



Innovation Diffusion

Concept note for the S3CoP Working Group

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ACRONYMS

CCTT	Competence Centre of Technology Transfer
EC	European Commission
EDP	Entrepreneurial Discovery Process
EU	European Union
FDI	Foreign direct investments
JRC	Joint Research Centre
OECD	Organisation for Economic Co-operation and Development
RTO	Research and Technology Organisation
S3	Smart Specialisation Strategy
S3CoP	Smart Specialisation Strategy Community of Practice
SME	Small and Medium Enterprises
TFEU	Treaty on the Functioning of the European Union
WG	Working Group

1. Introduction and objectives of the WG

The Working Groups (WGs) developed within the S3 Community of Practice (S3 CoP) aim to create a learning loop for smart specialisation strategies (S3) stakeholders on the fulfilment of the S3 enabling condition¹ focusing on industrial transition, innovation diffusion and interregional cooperation.

Innovation diffusion is one of the seven fulfilment criteria for the enabling condition “Good governance of national or regional smart specialisation strategy,” which is in turn part of Article 174 of the Treaty on the Functioning of the European Union (TFEU). More precisely, the criterion asks European regions to run an “up-to-date analysis of challenges for innovation diffusion and digitalisation” and it is one of the main focus of the S3 in the 2021-2027 programming period.

Innovation diffusion is a broad concept, which includes the analysis of how new ideas, practices and innovation spread through a society. In so doing, it is essential to involve SMEs, the backbone of the EU economy, which are extremely difficult to engage and yet are critical to understand innovations needs and dynamics across territories.

Innovation diffusion can be defined as the process through which different organisations gather ideas from outside and use them to introduce an innovation (e.g. a new process of production, a new product itself or a new way of providing a service). Innovation diffusion comprises also the process of adoption of existing technologies (e.g. purchasing machinery developed elsewhere or signing a license agreement for an existing patent). As mentioned before, this criterion addresses broad, but at the same time, essential aspects in innovation systems. Innovation diffusion, in a way, underpins a successful implementation of smart specialisation strategies. In other words, it is not possible to implement an S3 if the functioning of the regional innovation system is not clearly understood.

Based on the specialised literature, the WG on innovation diffusion will focus on the analysis of **four key issues** that are highly relevant for the topic at hand, and are also key for the success of smart specialisation strategies:

- The adoption of new technologies, innovations, business practices and digital tools across business (and especially among SMEs) from leading firms to those lagging behind.
- The role of universities and RTOs to meet the needs of companies in their ecosystem
- Knowledge spillovers and innovation diffusion channels between large firms, especially multinationals, and local enterprises.

¹ The enabling condition “Good governance of national or regional Smart Specialisation Strategy” as set out in Annex IV of the Regulation (EU) 2021/1060 of the European Parliament and of the Council the proposal for the Regulation on Common Provisions of the European Funds for 2021-2027 (COM/2018/375 final) was approved by the European Parliament and the Council on 24 June 2021 and is known as (EU) Regulation 2021/1060[2] (CPR).

- The role of innovation agencies and other public bodies in facilitating knowledge flows, and how they are coordinated (with a focus on multi-level governance issues).

The main purpose of this Working Group is four-fold: 1) to collect and document existing knowledge and good practices; 2) to identify common needs, problems and challenges; 3) to co-develop with the regions potential solutions (new approaches, policies, instruments, and coordination mechanisms), and 4) to support and monitor the deployment of solutions and adapt them to regional specificities.

The main target audience for the activities and outputs of the WGs are regional (and where appropriate national) policy makers in the implementation of the enabling condition.

The activities of the WG will follow a bottom-up, iterative and peer learning approach to facilitate exchanges of experience and knowledge among regional stakeholders. Special focus will be placed on the regional institutional context, given the experience that a one-size-fits-all policy is often misguided.

Figure 1 Figure 1. S3 CoP Learning loop



Source: Technopolis (2022)

In sum, this WG will provide policy makers and practitioners in different European regions a platform to share their experiences, to get a better understanding of what policy practices and instruments related to innovation diffusion are most suited to their circumstances (rather than suggesting to copy-paste approaches from leading regions).

A final consideration of note is that the links between the Working Group on innovation diffusion and the two other Working Groups (on industrial transition and interregional collaboration), as well as other activities of the S3CoP project, will be actively explored to generate a learning loop.

For example, innovation diffusion can be considered also across different territories in the context of interregional collaboration, especially when it comes to regions with lower innovation performance levels (or those part of countries that underperform in terms of R&I performance) connecting and cooperating with their stronger performing counterparts in other parts of Europe. This kind of approach links to the European policy aims of achieving a cohesive Europe and bridging the innovation gap to realise the potential of the EU research and innovation ecosystem as a whole. These goals are supported e.g. by the Horizon Europe Widening Programme. They also stay at the heart of the New European Innovation Agenda's flagship on "accelerating and strengthening innovation in European Innovation Ecosystems across the EU and addressing the innovation divide" and related new cross-cutting initiatives such as the Regional Innovation Valleys.²

This note, which sets the baseline for the development of the working group, is organised as follows: section 2 drafts a conceptual framework, highlighting the multi-faceted nature of innovation diffusion and its centrality to S3 success; section 3 sums up the key implementation challenges, based on the review of the literature and on experience on the ground; section 4 concludes highlighting the way forward within the working group.

2. Conceptual framework

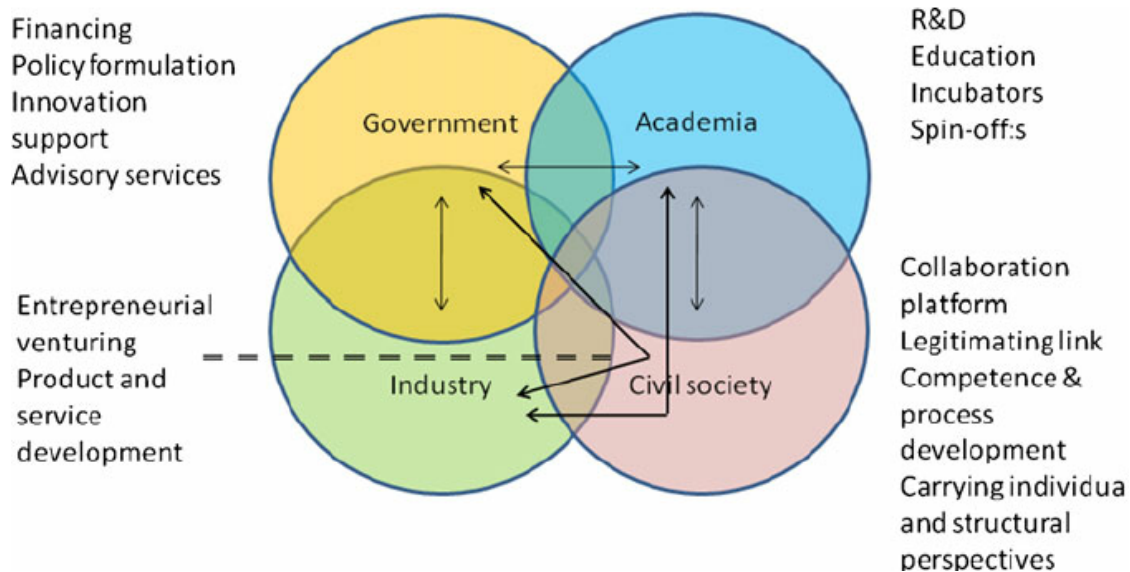
Innovation diffusion as a multifaceted topic

In the context of designing and implementing S3 in European regions, innovation diffusion is conceived as a highly complex and non-linear process that relates to: (1) regional and national framework conditions; (2) operational channels such as training and mobility, supply chains, collaborations; and (3) the presence and effectiveness of intermediary agencies. Therefore, it is closer to a proactive and deliberate process.

The analysis of innovation diffusion is integrated within the Quadruple Helix Model of innovation (Carayannis and Campbell, 2009) which recognises four major actors in the innovation ecosystem: academia, government, industry, and civil society. As Figure 2 illustrates, the interactions between the four components are not unidirectional, but rather multi-layered, dynamic and bi-directional interactions (Schütz et al. 2019). In most cases, innovations and the production of new knowledge and technologies result from the interaction between innovation actors and with regional stakeholders (e.g. intermediaries, public authorities), with feedback mechanisms allowing a learning process.

² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0332>

Figure 2 Innovation actors of the quadruple helix

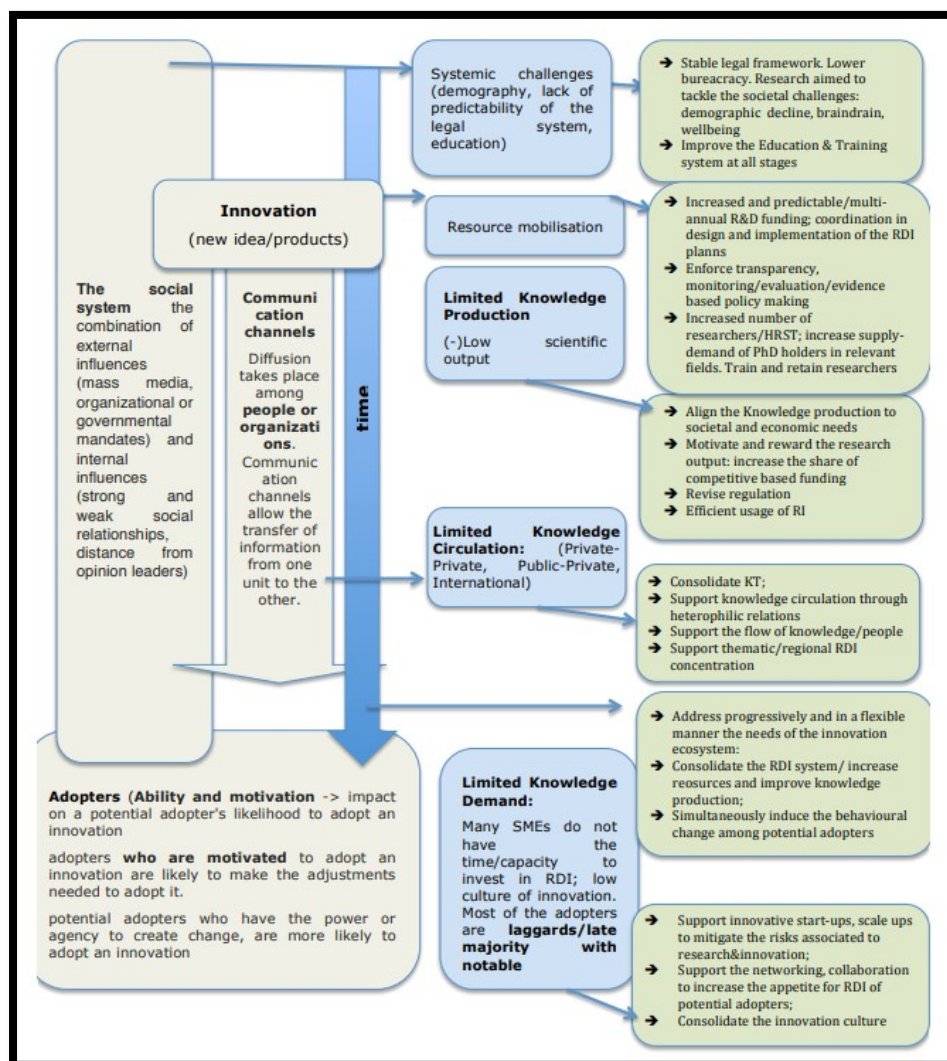


Source: Lindberg et al. (2014)

The identification of desirable and productive forms of interaction among actors to boost innovation diffusion is very challenging and requires a deep understanding not only of the role of the different actors but also the role of the various intermediaries present in the ecosystem (clusters, universities, technology centers, business associations, etc.) as well as the innovation patterns in different industries, the specific bottlenecks in the territory and the policy instruments available.

Taking the above into account, the recent analysis of the barriers for innovation diffusion in Romania (Chionchel, 2020) integrates the perspective of innovation diffusion, the challenges identified and potential direction for actions (see Figure below). The framework very effectively highlights the different elements that underpin innovation diffusion.

Figure 3. Innovation diffusion intervention logic: from obstacles to objectives



Source: Chionchel (2020)

Innovation diffusion is central to the success of S3

The focus of S3 is broadening and moving from from a strong emphasis on R&D and innovation capacities towards implementation and diffusion issues in a wider societal context (Schwaag Serger at al., 2023).

Innovation diffusion in the context of place-based policies in general, and S3 more specifically, has been the subject of many recent studies. In 2019, the Joint Research Centre (JRC) published a meta-analysis of 35 EU cases³ of how to implement S3 with many of the implementation challenges related to the diffusion of new technologies and innovative practices.

³ Cohen (2019).

The box below provides an overview of recent work relevant for the WG on innovation diffusion. They all follow a case study approach highlighting the experience of different EU regions (and countries in a few occasions) on issues at the intersection of innovation diffusion and smart specialisation strategies.

Box 1 Overview of recent analysis of innovation diffusion in European regions

- Innovation diffusion in the Northern and Western regions of Ireland: A regional approach⁴
- Innovation diffusion in Latvia: A regional approach⁵
- Innovation diffusion in Blekinge, Sweden: A regional approach⁶
- Innovation diffusion in Bulgaria, North Central Region: A regional approach⁷
- Innovation diffusion in the Czech Republic: A regional approach⁸
- Internationalisation of the next smart specialisation strategy: Opportunities and barriers in the Friuli Venezia Giulia region⁹
- Análisis de cuellos de botella a la innovación en la Comunitat V¹⁰
- National smart specialisation strategy for innovation 2022-2027 (Ireland)¹¹

The studies above, together with further evidence, point to the need to reshape the policy mix and to develop efficient policy instruments to support innovation diffusion able to generate structural transformation of the economy at regional and/or national level. As revealed by OECD (2016, 2021), in developing the policy mix, it is also important to support the process of demand articulation for innovation by firms, considering that the needs and instruments will differ not only by priority area, but also by SMEs typology (i.e., innovative or potentially innovative). Understanding the bottlenecks to innovation diffusion and the role of intermediaries in penetrating the territory and reaching out to different types of firms is a critical step, rightly acknowledged in the current enabling condition.

In this scenario, and in order to achieve the strategic objectives of S3 in European regions, it is necessary to design instruments targeted to the needs/bottlenecks of the different priority areas. To do this, however, it is necessary to understand, in depth, the innovation patterns of each field.

⁴ <https://www.oecd.org/regional/Innovation-Diffusion-NWR%20Ireland.pdf>

⁵ <https://www.oecd.org/regional/Innovation-Diffusion-Latvia.pdf>

⁶ <https://www.oecd.org/regional/Innovation-Diffusion-Blekinge-Sweden.pdf>

⁷ <https://www.oecd.org/regional/Innovation-Diffusion-Bulgaria%20.pdf>

⁸ <https://www.oecd.org/regional/Regional%20Innovation%20Diffusion%20-%20Czech%20Republic.pdf>

⁹ https://www.oecd-ilibrary.org/industry-and-services/internationalisation-of-the-next-smart-specialisation-strategy_067c3a60-en

¹⁰ https://ris3cv.gva.es/documents/164540377/353965115/Anexo+VI_Cuellos_de_botella.pdf/7c0da22d-93bf-7787-76c7-7411a5cd3700?t=1644574599178

¹¹ <https://assets.gov.ie/229665/853ac724-bea3-49d6-9179-7bd7f744a6e2.pdf>

3. Main implementation challenges

Experience on the ground has revealed the following criticalities, in the way bottlenecks to innovation diffusion have been addressed in Smart Specialisation Strategies:

- 1) The notion of “bottleneck to innovation” has sometimes been interpreted in very broad terms (i.e. low communication between business and university; low propensity to innovate in the private sector, etc.), hampering effective policy insights.
- 2) Limited attention has been paid to the specificities of different types of SMEs (i.e. SMEs integrated into global value chains will have different needs/bottlenecks from SMEs with a very local outlook; SMEs operating in knowledge-intensive sectors will face different challenges than traditional SMEs in the primary sector, etc.). The heterogeneity of SMEs, nevertheless, needs to be acknowledged and explored to design adequate policy instruments.
- 3) Limited attention has been paid to the fact that bottlenecks vary across S3 priority areas, which may have different propensity to patent, different reliance on university-industry collaboration, etc. For instance, in some sectors, multinationals are more active than in others. In addition, for some industries, local sourcing and knowledge partnership with indigenous firms are more common than in others, giving rise to notable differences in the potential for spillovers to take place.

A more nuanced analysis of bottlenecks to innovation diffusion has the potential to enrich public policy intervention by designing more targeted instruments and understanding more deeply the context in which they are deployed.

Keeping this three general points in mind, it is important to explore the bottlenecks across the four key issues mentioned above. Needless to say, our intention here is to open up the discussion, rather than being exhaustive.

(1) Strengths and weaknesses in the adoption of new technologies, innovations, business practices and digital tools across the business population (and especially among SMEs) from leading firms to those lagging behind.

- More attention needs to be paid to the articulation of the demand for innovation and for innovation support-services. Articulating business needs in terms of innovation requires effort and technical skills that SMEs do not always have. This is an important yet underexplored bottleneck that possibly underpins aspects such as the low culture of innovation or cooperation, as well as risk aversion.
- Skills shortages and/or a mismatch between supply and demand on the labour market often play a large role with SMEs in particular at a disadvantage to attract or retain the right profiles. The take-up of innovations entails the upgrading of skills (digital technologies is a prime example). While the notion that education and training

programmes should be well attuned to the evolving needs of the technological landscape is well established in theory, practices vary widely across the EU.¹²

- The uptake of digital tools and technologies varies significantly between firms at the frontier and those lagging behind. This is related to a multitude of factors such as deficiencies in the digital infrastructure, (digital) skills shortages (which seem to disproportionately affect SMEs) and access to finance for investments in digitalisation.
- A dearth of business development services for businesses, especially SMEs, to become more innovative, such as training, mentoring, advisory and consultancy services aiming at upgrading the managerial skills and business practices of SME managers.

(2) The **role of universities and RTOs** to meet the needs of companies in their ecosystem

- The analysis of this aspect has often stemmed from a “technology push ” view of innovation (that is, a view focused on the process of creating technology) and not a “demand pull ” view (i.e. focused on the demand for technological services and products by firms/users). A better understanding of the demand side, is likely to open-up avenues for innovation diffusion.
- It is necessary to reflect on the match (or mismatch) between demand and supply of innovation support services, finding out if the incentives, needs and capacities of companies and universities/research centres are aligned and able to respond to firms’ needs. In other words, it is important to understand whether the policy mix in place is able to respect the mission for scientific excellence of universities and research centres, whilst providing the incentives to support businesses.
- There are persistent difficulties in overcoming the gap between the business community and universities. A commonly cited problem is that the two communities “speak a different language” and find it hard to find common ground. Often, (financial) incentives for engaging with the local business community are missing among research organisations and universities as part of their “third mission.” Moreover, there are practical difficulties and bureaucratic hurdles, for instance related to the ownership of intellectual property that limit the appetite of research organisations to reach out to the (local) business community.
- Conversely, many businesses are not aware of or do not recognise the competitive advantage that collaboration with RTOs, universities or similar institutions can bring. There is scope for government involvement to reduce such barriers, for instance through the use of innovation vouchers or by simplifying the red tape required for (small business) to get access to project consortiums and research and development results.¹³

¹² https://research-and-innovation.ec.europa.eu/knowledge-publications-tools-and-data/publications/all-publications/workforce-skills-and-innovation-diffusion-trends-and-policy-implications_en

¹³ http://publications.europa.eu/resource/cellar/1b03ee59-67a4-11e8-ab9c-01aa75ed71a1.0001.01/DOC_1

- Finally, there has been a lot of emphasis on transferring technology and innovations from universities and RTOs to for-profit-ventures, for instance through spin-offs.¹⁴ The Competence Centre of Technology Transfer (CCTT), the centre of expertise within the European Commission has identified a need to develop capacity, have a somewhat mature innovation ecosystem in place and sufficient financing as important conditions for these activities to take place.¹⁵

(3) **Knowledge spillovers and innovation diffusion channels** between large firms, especially multinationals, and indigenous smaller enterprises.

- Large multinational companies are typically more productive than SMEs, suggesting there is room for the latter to adopt good managerial practices and other innovations. From a more meso-economic perspective, large companies could be part of a vibrant eco-system, involving local suppliers, R&D collaborators and other partners. At the same time, the empirical evidence on knowledge spillovers shows a mixed picture.¹⁶
- These diffusion channels can take the form of value chain linkages (with domestic firms typically operating as suppliers), strategic partnerships, labour mobility and through competition or imitation effects.¹⁷ Many of the preceding hurdles also play a role in fostering cooperation between large (multinational) firms and indigenous firms with the need to raise the absorptive capacity of the latter.
- In this respect, and of particular importance for firms to partner with multinational firms, there is untapped potential for (industry) standards and regulatory compliance in research, development and testing processes to be more standardised, so as to facilitate more firms, especially SMEs, to engage in innovative activities and raise productivity.
- The existence of a cluster of locally anchored firms with high specialist capabilities represents a potential attraction for foreign direct investments (FDI), which may be highly relevant for the design and implementation of S3. As one example, a recent review of FID-SME linkages in Portugal (with case studies in the Norte and Alentejo regions) showcases that there is untapped potential to better connect smart specialisation strategies in these regions with policies to attract and retain FDI.¹⁸

(4) The **role of innovation agencies** and other public bodies in facilitating knowledge flows, and how they are coordinated (with a focus on multi-level governance issues).

- Multi-level innovation governance can be defined as “a complex process of collaboration between different government levels (supranational, national, regional, local) and/or

¹⁴ The European Patent Office (EPO) conducted seven case studies in detail. <https://www.epo.org/learning/materials/sme/innovation-case-studies/technology-transfer-case-studies.htm>

¹⁵ https://knowledge4policy.ec.europa.eu/technology-transfer_en

¹⁶ https://www.oecd-ilibrary.org/economics/productivity-spillovers-from-multinational-activity-to-local-firms-in-ireland_58619717-en

¹⁷ <https://www.oecd.org/cfe/smes/fdi-sme.htm>

¹⁸ <https://www.oecd-ilibrary.org/sites/d718823d-en/index.html?itemId=/content/publication/d718823d-en>

innovation promotion agents in territorial (regional, local) innovation and economic development strategy development.”¹⁹ Many countries struggle to properly coordinate policy making at these various levels of governance.

- Both within and across levels of government, a scattered approach with different actors operating in “silos” (rather than a systemic approach) often prevails.²⁰

4. Preliminary conclusions

Given the breadth of the topic, this WG aims to discuss the most relevant implementation challenges on innovation diffusion across European regions, co-develop with the regions potential solutions (new approaches, policies, instruments, and coordination mechanisms) and propose actionable recommendations including examples, good practices, successful initiatives from various regions across the EU, covering a wide range of sectors and topics and adapted to regional specificities.

The activities of the WG will build on past insights and work, and should generate novel insights beyond the status quo.

The discussing will be framed considering the four key issues for the success of smart specialisation strategies:

- The adoption of new technologies, innovations, business practices and digital tools across the business population (and especially among SMEs) from leading firms to those lagging behind.
- Collaboration between universities and RTOs and the local business community.
- Knowledge spillovers and innovation diffusion channels between large firms and indigenous smaller enterprises
- The role of innovation agencies and other public bodies in facilitating knowledge flows.

¹⁹<https://www.interregeurope.eu/find-policy-solutions/webinar/multi-level-governance-for-innovation-key-insights-from-online-discussion>

²⁰ Related to this previous point, this study shows the impact of high quality public institutions and efficient expenditure on the one hand, and innovation performance on the other: <https://link.springer.com/article/10.1007/s11205-018-1904-5>

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