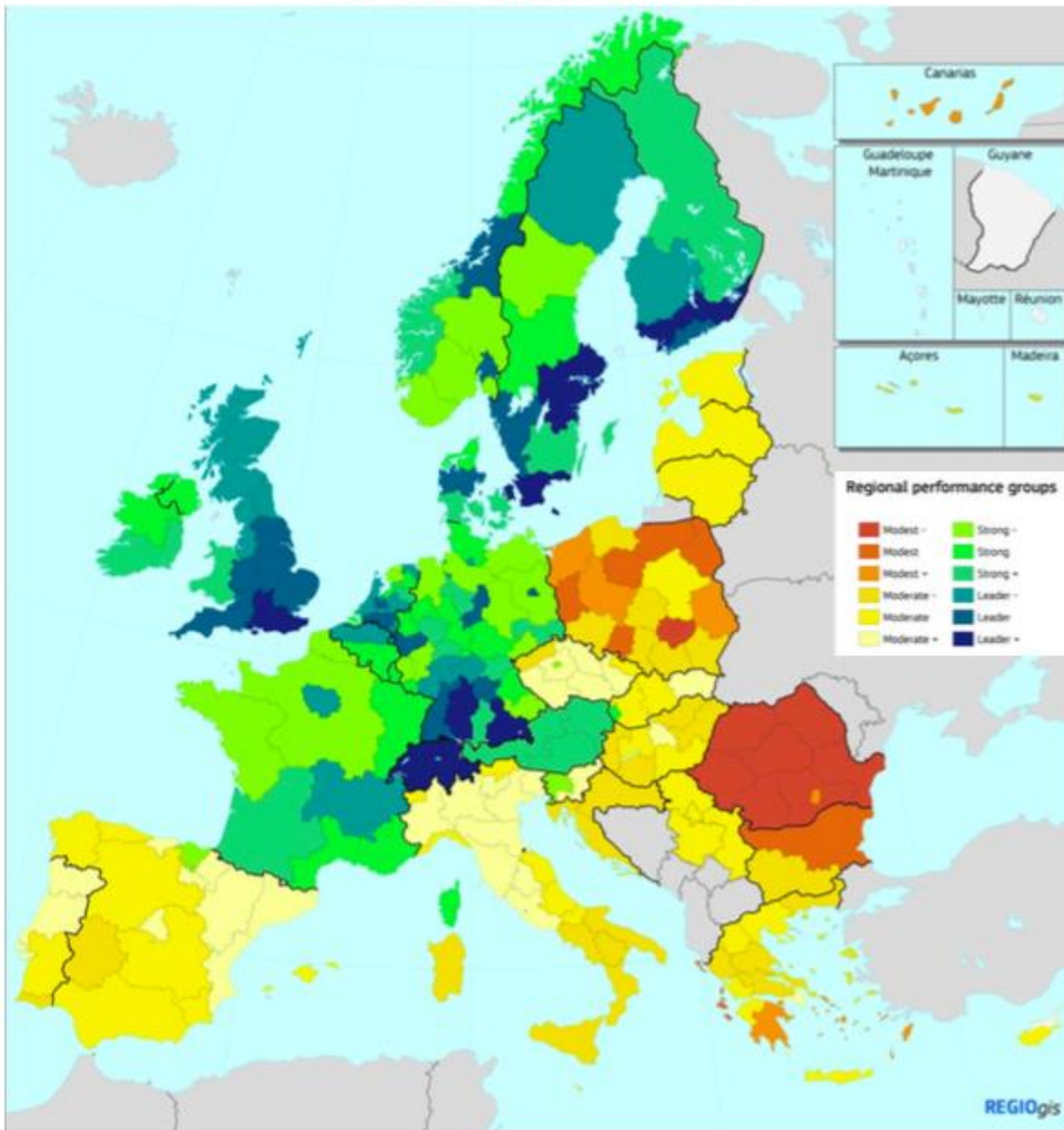
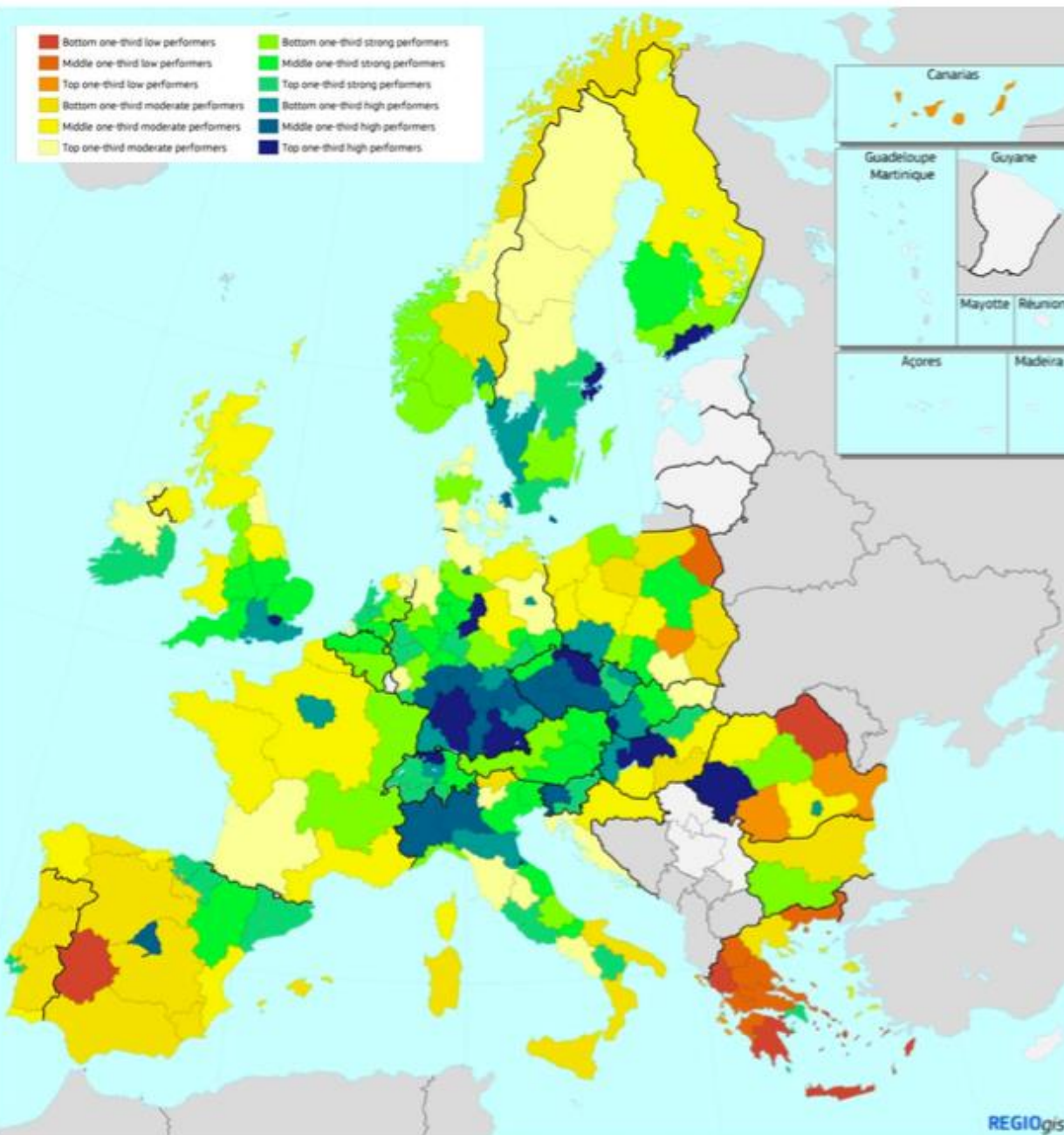
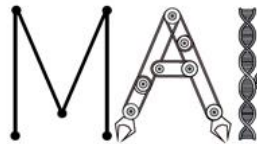


Figure 2: Regional performance groups

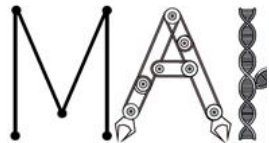


Regional
Innovation
Scoreboard
2017

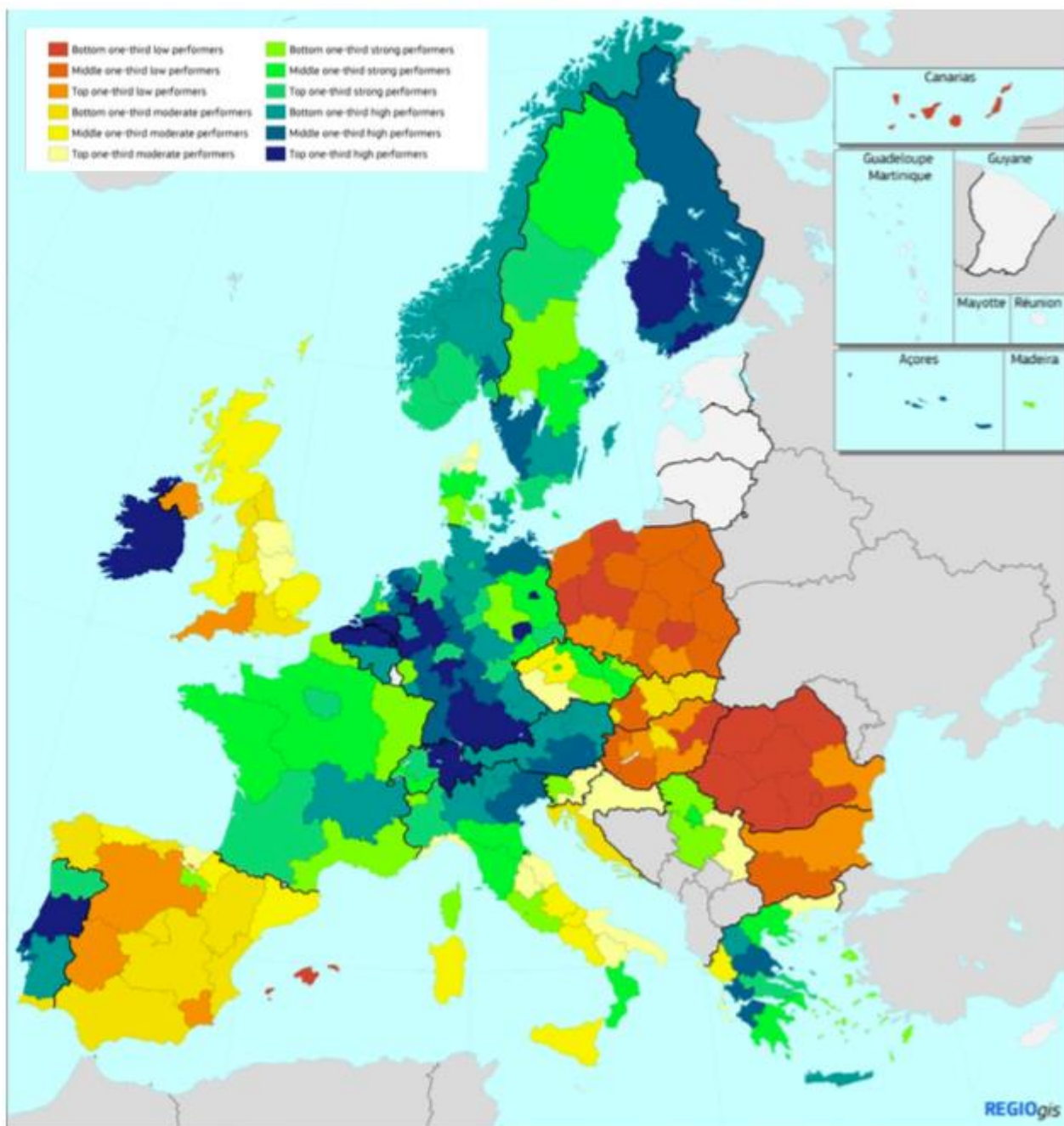
Employment in medium-high/high tech manufacturing and knowledge-intensive services as percentage of total workforce



Regional
Innovation
Scoreboard
2017



SMEs innovating in-house as percentage of SMEs



Regional
Innovation
Scoreboard
2017



SMEs introducing product or process innovations as percentage of SMEs

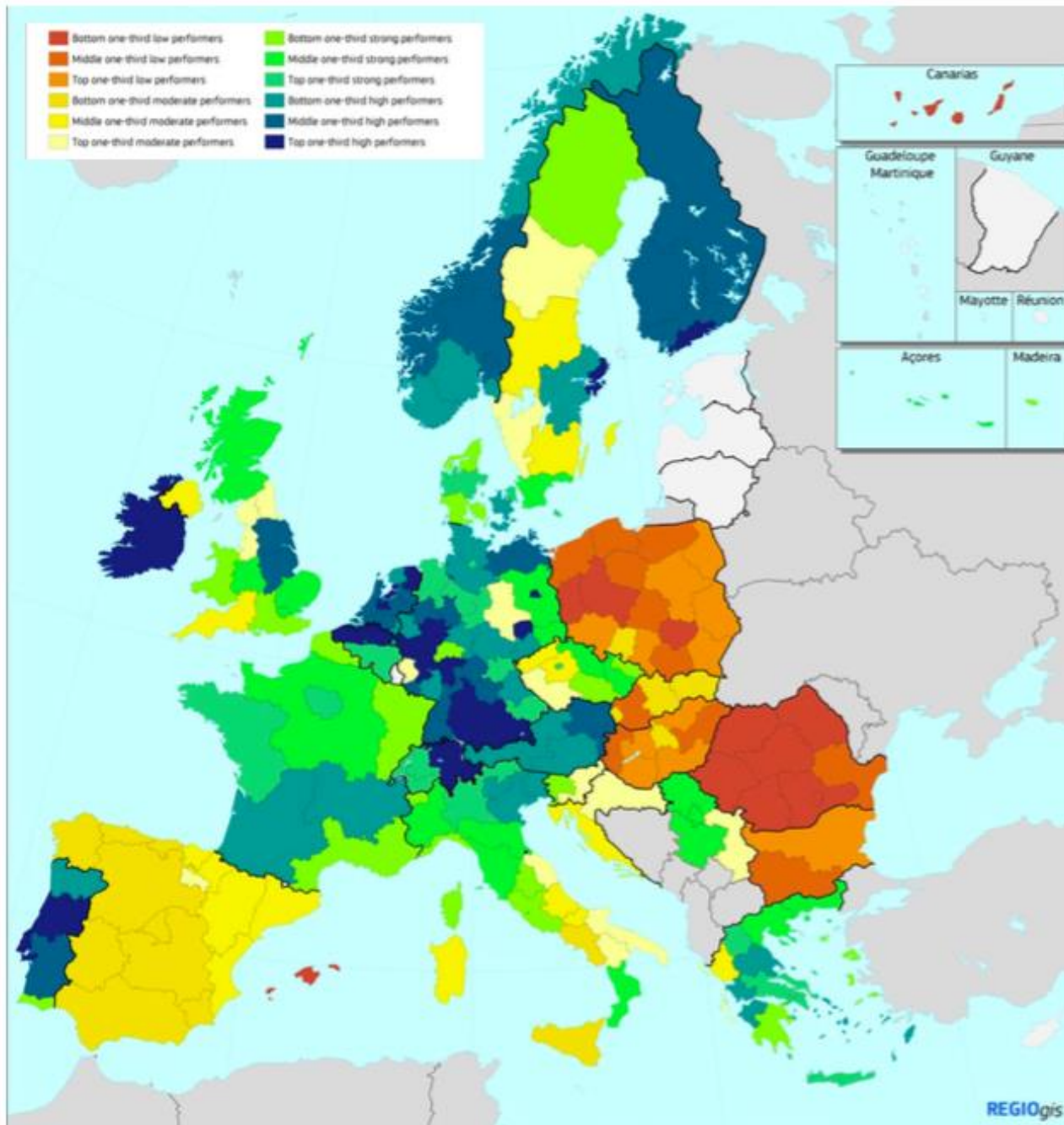
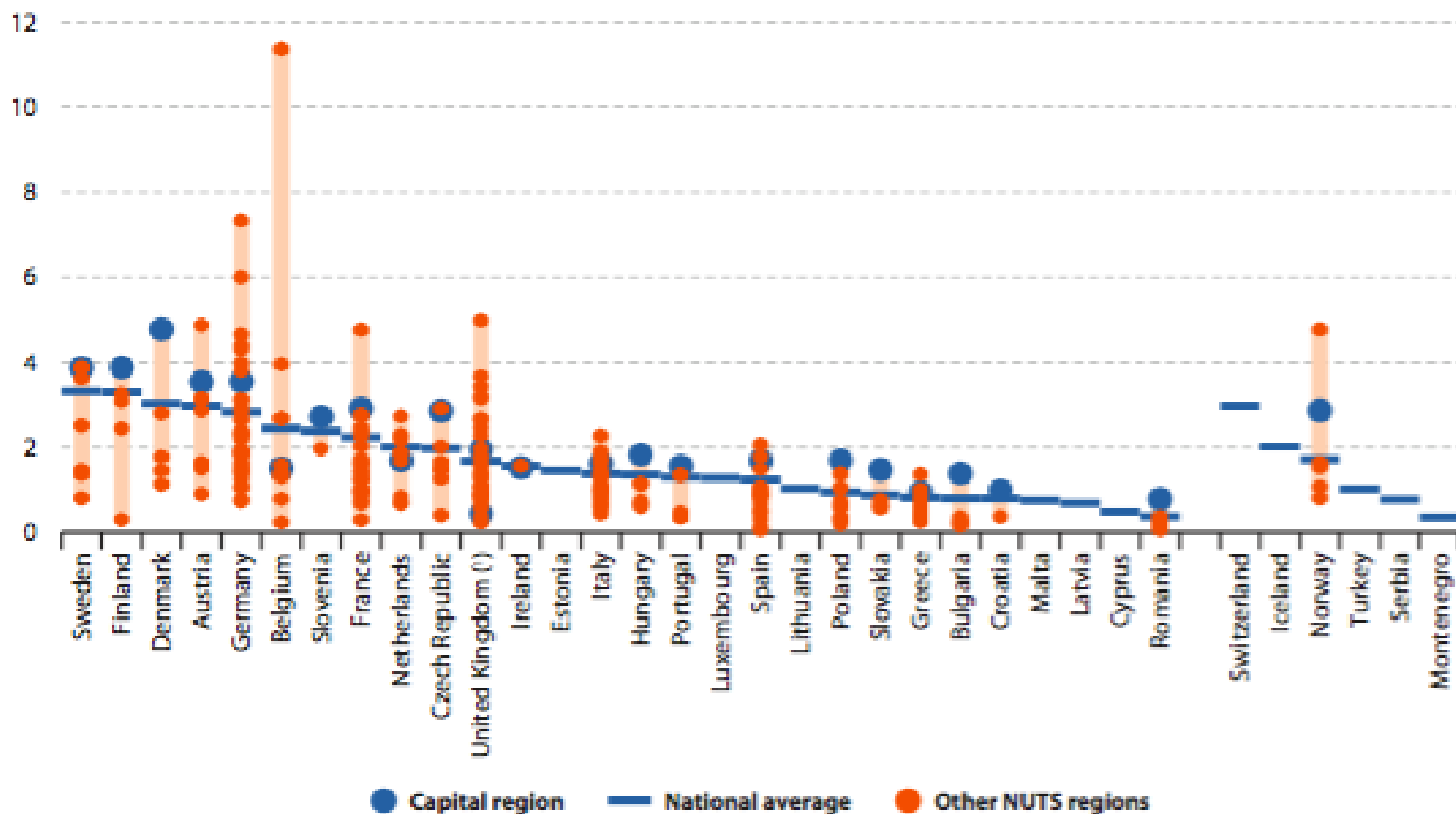
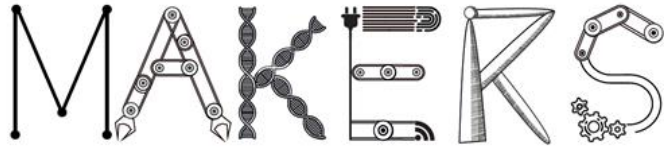


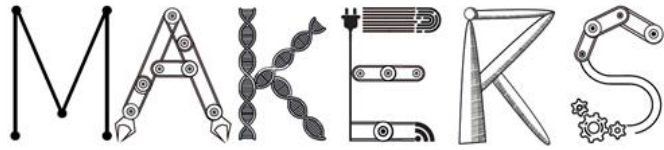
Figure 8.2: R & D intensity — gross domestic expenditure on R & D (GERD) relative to gross domestic product (GDP), by NUTS 2 regions, 2014
(%)





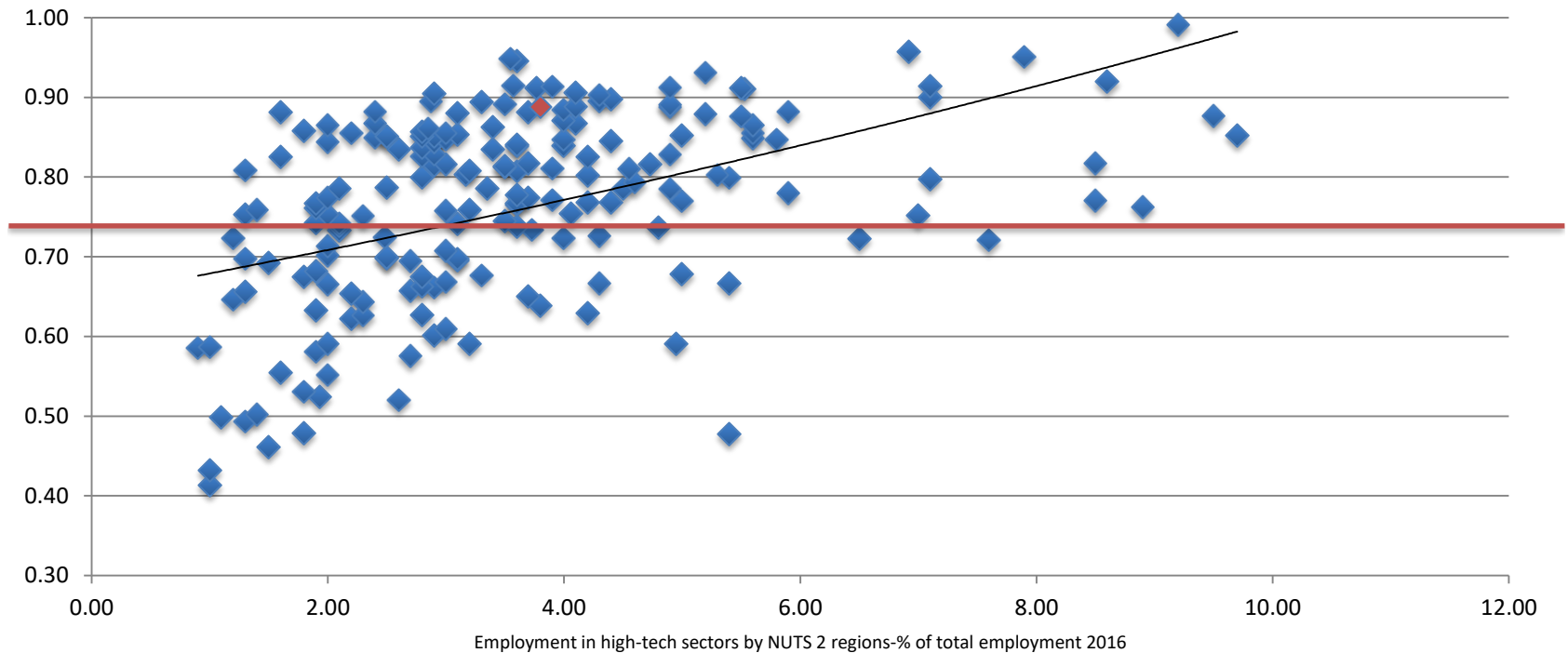
Key issues

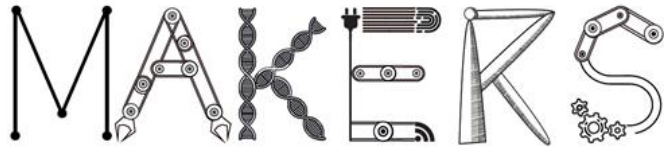
- Co-creation
- New ways of consuming, using, accessing or free-riding
- Servitising consumption and sourcing
- Downscaling
- Rethink products and processes from an ecological perspective



Regional index

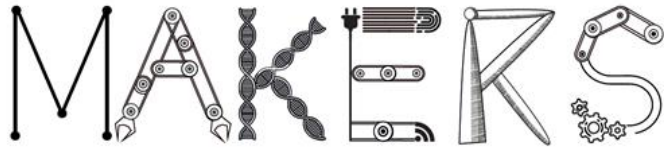
MAKERS I4.0 Readiness index



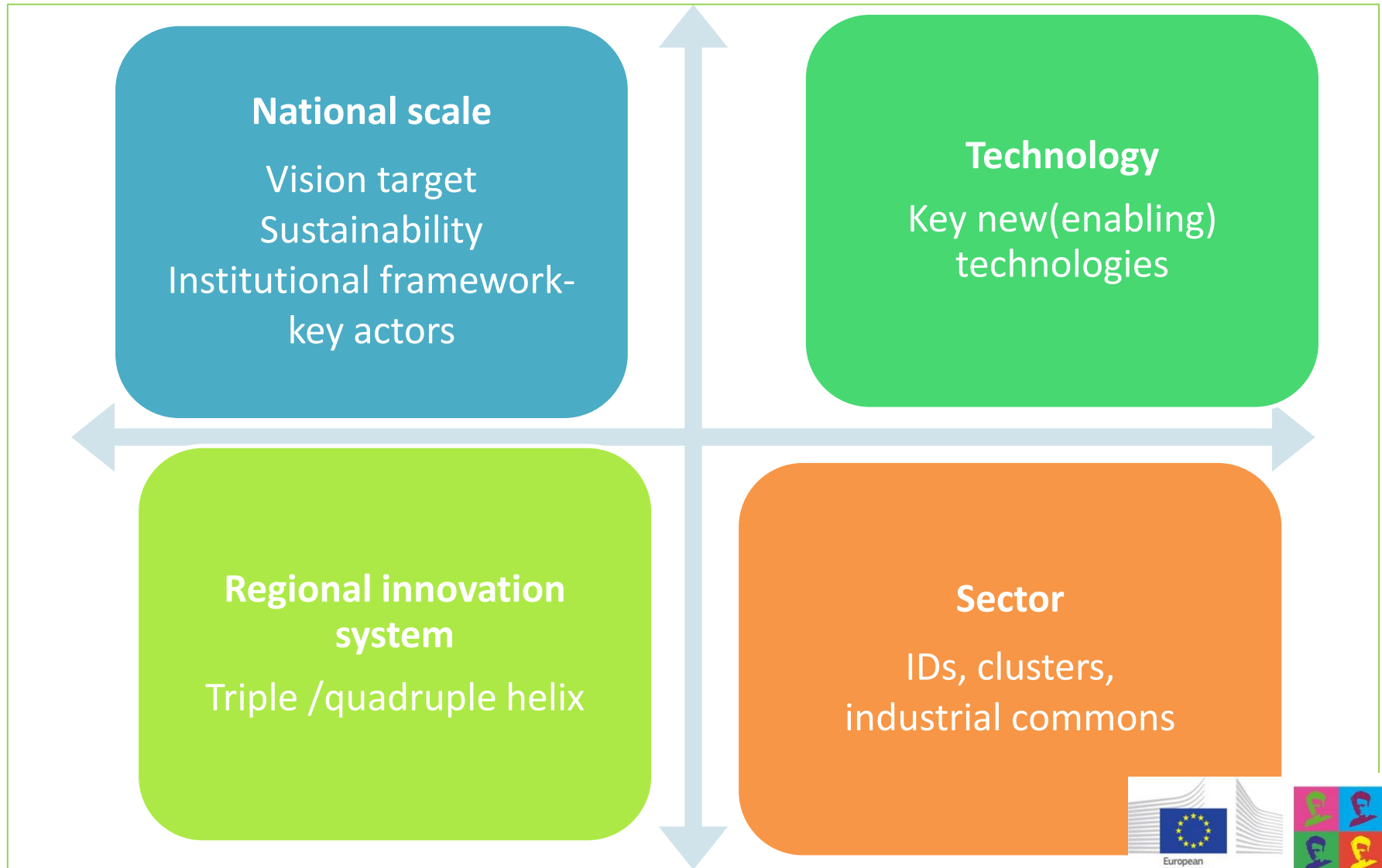


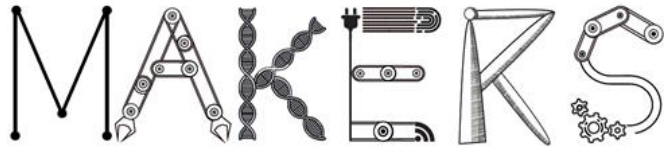
Pinch points for change

- **Limited awareness of change**
- **Vested interests and resistance to change**
- **Risk and uncertainty**
- **Delusion about the inevitable supremacy of ONLY services**
- **Belief that businesses & market know better**



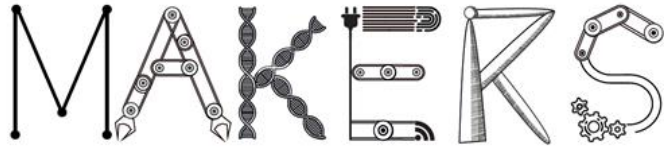
Innovation matrix





Regions' acceleration

- **Political understanding of scale of change → information and education**
- **Design and communicate clear vision → shared vision**
- **Join tech with sectors**
 - understanding regional applicability
 - promoting technology adoption and application



Thank you

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www.makers-rise.org