Report to the European Commission, DG Regional and Urban Policy

GOOD GOVERNANCE OF RIS3 2021-2027 in GREECE – A SYNTHESIS REPORT

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Introduction: DG Regio assignment

This synthesis report presents an outline of the DG Regio assignments on "Good Governance of S3 2021-2027 in Greece". We describe the findings of three reports and related surveys realised between November 2019 and March 2020 and the derived policy recommendations on how national and regional authorities in Greece should comply with the Policy Objective 1 for 'Smarter Europe' through innovation, digitisation, economic transformation and support to small and medium-sized businesses.

The section 1 of the report addresses the seven **enabling conditions of good governance** of national and regional smart specialisation strategies 2021-2027, as these are defined by European Commission:

1. Analysis of challenges including bottlenecks for innovation diffusion
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 co-operation ("entrepreneurial discovery process")
5. Actions necessary to improve national or regional research and innovation systems, where relevant
6. Where relevant, Actions to manage support industrial transition
7. Measures for internationalisation

This section and the underlying survey was prepared by George Stogylopoulos.

The section 2 focuses on the challenges related to innovation diffusion. It is based on up-to-date analysis of **bottlenecks for innovation diffusion, including** failures by Universities and RTO's to serve the needs of firms, inefficiencies of innovation agencies, problems in coordinating with public agencies, and problems in knowledge and technology transfer. This section and the underlying survey was also prepared by George Stogylopoulos.

The section 3 of the report deals with RIS3 Entrepreneurial Discovery Processes (EDP) and the contribution of business and innovation ecosystems to EDP. We address the challenge of defining a "functioning of stakeholder co-operation in entrepreneurial discovery process". Functioning EDP is working EDP, doing what it's supposed to do, namely addressing two challenges (1) the prioritisation challenge and (2) the discovery challenge. EDP must ***identify and prioritize*** innovative business activities in a variety of activities and sectors, that have the potential for diversification and transformation towards higher added value activities. Moreover, EDP must ***outline policy actions*** and public support measures for the benefit of entire industry sectors or ecosystems than the benefit of specific organisations and enterprises. This section of the synthesis report and the underlying survey was prepared by Nicos Komninos.

Thus the three sections of this synthesis report are dealing with the governance of smart specialisation in Greece for 2021-2027: the first section is a comprehensive organisation of S3 with respect to enabling conditions set by the European Commission, while the next two sections focus on two aspects that are important for Greece, namely the bottlenecks of innovation diffusion and the management of entrepreneurial discovery process.

During the preparation of the reports we had constant feed-back and advice by the European Commission, DG Regio Unit responsible for Greece and Cyprus, and in particular by G. Peroulakis, A. Sofos, W. Sluijters, P. Padazatos, P. Thanou and M. Rodrigues. Additional comments on the synthesis report we received from C. Rasmussen (DG Regio) and D. Pontikakis (JRC). The full reports and annexes with supporting data are available by the European Commission, DG Regio. You may address any inquiry to Mr. G. Peroulakis at <Georgios.Peroulakis@ec.europa.eu>.

1.Enabling conditions of S3 governance 2021-2027 in Greece

Good governance of RIS3 for the period 2021-2027 is defined by seven fulfillment criteria set as an enabling condition for Policy Objective 1, namely: 'Smarter Europe' through innovation, digitization, economic transformation and support to small and medium-sized businesses. These 7 fulfilment criteria are:

1. Analysis of challenges including bottlenecks for innovation diffusion
2. Existence of competent regional/national institution or body, responsible for the management of the smart specialization strategy
3. Monitoring and evaluation tools to measure performance towards the objectives of the strategy
4. Functioning of stakeholders cooperation (entrepreneurial discovery process)
5. Actions necessary to improve national or regional research and innovation systems
6. Support industrial transition
7. Actions for internationalisation

The governance system of the present programing period can be divided in four levels.
a. The strategic design and implementation of the operational programs relating to enabling condition 1 at national and regional level
b. The implementation design of the various development policies relating to enabling condition 1 based on national and European legislation
c. Management and monitoring
d. Actual implementation of the programs and measures

The present summary report mainly deals with governance **level 'a'**. It describes and highlights all the positive and negative elements of the current programing period concerning the design and implementation of the RIS3 strategy as a conditionality. At the same time it provides strategic options and conditions that could help the country to 'embrace' the seven criteria under enabling condition 1. The present report does not enter into the very nature of the operational programs that were applied neither into the operational programs that will be applied in the next programing period.

RIS3 as a conditionality for the period 2014-2020 affected mainly Thematic Objective 1. The conditionality was that a RIS3 strategy should be established. In the next programming period, the conditionality is not the design/re-design of the RIS3 strategy but the governance of Policy Objective 1 that will include actions and measures in favor of R&D & Innovation, digitalization, SME's growth and skills development. This implies that a larger number of actors will be involved, and a larger budget will be affected by the quality and efficiency of design activities and Governance.

Governance and monitoring structures although proposed by RIS3, GSRT and the relevant legislation, were not a top priority for national and regional RIS3 implementation. On the contrary, for many regions it was the last priority and sometimes a 'headache'. This happened due to not enough interaction with the relevant national authorities during the implementation phase or due to very low budgets for TO1 that have been allocated to the regions or lack of experience.

Prioritizing upside-down the criteria for the enabling condition for smart specialization

The country should design its next decade firstly by thinking and pointing at international targets. A major factor towards this direction is the shift towards digital economy, artificial intelligence, circular economy and industry 4.0 in general. In order to be successful Greece needs to identify actions necessary to improve national or regional research and innovation

ecosystems. But these actions should actually satisfy the results of an effective entrepreneurial discovery process that 'searches' internationally. Nevertheless, it is impossible to perform and document the EDP process without a clear monitoring and evaluation mechanism that is totally fitted with relevant regional and national institutions or bodies responsible for the governance of the strategy. This efficient governance structure will be used together with the programmes and measures proposed in order to eliminate the bottlenecks for innovation diffusion and secure a better international positioning. The above prioritization does not imply lower significance of some of the criteria. On the contrary all criteria try to identify bottlenecks to innovation and all criteria are interrelated.

1.1. Actions for internationalization

From the findings at national and regional level we observe that there is a rather 'limited view' in 'seeing' the design and implementation of RIS3 regarding internationalization. In most cases policy makers, at national and regional level, consider[1] internationalization as the simple participation in EU programmes like trans-regional collaboration (e.g. INTERREG) and the design of measures supporting companies to export[2].

The approach to smart specialization described in the 'Guide to Research and Innovation Strategies for smart specialization' by Foray et al. (2012) strongly promotes the international and trans-regional dimensions. 'Internationalization needs to be considered as a crucial component for smart specialization strategy. Internationalization includes not only export and FDI but also strategic alliances joint research co-development, outsourcing, relocation (especially R&D units), mergers and acquisitions, licensing intellectual property rights, technology showcases etc.' Also, Internationalization implies an effort by the regions to identify opportunities in the areas that they have International advantages. Internationalization also means that regions and Countries could identify partnering regions (nationally or internationally) that they could collaborate in the fields that they have selected and use common tools such as clusters, hubs, research infrastructures or intermediary innovation support organizations.[3]'

There is no analysis in the present RIS3 strategies concerning the positioning of the Greek excellence in the Global Value Chains. An analysis of the sectoral and technological ecosystems can give more 'light' in that direction. In addition, there is no description/assessment of the role of Multinational Enterprises (MNEs) in the local value chains including R&D (some findings and suggestions are included in the separate report on the bottlenecks to Innovation diffusion). For example, we need to assess the future impact of international investments in R&D in Greece like the recent establishments of major R&D departments and centers of excellence like Tesla, Pfizer, Nokia, Microsoft-RPA (Robotic Process Automation) and EY (AI).

RIS3 actions for international collaboration in the regional RIS3 2014-2020 are rather limited[4], at least for those funded by the Regional Operational Programmes. On the contrary, many actions of international collaboration have been implemented in the framework of the European Territorial Cooperation Programmes, such as Interreg, MED, Interreg-ADRION, Bilateral RTD Cooperation (GGET) or participation in H2020 projects.

Currently, there is no particular concern about actions of international collaboration in RIS3 2021-2027, and the topic does not pop-up in the interviews performed at regional level except some few regions like Attica and Epirus. The strategic thinking of regional policy

[1] Based on Interviews
[2] Source: EPANEK
[3] Radosevich slavo, Katerina Ciampi Stancova, Internationalising Smart Specialisation: Assessment and Issues in the Case of EU New Member States, 2015
[4] Interviews

makers was closer to the increase of the support to export companies. They have not promoted competitive actors of their local ecosystems as opportunities for internationalization like for example the case of regional R&D Centers or ecosystems (a positive example is the R&D center for Mastiha in North Aegean).

A new model of economic diplomacy. The new Government has already started implementing a completely new scheme according to which all the services involved in economic diplomacy are gathered under a single structure at the Ministry of Foreign Affairs (MFA). In this context, the Directorates of the Ministry of Development responsible for multilateral economic diplomacy have been transferred to MFA, while Enterprise Greece - the trade and investment promotion Agency - as well as the Export Credit Insurance Organization are also under the supervision of the MFA. Thus, MFA combines all the aspects of economic diplomacy and is able to manage and implement in a more efficient way all the tasks and targets related to promoting the extroversion of the Greek economy. The new structure of Economic Diplomacy has been designed to transform Greece into an outward looking economy capable of increasing significantly the exports' volume and attracting important FDI in various sectors of the economy. Having also in mind the technical expertise and the recommendations provided by the Dutch government, Economic Diplomacy will become the first priority of the Embassies via the Offices of Economic Diplomacy. In this context, new Offices will be set up in more countries aiming to promote exports and attract mainly greenfield and brownfield investment projects.

Recommendations for governance actions for the period 2021-2027

What has been done	What is missing	How it should be treated
'Limited view' in 'seeing' the design and implementation of RIS3 regarding internationalization at National and Regional Level	Internationalization of specific business ecosystems in GVCs, international collaborations and Networks	'Global marketing strategy for major Greek products, technologies and ecosystems'
	Internationalization does not include FDI, strategic alliances, joint research co-development, outsourcing, relocation (especially R&D units) and mergers and acquisitions	Internationalization needs to be considered as a crucial component for smart specialization strategy and should be included into National and regional RIS3 2021-2027
International R&D collaboration took place mainly through participation in EU programmes	Participation in Global R&D Networks through the identification of key R&D excellence.	Promote Greek R&D and innovation ecosystems in international FDI and MNE activities
Limited international patents (e.g. EPO)	Awareness and financing for international patenting	'Aggressive' policy and measures towards exploiting inventions internationally in collaboration with OBI
Non organized support of internationally oriented start-up and spin off creation	Solid legal framework for start-ups and spin-offs	Develop a new legislation that also supports internationalization of start-ups
Not evident connection between skills and international needs	Interrelation of the educational and training system with international needs	Adaptation of skills to digitalization and exponential technologies.

1.2. Supporting industrial transition

The international competitive position of the country can be upgraded through the support of the industrial sustainable transformation of the country. There are dramatic emerging technology trends worldwide. The classic Information and Communication Technologies (ICT) sector is not a sector any more and has reached a maturity point. However, disruptive technologies such as AI or blockchain etc. are maturing and progressing rapidly. At the same

time accelerated digitization of all aspects of human activity is paving the way for the emergence of new high-tech fields such as digital health, smart transportation, precision agriculture, and Industry 4.0 is leading a continuous growing demand for data scientists[5].

Greece belongs to the low-performing cluster of countries concerning digital transition. According to the Digital Economy and Society Index (DESI), Greece ranks 27th during both 2017 and 2018, exhibiting limited progress relative to other Member States over the past few years. However, some positive signs can be seen in the improvement in ranking regarding both the Digital Transformation Enablers and Digital Technology Integration indices, as well as the provision of Open Data (72%), on par with EU average (73%)[6]. Regarding connectivity, the transition to fast broadband connections is slower than in the rest of the EU, while the country's performance in digital public services and digital skills remains low and can act as a barrier for further development of the digital economy and society.

Further on, regarding Greece's readiness for future production, the assessment carried out by the World Economic Forum in 2018 scores Greece with 5 out of 10 for drivers of production and 4.4 out of 10 for the structure of production.

All regional RIS3 2014-2020 deal with some form of industrial restructuring. In the approved national RIS3 it is evident the concern for modernization of existing industry sectors and technological upgrading of existing industries through innovation and embodiment of key enabling technologies. However the limited analysis and support of ecosystems has not provided with strong ideas for an integrated policy on industry4 and digitalization. For regional RIS3 2021-2027, the concern for industrial transition is strong in the region of West Macedonia, given the transition to a post-lignite period entailing the closure on many low-productivity industrial facilities. In other regions industrial transition is mainly linked to digital transformation of industry and wider use of renewal energy. However, little has been done since financing under TO2 (ICT support) was limited and mainly focused on ICT infrastructure.

The Ministry of Environment and Energy revised and re-published in December 2019 the National Strategy for the Circular Economy[7], which is in line with the European strategy. Adoption of policies that promote the transition to a circular economy is an urgent need and at the same time an opportunity for growth. As typically pointed out in the Strategy "Circular economics refers to the economics of the real product, feeds the primary and secondary sectors of the economy, relies on the knowledge and specialization economy, generates high capital gains, exploits and respects the natural and environmental resources, reduces import dependency and improves trade balance, creates jobs, adapts to all sizes, does not always need to start-up capital, improve resource and energy productivity ratios and are fully compatible with SMEs and the social economy. "

The EU Recovery Plan is a challenge that EU faces not only by supporting the recovery of the economy but also by investing in the future. The European Green Deal and digitalization are designed to boost jobs and growth and protect public health and environment. Greece is among the ambitious EU member-states regarding the European Green Deal asking that the European Commission continue and intensify efforts to preserve climate and environmental goals. The EU will provide financial support and technical assistance to help people, businesses and regions that are most affected by the move towards the green economy through the Just Transition Mechanism in the most affected regions.

However, in order to support industrial sustainable transition, there is a need to coordinate measures and activities around specific dynamic ecosystems. Coordination is a key challenge

[5] Innovation Office Israel.
[6] Digital Economy and Society Index 2018, Country Report Greece
[7] National plan for Energy and Climate

at national and regional level, and it was not visible during the current programming period. ESETEK can play a key advisory role at national level and also to influence regional priorities around specific ecosystems by broadening the EDP process involving new stakeholders.

Recommendations for governing RIS3 for the period 2021-2027

What has been done	What is missing	How it should be treated
Industrial transformation was not an evident policy direction for the current programming period and not a clear policy priority for the current RIS3	Industrial transition focusing in specific business and R&D ecosystems at National and regional level	Focused & coordinated policy measures in ecosystems and sectors
	Industrial transition as a crucial component for smart specialization strategy.	Policy suggestions should be provided by ESETEK for national and regional RIS3 strategies
Circular Economy is included in the current RIS3 as part of GSRT's strategy for R&D and innovation (platform on R&D and sustainable development)	Interrelation among Industry4 actions, circular economy and the revision of RIS3	Interrelate circular economy (national plan) with the revision of RIS3 and the participation in European Green Deal and Just Transition Fund
Not evident connection between training/skills and industrial transition	Interrelation of the educational and training system with industrial transition opportunities	Adaptation of skills to Digital Europe, AI, eco-innovation and exponential technologies.

1.3. Actions necessary to improve the research and innovation systems

RTDI policy in Greece has largely focused on the support of Research Infrastructures and the development of collaborative research projects (Research-Create-Innovate-RCI). HFRI Grants (ELIDEK), RCI and Venture Capital Funds (both innovation window and start-ups) became very popular but there is no information yet on the quality of the projects selected and financed. Except HFRI Grants, the majority of the remaining financing is based on European Structural Funds.

Proof of concept, spin off support and incubation activities are supported mainly by Venture Capital funds during this programming period. These are financing activities that are directly related to new ideas that could become businesses and are not related with direct financing of any intermediary organization. Intermediary organizations like technology parks, business Innovation centers, TTOs, incubators and existing clusters appeared very late in the agenda of the implemented policy until now.

Exploitation of research results and Technology Transfer activities are also supported mainly by Venture Capital funds and without launching, until now, any other soft measures that could work as 'bridges' between research community and enterprises. It is in the agenda of GSRT to publish a call for tenders for the creation of Clusters, Competence centers and TTOs. However, there is no concrete policy yet for the support for an overall framework for technology transfer. GSRT performs a study in order to design a new integrated policy framework for technology transfer support and especially for the financing of technology transfer offices.

The systemic dimension of regional RIS3 2014-2020 is not particularly strong. It focuses mainly on research-business collaboration, a double helix approach, instead of setting more complex systems engaging actors from funding and market access domains. Main actions supported by the Investment Priorities 1a and 1b are about Research Infrastructures in which eligible are universities and research centres, and collaboration between academia and industry in 'RCI' type actions. In addition, actions funded by other Thematic Objectives (e.g. TO2, TO3, and TO8) do not demonstrate any systemic relationship (methodologically) to the National RIS3 although the call for tenders for supporting SMEs under EPANEK invited mainly SMEs active in the eight RIS3 priority areas. There was no coordination of the

measures supporting the technological advancement of SMEs and those supporting R&D and innovation. Even more there was no specific support of specific ecosystems.

Evaluation procedures and financing were as always late, creating complaints from participants in the calls for tenders. Simplification and shortening of procedures should a must for the next programming period.

Recommendations for governance actions for the period 2021-2027

What has been done	What is missing	How it should be treated
The actual RDTI policy implemented has mainly supported Grants for Blue sky R&D, human capital, applied research and R&D infrastructures with total budget around 1.44 billion.	Lack of support for intermediary organizations like tech parks, TTOs, Competence centers, incubators etc.	Support intermediary organizations
	Lack of a national technology transfer policy and priorities	Homogenization of the legal framework for spin off and start-up creation linked with a solid national strategy for technology transfer
	Lack of Internationalisation & Industrial transition strategy	International dimension and industrial transition should be part of almost every measure
Actions took place in favor of Brain Gain and Brain Sustain Favourable taxation initiative	Links with the market instead of only R&D oriented Fellowships Even better taxation system linked with start-ups	Support Industrial Fellowships Connection with industrial transition, circular economy and exponential technologies.
Brain Sharing is limited to R&D EU projects.	Internationalisation and Brain Circulation	Support international mobility of scientists
Relatively Linear approach for financing RDTI	A financing mechanism towards dynamic ecosystems	Large scale projects (e.g OXE type) encouraging International and interregional collaboration
Bureaucratic procedures for the evaluation and financing of projects.	Simplification	Task force for simplification Application of H2020 procedures.

1.4. Existence of competent institutions or bodies responsible for the management of the smart specialisation strategy

The **General Secretariat for Research and Technology (GSRT)** of the (then) Ministry of Culture, Education and Religious Affairs (and under the Deputy Minister for Research and Innovation) was the national RIS3 Design, Planning and Implementing Body. The National Research and Innovation Council (ESEK now called ESETEK) was supposed to monitor RTD policy developments and submit relevant proposals to the Ministry and the GSRT. However, this was not the case since ESEK met very few times and did not play a serious role. On the contrary, ESETEK, established in December 2019, has met more than ten times during the last months and was very active even during the 'pandemic' supporting the government on issues relating to organising the technology transfer mechanism of the country.

Regional RIS3 planning, monitoring and implementation units or services. The initial proposal suggested by GSRT was that the **Directorates for Development-Planning** of the regional authorities should undertake these responsibilities. In reality, in most of the regions the Special Management Authorities undertook the planning and implementation activities. Monitoring activities of RIS3 at regional level were weak or non existent.

The **Regional Research and Innovation Councils** (PSEKs) were established through the Law 4310/2014 revised in 2016 (law 4386/2016). PSEKs were set up by a decision of the regional governor to provide advise on issues related to research and innovation policy at regional level. Their mission is also to encourage the development of public-private partnership schemes and shape the conditions for successful participation of regional

organizations in National and European research projects. Each PSEK includes eleven (11) members, of which six (6) are professors of HEIs or researchers coming from research centers. The remaining five (5) members come from professional chambers and scientific associations, cultural institutions, local government and productive bodies in the region or from other national organisations. PSEKs were established in all Greek regions, but very few of them have been really active in providing advise to Regional RIS3 design and implementation.

Recommendations for governance actions for the period 2021-2027

What has been done	What is missing	How it should be treated
GSRT was responsible for RIS3 design at national level. This was not mentioned in any law	Collaboration among secretariats relating to National RIS3 design and implementation (strategic/political level)	Creation of a **structure responsible (by law) for the design and monitoring of RIS3 with a clear leader.**
The regional Directorates of Programming/ Development were proposed to Govern Regional RIS3. The structure succeeded partially.	Homogeneity of the structures in order to apply common decision making, design and monitoring of regional RIS3	Implementation of the current proposed structure at regional level. **Not as a suggestion but as a legal obligation.**
Regional PSEK have offered less than expected or they were not used in an effective way.	Lack of entrepreneurial spirit, internationalization, extrovert advice in regional PSEKs	Enrich PSEK with industrialists; enforce an industrial transition spirit with a global view.
Weak connection between regional and national RIS3	Channels of cooperation on a permanent basis for both design, implementation and monitoring	Participation of RIS3 network or PSEK representatives in the Smart Committee/Secretariat on a regular basis
ESEK has played a minor role until now. ESETEK is actually the national PSEK	Clear policy directions based on EDP process	ESETEK should play the role of coordinating EDP process. Establish links with regional PSEKs
The Smart Specialization Strategy Council (SSSC) met only once to approve national RIS3	Non existance of a body that approves the changes in policy.	Reactivation of SSSC in order to approve the design, implementation and governance process.

1.5. Functioning of stakeholders cooperation (entrepreneurial discovery process (EDP)

GSRT developed innovation platforms in all eight domains. These platforms have been and still are the core of the EDP process at national level, bringing together representatives from the sectors' businesses, research centers, universities, ministries and regions, and in general the stakeholders involved in the innovation system of each sector. For each Innovation Platform a small Steering Group has been set up consisting of experts with significant experience in the field, coming from both the productive and the research area. The mandate of each Steering Group was to choose the priorities inside each domain. For each domain a Coordinator has been appointed by GSRT.

GSRT, in the context of developing a National Strategy for Research and Innovation, has developed a National R&D Infrastructure Roadmap (NRIR). In December 2014, GSRT, after consulting stakeholders, issued the National R&D Infrastructures Roadmap with 28 infrastructures. The final **Multiannual Budgeting Plan for Research Infrastructures** (Roadmap renamed) should be included in the EDP process since a set of 28 infrastructures/projects have been established and many of them offer services to SMEs and the private sector in general. There is no accurate information on the progress level of those infrastructures yet [8].

[8] Interviews with GSRT

In regional RIS3 2014-2020 Entrepreneurial Discovery Processes (EDP) has been performed by all Greek regions. All 13 regions have used methods of enquiry, analysis and discovery of opportunities in the design of S3, including mapping, foresight, workshops, and focus groups, and other. In most of the cases the EDP process at regional level was based in a number of sectoral or thematic workshops thus being restricted to simple information collection without any use of more advanced tools. Participation of Enterprises was significant in the regions of Crete, Western Greece, Epirus and East Macedonia and Thrace. In the case of Attica the process was limited for such a large region.

Relating to EDP, participation and support by PSEK members was limited in the majority of the regions. The almost non-existence of real entrepreneurs in most of PSEK councils is a serious reason. In addition, PSEK members have never received any instruction concerning their role except what is mentioned in the relevant legislation (FEK)[9].

Recommendations for governance actions for the period 2021-2027

What has been done	What is missing	How it should be treated
One National and 13 regional RIS3 related EDP processes	Homogeneity in methodologies and indicators	Propose a manual with methodologies that could be followed by regions and Ministries
GSRT was responsible for RIS3 EDP at national level through the technology platforms operation ESEK had not active participation in EDP process.	Extrovert thinking. Ecosystems approach, interregional and international thinking. EDP in all important industries and prioritization following EDP.	Continuation of the platforms operation under GSRT. Enrichment industrial transition and internationalization issues. High-level monitoring and evaluation by ESETEK. Platform discussions should be widely.
Role of regional PSEK differs from region to region	A more advanced role of PSEK	Evident connection between national and regional EDP results

1.6. Monitoring and evaluation tools to measure performance towards the objectives of the strategy

An important challenge for smart specialization strategy is the monitoring mechanism that will guide the adaptation and implementation of corrective actions at both the target level and the process level for developing and implementing RIS3. This approach was followed for "Monitoring the Progress of Implementation of National RIS3 2014-2020" that envisages the development of a system of indicators that will take into account both the theoretical background for monitoring RIS3 and the GSRT service commitments and obligations. The 'Monitoring Mechanism of National RIS3' project was organized and performed by GSRT with a budget of 4,4 mio €. At regional level no serious monitoring and evaluation tools have been developed. This is a weak part of the overall RIS3 implementation.

Recommendations for governance actions for the period 2021-2027

What has been done	What is missing	How it should be treated
RIS3 indicators were related mainly to TO1	Missing links and indicators for better monitoring and evaluation for fulfilling the seven criteria	Indicators RDTI, Digital Greece, Industrial transition and internationalization and skills should be developed to Support PO1
Centralized system by GSRT: 'Monitoring Mechanism of the	Coordination among regional and national monitoring	Integrated monitoring system covering both national and

[9] https://s3platform.jrc.ec.europa.eu/greece

National RIS3' (national level)		regional levels (e.g. EKT)
Regional RIS3 monitoring and evaluation support mechanisms were not developed.	Advice and coordination	Provide ready for use solutions to the regions (e.g. like the 'Monitoring Mechanism' of GSRT)

2. Analysis of bottlenecks of innovation diffusion

The objective of the present summary report is to assess the bottlenecks to innovation diffusion, criterion 1 of the enabling condition 1 for good governance of national and regional RIS3 in Greece for the next programming period 2021-2027. Innovation diffusion, innovation creation and entrepreneurial discovery process are directly related to the implementation of RIS3 strategies 2021-2027.

Collaboration of many actors (e.g. technology supply, technology demand and intermediary organizations) is necessary for innovation diffusion. However, bottlenecks to innovation diffusion are actually included in all other 6 criteria presented before. I this part we specifically analyze the bottlenecks relating to the following four areas (as mentioned in the relevant specifications of the project)

- Weaknesses in adoption of new technologies at firm level
- Inefficiencies of innovation agencies in facilitating knowledge flows and coordination problems with other public agencies
- Failure by universities and RTOs to serve the needs of firms in their ecosystem
- Lack of knowledge transfer from multinational companies to domestic firms.

2.1. Innovation creation & diffusion: The long waves perspective

Innovative technologies have played a major role in economies through out the last two centuries. Disruptive innovations have marked economic evolution by creating technological paradigms that changed the forms of production, employment, communication, way of living, ethics and behaviours. In the beginning of the previous century the Russian economist Kondratieff has put all these major technology shifts into a simple graph showing the continuous influence of technology in the economy. The Kondratieff long waves explain how major technological revolutions like waterpower, textiles, railways, chemicals, aviation, ICT have entered into the world's production system and led to extensive «creative destructions»[10]. Under those long waves of innovation a series of disruptive or exponential technologies are developed that play an important role in each technological wave. Those technologies emerge through the friction of the new technological wave with the existing sectors and technologies covering new needs and resolving existing problems.

There is a lot of discussion today concerning the 6th Kondratieff long wave. ICT was the evolutionary technology that characterized the 5th one. Many scholars argue that the 6th technological revolution will be based on biosciences. Others, claim that this 6th wave «rolls» now and comprises major technologies that characterise the 4th industrial revolution like AI, nanotechnology, circular economy etc.

According to Perez, innovation diffusion takes place mainly during the 2nd phase (maturity phase) of the diffusion of a technological paradigm. This happens due to the fact that technologies are tested and have proven their values and use and they continuously reproduce other sub-technologies. Some of them will be proven unrealistic and others will be diffused in the economy. Tens of emerging technologies are developing as promising ideas but very few of them reach the productivity value. Especially in the case of artificial

[10] Schumpeter 1942

intelligence (AI) many of «bright» emerging technologies that many of us hear about in the media need a long way to prove their value in the market and the economy. In addition, in the present ICT paradigm, technology innovation life cycles are becoming more and more short. This is why large multinationals like Apple create networks of products processes and activities in order to control innovation diffusion and technology evolution.

Innovation diffusion can also actually be imposed. The pandemic of COVID-19 has resulted to a "pandemic" of adoption of technological products like ICT applications, teleworking, communication networks, security, health applications, food safety, safe transport etc. All these have been diffused and applied just in a few months during the COVID-19 pandemic period. COVID-19 was proven a "disruptive" factor causing the quick adoption of technologies that were discussed for many years. Many of these technologies will be permanently adopted and productivity structures and way of working will change. Those areas, technologies and production should be looked in a closer way in order to adopt technologies more easily and effectively. The same applies to large organizations and their structures, like banks or supermarkets. Physical interaction will be soon minimized firstly in banks and secondly in supermarket chains. Customers need to be familiar with new modes of financial interactions and efficient technology solutions should be searched and transferred for adaptation.

2.2. Weaknesses in adoption of new technologies at firm level

Greek government incentives (e.g. R&D tax super deduction, Patent Box, R&D Grants)[11] were successful resulting in an increase in R&D expenses, which in 2017, for the first time in the country's history, exceeded 2 billion euros reaching 1,13% of the country's GDP[12].

The private sector made a significant contribution in the country's R&D expenses, mainly by injecting their own revenues into R&D actions. For 2018, private R&D expenses amounted to 50% of total expenses[13].

The Community Innovation Surveys (CIS) gives a global picture of the Innovation System of Greece in comparison with the systems of the other countries of the EU. According to the last CIS 2014 – 2016 the 57,7% of the enterprises in Greece developed at least one type of innovation. This performance ranks Greece 9th among the EU countries, a position which is quite interesting given that Greece ranks 19th on R&D spending (R&D expenditure ratio as a percentage of GDP).

From CIS we also observe that Greece has the *smaller percentage of innovative big enterprises* (more than 250 employees) 2,91% against an average of EU 5,83% and the highest percentage 79,15% of small enterprises (10 – 49 employees) against 72,05% of the EU. This small size of the enterprises determines the horizons of the innovative Greek enterprises: their innovations are primarily "new for the firm" and secondly "new for the market" and their sales targets is rarely the international market.

From the interviews with the GSRT staff we have observed that despite the increase (from 0,23% of GDP in 2011 to 0,57% in 2018) the demand of R&I services is limited and collaboration between the enterprises and the research centers and universities is also limited. There is also lack of R&D departments and laboratories in the businesses, which limit the systematic development of R&I activities as well as low digitization and low use of the cloud by the firms.

[11]Delloite: Survey of Global Investment and Innovation Incentives, November 2018
[12] GSRT report: Actions and legislative interventions to enhance research and innovation (2015-2019)
[13]National Documentation Centre: research and Development expenditure and Personnel in Greece in 2018 (preliminary data)

2. 3. Inefficiencies of innovation agencies to in facilitating knowledge flows and coordination problems with other public agencies

In the following figure we can see the overall-initially-designed policy intervention of the national smart specialization strategy in the Greek Research Innovation and Economic System. As it shown public financing (TO1) was proposed to support largely the left part of the intervention mode. This was really the case since almost 1.44 billion euros were allocated for the support of research and early-stage innovation. If we compare the implemented policy as described in the previous figure with the initial design, we observe the following points:

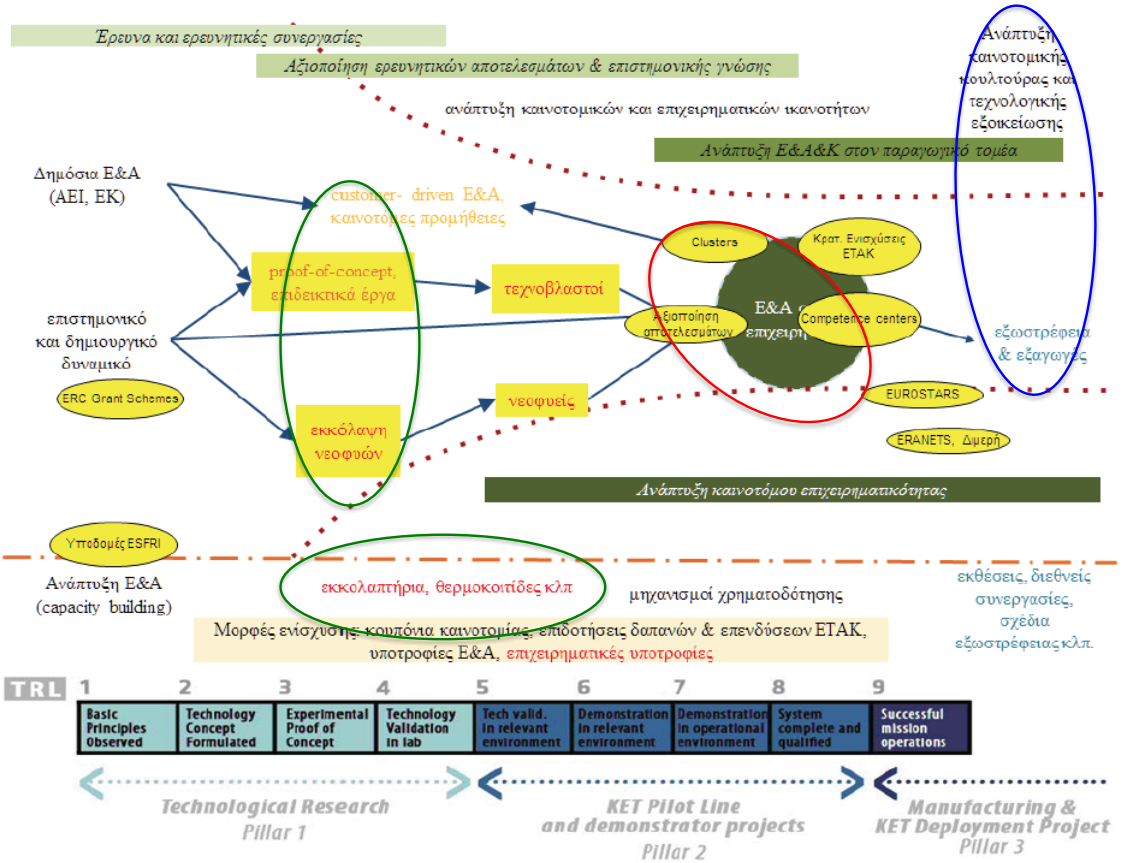

Figure 1: Intervention of RIS3 in the Greek RDTI system as initially designed
Source: National RIS3

Green circles: Proof of Concept, spin off support and incubation activities are supported mainly by Venture Capital funds. These are financing activities that are directly related to new ideas that could become businesses and are not related with direct financing of any intermediary organization. Intermediary organizations like technology parks, business Innovation centers, TTOs, incubators and existing clusters were not in the agenda of the implemented policy until now.

Red circle: Exploitation of research results and Technology Transfer activities are also supported mainly by Venture Capital funds and without launching, until now, any other soft measures that could work as 'bridges' between research community and enterprises. It is in the agenda of GSRT to publish a call for tenders for the creation of Clusters and Competence centers. However, they are no concrete policy for the support of technology transfer. GSRT performs a study in order to design a new integrated policy framework for technology transfer support (TTOs).

In Greece there are 5 technology parks active. In reality, technology parks in Greece act as incubators than real technology parks (there is no expansion capacity). They have developed during the 80s since that time there was not serious development except the recent booming of Demokritos's technology park. (Other Technology Parks still functioning well are those of Crete and Patras). This implies that these intermediary organizations were not embraced by the surrounded ecosystem or have never been in that.

During the 80s also a network of innovation centers was developed in Greece. None of them exists today. Also, the liaison offices attached to universities and research organizations were based on a small short-term financing that has not created any serious effect and most of them have not proceeded into actual technology transfer activities or the creation of start-ups.

Networking activities concerning start-up creation took place mainly by the private sector during the recent years and especially by the banks. This was expected since a large part of the start-ups worldwide are working on financial technologies and banks are under a global restructuring concerning their structure, services and relationship with the customers.

2.4. Failure by universities and RTOs to serve the needs of firms in their ecosystem

The OECD has defined TTOs as "... units or parts of an organization that assist staff in public sector research organizations, such as universities and research centers, to identify and manage the intellectual property of organizations, including the protection of intellectual property and transfer or concession of commercial exploitation rights to third parties to enhance the prospects for further development. The majority (60%) of TTOs in Europe have started operating in recent decades. However, differences between European countries, with Italy, Austria and Portugal having the most recent TTOs, while in countries such as England, Spain and Germany had many TTOs established before 1992.

The autonomous operation of TTOs can only be guaranteed over the long term, since maturing the performance of research results and ensuring a sufficient income from them are long-term processes. For this reason, most TTOs start as organizational units that are part of the foundations and partially supported by the foundation's budget, while seeking additional subsidies provided for by public funding under innovation support programs. This was the case in Greece.

During the last decades, Greece has not developed a solid R&D and Innovation system. Academia and research centers (except few) have always acted in an introvert way without specific objectives and mainly the personal interests of the researchers drove research[14] priorities. In many cases research was performed for 'research itself' without taking into account international trends and direct connection with international markets. In addition, international commercialization of research results or technology inventions was not in the mind of the Greek research and industrial basis. This is evident by the limited number of patents granted at the European Patent Office.

2.5. Lack of knowledge transfer from multinationals companies to domestic firms

For the period 2009- 2019, net FDI inflows in Greece focused heavily on the tertiary sector (i.e. services), which accounted for 72% of the whole and were mainly originating from EU countries (Germany, France, Cyprus, Switzerland)[15]. Investments in the Greek services sector were mainly directed towards financial and insurance activities, real estate management (not including private sales of real estate) and logistics. Notably, FDI investments in ICT sector

[14] IOBE
[15]Enterprise Greece: Foreign Direct Investments (period 2009- 2019), https://www.enterprisegreece.gov.gr/en/greece-today/why-greece/foreign-direct-investment

are negligible and account to only 2% of the services sector (or 1,44% of the Greece's net FDI inflows).

For the period 2014- 2020, almost all of FDI investments in Greek ICT sector refer to New Projects. It is also observed that these projects are over- concentrated in major Greek cities and mostly the country's capital, Athens. Greek enterprises show also a poor performance when it comes to investing in ICT projects abroad.

2.6. Policy recommendations on innovation diffusion

There is a need for new financial instruments for businesses' financing by the banks. The state should collaborate with banks and elaborate new tools to support the full range of business needs (innovation loans, loans for current expenses, pre-seed capital, seed capital, venture capital etc.).

Improve the management and the efficiency of the funding system for RTD projects to meet the needs of businesses. Accelerate the procedures of evaluation and financing of the projects. Establishing a time schedule for the calls for tenders and publish this in the web well in advance in order to help firms to plan their participation. Open calls with evaluation at regular intervals i.e. quarterly or semiannually could be very helpful.

Support intermediary organizations (TTOS, Technology Parks, Incubators and innovation Centers, Competence Centers and Digital Hubs) that were not supported during this programming period. Develop a National System promoting technology Exploitation/Diffusion/Transfer.

Connect the design of the innovation system with internationalization, ecosystems, exponential technologies and industrial transition. Support digital hubs and create measures that impose digitalization of the economy as fast as possible in parallel with the adoption of secure technologies.

Promote Technology Transfer Offices (TTOs) in research institutions and Academia in order to transfer knowledge, technology and innovation to the business sector. There is a study contracted by GSRT to two experts for the organization of this action. Technology Transfer Offices (TTOs) are not staffed with specialized personnel for technology collaboration, patents and exploitation of research results. As a result there is a very low number of patents and industrial designs. The same applies to Academia in addition with the lack of business culture in research and academic staff.

Universities and RTOs should own Intellectual Property Rights. For special reasons they can be released to the inventors ("releasing the IP"). It needs to be defined by law and the issue to be resolved for all. Institutions can then decide concerning the exploitation of IPR through their internal regulations.

The professional development of the TTOs operation involves continuous assessment and benchmarking. Development of goals and metrics for measuring the output produced should be formulated relating to the numbers and revenues from research contracts, licenses and creation/participation in start-ups and spin offs.

The country's research and academic institutions should play a vital role in the 'upgrading' of the Greek ecosystem. Workers and managers should acquire advanced and up-to-date knowledge on disruptive/emerging technologies at a practical level (i.e. on-the- job training). In addition, the Academic/ Research Infrastructures can be used as test and demonstration beds for those technologies.

3. Functioning Entrepreneurial Discovery process for S3 2021-2027

This section focuses on the criterion 4 of enabling conditions for good governance of smart specialisation strategies 2021-2027: ***a functioning of stakeholder co-operation in entrepreneurial discovery process***. We present a on this subject survey and policy recommendations for EDP in all important industries of Greece.

Functioning EDP is feasible and working EDP. EDP doing what it's supposed to do, namely to address (1) the prioritisation challenge and (2) the discovery challenge. EDP must ***identify and prioritize*** innovative business activities that have potential for diversification and transformation towards higher added value activities. EDP must *also* ***outline policy actions*** and support measures for the benefit of entire industry sectors and ecosystems than the benefit of specific organisations and enterprises.

The Entrepreneurial Discovery Process (EDP) is the cornerstone of smart specialisation strategies, a feature that distinguishes S3 from innovation strategies of the past**.** During the EDP, different entrepreneurial actors are brought together in a government-led ***participatory process generating a collective debate***, integrating the divided and dispersed knowledge belonging to different actors, and setting common priorities for S3 intervention. However, despite the guidance provided, serious gaps and open questions still remain in the theory and methodology for EDP. We don't dispose theoretical guidance about the selection of most promising industrial activities for diversification and growth. This gap in theory is accompanied by a gap in method regarding the EDP granularity. The greater the granulation, the deeper the level of detail and the better understanding of future trends. But, we don't dispose methodological guidance about the best granularity level to perform EDP.

These gaps in theory and methodology are reflected in the EDP process followed in Greece in the period 2014-2020. At national level the process was undertaken by the GSRT and involved two basic steps. The first was an exploratory study and consultation, which led to identification of 8 domains where research and innovation might contribute to significant competitive advantage, considering the critical mass and excellence of the research potential. The second step was related to the application of the Entrepreneurial Discovery Process in finding new business opportunities in those 8 domains. At regional level, EDP has been performed by all Greek regions, but the participation and support by members of Regional Innovation Councils (PSEK) has been limited. Selectivity and exclusion is clearly reflected in the 8 priority domains, which selected before EDP platforms and stakeholder consultation. Also, the industry granularity used was extremely fuzzy. Within the same domain, and the respective innovation platform, were combined science fields, services, and manufacturing activities. Most domains contain activities from many different industries, which makes impossible to identify common challenges and emerging opportunities in such large and diverse domains.

We address these EDP related challenges with a survey that has been developed in two stages. At stage 1 we addressed the problem of ***EDP for prioritisation of industrial activities in Greece***. This means that we don't define S3 priority activities by a theoretical approach guiding the selection and prioritisation of industrial activities, but we assess the functionality of EDP to all important industries, considering that they have potential of diversification and growth. At stage 2 we addressed the problem of ***EDP actions that deal with growth and innovation challenges.*** We search for challenges at the level of business ecosystems, which are common to all their members, and EDP actions addressing those challenges. We conclude with ***recommendations for EDP and policy actions*** to the benefit of industry groups and business ecosystems.

3.1. Identification of most important industry groups and business ecosystems

At this stage of work we assess whether it is functional to **perform EDP without excluding any important industry** in advance. NACE rev 2 classifies industrial activities at 4 levels: in 21 Sections, 88 Divisions, 272 Groups, and 615 Classes. Regional data are available at the level of Sections, Divisions and Groups. Thus, the industry group level is the level of higher granularity and detail when it comes to regional data. If non-excluding EDP is functional at this level, then it is preferable to any other level of granularity. So at this stage of work we examined the functionality of EDP at industry group level. Is the effort needed to perform EDP for all important industry groups in Greece compatible with the 13 regional and the national S3 in Greece? How many and which are these important industry groups in Greece?

We define important industry groups per region of Greece with respect to criteria of size and specialisation: (1) number of companies per industry group, (2) size of employment, (3) specialisation computed on companies, and (4) specialisation on computed on employment. We consider as important industries the top-10 industry groups per region that combine both size and specialisation. This survey reveals that top-10 industry groups in the 13 regions of Greece belong to 51 categories, of which 26 categories appear in more than one region and 25 in one region only. Their share in the total of industry groups of Greece in terms of number of companies, employment, and turnover is between 34.04% and 42.22%. In the table below, the green colour shows manufacturing groups (38 cases), the brown colour services groups (11 cases), and the white primary sector groups (2 cases).

NACE	Name	# Regions	NACE	Name	# Regions
55.1	Hotels and accommodation	8	63.9	Other information service activities	1
11.0	Manufacture of beverages	8	61.3	Satellite telecommunications activities	1
10.5	Manufacture of dairy products	7	61.1	Wired telecommunications activities	1
03.1	Fishing	7	50.2	Sea and coastal freight water transport	1
16.2	Manufacture of products of wood,	6	32.2	Manufacture of musical instruments	1
31.0	Manufacture of furniture	5	32.1	Manufacture of jewelry, and related	1
03.2	Aquaculture	5	30.3	Manufacture of air and spacecraft	1
25.1	Manufacture of structural metal	4	29.1	Manufacture of motor vehicles	1
23.4	Manufacture of other porcelain	4	28.9	Manufacture of special machinery	1
10.9	Manufacture of animal feeds	4	26.7	Manufacture of optical instruments	1
10.7	Manufacture of bakery and related	4	26.2	Manufacture of computers & peripheral	1
10.6	Manufacture of grain mill product	4	26.1	Manufacture of electronic components	1
10.3	Processing and preserving of fruit	4	24.3	Manufacture of first processing of steel	1
90.0	Creative, arts and entertainment	3	24.2	Manufacture of tubes, pipes, profiles	1
79.1	Travel agency and tour operator	3	23.6	Manufacture of concrete, cement	1
72.1	R&D on natural sciences and eng.	3	23.3	Manufacture of clay building materials	1
50.1	Sea & coastal passenger water tran	3	22.2	Manufacture of plastic products	1
23.7	Cutting, shaping of stone	3	21.1	Manufacture of basic pharmaceutical	1
16.1	Sawmilling and planning of wood	3	20.5	Manufacture of other chemical products	1
10.4	Manufacture of vegetable oils, fats	3	18.2	Reproduction of recorded media	1
10.2	Processing and preserving of fish	3	15.1	Tanning and dressing of leather, etc.	1
10.1	Processing and preserving of meat	3	14.2	Manufacture of articles of fur	1
62.0	Computer programming & consult	2	14.1	Manufacture of wearing apparel, exc fur	1
28.3	Manufacture of agri- machinery	2	13.3	Finishing of textiles	1
22.1	Manufacture of rubber products	2	10.1	Processing and preserving of meat and	1

10.8	Manufacture of food products	2			

3.2. Profiling industry groups and business ecosystems

Having identified the most important industrial activities in Greece in 26 industry groups at national level and 25 at regional level, we ***went deeper and looked into those 51 industry groups***. Main question was about the identification of industry groups that have potential for ecosystem development and the business and innovation challenges they face. We undertook a survey based on interviews with business stakeholders and experts in the 13 regions of Greece.

We identified 25 business ecosystems that have typical features of business clusters such as (i) productive specialisation, (ii) geographical boundaries in a region, and (iii) high location quotients. These ecosystems were also identified as potential platform-ecosystems. We analysed business and growth challenges using various sources of data: (1) sectoral studies, (2) data from the ICAP database, (3) secondary data sources, such as company websites, news, and reports from industry associations, and (4) data from the GSRT on research proposals submitted to Erevno-Kainotomo A and B calls.

3.3. Innovation challenges and platforms for ecosystems development

The study of profiles of these 25 industry groups and business ecosystems allowed identifying four types of growth and innovation challenges in regard to (1) new product design and development, (2) production and supply chain optimisation, (3) branding and promotion, and (4) export market access and demand crisis. These challenges also include issues related to Green Deal goals and Digital transformation goals. Per ecosystem these challenges are interwoven, and the production side is linked to demand in other ecosystems, such as energy, transport, waste management and recycling.

- *New product design and development* is the dominant innovation challenge in ecosystems such as 21.1-manufacture of basic pharmaceutical products (new medicines and molecules, pharmaceutical discovery, relocation and drug re-targeting), 22.2-manufacture of plastic products (new degradable plastics, transition to a circular economy model), 55.1-hotels and similar accommodation (services to specific population targets, applications to provide new advanced services or optimize existing services), 62.0-computer programming and consultancy (smart applications and new e-services), 79.1-travel agency and tour operator activities (replacement of services previously offered, need for new services).
- *Production modernisation and supply chain optimisation* is the dominant innovation challenge in ecosystems such as 03.2-aquaculture (improving the productivity, diagnosis and control of diseases, expansion of activities), 10.1-processing and preserving of meat and production of meat products (verticalization, standardisation and processing, storage and distribution), 10.9.-manufacture of prepared animal feeds (increased specialisation, supply of raw material, lowering production costs), 11.0-manufacture of beverages (protocols for the clonal selection of grapevine, vertical coordination, high labour costs), 23.7-cutting, shaping and finishing of stone (automation, exploitation of mining and marble by-products, environmental remediation, quarry rehabilitation.
- *Branding and promotion* is the dominant innovation challenge in ecosystems such as 10.4-manufacture of vegetable and animal oils and fats (high quality of products but low branding, standardization of quality, trade in bulk form), 10.5-manufacture of dairy products (local brands, better packaging, international sales networks), 90.0-creative, arts and entertainment activities (access to media, innovative platforms for promotion, dissemination of intangible cultural heritage).
- *Market innovation and access to global markets and exports* is the dominant innovation challenge in ecosystems such as 4.2-manufacture of articles of fur (sharp drop in demand

from abroad, lost market shares due to traditional promotion models). On the internal market side, *the collapse of demand due to crisis of construction is pressing for access to new markets* in industries such as 16.2-manufacture of products of wood, cork, straw and plaiting materials, 24.2-manufacture of tubes, pipes, hollow profiles and related fittings, 31.0-manufacture of furniture, and 50.1-sea and coastal passenger water transport.

A novel solution to these challenges comes from the recent literature on platforms and platform-based ecosystems. Research in this field shows that "industry platforms are technological building blocks (that can be technologies, products, or services) that act as a foundation on top of which an array of firms, organized in a set of interdependent firms (sometimes called an industry "ecosystem"), develop a set of inter-related products, technologies and services". Platform-based ecosystems are created when an organisation launches a platform that becomes the foundation for products and services of other companies. This "platform leadership" is a strategy that enables companies to exert influence over the direction of innovation in an industry, by engaging other firms in a joint effort for complementary products. Industry-wide platforms offer resources that third party organisations can use to develop their own complementary products, technologies, or services. Working with an industry-wide platform typically results in a two-part structure: on the one side, there is the specific solution that is hosted on the platform, and on the other side, there is the platform with its infrastructure, hardware, software and data which communicate with the hosted solutions and organise collaboration according to established procedures (fig. 2).

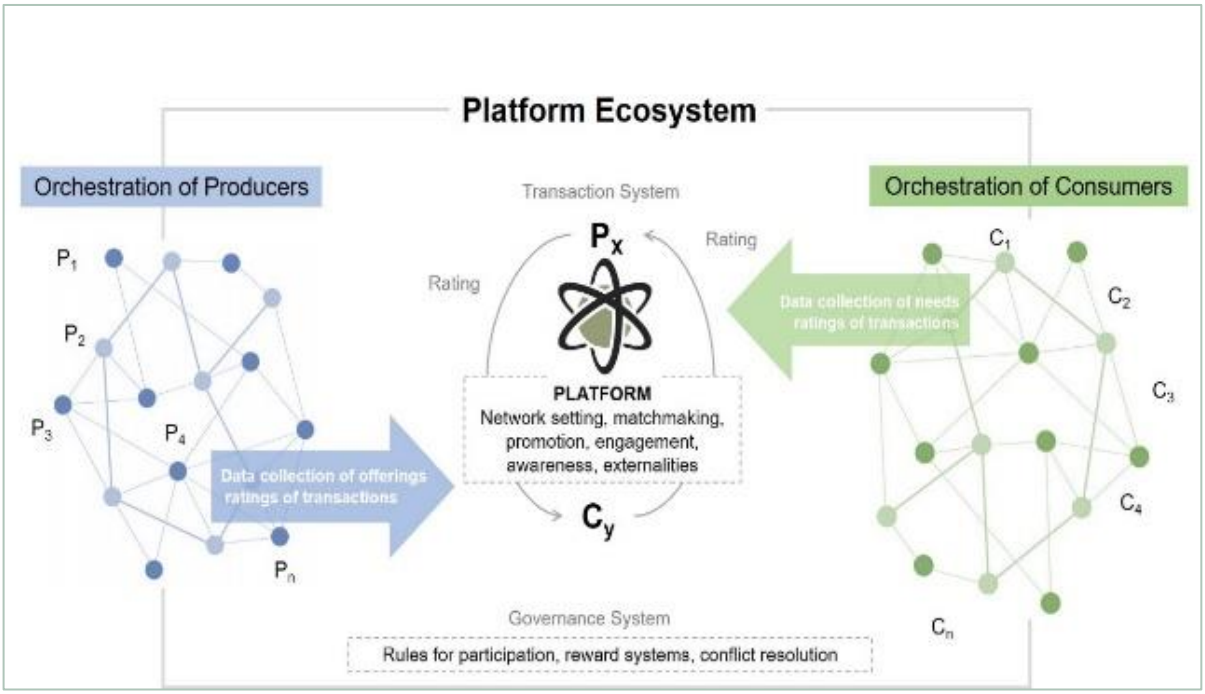

Figure 2: Platform-ecosystem and two-side orchestration of producers and consumers

The four types of growth and innovation challenges found can be addressed by platforms that orchestrate both producers and consumers:

- *Market-driven platforms*, with emphasis on dealing with demand, market access, branding, product promotion.
- *Product-driven platforms*, with emphasis on dealing with product design, new product development, smart products, quality, and certification.

- *Production-driven platforms*, with emphasis on production processes, automation, supply chain integration and optimisation, vertical coordination.
- *Materials-driven platforms*, with emphasis on dealing with new materials, raw material, waste, and materials recycling.
- *Infrastructure-driven,* with emphasis on physical space and equipment.

These platforms must be ***regional*** when the respective industry group or business ecosystem is located into one region or ***national*** (trans-regional) when the industry group is present in many regions. In platform-ecosystems, the creation of the ecosystem goes together with the development and deployment of the respective platform. The discovery of platforms for industry ecosystems should be the main task of ***EDP exercises***. Thus, EDPs will be justified as a collective search for actions to the benefit of all actors belonging to an ecosystem. All national ecosystems should be included for EDP, while in our survey 3 out of 10 regional ecosystems cases do not meet the conditions for EDP, due to low innovation demand, small number of companies in the group, or difficulty to identify common ground for platform building.

Given the number of industry groups we have studied (25 out of 51), we estimate that a full coverage of most important industry groups in Greece would require 26 national-level EDP and 17 regional-level EDP, and ***overall 43 EDP exercises***. This is a figure quite feasible, if it is well distributed and coordinated between the national and in 13 regional strategies for smart specialisation.

3.4. Policy recommendations

Based on the above 2-stage survey the following policy recommendations are proposed to national and regional authorities of Greece about EDP for 2021-2027.

EDP in Greece is feasible at NACE industry group level: This level of industry granularity is the best possible to reveal detailed challenges and future prospects of an industry. The only barrier to perform EDP at the level of industry groups is the large number of EDP exercises. However, we have seen that most important industrial activities in Greece, in terms of size and specialisation, are gathered in 51 industry groups. Among them, 26 figure in more than one region and 25 in one region. Thus, a full coverage of important industry groups in Greece would require approximately 43 EDP exercises, as industry groups that include only a few companies should be excluded. It is within the potential of 14 (13+1) smart specialisation strategies in Greece to implement EDP in the most important industry groups, with approximately 3 EDP exercises per RIS3.

Priority domains for RIS3 support should be determined after EDP: At the end of EDP at the level of important industry groups the priority domains for RIS3 support should be defined. All 51 (or 43) industry groups will not be selected as priority domains, but only those having potential for future development toward higher added value activities and assessed successfully by EDP. This is in contrast to what happened in EDP at RIS3 2014-2020, both at national and regional RIS3, where first was the selection of priority domains and then followed the EDP. Authorities should perform EDP without excluding any important industry in advance and then decide about prioritization.

EDP at the level of industry groups requires coordination between national and regional S3 authorities: EDP exercises must be national or regional depending on whether the respective industry group or ecosystem is present in one or more regions. We have observed common challenges and solutions per industry group across regions and localities. Main task of the national S3 authorities will be to organize the distribution of EDP exercises among the 13 regions of Greece and engage the regions in interregional EDP exercises. EDP in industry groups that are important for most regions must be conducted

nationally and bring together companies that are spread across multiple geographical areas over the same industry platform.

The design of platforms that address common growth and innovation challenges of an ecosystem should be main objective of EDP: Industry platforms address common challenges of companies belonging to an industry group and create favourable conditions for setting up business and innovation ecosystems. Platforms must be designed as service providers. Their detailed design must define the model of service provision, the providers, services, and users, as well as the business model, the service operation model, and the quality model of provided services assessment. Failure of defining a sustainable service model is equal to EDP failure and no further policy support to the respective industry group should be provided. In platform design and engagement, international stakeholders, as well as national (extra-regional) business stakeholders with thematic affinity should be involved in EDP meetings, deliberating on priorities and investments in a region. Another purpose of an outward-looking EDP would be for ESIF funding to potentially trigger inwards FDI or national business investments into the region. This outward-looking/international engagement of EDP has been pointed out by the work of JRC https://s3platform.jrc.ec.europa.eu/governance-edp?inheritRedirect=true) and especially the workshop held in Chios on November 2019.

EDP actions for platform-based-ecosystems can justify EDP as public cohesion policy: We have identified 22 industry groups in which business and innovation ecosystems can be created under the guidance and orchestration of well-designed platforms. These ecosystems do not exist prior to a platform, which acts as an anchor orchestrating complementors. Ecosystems can be created in each and every industry group around a challenge and common assets that deal with the challenge. The starting point is to recognise some form of externality (conditions outside the market and inter-firm competition) or common challenge and how a platform can engage the companies of the industry group in dealing with the challenges they face. We consider these 22 cases as mature for starting an EDP exercises aiming to discovery of all key features of respective platforms. The ecosystem perspective should address timely all transformation challenges of an ecosystem without sectoral and spatial silos.

4. S3 enabling conditions 2021-2027 in Greece: Concluding remarks

The three reports, which were summarised in the previous sections, propose a series of recommendations for defining the enabling conditions of good governance for smart specialisation strategies in Greece during 2021-2027.

These recommendations are built upon the following principles, sustained by the surveys realised:

- S3 governance is evolutionary. Change does not occur in random patterns and any attempt to intervene in governance should start with a thorough understanding of context. The recommendations proposed rely on the way RIS3 was governed in Greece during 2014-2020, the strengths and weaknesses observed in this first period of smart specialisation, and changes that can be introduced in the existing governance at national and regional level.
- Internationalisation, industrial transition, and systemic view of research and innovation drive the governance of S3 and its principal components of management, EDP, monitoring, and innovation diffusion.
- In the recommendations, there is strong concern for industrial transition, which gives more emphasis to manufacturing instead of services prioritised in the first period of RIS3. This came out from the analysis of most important industries in Greece with respect to size and specialisation.

- S3 priority domains should be selected at the end of Entrepreneurial Discovery Processes (not before) and the derived policy mix should address challenges common to an industry or ecosystem.
- Innovation bottlenecks are assessed within the entire system of innovation in Greece, the weaknesses of policies exercised in the past, and a primary role of research and academic organisations.
- An overview of the logic of recommendations proposed in the three reports is given in the figure 3 below.

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The recommendations we make can classified to two categories: (1) short term and easy to make within the existing framework, and (2) long-term that demand more preparation and eventually linked to institutional change or new legislation. These two categories of recommendations are presented in the Table below.

Area of S3 good governance enabling conditions	**Recommendations**	**Short-term: within the current institutional setting**	**Long-term: need institutional change**
Enabling condition 1: Bottlenecks of innovation diffusion	1.1. New financial instruments for businesses. Set the legal status of start-ups and spin offs	√	
	1.2. Improve the management and the efficiency of the funding system for RTD projects		√
	1.3. Support intermediary organizations (TTOS, Technology Parks, Incubators and innovation Centers, Competence Centers and Digital Hubs)	√	
	1.4. Support the absorption of emerging/ disruptive/ technologies by ecosystems		√
	1.5. Clear the ownership of Intellectual Property Rights (IPR) for RTOs and Academia.	√	
Enabling condition 2: Existence of competent regional/national institution or body, responsible for the management of the smart specialization strategy	2.1. Creation of a Smart Committee/Special Secretariat with specific mandate and timetable for revision/design and Implementation of RIS3. (It should be created through a new Legal Act)	√	
	2.2. The Directorates of Programming and Development of each region are proposed to Govern Regional RIS3 in collaboration with PSEKs and the use of external contractors. Keep the structure and reinforce it (Legal act).	√	
	2.3. PSEKs should be enriched with industrialists end experts with a global view on technologies and entrepreneurship like ESETEK (changes in the existing law).	√	
	2.4. Provide evident links between national and regional RIS3.		√
	2.5. Set the leader of EDP process at national level. (ESETEK could be the major candidate. Regional PSEKs should remain the leaders of EDP at regional level. Provide links between ESETEK and new PSEKs	√	

	2.6. Creation of a Smart Committee/Special Secretariat with specific mandate and timetable for revision/design and Implementation of RIS3. (It should be created through a new Legal Act)	√	
Enabling condition 3: Monitoring and evaluation tools to measure performance towards the objectives of the strategy	3.1. Common processes/indicators to be adopted by regions and Ministries.	√	
	3.2. Enrich indicators on RDTI combining with indicators on digitalization, industrial transition, circular economy, internationalization and skills.		√
	3.3. Set an integrated monitoring system covering both national and regional level	√	
Enabling condition 4: Functioning stakeholder co-operation in EDP	4.1. EDP in Greece is feasible and should be dome at NACE industry group level	√	
	4.2. Priority domains for RIS3 support should be determined after EDP exercises in all important industry groups	√	
	4.3. EDP at the level of industry groups requires coordination between national and regional S3 authorities	√	
	4.4. The design of platforms that address common growth and innovation challenges of an ecosystem should be main objective of EDP	√	
	4.5. EDP actions for platform-based-ecosystems can justify EDP as public cohesion policy	√	
Enabling condition 5: Actions necessary to improve national or regional research and innovation systems	Support for intermediary organizations like Tech Parks, TTOs, Competence Centers, and Incubators etc.	√	
	Clear legal framework for spins offs and start-up creation.	√	
	Support Industrial Fellowships and connect them with industrial transition, circular economy and exponential technologies		√
	Support Internationalisation through Brain Circulation.		√
	Financing of dynamic ecosystems and large scale projects (strategic design)	√	
	Simplification of the evaluation and financing procedures. Possible application of H2020 procedures.		√
Enabling condition 6: Support industrial transition	Promote Industrial transition in specific business and R&D ecosystems at National and regional level.	√	
	Industrial transition should be a crucial component of the revised national and regional RIS3.		√
	Use of GSRT or other technology platforms for identifying entrepreneurial challenges by enriching the platforms with relevant experts (EDP).	√	
	Interrelation among circular economy (national plan including governance issues) with the revision of RIS3 (national regional) and the Green Deal and the Just Transition Mechanism for Greece.	√	

	Interrelation of the educational and training system with industrial transition opportunities.	√	
Enabling condition 7:	Develop a draft 'Global marketing strategy for products and technologies' and set the international 'salesman(men)' (possibly MFA).		√
Actions for Internationalisation	Support internationally oriented start-up and spin offs companies (Legal action)	√	
	Encourage international patenting through awareness and financing (strategic action in new ESPA)	√	
	Involve ESETEK, PSEKs and the Economic Committee in internationalization strategy (strategic action - revised RIS3).	√	
	Adapt the educational and training system to international challenges, exponential technologies and skills for Digital Europe (strategic action in new ESPA).	√	

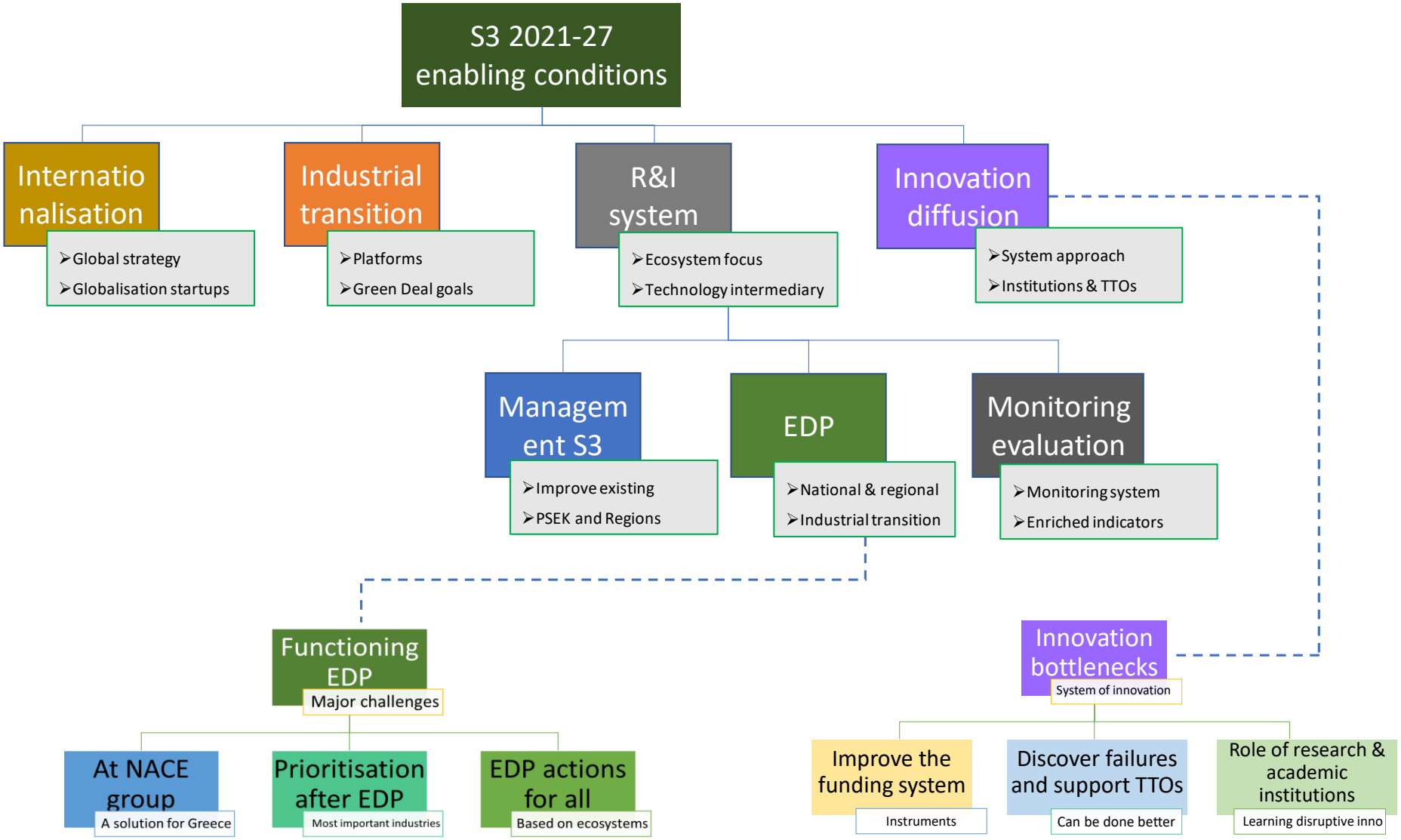

Fig 3: S3 Greece 2021 - 2027: Enabling conditions of good governance at a glance