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# Towards a transformative Smart Specialisation Strategy: lessons from Catalonia, Bulgaria and Greece

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## **Executive Summary**

The recovery from the pandemic, and the green and digital transitions foreseen in the European Green Deal require no less than a transformation of our economies and societies. Smart Specialisation Strategies (S3) can make an important contribution to this process. S3 have been designed to promote innovation-led economic development with the framework of European Cohesion Policy. Our paper considers how S3 might adapt to more fully support system-level transformation in line with insights from literatures on Sustainability Transitions, Transformative Innovation Policy, and Responsible Research and Innovation. The paper examines experiences of S3 design (JRC inputs for the consideration of the Greek and Bulgarian authorities) and implementation (Catalonia) with transformational objectives and offers broader lessons for policy makers.

Early 2021 finds most regions at the design phase of their S3. Future S3 will have to be aligned with the European Green Deal. The Recovery and Resilience Facility presents an opportunity for Europe to “build back better” and prepare our economies and societies for the implementation of the green and digital transitions. To be more fully aligned with the European Green Deal and support its implementation we conclude that future S3 design needs to consider the societal implications of research and innovation interventions, to be based on multi-level systemic analysis, to more purposefully identify relevant social stakeholders according to the system that needs to change, to design interventions that combine research and innovation with pervasive (user/application) experimentation, introduce monitoring based on learning and on transformative outcomes and mechanisms to facilitate alignment of stakeholder efforts and to strengthen the legitimacy of transformational visions.

## **Abstract**

There are increasing demands on our economies and societies for transformational change. The European Union (EU) and global actors such as the United Nations (UN) are giving increasing attention to social and environmental sustainability. This paper reflects on how Smart Specialisation Strategies (S3), and in particular the search for actionable policy pathways through the Entrepreneurial Discovery Process (EDP), need to evolve. To respond to the challenges ahead, S3 must also contribute to the transition towards more sustainable and inclusive pathways, in line with the European Green Deal's objectives and the UN Sustainable Development Goals (SDGs). In this sense, we argue that we need a transformative Smart Specialisation, sustained by a transformative EDP.

With this objective in mind, we begin by examining the current policy context and frame S3 in the broader EU agenda. We stress the importance of aligning S3 to the EU New Industrial Strategy and the European Green Deal, mustering momentum to address social and environmental challenges. We then introduce conceptual and policy frameworks which can support the development of a transformative EDP, namely Sustainability Transitions, Transformative Innovation Policy, and Responsible Research and Innovation. We then report on two pioneering policy experiences that -building on the above conceptual foundations and approaches- have attempted to imbue the S3 and EDP with transformative elements, namely the POINT (Projecting Opportunities for INdustrial Transition) Reviews by the Joint Research Centre and the Shared Agendas in Catalonia. We conclude with a discussion of some implications for the future of Smart Specialisation and highlighting the challenges ahead.

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# 1 Introduction: The need for a transformative SMART SPECIALISATION STRATEGY (S3)

The new Cohesion Policy programming period starts at a significant time in history: 2020 has been a year that has defeated all forecasts and has left humanity, across the developed and developing world, disoriented. We have learnt, at an extremely high price, how fragile our sophisticated socio-economic system is. We have seen that, as citizens, we have huge responsibilities for how global trends affect our local communities. We have realised the importance of a system that supports research and innovation, as we have turned our hope and efforts to the development of new therapies and vaccines. At the time of writing of this paper, in the middle of the third wave of the COVID-19 pandemic and with the end of the tunnel just about in sight, it is fair to say that this experience will shape our views for many years.

When it comes to public life and public choices, there are some lessons that should be kept in mind: the COVID-19 pandemic is not the last global crisis; other societal challenges such as climate change and increasing inequality are significant threats to our wellbeing. They are, like COVID-19, global trends that will manifest in each and every community. Like COVID-19, they will require taking responsibilities at the individual and collective level. Like COVID-19, they will need a system that supports challenge-oriented research and innovation.

The COVID-19 crisis also occurs at the transitions between two European Commission (EC) programming periods, making it a moral imperative to reflect on how to make the most of the opportunities offered by European policies. This paper aims at doing that, with a focus on Smart Specialisation and, in particular, its engine: the Entrepreneurial Discovery Process (EDP). The EDP has been considered a significant novelty of smart specialisation strategies (S3) and has certainly increased the level of stakeholders' engagement in the research and innovation policy. The concept has evolved throughout the years from a sort of "one-off" experience during the strategy design, to a continuous one: a process which supports stakeholders' engagement in the identification and assessment of S3 priority areas throughout the policy cycle (Marinelli and Periañez, 2017). Despite such increased participation, however, S3 has been implemented mainly through traditional instruments, with limited room for experimentation (Gianelle et al. 2020).

In this renewed policy and global context, in which increasing attention is given by the European Union (EU) and global actors such as the United Nations (UN) to social and environmental sustainability, it is necessary to reflect on how S3, and in particular the EDP, needs to evolve.

To respond to the challenges ahead, S3 must also contribute to the transition towards more sustainable and inclusive pathways, in line with the European Green Deal's objectives and the UN Sustainable Development Goals (SDGs). In this sense, we argue – in this paper- that we need a transformative Smart Specialisation, sustained by a transformative EDP. Building on the literatures on sustainability transitions, transformative innovation policy and Responsible Research and Innovation (RRI) we discuss possible characteristics of a transformative EDP.

We do so in the following steps: in section 2 we look at the current policy context and frame S3 in the broader EU agenda. We stress the importance of aligning S3 to the EU New Industrial Strategy and the European Green Deal, mustering momentum to address social and environmental challenges. Section 3 introduces conceptual and policy frameworks which can support the development of a transformative EDP, namely *Sustainability Transitions*, *Transformative Innovation Policy*, and *Responsible Research and Innovation*. Section 4 reviews two pioneering policy experiences that -building on the above conceptual approaches- have attempted to imbue the S3 and EDP with transformative elements, namely the POINT (Projecting Opportunities for INdustrial Transition) Reviews by the Joint Research Centre and the Shared Agendas in Catalonia. Based on the above, section 5 discusses some implications for the future of Smart Specialisation. Section 6 concludes highlighting the challenges ahead.

## 2 Smart specialisation in the EU policy arena

Societal challenges such as growing inequality and climate change have been put at the centre of global policy initiatives such as the Sustainable Development Goals (UN, 2015). With the European Green Deal (EC, 2019) and the New Industrial Strategy (EC, 2020a), the new European Commission has positioned itself as a leading actor in the transition to a healthy planet, the digital economy and a sustainable development guided by the SDGs.

### **Box 1 The EU Green Deal and the EU New Industrial Strategy**

The EU Green Deal is a set of policy initiatives with the overarching aim of becoming the world's first "climate-neutral bloc" by 2050. Its goals extend to many different sectors, including construction, biodiversity, energy, transport and food. It also leans on the Horizon Europe Programme, to play a pivotal role in leveraging national public and private investments. Through partnerships with industry and member States, it aims to support RTDI (Research Technological Development and Innovation) on transport technologies, including batteries, clean hydrogen, low-carbon steel making, circular bio-based sectors and the built environment.

The EU New Industrial strategy includes comprehensive measures to modernise and decarbonise energy-intensive industries, support sustainable and smart mobility industries, promote energy efficiency, strengthen current carbon leakage tools and secure a sufficient and constant supply of low-carbon energy at competitive prices, supporting the development of strategic digital infrastructures and key enabling technologies. It also comprises a renewed focus on innovation, investment and skills

The European Green Deal will orient EU Funds and will steer national efforts towards addressing environmental challenges. It will also provide legal and regulatory certainty to entice private investments in the same direction. The European Green Deal represents a bold decision which, for the first time, puts RTDI policy at the centre of social and environmental challenges. In other words, the focus is no longer on RTDI as a process, but on the directionality of its outcomes, on its ability to support the shift towards sustainability. The new EU Industrial Strategy (EC, 2020a) reinforces such message, as it aims at supporting Europe's industrial leadership focussing on three key priorities: maintaining European industry's global competitiveness, making Europe climate-neutral by 2050 and shaping Europe's digital future.

Recent policy documents have stressed the importance of mobilising Cohesion policy for this new growth strategy and much attention has been paid to Smart Specialisation as a tool to address societal challenges, combining the directionality of new EU initiatives with the search and co-creation path of the entrepreneurial discovery (EC, 2020b). As highlighted in Gianelle et al. (2020) and in Pontikakis et al. (2020), S3 needs to evolve, complementing the initiatives and instruments that have been developed in the past few years, with more experimental ones (McCann and Soete 2020).

This reinforces some aspects that had already emerged in the first drafts of regulations for the new Cohesion Policy programming period. In those, S3 was explicitly linked to industrial transitions and a "functioning entrepreneurial discovery process" was formally included as one of the seven fulfilment criteria (see Box 2).

### **Box 2 Policy Objective 1 – Cohesion Policy 2020-2027**

Policy objective 1 A more competitive and smarter Europe by promoting innovative and smart economic transformation and regional ICT connectivity

In accordance with the policy objectives set out in Article [4(1)] of Regulation (EU) 2018/xxxx[new CPR], the ERDF shall support the following specific objectives:

(a) **a more competitive and smarter Europe** by promoting innovative and smart economic transformation and regional ICT connectivity ('PO 1') by;

(i) developing and enhancing research and innovation capacities and the uptake of advanced technologies;

(ii) reaping the benefits of digitisation for citizens, companies, research organisations and governments public authorities;



- (iii) enhancing sustainable growth and competitiveness of SMEs and job creation in SMEs, including by productive investments;
- (iv) developing skills for smart specialisation, industrial transition and entrepreneurship;
- (v) enhancing digital connectivity.

Enabling condition 'Good governance of national or regional smart specialisation strategy' applicable to specific objectives 1.1 Developing and enhancing research and innovation capacities and the uptake of advanced technologies and 1.4 Developing skills for smart specialisation, industrial transition and entrepreneurship

Building on the results and lessons learned from the current programming period, the European regions need to incorporate the following in their smart specialisation strategies:

1. Up-to-date analysis of challenges for innovation diffusion and digitalisation;
2. Existence of competent regional / national institution or body, responsible for the management of the smart specialisation strategy;
3. Monitoring and evaluation tools to measure performance towards the objectives of the strategy;
4. Functioning of stakeholder cooperation ("entrepreneurial discovery process");
5. Actions necessary to improve national or regional research and innovation systems, where relevant;
6. Where relevant, actions to support industrial transition;
7. Measures for enhancing cooperation with partners outside a given Member State in priority areas supported by the smart specialisation strategy

In this renewed context, it is particularly critical to define the role and boundaries of S3 and the EDP. A transformative S3 should be capable of catalysing stakeholders' ideas and energies into addressing the territorial manifestations of global challenges. This could in turn allow regions to embrace opportunities within and beyond Cohesion policy, preparing stakeholders to seek synergies with other funds and aligning them to global trends and value chains.

This approach, however, requires a change of perspective and an integration of the policy mix. As clearly explained in EEA (2019), developing innovation for competitiveness may not be enough. Novel social practices and capable business models will be necessary to catalyse changes in behaviour, beliefs and values. Reconfiguring societal systems to support a transition to socially and environmentally sustainable living requires the efforts and commitment of many stakeholders, across different geographical levels (from the national to the very local) and many forms of innovation across virtually all sectors. In turn, policy instruments need to support the development of such practices, the underpinning stakeholders' continuous interaction and accompany them with path-opening reforms in regulation, legislation and organisational governance. The challenge for S3 to embrace a fully transformative nature is therefore not to be underestimated and new policy and conceptual tools are necessary to navigate the new landscape. Indeed, the European Commission (EC, 2020b) has published a guide and a toolkit for national and regional decision-makers to support sustainability transitions under the European Green Deal with cohesion policy. The orientation of S3 towards transformative change requires a new perspective on the design and implementation phase, as described in Box 3. This paper articulates those ideas further in light of recent experiences of applying a transformative framing of innovation within the Joint Research JRC and the Smart Specialisation of Catalonia.

### **Box 3 Orienting s3 towards transformative change**

The following aspects need to be taken into account when orienting S3 towards transformative change:

#### **1. In the S3 design phase:**

- Analysis of regional context and innovation potential by identifying potential solutions that are critical for unlocking or accelerating transition towards more sustainable and inclusive trajectories.
- Identification of the relevant stakeholders for transformative change, both within government (across policy departments which will have to coordinate) and in the broader socio-technical system, paying particular attention to users and consumers, in addition to producers.
- Development of a shared vision for the future of the region by setting collective priorities for transformative change, in line with visions and strategies.
- Definition of a governance that ensures stakeholders' participation and ownership by:
  1. shielding innovation from mainstream economic, infrastructural, consumer preferences by creating protected spaces in cities and regions (through protected niches);
  2. nurturing innovation by assisting learning processes, articulating expectations, and helping networking processes;
  3. empowering innovation by reframing the rules of the game, and reform institutions that influence prevailing performance criteria.
- Identifying innovation priorities in line with system level transition agenda across all targets, by assessing the best options, mapping their impacts and ranking them accordingly.
- Defining a coherent policy mix, roadmap and action plan.

#### **2. In the S3 implementation phase:**

- Experimentation, this is testing of technical performance, markets, consumer preference and societal acceptance, probing and learning.
- Open innovation, by involving in the innovation process users, civil society and communities, besides businesses and academia.

Source: Adapted from European commission (2020b).

### 3 New Policy and conceptual frameworks for a transformative S3

To understand how to shape a transformative S3 and EDP, we introduce key insights from the RRI approach, the sustainability transitions literature (Geels 2002, 2004, 2006; Geels et al. 2017) and the closely linked transformative Innovation Policy literature (Schot and Steinmueller 2018; Schot and Kanger, 2018).

#### 3.1 Responsible research and innovation.

The RRI concept has taken hold in EU Science and Innovation policy, with significant implications for S3. RRI is about fostering inclusive and sustainable RTDI activities, by systematically anticipating and assessing potential implications of RTDI activities, which are not seen as neutral to society, nor automatically positive in their impact. Such outlook appears all the more important due to the uncertain nature of research innovation, which causes the end point of any project to be a moving target. Within the RRI approach, scientists must also reflect on the value systems and theories underpinning a given research project and must pursue meaningful stakeholders' participation accepting that the latter may well affect the project's overall trajectory (Stilgoe et al., 2013).

The utility of this concept to Smart Specialisation has been explored by practitioners and researchers. As pointed in Fitjar et al. (2019) RRI is a place-neutral concept which can be boosted by considering the notion (well embedded in S3) that knowledge is localised. S3, on the other hand, has formally always been oriented towards addressing social needs, yet this objective has always been secondary to that of enhancing competitiveness. RRI principles, hence, provide guidance on how to place socio-environmental challenges at the centre of S3.

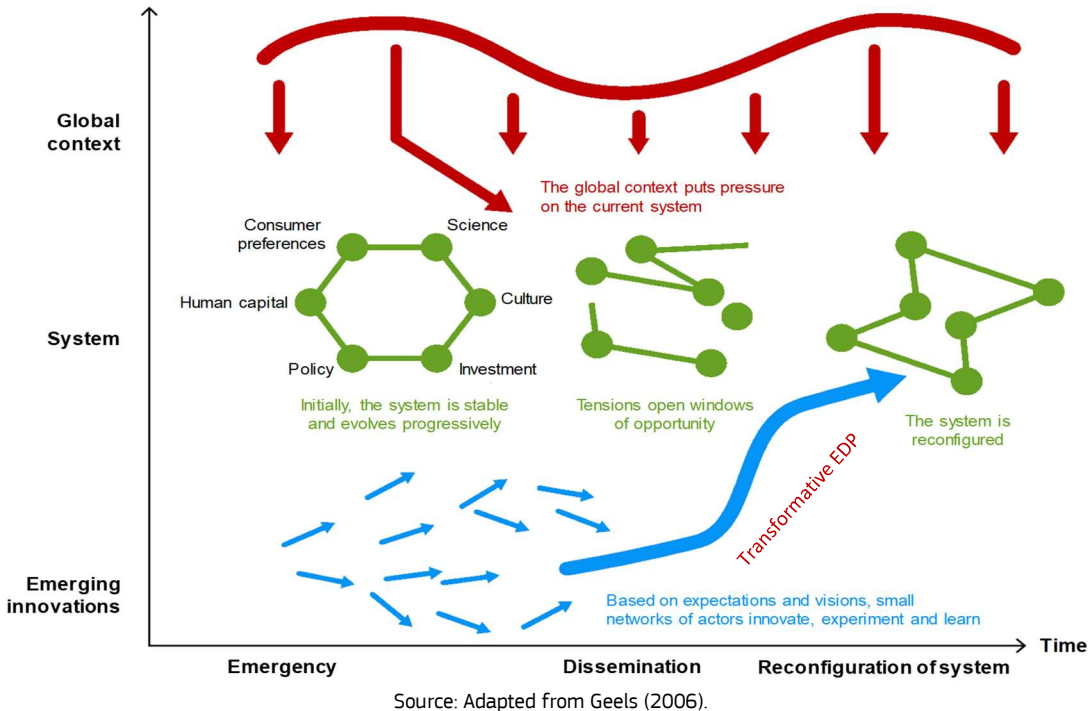
Adapting Stilgoe et al. (2013), Fitjar et al. (2019) articulate four key attributes of RRI in S3 terms, namely: Anticipation, Inclusion, Reflexivity and Responsiveness. A *Responsible S3* should aim at **anticipating** the effects of innovations on regional competitiveness, as well as on social and environmental outcomes, gearing the EDP towards addressing grand societal challenges. As for **inclusion**, S3 should not only engage stakeholders involved in producing innovation, but also those potentially affected by the latter. Finally, a **reflexive** and **responsive** S3 is one in which there are mechanisms to systematically reflect on the socio-economic impact of the strategy and to respond to the views of those affected within and beyond the region. Clearly, embedding the RRI principles in S3, calls for a reflection of the EDP, as well as the governance and monitoring systems, which should provide channels and data for interaction.

### 3.2 From the Multi-level perspective on sustainability transitions to transformative innovation policies

The Multi-Level Perspective (MLP) on sustainability transitions (Geels, 2002; Geels 2006, Geels, 2012; Smith et al., 2005; OECD, 2015) stresses that transformations are always complex and multi-factor processes. Transitions, or ‘system innovations’, arise from the interplay between multi-dimensional developments at three analytical levels, as shown in Figure 1 below:

- Exogenous (mostly) global trends (in red)
- Socio-technical regimes (in green) which refer to the dominant practices, rules and technologies that provide stability, enabling and constraining incumbent actors in relation to existing systems. Within a regime, change occurs incrementally and aims at optimisation, rather than radical change.
- Grassroots innovations: entrepreneurs, researchers, start-ups, and social networks that innovate to respond to new demands and societal challenges and promote alternative technologies or new uses of technologies (e.g. organisations that promote shared-energy schemes). These bottom-up or grassroots innovations and initiatives generating new practices and solutions to existing challenges are usually disconnected and not big enough to provide, by themselves, a systemic alternative. S3, through transformative EDP can contribute to articulate these grassroots innovations by creating niches. These are protected spaces in which experimentation, learning and innovation can occur.

**Figure 1** The Multi-Level perspective on sustainability transitions



In a transition niche-innovations build up internal momentum, whilst changes in the exogenous landscape put pressures on the regime, opening-up windows of opportunity. These can allow niche-innovations to diffuse and reach mainstream markets, where they will need to interact with the existing regime in its economic, technical, political, cultural, infrastructural dimensions, encountering resistance.<sup>1</sup>

Truly transformative S3 needs to enable *the reconfiguration of the system* and needs to operate at multiple levels: It needs to help emerging innovations reach up to the system, but it also needs to enable the reconfiguration of the system operating at the meso level, where governments (both national and

<sup>1</sup> One criticism of the MLP, which we are unable to address in this paper, is the lack of attention for power and politics that underpin the development and implementation of specific policies (Smith et al., 2005; Meadowcroft, 2011).

regional) have a major role. The meso level is particularly important in less developed regions and countries as the broader socio-technical system there likely requires radical reconfiguration, including the introduction of missing elements and the reform of key system functions, in order to benefit from the transition.

Policy makers aiming at addressing societal challenges, need to manage precisely these processes. The literature on *Transformative Innovation Policy* (TIP) offers important insights for decision makers, building on the MLP. In particular, according to Schot and Steinmueller (2018), RTDI policy is shaped by persistent framings that arise from historical context. Two established frames are currently dominant, whilst a third one is emerging. Each framing is characterised, among other things, by its own geographical focus, focal actors and actions, policy rationales and strategic direction, as well knowledge and innovation configurations.

In **Frame I** (innovation for growth) which originated in the Post-World War II, RTDI government support is institutionalised under the assumption that it contributes to economic growth and addresses market failures in the private provision of new knowledge. Science is considered the basis for long term economic growth and innovation largely involves the commercialisation of scientific discovery. Many of the policy practices and narratives developed within this framing are still in use (such as R&D grants, tax credits, and public support to large R&D infrastructure) whether in EU, national or regional RTDI policy.

In **Frame II** (national systems of innovation) which emerged in the 1980s globalising world, innovation is emphasised as a source of competitiveness, shaped by national and regional systems of innovation. Policies are geared to promoting learning among systemic actors, ensuring the application of scientific discovery and supporting entrepreneurship. The rationale for policy intervention is “system failure”, most often interpreted as a failure to link and coordinate actions of knowledge producers, hence the focus is on technology transfer, learning platforms, clusters etc. Innovation is considered the engine of growth and competitiveness and, as such, is assumed to be universally good.

This latter element has come into question in the emerging **Frame III** (transformative change) as the environmental and social consequences of innovation are straining our socio-economic systems. The neutrality of innovation activities can no longer be assumed and the attempts to align social and environmental challenges with innovation objectives (as in Horizon 2020 Programme and in S3 during 2014-2020) have proven insufficient. RTDI policies should thus be directly supporting socio-technical transition towards a more socially and environmentally sustainable world. Such *Transformative Innovation Policies* are geared towards constructing a new relationship between the state, the market, and civil society. In this context, public research and innovation policies should promote transformations that can generate alternatives to current unsustainable practices and systems. This implies supporting *experimentation* and *learning* in protected niches, to allow new practices to emerge and ultimately be scaled-up. The whole policy cycle, through its instruments, governance and monitoring, should embed and endorse diffused experimentation.

Table 1 below summarises the key characteristics of the three framings.

**Table 1** Summary of three STI framings

	<b>Framing 1: Innovation for growth</b>	<b>Framing 2: National Systems of Innovation</b>	<b>Framing 3: Transformative change</b>
<b>Time dominance of</b>	1960s-1980s	1980s to today	Emerging
<b>Geographical focus</b>	National	National, regional, sectoral systems of innovation	Multi-scalar: grand challenges across and beyond geographical, sectoral, technological boundaries
<b>Focal actors</b>	Government, scientists and industry (especially large firms)	Triple-helix interaction	Dynamic identification of relevant stakeholders (Government, science, industry, civil society, end-users and non-users, others)
<b>Justification for policy intervention</b>	Fixing market failures	Fixing structural system failures	Fixing transformational system failures
<b>Main strategy</b>	Knowledge generation	Knowledge utilisation	Solving social and environmental challenges
<b>Nature of critical knowledge</b>	Transferable	Sticky and place-based	Emergent and co-produced
<b>Focal areas</b>	Technology	Competitiveness	Socio-Technical system
<b>Typical policy activities</b>	<ul style="list-style-type: none"> <li>• RTDI, stimulation, intellectual property regime,</li> <li>• STEM education and communication</li> </ul>	<ul style="list-style-type: none"> <li>• Building links</li> <li>• DUI (Doing Using and Interacting) learning</li> <li>• Entrepreneurship support</li> </ul>	<ul style="list-style-type: none"> <li>• Support to experimentation with niches</li> <li>• Support to R&amp;D directionality</li> <li>• Social, inclusive, frugal and pro-poor innovation</li> </ul>
<b>Underlying model of innovation</b>	Linear	Interactive and system bound	Systemic and experimental

Source: Author's summary and adaptation from here: [http://www.tipconsortium.net/wp-content/uploads/2018/04/4173\\_TIPC\\_3frames.pdf](http://www.tipconsortium.net/wp-content/uploads/2018/04/4173_TIPC_3frames.pdf)

## 4 Articulating transformative S3 and EDP in practice: Lessons from the point reviews and the shared agendas

The concepts described in section 3 have inspired a set of initiatives seeking to include transformative elements in Smart Specialisation, in particular focussing on the EDP. The POINT reviews (conducted by the JRC) and the Shared Agendas (framed within Catalonia's S3 and co-financed by ERDF) are pioneering exercises implemented over the last few years and provide interesting empirical insights.

They both started before the European Green Deal and the New Industrial Strategy were announced and before the COVID-19 pandemic revolutionised our way of living. Yet, the recent policy and global events make these approaches more compelling, due to their strong experimental, analytical and inclusive nature. They stress the importance of the co-definition and in-depth articulation of the challenges faced by the territory, the importance of a shared vision towards which the transition should move, the co-definition of experimental policy action, and the crucial role of research and innovation in addressing them.

Both approaches highlight that moving towards a more sustainable way of living requires a multi-level perspective to understand and manage the social and economic impact of change. Both approaches are strongly rooted in Smart Specialisation, with its focus on stakeholders' engagement, knowledge-based development and attention to local specificities. They build on the lessons and practice of the last few years of S3, to bring it to the next level.

### 4.1 The POINT reviews: identifying positive directionalities and policy pathways

The POINT (Projecting Opportunities for Industrial Transitions) reviews conducted by the JRC are a tool to collect evidence and examine the scope for developing appropriate territorial responses to global impulses for change. They contribute to building the evidence base for the criterion 6 "Actions to Manage Industrial Transitions" of the ERDF Enabling Condition (EC, 2018). A broader objective is to contribute to the development of a positive, credible and coherent direction for the transition of the territory. The JRC has documented the methodology for the reviews (Pontikakis et al. 2020) and conducted the first four reviews in Andalusia, Bulgaria, Greece and Romania.<sup>2</sup>

As explained in the published methodology, a review follows **four key steps**:

- **Defining a theme for the transition.** This needs to be a theme of growing global importance suggested by the relevant territorial authorities (for instance: climate change/renewable energy; circular economy; digitalisation; artificial intelligence, etc.) but which nevertheless stands to have pervasive impact in the examined territory.
- **Mapping the current system.** This is done by looking at four systemic functions (namely: orientation and planning; human and financial resource mobilisation; production of knowledge, goods and services; consumption and use).
- **Visioning a desirable future system.** This requires identifying missing systemic components and configurations to meet the territory's aspirations. The focus is on devising a positive "destination" of the transition building on inputs from a broad cross-section of stakeholders.
- **Identifying the leverage points.** This last step starts sketching actions to support the transitions, in terms of guidance for governance, the role of support coalitions, understanding and where appropriate managing resistance to change, and offering suggestions for pathway-opening policies, instruments, reforms and policy experiments.

Each of these steps addresses specific questions with the aim to produce a coherent analysis of the current system and theme and to propose pathways to achieve the desired system.<sup>3</sup>

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<sup>2</sup> The POINT Review of Greece is documented in Janssen et al., 2021. The remaining reports are currently being finalised will be made available at: <https://s3platform.jrc.ec.europa.eu/industrial-transition>

<sup>3</sup> In each territory under review, and for each industrial theme selected, the review findings are documented in a report that: Maps the systems in the territory; documents existing planning arrangements and directions of deliberate change; makes concrete

Reviews require extensive consultations with stakeholders. Interviews and consultation workshops with a broad range of stakeholders contribute to the mapping, visioning and planning for the transition, highlighting and strengthening links between previously unconnected parts of the system. Particular emphasis is placed on the correct identification of relevant stakeholders, which can come from all parts of the socio-technical system, including various kinds of producers, workers, consumers, users and regulators. Stakeholders are also central after the review in driving the transitions forward: “Support Coalitions” are groups of stakeholders with common values and incentives that can drive the transition in the early stages by putting pressure on government, or coordinating activities. The public administration aiming at driving the transition should take the role of protecting, steering and nurturing these coalitions (a type of *niche*) to prevent captures by incumbents, managing tensions and accommodating the needs of those who stand to lose from the transition.

POINT reviews provide interesting insights on what a transformative EDP can achieve and can inform the stakeholder composition of EDP workshops aiming for transformation. As POINT reviews frame the issues at the level of the socio-technical system, they can be a useful input for developing priorities and ambitions that combine economic considerations with socio-cultural values. As illustrated in the boxes 4 and 5, they articulate challenges and opportunities at the intersection of previously separate sectors, searching for actors with dynamic characteristics and mobilising policy, cross-ministerially, to support the transition in its all dimensions.

#### **Box 4. POINT Review of Greece**

##### Theme

The review focuses on the nexus between renewable energy, energy storage, with a focus on batteries and their applications in electric mobility, shipping, agriculture and defence.

##### Opportunities

The review shows that some Greek firms are active in developing applications in areas of major economic importance, including renewable energy generation and distribution, energy solutions for non-interconnected islands, and shipping. These have high potential complementarities with other sectors underpinning the deep transformation of the global energy system. Small but dynamic niches have emerged, notably various producers of renewable energy, small-scale shipbuilding and maintenance, electric batteries and ICT services operating within their respective internationally weak sectors.

Actions to catalyse the transition include:

- Public policy interventions: in the form of legislation on microgrids, sandboxes, enforcement of environmental regulation and more generally, policy stability.
- Enabling actions: in the form of support to infrastructure (network and charging points), support to skills (especially vocational skills with active participation in Centres of Vocational Excellence ), demand management (smart meters, city-level standards, EV facilities, etc.), and acceptance of RES (as energy communities seem a good match with territorial values).
- R&D and innovation actions, focussed on knowledge transfer, Public Private Partnerships and Public Procurement for Innovation.
- Developing and adopting a national mission, a “Greek Green Deal for industrial development and the creation of quality employment”, inspired by the recently launched “Greek Green Pact for Electric Mobility” and the ambitious National Energy and Climate Plan. A key instrumental objective of this mission would be to promote the primacy of an industrial development logic, as this can provide a lasting solution to the high-skilled employment and emigration crisis afflicting Greece.

##### Role of stakeholders

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suggestions for the advancement of the transition and for managing its downsides. As the domain of change is defined as that of the socio-technical system, public policy recommendation go beyond RTDI placing particular emphasis on cross-domain alignment and coordination within government.



Several dozen stakeholders provided inputs that helped in mapping the system and identifying leverage points for the transition. In the future, the review suggests that Greek stakeholders build on the positive experience with the EDP and develop shared agendas. Within government this involves specifying how ambitions and support measures of different policy departments interrelate. Beyond government, this requires engaging allying groups of stakeholders, articulating their interests, exploring differences and commonalities, aligning priorities, and endorsing the agenda.

Territorial scale

The exercise was conducted at the national level

#### **Box 5. POINT Review of Bulgaria**

Theme

The review focusses on the link between mechatronics and ICT, as an opportunity to open up new pathways for digitalisation and sustainability in society and manufacturing.

Opportunities: synergies between mechatronics and ICT for the local market

Bulgaria has a history in both ICT and mechatronics dating back to the 1980s, which provides the necessary depth of the system for transformation. Today the competences and business capabilities of the ICT sector are mostly geared to the export markets and foreign clients.

The strengths in the Bulgarian ICT sector can contribute to the further digitalisation of the domestic manufacturing sector and in particular mechatronics. The reinforcement of the linkage can play a role to boost economic performance and create a platform for wider digitalisation in other areas such as green tech, telemedicine and tele-education, upgrading the position of Bulgarian firms in the global value chains. Notably a recent inter-ministerial Working Group has been established for Industry 4.0 and on digitalisation.

The following key actions to catalyse the transition have emerged from the review:

- Placing a renewed emphasis on education and skills to allow increased investments in human capital appears a key leverage point, in light of widely accepted challenges of low labour productivity, low capital intensity, and the long-term demographic crisis of Bulgaria.
- Strengthening policy capacities for coordination (with the introduction of a special intelligence unit within the Council of Ministers to prepare and coordinate overarching policy strategies).
- The establishment of a digital manufacturing research and innovation centre, with a core hub as well as peripheral nodes, in order to cover the whole territory. The centre should have an applied nature with piloting and demonstration facilities to support business innovation and capability accumulation.
- Supporting the internationalisation of key actors through the entry in European networks, such as EEN (European Enterprise Network), among others.

Role of stakeholders

Based on dozens of interviews with varied stakeholders, the review revealed that limited coordination currently takes place among stakeholders involved in these themes. Much effort, in the transition process, will have to be devoted to building stakeholders' capacity to engage with the transition and seek positive sum outcomes. Indeed, several policy initiatives have been planned that go in that direction (i.e. the National Skills Strategy Platform).

Territorial scale

The exercise was conducted at the national level.

## **4.2 Shared agendas: articulating multi-level change**

Shared Agendas for sustainability and social change are framed within the Catalan Smart Specialisation Strategy (RIS3CAT). They articulate, through a participatory model of governance, the collective action of various actors aimed at addressing a common challenge (usually related to SDGs) in a given territory (Fernández and Romagosa, 2020).

Shared Agendas are collectively agreed plans for territorial transformation in which broad coalitions of affected stakeholders commit to specific actions. RRI is the main driver for generating new jobs and business opportunities and for advancing towards more sustainable and inclusive pathways. Experimentation is central to their development.

Whilst each Shared Agenda is different, a set of horizontal characteristics have emerged. Shared Agendas are:

- Aimed at understanding and managing *complex problems* from a holistic and dynamic perspective, taking into account the long-term effects and the direct and indirect impacts.
- Based on *dialogue* and *cooperation* across sectors for the generation of shared knowledge between government, academia, companies and civil society.
- Organised according to *demand*, to respond to specific needs and problems of affected social groups in the territory, through the co-design of solutions.
- Focused on *action* around concrete problems and that encourages change, transformation and collective impact that are sustained over time.
- Managed with governance structures and models that are *participatory*, using flexible, open and dynamic approaches to programming, coordination and evaluation that encourage experimentation, learning and adaptability;
- *Bold* and designed so that they explore alternative routes, including experimenting with untested approaches and actions, evaluating their impact, integrating lessons, reproducing or scaling up successful solutions and linking them to other strategies and agendas (such as the research and innovation missions in the Horizon Europe Programme).
- *Forward-looking* by trying to predict the systemic effects the long-term actions will cause and open so they can adapt and respond actively to unexpected effects, developments, achievements and failures.

The Bages and the BIOLAB Ponent shared agendas are described in boxes 6 and 7

### **Box 6. Bages Shared Agenda**

#### Aim

To address the challenges generated by the problems and needs of dependent people affected by chronic diseases and the ageing population from the perspective of their interaction with the health-social system and its different ecosystems, by co-developing and implementing quadruple-helix innovative solutions.

#### Opportunities identified

The shared agenda is becoming a driver for social and economic transformation of the territory generating new technology-based business opportunities related to 3D design and planning, simulation methodology, applied robotics, artificial intelligence, telemedicine and telecare.

#### Stakeholders

- Academia and health institutions: Bages University Foundation (FUB), Polytechnic University of Catalonia (UPC) in Manresa, EURECAT, Althaia Foundation, Sant Andreu Salut Foundation, Ampans Foundation, University Institute for Research in Primary Care (IDIAP Jordi Gol), Catalan Association of Associative Base Entities (ACEBA), Territorial Management of Central Catalonia of the Catalan Health Institute, ICT Social Health Foundation, Union Consortium Formation (UCF), University of Newcastle (UON) Australia.
- Public administrations: Manresa City Council, Bages Regional Council.
- Companies: Manresa Chamber of Commerce, ICT Bages, Vodafone Spain, Avinent Implant System, Control Live, Maccion Lean Solutions, Yasyt, Bit Genoma, Iskra, Neuro in Business, Natural Machines, UVE Solutions, Oliva Torras, Broomx Technologies, Zerintia Technologies, Denso Barcelona, Tecnum, Robbie.ai.
- Civil society: Family Association of Alzheimer' Diseases of Bages, Berguedà and Solsonès (AFABBS), Association of Diabetics of Central Catalonia, Bages Multiple Sclerosis Group Association, Family Association of Mental illness of Bages.

#### Territorial scale

Bages county

### **Box 7. Biolab Ponent Shared Agenda**

#### Aim

To change the current model of production and consumption to one based on the green and circular economy in order to capture the potential social, economic and environmental benefits of this transformation by capitalising on local resources and articulating effective responses to socioeconomic problems in the territory.

#### Opportunities identified

- To promote new value chains in the territory through the production of biomaterials, biofuels and bioenergy.
- To promote the generation of value in the territory based on renewable energy sources.
- To promote new value chains and new production models that increase the resilience and competitiveness of the agri-food sector.
- To promote the multifunctionality of rural spaces and convert them into ecosystem service providers.
- To create green jobs.

#### Stakeholders

- Public administrations: Lleida's provincial Council, Lleida's Economic Promotion Board, municipal councils of Lleida, Alcarràs, Tàrraga, Balaguer, Bell-lloc, Soses, Seròs, Sudanell, Montoliu de Lleida, Torres de Segre, Albatàrrec.
- Academia and research institutions: University of Lleida, Lleida's Cientific and technological Agrofood Park, IRTA.
- Companies: SAT Km0, Muns Agroindustrial, Griño Ecològic, Vegas Suport Agrotècnic, Akis International, E3G Enginyeria, Fruits de Ponent, Ignis, Mat Envases, Agromòdol, Fruites Lozano, Lleida's Chamber of Commerce.
- Civil society: Federació de Cooperatives Agràries de Catalunya, Comunitat General de Regants del Canal d'Urgell, DO Garrigues, Centre d'Estudis Agropecuaris, Escola de Capacitació Agrària Alfarràs.

#### Territorial scale

Six counties in Lleida province: Segrià, Noguera, Pla d'Urgell, Urgell, Segarra and Garrigues

## 5 Towards a transformative S3

As highlighted above, global trends are putting pressure towards accelerating transitions to more sustainable and inclusive development pathways and public policies and EU funds are called to contribute to the achievement of the SDGs and of the Green Deal objectives.

In this context, RTDI policies and S3, that in the period 2014-2020 have been strongly grounded in framing 2 of RTDI policies (c.f. Table 1), characterised by a triple-helix approach and a strong focus on competitiveness, need to evolve in order to meet their mandate. We argue that, as S3 is called to contribute to the SDGs and the Green Deal objectives, it must integrate elements of framing 3 and of RRI.

Both the scientific contributions reviewed in section 3 and the practical experiences reviewed in section 4, allow us to draw some indications on how S3 should evolve, complementing the lessons and instruments from the previous period, with insights from framing 3, as defined in *transformative innovation policy* literature. Table 2 synthesises such a desirable evolution.

**Table 2** From S3 towards transformative S3

	S3 (2014-2020)	Transformative S3 (2021-2027)
Main focus	<ul style="list-style-type: none"> <li>R&amp;I is a driver of economic growth, competitiveness, and ultimately public welfare. The focus is on increasing competitiveness (of companies and other actors performing R&amp;I) and on addressing the failures of the regional/national innovation systems.</li> <li>Mobilisation of triple helix stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>R&amp;I is not neutral and may amplify social and environmental problems. R&amp;I addressing environmental and social challenges in a responsible way is a driver of economic growth, increased competitiveness and public welfare.</li> <li>Mobilisation of relevant stakeholders.</li> </ul>
Identification of priorities (EDP)	<ul style="list-style-type: none"> <li>Analysis of the regional economic and innovation system to identify opportunities for knowledge-based development.</li> <li>Broad consultation and participative processes (workshops, focus groups, platforms for interaction...) mainly with triple helix stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>Multi-level systemic analysis, and identification of the necessary reforms in governance, regulations and legislation that can enable transformative innovation (e.g. through POINT reviews or similar methodologies).</li> <li>Relevant stakeholders are identified according to the system that needs to change. They are actively engaged in the systemic analysis and in the identification of priorities.</li> <li>Priorities are linked and adapted to the dynamics of territorial challenges and global trends.</li> </ul>
S3 Instruments	<ul style="list-style-type: none"> <li>Traditional R&amp;I support instruments to enhance the regional/national competitiveness focusing on: <ul style="list-style-type: none"> <li>the S3 sectoral and technological priorities</li> <li>the R&amp;I ecosystem (i.e. R&amp;I infrastructure and equipment, capacity building, support to entrepreneurship, etc.).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>S3 instruments and actions are challenge-oriented and integrate the RRI dimensions: (anticipation, inclusion, reflexivity and responsiveness).</li> <li>Combination of traditional R&amp;I support instruments with instruments supporting continuous experimentation.</li> <li>Instruments to support bottom-up</li> </ul>

		<p>collaborative initiatives of stakeholders addressing common challenges (through shared agendas).</p> <ul style="list-style-type: none"> <li>• Instruments (legal and financial) to support protected spaces (niches) enabling experimentation and radical innovation for transformative change.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Focus on accountability and effectiveness, ensuring the achievement of the pre-identified objectives/results.</li> <li>• Focus on the performance of pre-defined priorities.</li> <li>• Traditional indicators based on statistics, surveys and administrative and projects' data, complemented with qualitative information from focus groups and interviews.</li> <li>• Incipient use of digital tools and open data.</li> </ul>	<ul style="list-style-type: none"> <li>• Beyond the administrative requirements, the focus of monitoring is placed on learning and on transformative outcomes.</li> <li>• Integration of traditional monitoring tools with exploitation and visualisation of big-data and open-data to identify challenges, emerging trends and the configuration of collaborative networks.</li> <li>• User-friendly visualisation tools are publicly available to provide evidence for stakeholders' decision making.</li> </ul>
Governance	<ul style="list-style-type: none"> <li>• Coordination mechanisms between strategic, technical and bottom-up levels, to ensure the implementation of the strategy.</li> <li>• Coordination across government departments that share a thematic interest in given S3 priorities.</li> <li>• Facilitation of spaces for stakeholders' interaction</li> <li>• Guarantee that stakeholders' views related to priorities are taken into account throughout the policy cycle.</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanisms to facilitate the alignment of stakeholders' efforts and resources to address the challenges that matter to society, through shared agendas, participatory forms of governance and participatory monitoring mechanisms.</li> <li>• Generation of legitimacy for transitions (through evidence, dialogue and commitment of relevant actors).</li> </ul>
Continuous EDP	<ul style="list-style-type: none"> <li>• Discovery of emerging opportunities in relation to specialisation and competitiveness.</li> </ul>	<ul style="list-style-type: none"> <li>• Generation of continuous knowledge about the system and facilitation of collective learning and action.</li> <li>• Identification and monitoring of grassroots innovations and bottom-up initiatives developing alternatives to current unsustainable practices and technologies.</li> </ul>

## **6 Concluding remarks**

This paper has aimed at describing in outline some desirable features of transformational Smart Specialisation and of its EDP.

To do so, we have highlighted the policy and global trends that push Cohesion Policy and S3 towards environmental and social sustainability. We have also introduced conceptual and policy frameworks, as well as pioneering policy initiatives, that can enhance the transformative nature of S3. On this basis, we have identified the key dimensions that distinguish the new generation of S3 and EDP from the previous one.

To conclude, developing an S3 and EDP that support systemic transitions is not easy and requires effort and resources. This aspect cannot be understated. Not only does this change require a new institutional design, able to include stakeholders across society and territories, but it also demands skills and capacities from all those involved which take time to develop. Balancing all these elements is as difficult as it is imperative. The new EU programming period offers significant opportunities and those involved in Cohesion policy should seize them by being open to working in new and challenging ways.

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