Regional policy and production capabilities: how Research and Technology Organisations can (or cannot?) favour diversification at the local level

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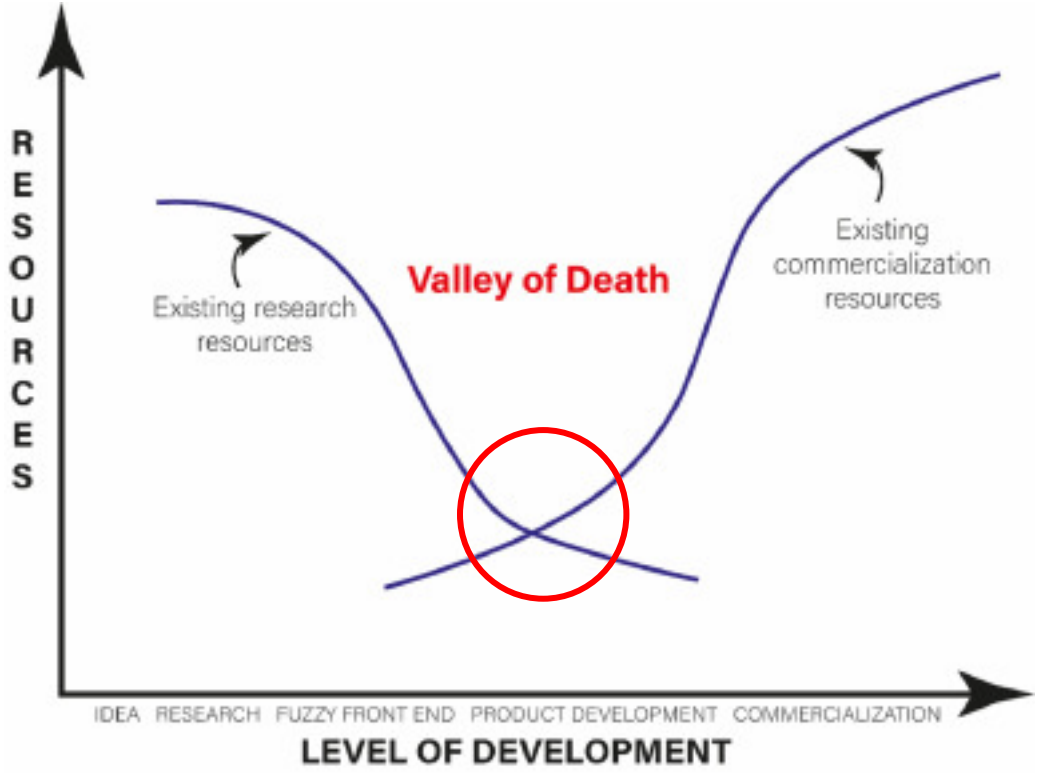
Background motivation & background research project

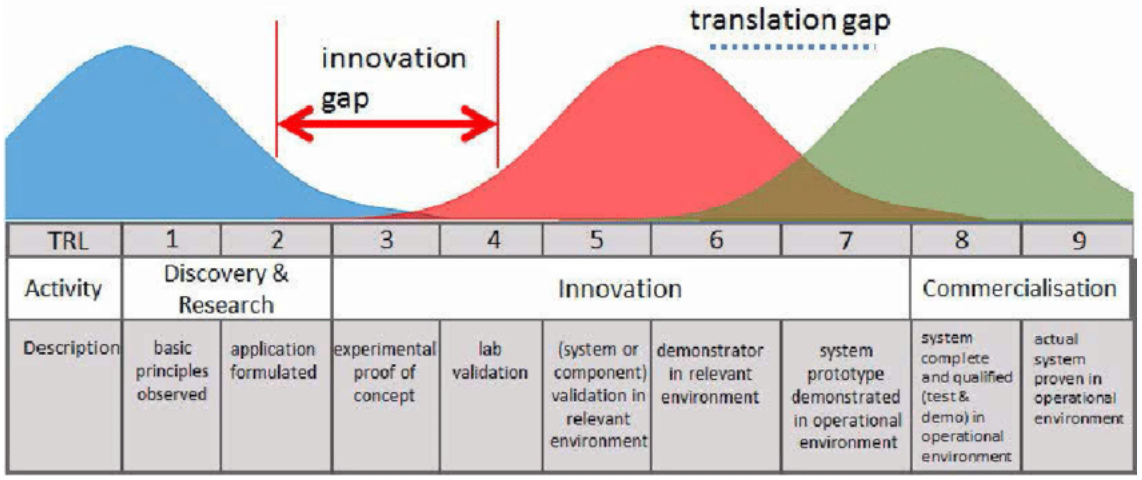
Market failures in the innovation cycle

1

- There are many.. but some are more ‘recognized’ than others



Gbadegeshin et al., 2022



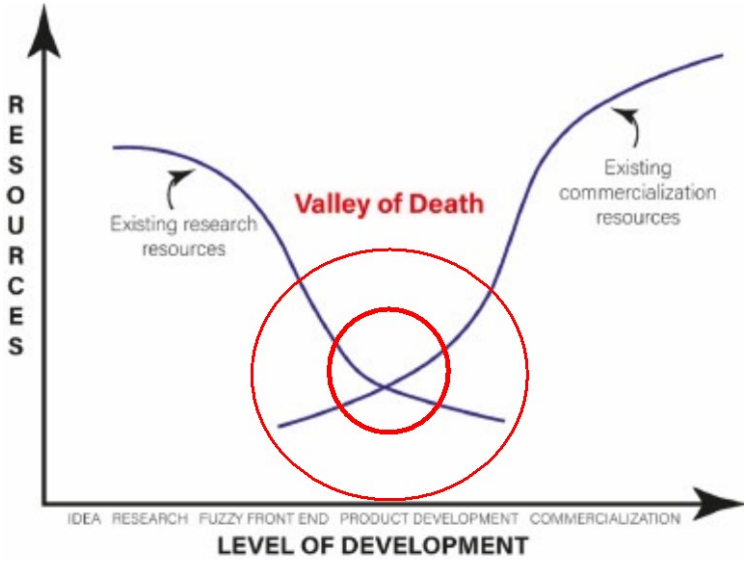
Technology readiness levels

Gaps along the innovation cycle

2

Digital production technologies

- Co-innovation and co-value creation
- Integration of technologies
- Flexibility
- Productivity/efficient use of technologies



Gbadegeshin et al., 2022

How can policies address challenges at the firm level (and supply chain level) in terms of barriers for technology adoption/diffusion?

Introduction to Innovation Systems

- **Product Innovations:** New (or better) material goods or services
- **Process Innovations:** New (or better) ways of producing goods

[May be technological or organisational]

- **Firms rarely innovate in isolation + ** evolutionary/resource-based literatures on how innovation happens (tacit and codified knowledge that build up the unique bundle of capabilities that constitute firms' competitive advantage)
- Collaboration / interdependence with other organisations
- **Important interactions with range of organizations**
  universities, customers, suppliers, national labs, ministries, standards bodies, etc

A **systems-perspective** is important in analysing such interactions

Ostry and Nelson, 1995; Lundvall, 1992; Nelson, 1993; Freeman, 1995

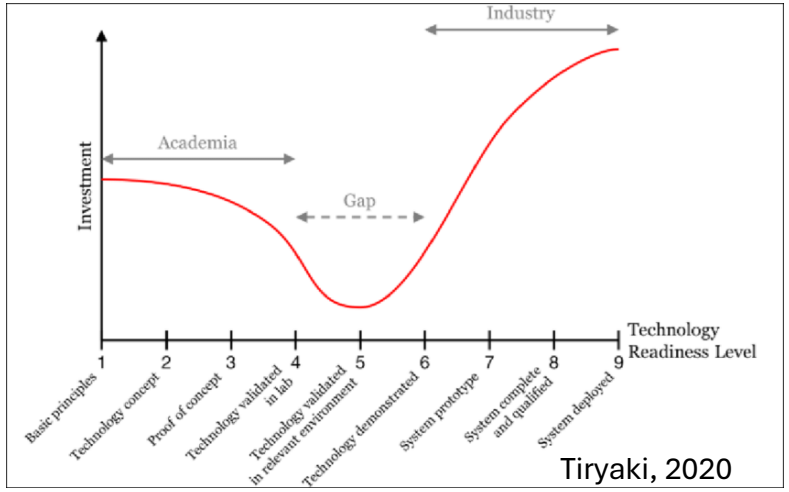
Research and Technology Organisations

- **Definition**

  organisations "which as their predominant activity provide research and development, technology and innovation services to enterprises, governments and other clients …" **EARTO**

- **Special subset of innovation intermediaries**

What is RTO's role in providing the resources and competences to address barriers/gaps along that innovation pathway? TRL4-6/7



Tiryaki, 2020

Fraunhofer

CATAPULT

TNO innovation for life

ManufacturingUSA

Underpinning academic literature

Introduction to Innovation Systems

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Industrial policy/capabilities

- Mission oriented policy? Some problems do not have a clear technology goal (Uyarra et al., 2020; Holland et al., 2024) → role of RTOs at the **intersection of the triple helix** of innovation (Kerry and Danson, 2016)

- Beyond market failure and towards a ***system failure approach*** (Malerba, 2002; Arnold et al., 2014) → **capability failures**, network failures and institutional failure

- **What does innovation need to be transferred?** Intersection between policy and tech transfer is **complex** (high sunk cost, high uncertainty, multiple layers of investments – technology, workforce, supply chain - at the same time) (Chang and Andreoni, 2020)

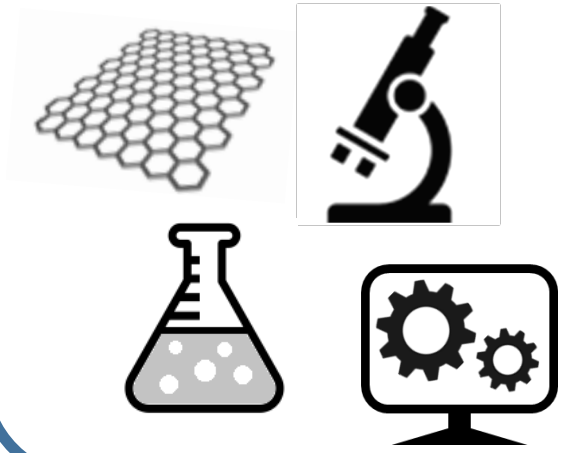
- Placed-based/smart specialisation: relatedness as a driver of regional diversification (Foray, 2014; Boschma, 2017)

- Building on **local capabilities**, on regional existing industrial commons (no one size fits all) (Bailey et al., 2015) → **the role of RTOs** (Diaz and Garrigos, 2017; Martins and Singh, 2023)

Regional Innovation Policy

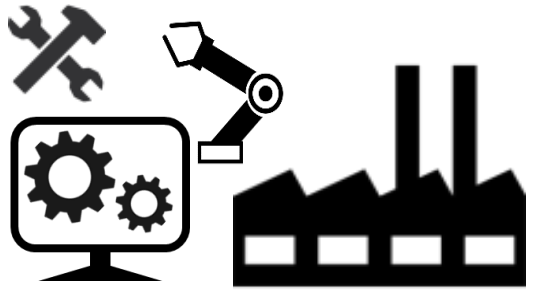
Aligning local R&I strengths with industrial opportunities

R&D



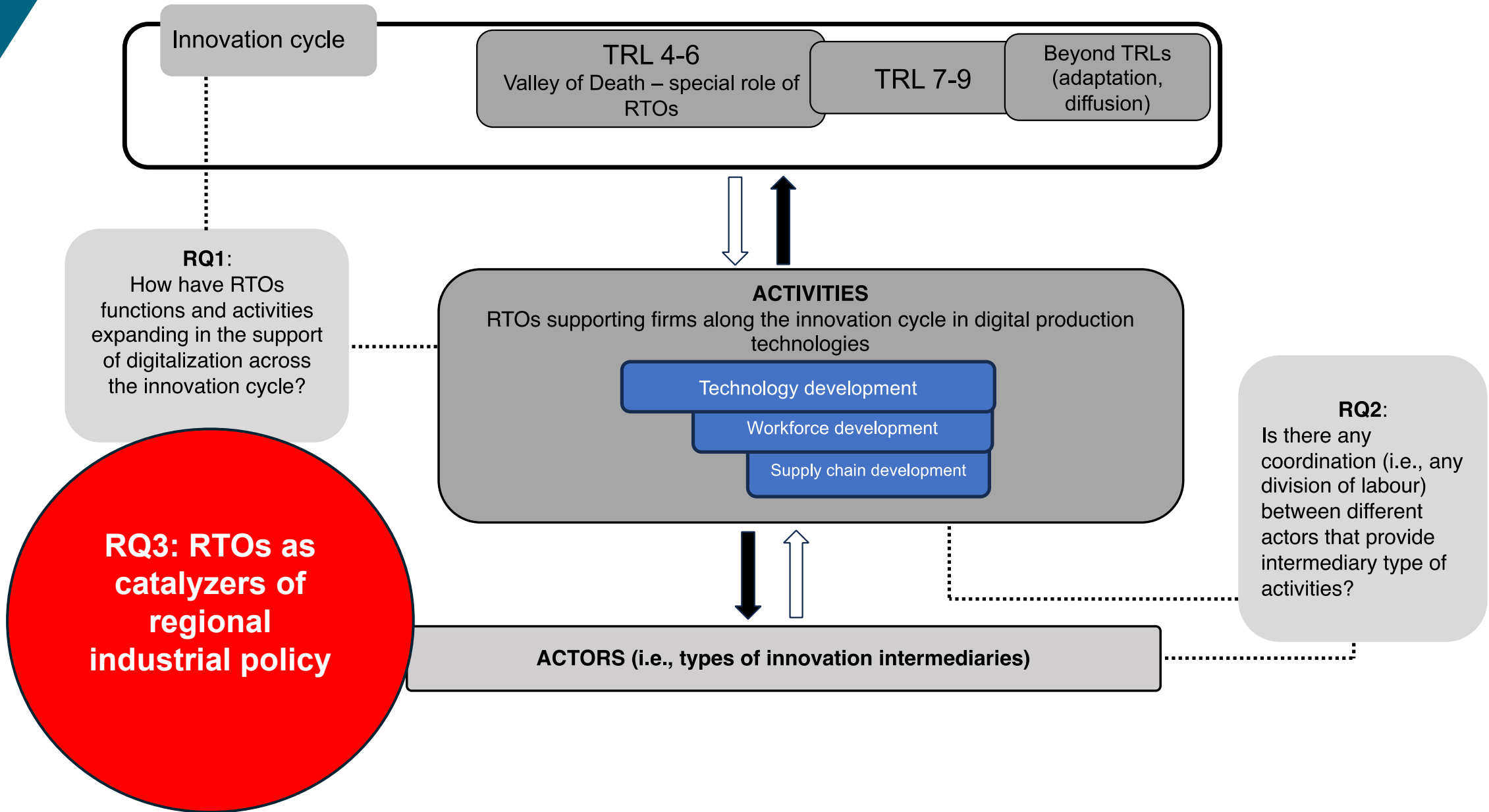
How do local research outputs (knowledge resources) get combined with other regional resources/competencies to underpin competitive **local value capture capabilities?**

Industrial opportunities



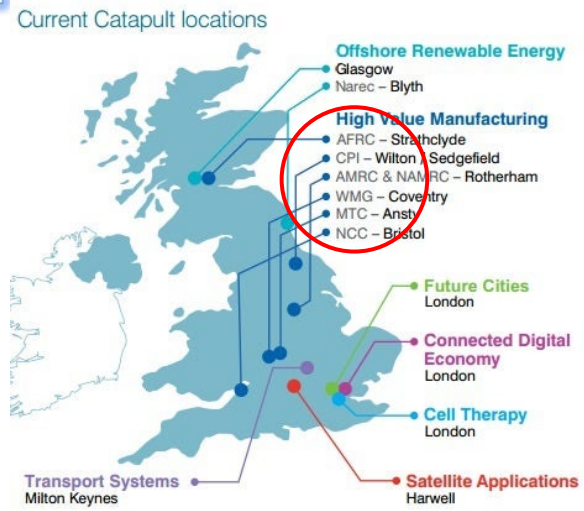
Is there a tension between amplifying (funding to regions with existing capabilities) and diminishing (ensuring that funding go to left behind places) regional disparities?

Our study/The conceptual framework



The comparative case study between UK and US

Case study

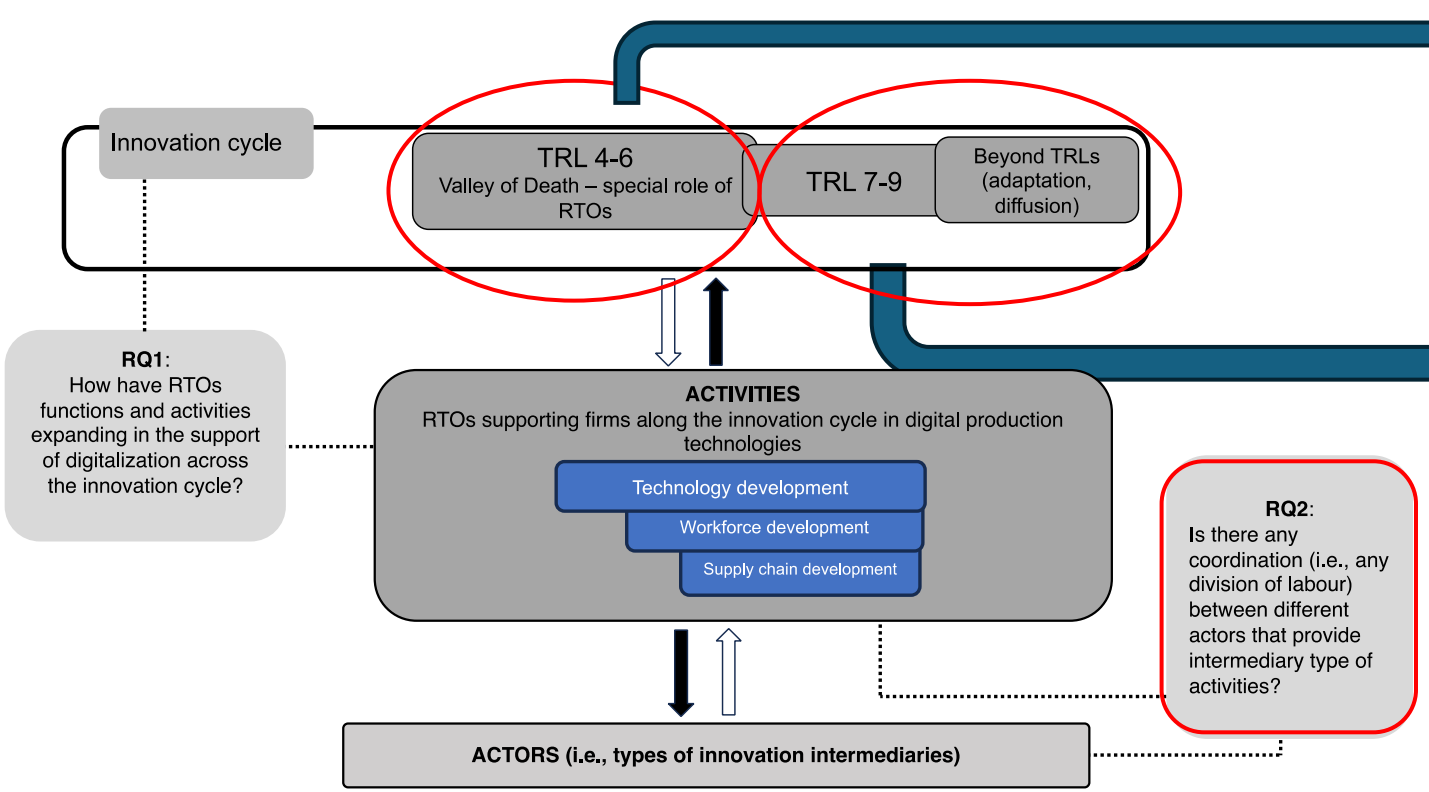


- Funded in a similar moment
- After GFC: something broke in the free market approach
- Deindustrialisation
- Detachment between value creation early stages of innovation and value capture (production and manufacturing)

Methodology – comparative case study

Country	Organisation	Role
1_US	MxD	Vice President Strategy + Engagement
2_US	MxD	Membership & External Relations
3_US	MxD	Vice President MxD Learn
4_US	MxD	Vice President, Projects & Engineering
5_US	MxD	CTO
6_US	MxD	CEO
7_US	MEP Illinois	CEO
8_US	MEP Rhode Island	Senior Workforce Manager
9_US	JARC	President JARC
10_US	AMNPO	Exploratory interview/call
11_UK	HVMC	Chief Technology Officer HVMC
12_UK	HVMC	Technology Strategy Manager
13_UK	HVMC	Director for Strategic Development HVMC
14_UK	HVMC	Particulate Engineering Group Technology Leader
15_UK	HVMC	Chief automation officer MTC/ Head of Digital AMRC
16_UK	Ex BEIS	Senior civil servant in charge of the Made Smarter program
17_UK	Made Smarter Adoption	Made Smarter program manager
18_UK	Siemens	Supervisory board of HVMC, co-chair of Made Smarter in 2022
19_UK	HVMC	AMRC Director of research
20_US	Georgia Institute of Technology	Expert/professor involved in the formation of the Manufacturing USA Institutes

Which role/which division of labour in the ecosystem? (RQ2)

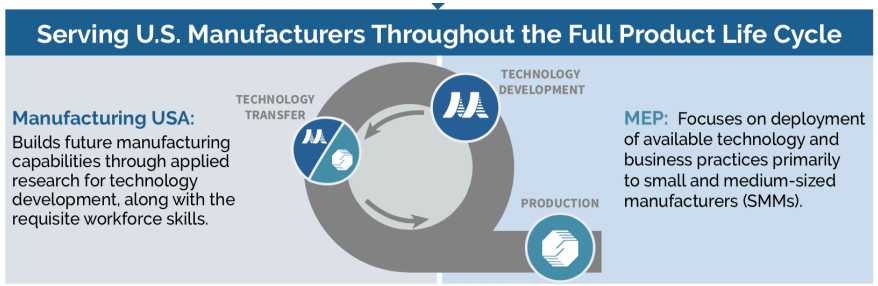


CATAPULT

MADE SMARTER

ManufacturingUSA

MEP National Network™
The Go-To Experts for Advancing U.S. Manufacturing



Results – Coordination/division of labour (RQ2)

Technology development

- **US** different business models. High coordination
- **UK:** different business models. No collaboration

Workforce development

- **US** patchy coordination, but increasing policy effort from NIST, funding that encourages collaboration between the two institutes.
- **UK**: No policy coordination, challenges also to do 'workforce development' activities because of narrow mission from InnovateUK

USA

- Relationship with other actors is both top down and bottom up through projects/policy
- Lack of formal rules but collaboration exists.. bottom up, e.g., MxD has collaborated with roughly 12 MEPs + NIST top down; e.g., exchange workforce program designed by NIST

UK

- Very fragmented, gap since MAS abolition
- Hard to collaborate, e.g., with Made Smarter (a program not an institute)
- Catapults are 'isolated' from the rest of the ecosystem (SMEs)

RQ3 about RTOs role at the regional level: *on going*

- MxD and HVMC – and the networks – were placed where regional capabilities exist but are **not acting with a regional mandate**

- Their objective is purely a knowledge transfer one (TRLs 4-7) – which can include new activities to fulfill the knowledge transfer mission but no/less directly regional development (Clark and Doussard, 2019)

- Hypothesis (coming from first part of the study): **RTOs could potentially play a key/orchestrating role** given:
  - The capabilities they have accumulated over time, both technological and in terms of the knowledge of the ecosystem
  - The new phase they have entered over the past couple of years, a phase of collaboration rather than competition

- Clear policy objective with regional mandate: what incentives to build?

Last step: looking at regional programmes in UK/US

- Strength in places → Strategic Programmes budget (formerly the National Productivity Investment Fund).
  - £2 million 'seedcorn' funding for 40 projects
  - £314 million allocated to 12 full stage projects.
  - 4 out of 12 have RTOs
- Accelerator programmes:
  - ❖Glasgow Innovation Accelerator: 4/10
    - £ 32.7 million
  - ❖West midlands accelerator: 3/5
    - £ 33 million
  - ❖Great Manchester: 0
    - £ 33 million

Programme	Funding Source	Value of the project	Award	Topic	Region	RTO or PSRE (or similar) partners
Strength in Places	Strategic Programmes budget (formerly the National Productivity Investment Fund). (1) £2 million 'seedcorn' funding for 40 projects (2) £314 million allocated to 12 full stage projects.	£23 million	Advanced machinery and productivity initiative (AMPI)	Advanced manufacturing (machinery sector)	Yorkshire and Manchester	National Physical Laboratory (NPL)
		£25 million	CSconnected	Semiconductor materials	South Wales	Compound Semiconductor Applications Catapult
		£22 million	Media Cymru	Creative economy (media sector)	Wales	(Not applicable)
		£21 million	Digital Dairy Value-chain for south-west Scotland and Cumbria	Agri-Tech, Food and drink	South-west Scotland and Cumbria	CENSIS

Same thing with similar programmes in the US: Regional Innovation Engines, Tech Hubs, Build Back better regional challenge

Points for discussion/future developments

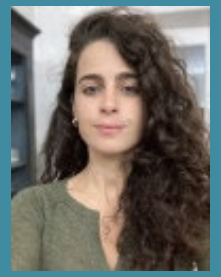
Coordination and placed based policy?

- RTOs based in ecosystems where there were already capabilities: what does this mean for levelling up?
- Different phases for RTOs. Time to know and engage with existing players; difference between UK vs US.
- What can be done to favour coordination for broader innovation-based goals? Can this be done at the regional level?
- Complexity of policy making process targeting innovation failures and coordinating different actors that should ‘divide up’ the system failures (interesting lessons from NIST/US)

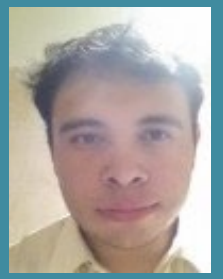
Thank you

Director

Research Associates



PhD Students



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