Analysis of Smart Specialisation Strategies in Nanotechnologies, Advanced Manufacturing and Process Technologies

Research and Innovation

Analysis of Smart Specialisation Strategies in Nanotechnologies, Advanced Manufacturing and Process Technologies

Final report

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EXECUTIVE SUMMARY

This document presents a summary of the final report of the study "Analysis of Smart Specialisation Strategies in Nanotechnologies, Advanced Manufacturing and Process Technologies". This study has been undertaken on behalf of DG Research and Innovation, Key Enabling Technologies Directorate. The principal aim of the study was to identify and map priorities, declared strategies, emerging trends, instruments envisaged, estimated funding volumes and modalities regarding the Key Enabling Technologies (KETs). The study focuses in particular on the nanotechnologies, advanced materials and advanced manufacturing and process technologies KETs and how they are reflected in the Research and Innovation Smart Specialisation Strategies (RIS3) prepared at either the national or regional level. The study provides a snapshot of the situation during late spring/early summer of 2014.

The specific objectives of the study are: to identify national/regional priorities, strategies, budgets linked to KETs with the aim of analysing trends, commonalities, striking features among the priorities, instruments and funding volumes, and to identify synergies and bottlenecks between H2020/LEIF and Structural Funds KETs priorities. The study also aims to facilitate the efficient coordination of financial instruments between the relevant responsible administrations at EU, national and regional level.

The study methodology initially proposed underwent some changes to take on board limited data availability, notably RIS3 documents and especially the Operational Programmes. Notwithstanding the challenges that the study had to face, it has succeeded in providing a unique insight into the issues and challenges concerning the linkages and trends regarding RIS3 and KETs Indeed the online survey has gathered data not currently available in a similar or consolidated format elsewhere. The study and the feedback from the national and regional research and policy community have also highlighted the fact that the subject of RIS3 and KETs is still very much of an ongoing process. The results show that the RIS3 and their associated OP's provide an important opportunity for funding and implementing KET related actions and that regional stakeholders are very interested in exploiting synergies between the various planning and funding frameworks to support KET actions and working together to remove bottlenecks for enhanced impacts.

General considerations on Smart Specialisation Strategies and links with KETs

The Smart Specialisation concept aims at concentrating knowledge resources and linking them to a limited number of priority economic activities so that countries and regions can become, and remain, competitive in the global economy. Smart specialisation is also considered an important instrument for ensuring synergies between Horizon 2020 and the ESIF, by providing a stairway to excellence and providing companies and research actors with a funding continuum, or at least the opportunity for developing jointly funded projects. The European Commission has released guidelines for RIS3 which aim to coordinate existing tools within the EU policies and regulations.

KETs are instrumental as a key accelerator of innovation and the competitiveness of EU industries. However, whilst Europe generally shows an excellent R&D performance, its major weakness lies in translating this knowledge into commercially successful goods and services and supporting innovative SMEs. Hence KETs are a key instrument within the RIS3 to address the technology and innovation challenges, but also the broader societal challenges within each region. The Leadership in Enabling and Industrial Technologies (LEIT) programme within Horizon 2020 will support the development of technologies underpinning innovation across a range of sectors, including ICT and space. Horizon 2020 will have a strong focus on developing European industrial capabilities KETs.

At the time of the study (spring/summer 2014) the RIS3 strategy preparation and Operational Programme (OP) finalisation process was very heterogeneous, both between and within countries. As a result, the information concerning the content of the Smart Specialisation Strategies and approved OP's was not readily available. The study was therefore based on an online survey of managing Authorities, complemented by a literature review and some interviews. The results of the survey cover 83 European regions, of which 70 regions provided information at the Sub-KETs level. This approach has provided a good EU wide coverage with a varied mix of regions and all KET domains have been covered. The analysis of this snapshot and the survey's results has also made it possible to identify and describe the European state of advancement and synergies between the RIS3 development process and the KETs. The main study results were tested with a cross section of European, national and regional policy makers in October 2014.

At the time of the survey around 50 RIS3 were identified as approved at a regional or national level. This should be compared to the status of play provided by DG Regio in October 2014, which indicated that 27 out of 28 (national) Partnership Agreements (PA) had been adopted. Draft

Cohesion Policy Operational Programmes (OP) from all countries outlining their investment plans for EU Structural and Investment Funds for the 2014-2020 programming period was still under review. In December 2014 all of the REGIO-led OPs had been submitted, and of these 34 OPs had been adopted.[1]

OPs are not focused precisely on KETs but on Structural Funds thematic objectives, e.g. Research and Innovation, ICT, SME Competitiveness, etc. The survey showed that the main sectoral foci identified in the RIS3 were: health, ICT, tourism, biotechnology, agro-food, environment, bioeconomy, smart energy, water (recycling, waste processes, etc.), mobility/transport and mechatronics. Since OPs are focused on broader thematic priorities, KET-related elements are sometimes included within either RDI or ICT priorities or within other thematic priorities.

The survey results show that several regions have indicated priorities related to Nanotechnologies, Advanced Material and Advanced Manufacturing Systems (NMPs) in their OP's and RIS3. A number of regions have selected more than one KET in their OP's. The most frequently cited KET sectors were (see figure below): Advanced materials, Advanced Manufacturing Systems and Industrial Bio-technology. There were fewer responses in relation to Nanotechnology, Micro-and Nano-electronics and Photonics. The results are broadly in line with KET related data provided on the IPTS RIS3 Platform database.

The main report includes a map for each KET sector and indicates which regions selected which KET. Comparative date from the IPTS Platform is also included on these maps. Tables highlighting the KETs and the sub KETs selected by each region have also been produced. A summary of the analysis by KET is set out below.

In the area of **Nanothechnology,** the sector that seems to attract most interest from regions is that related to developing next generation nanomaterials, nanodevices and nanosystems, with a clear majority of replies related to nanomaterials.

Advanced materials is the KET sector which generated the most information in the project survey. The cross-cutting and enabling materials technologies and material development and transformation and sustainable (low-carbon) material energy solutions are the categories where regions indicated most priorities.

For **Advanced manufacturing systems**, technologies for Factories of the Future was cited as a priority most often.

For **industrial biotechnology**, regions indicated priorities mostly related to biotechnologies as an innovation driver and biotech based industrial processes. Concerning the latter, priorities were cited most often concerning agro-food, food safety, biomaterials and cosmetics.

Some Regions indicated priorities related to **Photonics**, mostly related to lasers and photonic sensors. Several regions signalled interest in possible combinations with Micro-and nanoelectronics; a number of regions indicated that the rise of digital electronics and photonics has potential to impact on a range of industries and they will be exploiting photonics as an enabling technology in a horizontal fashion in their RIS3.

For **Micro-and nanoelectronics,** regions indicated a number of priorities mostly related to advanced sensors and power components.

Emerging Trends

The survey provided a valuable and unique insight into sub KET level data. The regions which participated in the survey were able to identify in a very precise fashion the particular area of the KET upon which they intended to focus their resources. The exploitation of this data will allow policy makers and other regions to identify potential areas for technology cooperation and RDI co-investment.

The results show that a number of regions have sought to encourage cross KET activity as a mean of promoting and developing RDI initiatives. This is also reflected in the role different stakeholders have played in designing the RIS3, for example clusters and technology transfer intermediaries

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[1] Inforegio-Newsroom, Partnership Agreements and Operational Programmes - State of Play, dated 5 December 2014.

were cited as playing an active role in developing cross KET activities. Other results revealed by the survey shows which KETs regions have most frequently selected and coupled together, for example the Nanotechnology and Advanced Material KETs are often associated and linked to Low Carbon energy technology and Energy Efficiency initiatives.

Elsewhere, at both the Member State and European level, policy makers are encouraging cross KET initiatives. For example, the EU Commission is promoting cross KET cooperation in the Factories of the Future initiative and cross-sectoral and industrial value chain initiatives, notably through H2020, and COSME is promoting inter-clustering and cross sectoral initiatives to support business competitiveness and create employment growth.

Instruments Envisaged for KET-RIS3 Implementation

Given the state of the preparation of ESIF documents it was very difficult for respondents to identify the amounts of dedicated funding for individual themes or KET priorities. In addition, Research and Innovation funds are unlikely to be pre allocated to any specific KET area and individual projects will be assessed on merit and impact. Most regions intend to finance the development of KET related activities primarily through ESIF and other EU and national sources. Only a few regions in the survey were able to provide indicative funding volumes related to their KETs within ESIF but none was in a position of providing indicative budget breakdowns by KET priority.

Regions identified the need to create a framework to coordinate actions between the H2020 and ESIF funding instruments. In particular, the need to <u>coordinate action between the players</u> at national/regional level and also between the various levels of intervention (EU/national/regional) was considered essential. In this context, some regional experiences were mentioned related to the creation of platforms or coordination mechanisms between National Contact Points and Managing Authorities (NCP/MA); and the possible role of regional partnerships such as the Vanguard Initiative in this regard, or the cooperation that exists in some "meta region" collaboration initiatives such as the Baltic Sea Region supported notably by Interreg funding.

Regions indicated that they will use a variety of measures and/or approaches to support the diffusion of KETs. Technology transfer actions aimed at SMEs topped the survey followed by support for technological research support. Both are rather traditional measures and well embedded in regional RDI ecosystems. The establishment of project demonstrators/prototypes is an interesting trend showing greater interest in higher Technology Readiness Levels (TRLs) and co-funding with private actors shows that greater efforts for Public Private Partnership's (PPP's) will be required to turn this into reality. Public procurement and other forms of demand led innovation support can also help create greater synergies and remove bottlenecks linked to the uptake and use of KETs. Support via cluster ecosystems and adopting an industrial value chain approach was also highlighted in the survey. Furthermore, some interesting links exist between KET and the instruments intended to support their adoption and diffusion. For instance, 73% of the respondents who selected the Photonics KET consider Technology transfer to SMEs as a suitable instrument to support the diffusion of this KET.

Regions which participated in the survey indicated that they welcome and will encourage additional forms of cooperation with existing instruments and also with other regions. A majority of respondents indicated that their regional OPs included provisions to facilitate inter regional cooperation. Although only 1/3 of respondents indicated that their region is currently involved in the exchange of KET related experiences and best practices with other Regions. The forms of cooperation programmes or partnerships identified or envisaged include INTERREG, VANGUARD, Silicon Europe and European Technology Platforms.

Conclusions and Policy Recommendations

In general, and with respect to RDI programmes, the RIS3 approach provides opportunities to enhance their efficiency and effectiveness. A systematic approach should be devised to coordinate financial instruments and to monitor regions' performance in RDI policies and programmes and would significantly help reduce funding bottlenecks and create greater synergies between project partners.

Although the RIS3 approach is an ex ante conditionality clause for the OPs, it has been undertaken in many different ways and documents are not always publicly available. The KET component has also been treated in a heterogeneous manner and both bottom up and top down approaches have

been identified. It will be, therefore, that strong social and political support, on the one hand, and steady improvements and corrections on the basis of accompanying monitoring measures, on the other, are maintained or put in place. Moreover, the RIS3 approach and associated KET activities should not be considered just as a monitoring tool. A dedicated monitoring system and methodology should be developed to inform about the regional strategies, allow comparison and track the results and achievements.

The main policy recommendations emerging from the study include:

Ics underline>KET Definitions</ins>

- The definition or parameters of what is included/excluded in a KET need clarification and consistency. This is especially true at the sub KET level. The preparation of a set of KET Categories/typologies and common indicators would help RIS3 actors better understand their scope and the opportunities for synergies with their sector specialisations. This enhanced understanding and transparency would facilitate later synergies with H2020.

Stronger policy and political support

- The European Commission should consider how it can provide additional methodological guidance and training. Multi level governance will be a key issue for the implementation of RIS3 activities as the RIS3 prioritisation process remains in its infancy so far as implementation experiences through the new Ops are concerned.
- Indeed, given the different funding procedures (ESIF and Horizon 2020) it will be difficult for policy makers and stakeholders to plan or foresee H2020 funding for KETs as a means of enhancing regional RDI excellence. A strategy of targeting such funds linked to regional KETS could be developed, but in practice there is no guarantee that H2020 funds can be secured in line with regional KET priorities.
- It could also be interesting for the EC to launch a Regional Pilot or Demonstrator call asking for expressions of interest from "model KET/RIS3 regions". The results could then provide practical results for use by other regions.

Implementation Instruments

- Technology transfer to SMEs remains a key RIS3/KET instruments and requires a mechanism or approach for sharing best practices in relation to the exploitation of regional KETs i.e. how can RDI strengths, KETs and uptake by SMEs be enhanced. Specific funding incentives could be provided to stimulate take up or launch pilot initiatives with SMEs and selected KETs.
- Public procurement initiatives and other similar demand measures also represent an interesting mechanism for supporting KET development or helping SMEs to participate in procurement processes that reflect regional priorities.
- Technology Foresight tools can help identify the needs for developing or introducing new KETs into a region. Universities could play an important role in foresight type activities to help understand where and how future economic growth may come from.
- Clusters have been active in the RIS3 and KET prioritisation process and can continue to play a part in these processes, for example by acting as a resources channel towards SMEs and help structure KET based industrial value chains;

Stakeholder involvement

- Policy actors should continue to proactively target key actors and users of KETs such as SMEs and intermediary actors such as technology transfer agencies, business networks and clusters to enhance take up. Indeed by supporting cluster collaboration it is also possible to enhance inter KET actions, generating and or supporting emerging industries or enhancing industrial value chains.

Internationalisation and Links with other initiatives

- Inter regional cooperation is a priority for many regions but many survey respondents considered that there are insufficient policy or financial incentives for this to take place, especially in the OP's. Whilst many new initiatives and the basic funding rules of Horizon 2020 necessitate international cooperation it would seem valuable that such mechanisms be given a

greater emphasis. The Interreg programme was often cited by survey respondents as helping inter regional cooperation. Indeed, the mapping results of the KETs will enable regions to identify potential partners more easily.
- The role of clusters in supporting inter-sectoral and inter regional cooperation was also highlighted in the survey results.

Platforms and innovation infrastructures

- Survey respondents consider it important to promote the use of existing KET and RIS3 platforms and Regional Innovation Observatory as a tool for planning KET support.
- Some RIS3 authorities believe that the "platform approach" provides the best mechanism for developing regional specialisations and inter regional cooperation.
- Survey results highlight the continued importance of technology transfer actions. These can provide an interesting link from H2020 project results to ESIF support and ensure downstream funding in TRL (4-9) actions.
- The study results support the trends for developing early/pilot production facilities (Fab Labs...), advanced manufacturing and new industrial value chains or emerging industries. These can be supported by ESIF and be in line with KET/RIS3 priorities.

Enabling synergies

- The study clearly shows that ensuring synergies to reduce bottlenecks, maximise impact and efficiency of public funding requires better alignment of strategies and implementation modalities. At present this will remain a challenge given the different implementation and management processes associated with H2020/ESIF.
- A mechanism for the coordination of financial instruments and raising awareness could be devised to improve the management, performance and efficiency of the synergies between Horizon 2020 programme and ESIF Funds. Project partners should be encouraged to review the role of different funding sources and different stages of project implementation.

Better training, coordination and monitoring

- Monitoring and evaluation methods and the gathering of strategic intelligence must be developed to take into account KETs and sub KET categories to ensure that the regional focus (funding) remains relevant and that the leverage effects are maximised. There seems to be a need to devise suitable KET indicators to enable policy makers to establish whether focussing on a limited number of KETs makes sense.
- The need for additional training regarding the use of funding mechanisms was also highlighted as a priority by the participants and the project workshop who felt that more "hands on" training was required to develop ESIF and H2020 funding and project development synergies.
- The European Commission should also consider how Platforms such as the IPTS RIS3 can provide additional methodological guidance and training.

In conclusion, this study is a first step towards a better understanding of the linkages between KETs and RIS3 strategies. It is not possible to derive absolute conclusions on these matters but it has been possible to identify interesting trends, issues and challenges that require further attention. A more precise assessment of national plans, which is not possible at the moment, would require a review of the KET selection and development processes and the regional Operational Programmes and Research and Innovation Smart Specialisation Strategies, funding instruments when these are finally approved and publicly available.

1. STUDY INTRODUCTION AND METHODOLOGY

This study has been undertaken on behalf of DG Research and Innovation (Unit D1-Key Enabling Technologies, Strategy) within the Framework Contract "Provision of Services in the field of Research Evaluation and Research Analysis" – Lot 3.

The principal aim of the study is to identify and map the priorities, declared strategies, emerging trends, instruments envisaged, estimated funding volumes and modalities regarding the Key Enabling Technologies (KETs), in particular nanotechnologies, advanced materials and advanced manufacturing and process technologies, in the European Structural and Investment Fund (ESIF) programmes, represented in most cases through the content of the research and innovation Smart Specialisation Strategies (RIS3) prepared at either the national or regional level.

An inception meeting was held with the Steering Committee on the 29 January 2014 and an inception report was finalised in February 2014. The subsequent desk survey work resulted in a further review of the proposed methodology to secure the objectives of the terms of reference. Indeed the field work rapidly showed that many Operational Programmes (OP's) and RIS3 were not completed nor approved and hence not available in their finalised forms. Those that were available in draft form were often lacking in details regarding information on the KETs. Indeed, information on KETs, when it did exist, was located in a great variety of sources, other reports or in separate documents, such as RIS3 regional reports (for example in France) or national sector specialisation reports (for example in Ireland the FORFAS Research Prioritisation report) or the information remained at sector specialisation level (for example in Denmark). Pursuing the initial methodology would have put the study in difficulty, notably regarding the gathering of robust and verifiable KET level information.

The main survey methodology was therefore modified to ensure KET information was gathered in a more direct fashion from regions and country contacts. Thus the principal methodological change consisted in shifting the balance away from the desk based collection and analysis of approved OPs and S3 strategies to the enhancement of primary data collection through an on line survey designed by the study team. This had the added advantage of increasing the geographical coverage of the study. It also had a very significant impact on the quality of the data regarding KETs, since the material was directly provided by survey respondents directly involved in the preparation of the OPs and Smart Specialisation Strategies.

Furthermore, it was agreed, following discussions with the S3 Platform team at IPTS Seville, to broaden the study scope to cover all KETs and to integrate a range of additional questions in the survey regarding the use of the S3 Platform.

Given these conditions the results of this piece of research should therefore be regarded as providing a snapshot of the situation at a given period of time, i.e. late spring/early summer 2014.

1.1. Literature review

This phase of work was undertaken during the February- April 2014 period. The first step of the study focussed on the identification of the available sources of information (see above). This included a selection of published and publically available S3 or OP documents and other reports produced by research bodies or public authorities.

More specifically it included:

- Review of the documentation available from public sources (cf. S3platform, Managing Authorities in Member States, etc.)

- Review of the information available from relevant Commission Services (RTD, REGIO, IPTS, etc.)

- Relevant web sites/platforms (such as Info Regio, the Ariane Plarform managed by Commissariat General à l'Egalite des Territoires (CGET) in France…)

- Analysis of the current status of the S3 process;

- Regional Innovation Monitor

A selection of the main documents reviewed is set out in the bibliography at the end of the present report.

The review of the existing literature highlighted the main challenges related to the rationale for Smart Specialisation Strategies in the context of planning for the Structural and Cohesion Funds for the period 2014-2020; the process of planning and the state of progress in the planning for ESIF; the possible role of KETs within this context, and the possible synergies between ESIF and Horizon 2020 programmes.

Significant financial resources have been allocated for Structural investments at regional level between 2014 and 2020. Funding for regional and cohesion policy in 2014-2020 amounts to €351.8 bn. Financial allocations for 2014-2020 range from a maximum of €77.57 bn for Poland to €59 ml for Luxemburg.[2] The funding available through European Regional Development Fund (ERDF) for the period 2014-2020, excluding co-financing, is €185,374 bn for regional convergence.[3]

As previously stated one of the main findings of this phase of work indicated that the progress with RIS3 strategy preparation and OP finalisation was very heterogeneous both between countries and within countries. Therefore, the information concerning the content of the Smart Specialisation Strategies and draft Operational Programmes was not readily available, as it was being prepared and discussed within each of the countries/regions with a view to discussion with Commission Services. In fact the situation at the time of writing is still in progress. By mid November 2014, The European Commission has adopted the 28 Partnership Agreements (PA), as well as draft Cohesion Policy Operational Programmes (OP) from all countries outlining their investment plans for EU Structural and Investment Funds for the 2014-2020 programming period. Therefore 97% of all REGIO-led OPs are now submitted, totalling 200, whilst only 21 OPs have been adopted.[4]

1.2.   The On line survey

This task was divided into three steps:

- Preparation of the database of relevant contacts to ensure EU 28 coverage

- Designing of the questionnaires.

- Carrying out the survey (From end May to early July 2014)

The support of IPTS was invaluable in providing contacts information from the S3 database and in suggesting questions for the survey.

In order to enhance the contact database for the on line-survey, the following additional sources of information were also consulted: S3 Platform; INFOREGIO (national and regional contact for every country); DG Regio Desk officer suggestions; Partners' networks (e.g. European Cluster Alliance, EURADA). Finally, the contact database included more than 500 contacts covering the EU 28 and mostly at the NUTS 2 level.

The survey questionnaire was prepared, discussed and reviewed with EC services, including IPTS. Ten groups of questions were drafted to cover various aspects of the Smart Specialisation Strategies and Regional Operational Programmes and with Key Enabling Technologies. In addition to requesting respondents to provide details on KETs, the questionnaire sought information at the sub KET level and the inter KET level.

These groups of questions covering both processes and outputs were structured as follows:

- Personal information (Providing the contact person/organisation and the right S3 NUTs level)

- Regional Innovation Smart Specialisation Strategy (RIS3) State of play

- Main sectoral specialisations or priorities identified

- Stakeholders involved in identifying these priorities

- Key Enabling Technologies (KETs) related to the areas of specialisation of the region

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2   For more information about the 2014-2020 allocation for cohesion policies, see http://ec.europa.eu/regional_policy/thefunds/funding/index_en.cfm

3   Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006.

4   DG Regio, State of play update 18 November 2014, http://ec.europa.eu/regional_policy/newsroom/detail.cfm?id=1506&LAN=EN&lang=en

- Specific cross-sectoral KET priorities included in the S3 strategy and/or OP

- Support required for other KETs

- Financing instruments

- Regional support for the diffusion and adoption of Key Enabling Technologies

- Assistance (technical expertise) needed by the regions on KETs

- A series of questions on the usage of the S3 Platform tools and services

Respondents were also allowed to provide free comments on a number of these topics.

The full survey questionnaire can be found in Annex 2.

1.3.   Analysing of the results of the survey

More than 110 responses were received, however after the initial processing, it became apparent that some regions replied twice, and that some answers were not complete. Therefore the analysis presented in this report is based on 83 answers.

The results of the survey and country/regional coverage is summarised in the table below. It shows the number of regions in the database (in red) and the number of replies received (in blue), which include partial responses. Indeed the survey resulted in unusable responses from more than 27 regions (i.e. 110-83). Furthermore, of the 83 useable responses, detailed information at a sub KET level was only provided for 70 regions. Therefore some of the tables in the Annexes are based on a sample of 70 regions.

Figure 1: Results of the survey and country/regional coverage
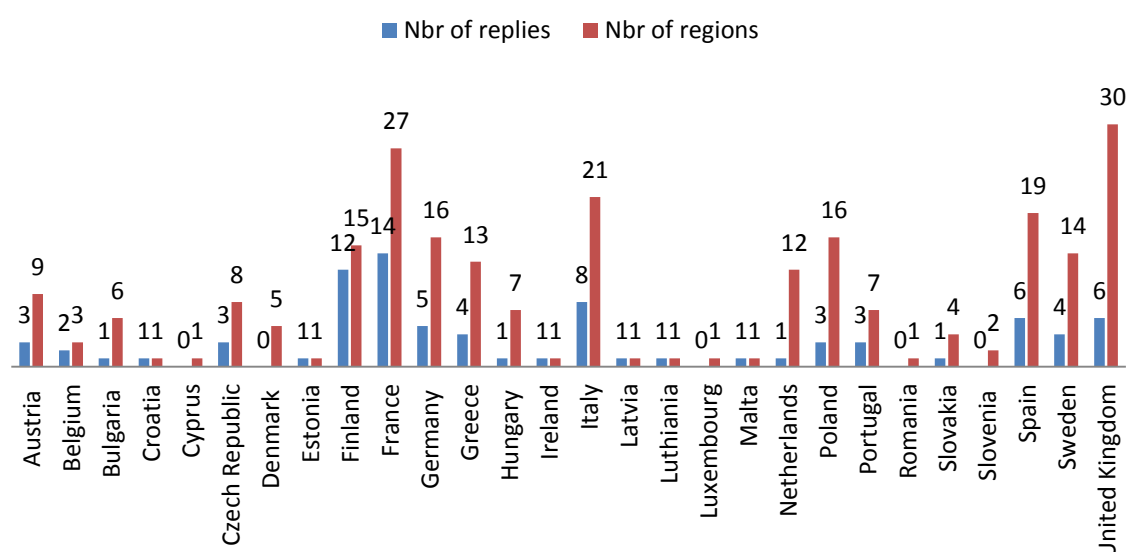
Additional phone interviews took place with the regions/countries that did not respond and a summary of the main reasons for their non-completion are given.

Luxembourg: The NMP expert was not in a position to reply to the questionnaire, as related documents were still being drafted and no decision had yet been taken concerning possible inclusion of KETs in RIS3 documents;

Bulgaria: At the time of the survey Bulgaria does not yet have a Smart Specialisation Strategy, but it is under development.

Romania: National RDI strategy 2014 – 2020, together with its main instruments for implementation (National Plan for RDI 2014-2020 and the Operational Programme Competitiveness 2014-2020/axis for research) are still at the status of project of Government The RDI strategy includes some smart specialization priorities for investment in RDI, notably concerning KETs on biotechnology, eco-nano technologies and advanced materials.

Cyprus and Denmark have not included priorities related to KETs in their RIS3 strategies. Meanwhile some responses provided, such as from one region in the **Netherlands** were not sufficiently detailed to allow a full analysis.

Indeed following desk research on the case of Denmark, where both the Partnership Agreements and Operational Programme have been approved and reviewed by the project team it is possible to note the selection of some sectoral priorities but there is no clear reference to the selection or development of specific KETs. Whilst sector priorities are identified little reference is made to KET or KET based approaches.

A general message from many contacts in the database that chose either not to reply or could not reply is closely linked to the non availability (approved documents) of material in the public domain or through the lack of relevant and detailed information in the documents regarding KETs. This issue is dealt with in the final conclusions and recommendations of this report.

Nevertheless the study team believes that the overall results produced at a specific moment in time and the response rate has provided a good EU wide coverage with a varied mix of regions and all KET domains have been covered. The analysis of this snap shot and the questionnaire's results has also made it possible to identify and to confirm the European state of advancement and synergies between the S3 development process and the KETs. Finally, although a number of questions regarding the S3 Platform were included in the questionnaire these results should in no way be regarded as an evaluation of S3 Platform services.

1.4. Desk Research and Project Workshop

The analysis of the on line survey was complemented by additional desk research and discussions with stakeholders at a project workshop held in Brussels on the 8 October.

- Desk research included interviews with national and regional stakeholders responsible for RIS3 and reviewing key documents. The outcomes of this work have been used to illustrate the survey results presented in the next chapter.

- The project workshop was attended by some 40 policy makers from across Europe and representatives of four European Commission Directorate Generals (namely DG RTD, REGIO, ENTR and the JRC). They commented and largely confirmed the results of the survey work and provided further insights into some of the policy challenges that lie ahead, such as the difficulty to create concrete (financial) synergies between H2020 and ESIF funding. They also provided some case study material that has been included into the main body of the report to further illustrate some of the points made.

2. STATE OF PLAY

2.1 Policy context

The concept of 'Smart specialisation'[5]

The concept of 'Smart specialisation' was developed by the "Knowledge for Growth" expert group advising the European Commission.[6] Smart specialisation is defined by the group as "an entrepreneurial process of discovery that can reveal what a country or region does best in terms of science and technology….a learning process to discover the research and innovation domains in which a region can hope to excel".[7] This implies regions should seek to ensure a more effective use of public and private funds by concentrating resources on few key priorities rather than spreading investment thinly across areas and business sector.[8]

As part of the Europe 2020 strategy, the Commission adopted the 'Innovation Union' flagship initiative. It sets out a comprehensive innovation strategy to enhance Europe's capacity to deliver

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[5] This part is largely based on the elements contained in the Guide to Research and Innovation Strategies for Smart Specialisation (RIS3 Guide). European Commission, 2012, notably part II The Rationale Of Smart Specialisation

[6] Foray D, David P.A., Bronwyn H, Smart Specialisation – The Concept, Knowledge Economists Policy Brief n° 9,June 2009.

[7] Ibid.

[8] Regional Policy For Smart Growth In Europe 2020, European Commission 2011.

smart, sustainable and inclusive growth and highlights the concept of smart specialisation as a way to achieve these goals. The concept of smart specialization has also been promoted by the Communication 'Regional Policy contributing to smart growth in Europe 2020'.[9] In this document the Commission encourages the design of national/regional research and innovation strategies for smart specialisation as a means to deliver a more targeted Structural Fund support and a strategic and integrated approach to harness the potential for smart growth and the knowledge economy in all regions.

Smart specialization was also considered as an important instrument for ensuring synergies between Horizon 2020 and the Structural Funds in the interest of capacity building, by providing a stairway to excellence and providing companies and research actors with a funding continuum or at least the opportunity for seeking and developing joint funding projects.[10]

The role of smart specialisation in the Europe 2020 policy framework has also been highlighted by the Council of the EU in its conclusions on the Innovation Union. The Council underlined *'the concept of 'smart specialisation', with each region building on its own strengths, to guide priority-setting in national and regional innovation strategies, as well as cross-border cooperation where appropriate'* and invited the Commission *'to advise Member States on possible improvement of the performance of their national innovation systems and with the implementation of smart specialization strategies'*[11]

The underlying rationale behind the Smart Specialisation concept is that by concentrating knowledge resources and linking them to a limited number of priority economic activities, countries and regions can become — and remain — competitive in the global economy. This type of specialisation allows regions to take advantage of scale, scope and spillovers in knowledge production and use, which are important drivers of productivity.

The smart specialisation concept promotes efficient, effective and synergetic use of public investments and supports countries and regions in strengthening their innovation capacity, while focusing scarce human and financial resources in a few globally competitive areas in order to boost economic growth and prosperity.

Following the adoption of 2011 legislative package framing the EU's cohesion policy, DG REGIO issued two Communications on 'smart growth' and 'sustainable growth'. Both communications highlight the contribution of regional policy to Europe 2020 objectives and flagship initiatives.[12]

In June 2011, the European Commission launched the "smart specialisation platform" in order to support regions and Members States to define their research and innovation strategies. The approach developed by the platform is meant to provide assistance for regions to assess their specific Research and Innovation strengths and weaknesses and build on their competitive advantage, based on the concept of 'smart specialisation'. According to the platform, by using this instrument regions should be able to "identify its best assets and R&I potential in order to concentrate its efforts and resources on a limited number of priorities where it can really develop excellence and compete in the global economy".[13] The S3 platform gathers useful resources that can support regions that want to develop KETs for regional growth.

The European Structural and Investment Funds (ESIF) for 2014-2020 have a thematic objective of "Strengthening research, technological development and innovation". This objective is governed by an ex ante conditionality of national or regional research or innovation strategic policy framework for smart specialisation, in line with the National Reform Programme, to leverage private research and innovation expenditure.[14] Programming for the ESIF period 2014-2020 is on-going in different

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[9] 'Regional Policy contributing to smart growth in Europe 202, COM(2010) 553 final

[10] Expert group on synergies between FP7, the CIP and the Cohesion Policy Funds: Synergies Expert Group (SEG), Final Report of the Synergies Expert Group, June 2011.

[11] Council Conclusions on Innovation Union for Europe, 3049th Competitiveness Council meeting. Brussels, 26 Nov. 2010.

[12] Mendez C, Bachtler J & Wishdale F (2011) A budget and cohesion policy for Europe 2020 : let the negotiations begin, EoRPA Paper 11/4, European Policy Research Paper, Number 81, European Policies Research Centre.

[13] http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/776&type=HTML

[14] See link for the legislative proposal for ESIF: http://ec.europa.eu/regional_policy/what/future/proposals_2014_2020_en.cfm

stages by Member States, some have already drafted their Partnership Agreements, Smart Specialisation Strategies and corresponding Operational Programmes, and some are in the process of doing so.

Table 1 Main characteristics of EU R&D and Cohesion policies[15]

EU R&D Policy – Horizon 2020	EU Cohesion Policy
Horizon 2020 focus on tackling major societal challenges, maximising the competitiveness impact of research and innovation and raising and spreading levels of excellence in the research base	**Cohesion policy** focus on galvanising smart specialisation that will act as a capacity building instrument, based on learning mechanisms and the creation of critical skills in regions and Member States. One of the expected results will be better ability to participate in Horizon 2020.
Horizon 2020 implemented through transnational research and innovation actions, focus on specific societal and technological challenges. Not place based. Centrally managed by EC.	**ESIF** action in support of RDI, focus on economic development in the context of smart specialisations. Place based (with cooperation aspects). Managed by IA. May include capacity building for scientific excellence as part RIS3 strategy. Eg. RDI infrastructure, capacity building, Skills and HR (FSE), market take up etc.
H2020 Rules for participation (art. 31) **Common Provisions Regulation ESIF (art. 55(8))** **Exemption FR (art 129)** **Allow funding same action through separate instruments, but no double funding same action**	

The European Commission has also released guidelines for regional smart specialisation strategies which aim at coordinating existing tools within the EU policies and Regulations. [16] The individual RIS3 strategies would take the form of an annex to the Operational Programmes for the Cohesion programmes.

According to estimations from 2011, around 1 in 10 EU regions achieves the target of spending 3% of GDP on R&D. The mechanism for achieving this shift should be smart specialisation strategies. These strategies should: focus on a limited number of priorities linked to innovation; coordinate of all relevant policies and other activities; involve business, research centres and universities; and are coordinated with other EU funding programmes (e.g. Framework Programmes), and in future, the European Innovation Partnerships focused on societal challenges. Priorities for smart specialisation strategies could include support for KET-linked projects such as R&D, pilot lines and projects linked to competitive manufacturing, as well as clusters.

KETs in ESIF programmes

The Commission defines KETs as "*knowledge intensive and associated with high R&D intensity, rapid innovation cycles, high capital expenditure and highly skilled employment. They enable process, goods and service innovation throughout the economy and are of systemic relevance. They are multidisciplinary, cutting across many technology areas with a trend towards convergence and integration. KETs can assist technology leaders in other fields to capitalise on their research efforts".*[17]

In the Communication "A European strategy for Key Enabling Technologies–A bridge to growth and jobs" of June 2012, KETs are identified as "*a key source of innovation as they provide indispensable technology bricks that enable a wide range of product applications, including those required for developing low carbon energy technologies, improving energy and resource efficiency, boosting the fight against climate change or allowing for healthy ageing".*[18]

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[15] Based on Horizon 2020 Regulation (Regulation (EU) No 1291/2013) and ESIF Common provisions regulation (CPR) (Regulation (EU) No 1303/2013).

[16] European Union, Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3), (2012)

[17] "A European strategy for Key Enabling Technologies - A bridge to growth and jobs", European Commission Communication (2012) COM (2012) 341 Final
[18] Ibid.

KETs are instrumental as a key accelerator for innovation and the competitiveness of EU industries. However, whilst Europe shows an excellent R&D performance in this area, its major weakness lies in translating this knowledge into commercially successful goods and services. Hence KETs constitute a key instrument within the smart specialisation strategies to implement the priority themes identified to address the societal challenges within each region.[19] According to the RIS3 guide, "the deployment of Key Enabling Technologies (KETs) can be an important component of a smart specialisation strategy because of their horizontal nature and transformative potential".[20] In particular they are foreseen as a priority tool for *modernization,* the technological upgrading of an existing industry, "involving the development of specific applications of a Key Enabling Technology to improve efficiency and quality in an existing (perhaps traditional) sector".[21]

Concerning the possible inclusion of the KETs within the regional planning documents for ESIF, it should be noted that the OPs are not focused precisely on KETs but on thematic objectives. In most cases, KETs may be included in Thematic Objective 1 Research and Innovation and Thematic Objective 2 – ICT.

The EC guideline template for OPs, include a dedicated section on section 8 "coordination between the funds, the EAFRD[22], the EMFF[23] and other union and national funding instruments, and with the EIB", which should include a description how coordination will be ensured with other union instruments i.a. Horizon 2020.

Use of KETs is specifically foreseen notably within the guidelines for the thematic objective for Research and Innovation, within Investment priority 1.b,[24] through "Pilot lines, validation actions, advanced manufacturing capabilities, first production in Key Enabling Technologies and other multi-purpose technologies".[25] The Thematic Objective 2 ICT on Digital Growth specifically includes KETs such as micro- or nano-electronics, photonics, embedded systems, etc.).[26]

In practice, the references to KETs are rather heterogeneous and can sometimes be found in the methodological document and annexes and sometimes (rarely) identified as a specific priority in the OPs. Indeed, KETs are often described as being "methodological tools" to help refine and select sectoral priorities or they exist as part of "horizontal or transversal" actions as opposed to specific thematic actions.

In addition, IPTS has identified a number of possible lines of action related to KETs development in Regional Operational Programmes: structuring the regional stakeholders around an innovation cluster; Linking value chain activities through cross-cluster and cross-region cooperation; Supporting innovative SMEs; Supporting Manufacturing Platforms & Pilot Production Lines; Supporting Large Scale Deployment Actions.[27]

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[19] Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3 Guide). European Commission, 2012.

[20] Ibid.

[21] Ibid.

[22] European Agricultural Fund for Rural Development

[23] European Maritime and Fisheries Fund

[24] Promoting business investment in R&I, developing links and synergies between enterprises, research and development centres and higher education sector, in particular promoting investment in product and service development, technology transfer, social innovation, eco-innovation, public service applications, demand stimulation, networking, clusters and open innovation through smart specialisation, and supporting technological and applied research, pilot lines, early product validation actions, advanced manufacturing capabilities and first production, in particular in key enabling technologies and diffusion of general purpose technologies.

[25] Draft Thematic Guidance Fiche for Desk Officers, Research And Innovation, Version 3 - 13/03/2014, Dg Regio.

[26] Draft Thematic Guidance Fiche For Desk Officers Enhancing Access To And Use And Quality Of ICT – Digital Growth Version 2 - 13/03/2014
[27] http://s3platform.jrc.ec.europa.eu/kets

Horizon 2020 LEIT Programme

Horizon 2020 is designed to tackle societal challenges by helping to bridge the gap between research and the market, for example, bringing business into the research and innovation chain throughout its various mechanisms. One of the three objectives under Horizon 2020, 'Industrial leadership and competitive frameworks', aims to make Europe a more attractive location for businesses, large and small, to invest and set the research and innovation agenda.[28] Three key elements will support this goal: Leadership in Enabling and Industrial Technologies (LEIT), Access to Risk Finance and Innovation in SMEs.

Leadership in Enabling and Industrial Technologies will support the development of technologies underpinning innovation across a range of sectors, including ICT and space. Horizon 2020 will have a strong focus on developing European industrial capabilities in *Key Enabling Technologies* (KETs).

Horizon 2020 pays particular attention to the development and application of KETs, stressing their importance for growth and jobs. With a proposed combined earmarked budget of EUR 6.663 billion, KETs represent a major component of the 'Leadership in Enabling and Industrial Technologies' (LEIT) strand of the Commission proposal.

Special interest has been focused in the context of the present study on **three** of the six KETs, namely: Nanotechnologies, Advanced Materials and Advanced Manufacturing and Processing. In particular, the interest is to develop synergies with the ESIF (European Structural and Investment Funds for 2014-2020) funding on the KETs mentioned above.

2.2 Readiness of RIS3 strategies

The survey respondents were asked in the survey to indicate whether the Research and Innovation Smart Specialisation Strategy (RIS3) mapping in their region/country has been approved at regional or national level and if so, if it is available for consultation. From the 83 regions that answered the survey, 41% of answers indicated that the mapping of RIS3 in their region/country was still in draft form, and 59% indicated that it had been approved. This statistic in itself highlights the difficulty in gathering data at this moment in time. During summer 2014, among the regions surveyed, around 50 research and innovation smart specialisation strategies were identified as approved at regional or national level. This should be compared to the status of play provided by DG Regio in October 2014, where it was indicated that 27 out of 28 (national) Partnership Agreements (PA)[29] had been adopted. Draft Cohesion Policy Operational Programmes (OP) from all countries outlining their investment plans for EU Structural and Investment Funds for the 2014-2020 programming period were still under review. At the end of October 2014, therefore 96% of all REGIO-led OPs had been submitted, while 6 OPs had been adopted.[30]

No overall status of play information on RIS3 completion/publication data is available at the time of writing. It is estimated that the figure should be in line with the OP preparation percentage figure highlighted above, given that the completion of the RIS3 is an ex ante conditionality clause for the preparation of the OPs, and should be annexed to the final OP.

The majority of the respondent stated that their RIS3 documents are publicly available (59%). In this context it should be noted that some regions do not intend to officially approve their RIS3 document and prefer to maintain this document as a working or internal document.

2.3 Stakeholders involvement in RIS3

Another question was aimed at identifying which stakeholders have been involved in identifying the priorities in the RIS3. The survey results show that academic organisations, universities and

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[28] http://ec.europa.eu/research/horizon2020/pdf/press/fact_sheet_on_industrial_participation_in_H2020.pdf

[29] Partnership Agreements are policy documents that outline each country's strategic goals, funding priorities and related thematic objectives, to ensure a coordinated approach between the various structural funds, linking them to the overall aims of the Europe 2020 strategy. In principle, they do not include elements related to specific priorities, instruments and funding. A brief outline of PA is presented in DG Regio memo, http://europa.eu/rapid/press-release_MEMO-14-331_en.htm. Cf. art. 2 (20) of the **Common Provisions Regulation (EU) No 1303/2013.**

[30] Inforegio-Newsroom, Partnership Agreements and Operational Programmes - State of Play, dated 30 October 2014.

research institutes were the most frequently cited stakeholder followed by companies and organisations, other government departments and cluster organisations and business networks. Civil society groups and the general public were involved in the process to a more limited extent and few respondents cited the involvement of European Technology platforms.

These results may indicate that regions have been following the guidelines and best practices on preparation of the RIS3 strategies which have been suggested in the context of the peer reviews organised by the IPTS S3 Platform team and notably within the Guide on Research and Innovation Strategies for Smart Specialisation (RIS3 Guide).[31] The consultations between departments mainly between coordination of regional development and R&D policy is also notable. The role of university and clusters has been indicated by some regions as fundamental in devising the priorities at KET/Sub-KET level. This trend supports the need for region's to focus and to develop centres of excellence and concentrate on their RDI strengths and to engage with business/technology actors via cluster ecosystems.

Desk research and the Workshop attendees confirmed these results. In some regions, for example Scotland, specific studies were undertaken to assess the role different actors could play but also to help identify specific KET priorities. This survey in Scotland showed that there was a strong mismatch between the KET/sector strengths of the academic/research community as opposed to the sector strengths of the business community. This challenge now features as a priority in the OP. Meanwhile in the French region of Languedoc Roussillon a specific web platform[32] was set up as part of the RIS3 preparation process to allow all interested parties to participate in the strategy definition process and identify sector specialisations. Over 300 responses were received and the regional agency responsible for the RIS3 subsequently organised some 20 sector workshops to refine the regional specialisation choices.

The Lazio region organised a detailed mapping of innovation ecosystem within the region, including technology stakeholders, clusters, existing digital infrastructure, administration, etc. Furthermore focus groups of stakeholders were organised for each of the smart specialisation areas identified to discuss trends and priorities within them, notably on the basis of questionnaires based on KETs and the H2020 challenges.

Figure 2 Stakeholders involved in identifying priorities (Nb of replies)

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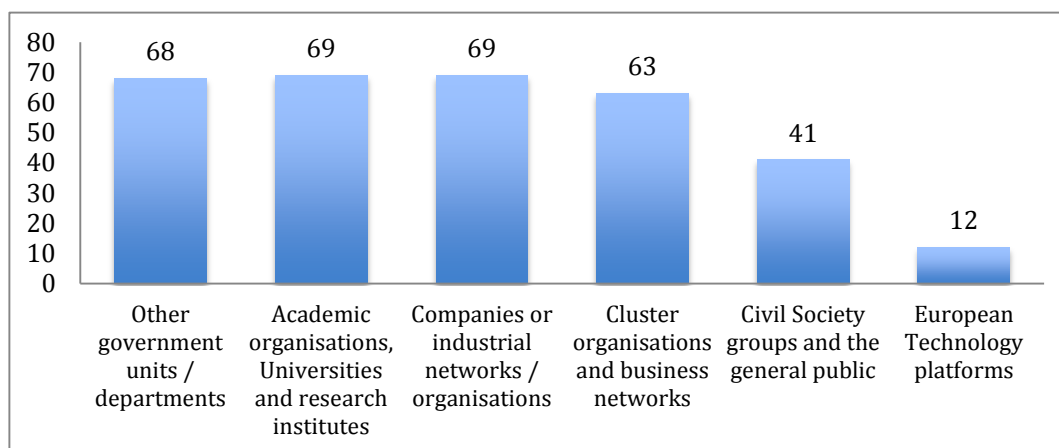
[31] Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3 Guide). European Commission, 2012

[32] http://www.3s-en-lr.com/

2.4 Main sectoral specialisations

Respondents were asked in the survey to identify the main sectoral specialisations or priorities identified in the finalised RIS3 documents and/or regional OP's (or drafts if these are the only documents available). Respondents were asked to use their "own" descriptions/terms as they appear in their documents as opposed to ticking pre-identified sectors. The aim was to reflect the diversity of approaches and themes proposed by regions.

It appears that the main focus is on health, ICT, tourism, biotechnology, agro-food, environment, bioeconomy, smart energy, water (recycling, waste processes, etc.), mobility/transport and mechatronics. It should be noted that in most cases the OPs are not focused on RDI themes but on thematic priorities. Therefore KETs-related elements sometimes may be included within RDI or ICT priorities or within other thematic priorities.

Figure 2 Regions' main sectoral specialisations or priorities (Nb of replies)
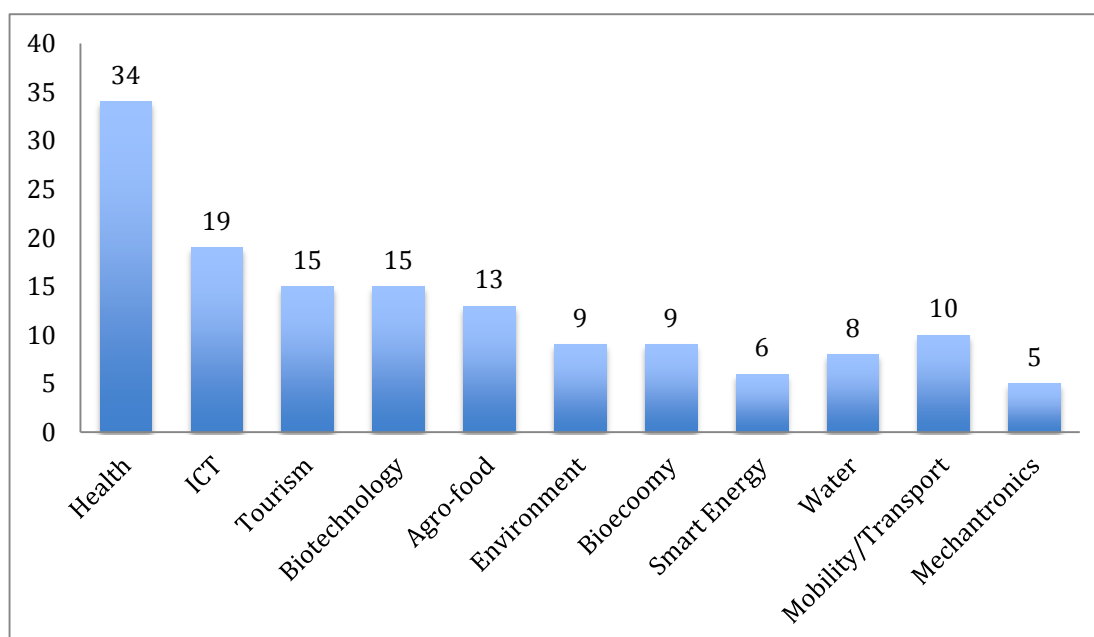
The results of an internal analysis of the RIS3 documents produced in France, undertaken by the CGET (formerly known as DATAR) would tend to corroborate these on-line survey results. They show that from an analysis of the 27 French regions, the following priorities have been made: Health (25); Energy (22); agriculture/agro-food and fishing (19); transport and mobility (14); ICT (16); Tourism (9). The analysis of the CGET indicates that some 74% of French regions have made a specific reference or included a KET focused action/specialisation domain in their RIS3.

The Department for Business Innovation and Skills produced a draft National Smart Specialisation Strategy for England in August 2014[33] and was thus unable to complete the on line survey at the time of this study. In this report the authors note that five Local Enterprise Partnership's (LEP's) had prepared RIS3 documents. Furthermore, the report sets out advice for the LEP's and indicates that individual LEP areas are not obliged to prepare RIS3 documents but if they think this approach is relevant then they are encouraged to follow the guidance of the JRC IPTS RIS3 Guide. The report makes references to KETs and identifies eight "Great Technologies". They are: Big data and energy efficiency computing; robotics and autonomous system;, satellites and commercial applications of space; life sciences, genomics and synthetic biology; regenerative medicine; agri-science; advanced materials and nano-technology; and energy technologies. This list shows that there are some similarities with the EU KET's definitions but also some new priority areas and highlights again the research challenges faced by this study.

In Hungary, the national RIS3 Strategy has identified the following six sectoral priorities: Healthy society and well-being; Advanced technologies in the vehicle and other machine industries; Clean and renewable energies; Sustainable environment; Healthy local foods; and Agricultural

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[33] https://www.gov.uk/government/publications/smart-specialisation-in-england

innovation. Two horizontal measures are also proposed. Regional RIS3 stakeholders were active participants in the strategy development process and the national document includes a mapping of regional synergies with the national priorities.

Meanwhile Ireland adopted a somewhat different specialisation methodology. The national agency FORFAS, undertook a research prioritization process that identified thirteen areas. These were selected on the basis of high degrees of industry and academic interactions and stated that "Priority areas should derive from economic and societal needs and, for the most part, will be areas where there is a combination of enterprise relevance for Ireland and research strength in Ireland".

In Italy, the Puglia region has indicated in its draft OP for RDI as the main priority axis for the use of ESIF, also "with a view to encourage participation in European programs Horizon 2020 and COSME, by ensuring high standards of quality concerning science and technology".

3. KETS in the OPs/RIS3

3.1. KET specialisation

The first section of the questionnaire on Smart Specialisation Strategies referred to the state of play of RIS3. Respondents were subsequently invited to describe the KET priorities identified in the RIS3 and/or regional OP's. Several KET priorities may have been indicated for the same region.

In general, respondents put more emphasis on: Advanced materials (52 answers), Advanced manufacturing systems (47 answers) and Industrial Bio-technology (45 answers). The other group of KETs showed slightly fewer responses with Nanotechnology (40 answers), Micro-and Nano-electronics (34 answers) and Photonics (27 answers).

Figure 3 KETs related to the areas of specialisation (number of replies)
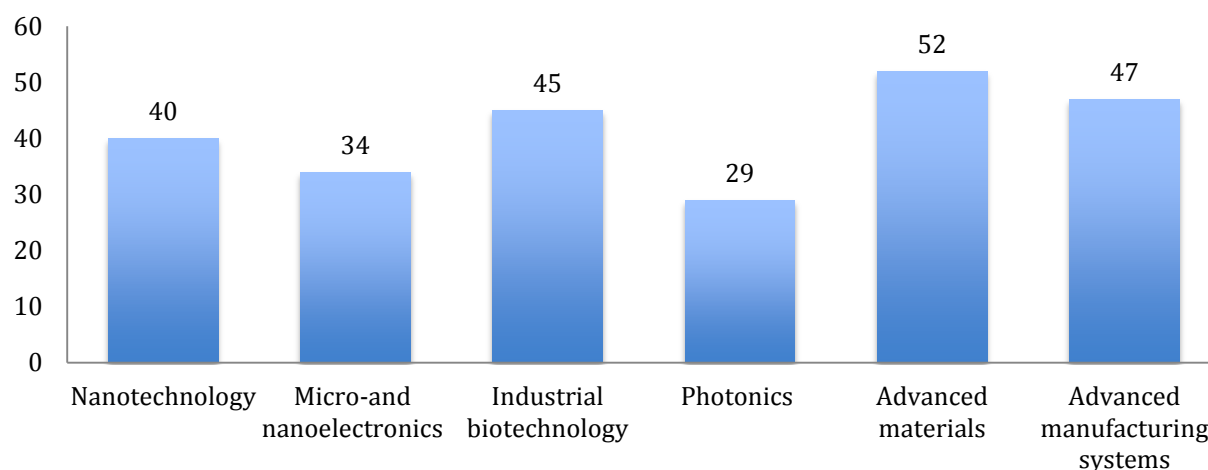
The following table shows the linkages between KETs according to the survey results. It shows the percentage of associated results by KETs: for instance the Advanced materials KET is the most frequently associated KET and is clearly linked to the Photonics as 97% of the 27 regions involved in Photonics are also involved in Advanced material Advanced manufacturing also receives high scores with all of the results over 76%.

Figure 4 Linkages between KETs

Number of answers by KETs/ percentage of linked KETs	Nano-technology	Micro-and nano-electronics	Industrial biotechnology	Photonics	Advanced materials	Advanced manufacturing systems
Nanotechnology (40)	-	59%	71%	54%	**90**%	76%
Micro-and nanoelectronics (34)	69%	-	74%	66%	**94%**	86%
Industrial biotechnology (45)	63%	57%	-	50%	85%	76%
Photonics (27)	73%	77%	77%	-	**97%**	80%
Advanced materials (52)	69%	61%	72%	54%	-	81%
Advanced manufacturing systems (47)	63%	61%	71%	49%	**90%**	-

The following table distributes the KETs specialisations as recorded in the survey per type of countries identified in the Regional Innovation Monitor Report[34] (note most Regions specified more than one specialisation). There is very little difference between the four groups from the Innovation Scoreboard and specialisation. The exception being modest innovators, but these results are based on only four responses which is too small to draw general conclusions.

Table 3 KETs specialisation according to RIM categories[35]

KETs specialisation/type of region	Leaders		Followers		Moderate		Modest	
Nanotechnology	8	17%	13	14%	17	20%	1	9%
Micro-and nanoelectronics	5	11%	15	16%	11	13%	1	9%
Industrial biotechnology	9	19%	14	15%	16	19%	4	36%
Photonics	5	11%	13	14%	9	11%	1	9%
Advanced materials	11	23%	20	21%	16	19%	3	27%
Advanced manufacturing systems	9	19%	19	20%	16	19%	1	9%
Total	47		94		85		11	

These results can be compared to the situation as reported on the S3 platform with 227 EU28 NUTS2 regions that indicated one or more KET related priority on the EYE@RIS platform,[36] as described in the table below:

KET priority	Total result project survey	Total result EYE@RIS Platform
Advanced manufacturing systems	47	67
Advanced materials	52	71
Industrial Bio-technology	45	52
Nanotechnology	40	6
Micro-and Nano-electronics	34	11
Photonics	27	13
TOTAL	245	227

From this table, it appears that while for the first 3 KETs: Advanced manufacturing systems, Advanced materials, Industrial Bio-technology, there is consistency between the results of the survey, the other topics (Nano, Micro-electronics and photonics) have differing results in the S3 platform.

It should be noted that not all regions have uploaded or updated their RIS3 documents in the S3 platform. The S3 database also includes elements from other sources than those provided directly by the regions, such as peer-reviews, and other assessments provided by experts and or other national sources. Therefore differences in results are probably due to the differences in the

[34] Regional Innovation Monitor, Innovation Patterns and Innovation Policy in European Regions - Trends, Challenges and Perspectives 2013, Annual Report, 2014.

[35] Note that five responses were from countries not covered by the RIM (Estonia, Croatia, Lithuania, Latvia and Malta) so the totals will differ from other tables in this report. Leaders perform 20% or more above the EU average. Followers between 90% and 120% of the EU average. Moderate innovators perform between 50% and 90% of the EU average and modest innovators below 50% of the EU average.

[36] Information about preliminary priorities of regions and Member States can be found on the S3 Platform through Eye@RIS3 tool (http://s3platform.jrc.ec.europa.eu/eye-ris3). Accessed on 6 October 2014. Data for EU28. Nota bene, data for Sweden and Finland at NUTs3 level.

collection of data between the survey carried out in the context of the present project and the S3 platform. In fact, the regions that have replied to our survey have indicated that only 57% of them have uploaded information on their RIS3 strategies to the European Commission's S3 platform. In addition, 13 regions which had not yet done so have indicated that they intended to upload their RIS3 documents to the S3 platform in the (near) future in most cases pending approval of the document.[37] As this trend continues, the information available for analysis and exploitation by policy makers and region's alike will improve.

The cross checking of the on line survey results with the S3 platform mapping results indicates a relatively strong coherence between the two approaches and suggest that these results provide a good "snap shot" of the current situation regarding the inclusion of KETs in RIS3 documents. Furthermore, these issues were confirmed by the workshop attendees who in addition suggested that tools such as the S3 platform needed to be regularly updated.

3.2. Regional plans concerning NMPs

This section presents the list of regions that have indicated priorities related to NMPs (Nanotechnologies, Advanced Material and Advanced manufacturing systems) in their OPs and RIS3. The results of the on line survey represent the first attempt to collate such information and as such provide a unique insight into the way in which regions have positioned themselves on individual KETs and sub KETs. The detail provided about concrete measures per KETs is listed in annex 3.

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[37] Praha CZ01, SAARLAND DEC, Languedoc-Roussillon FR81, IRELAND IE0, Lombardia ITC4, Lazio ITI4, Dél-Alföld HU33, Niederösterreich AT12, Bratislavský kraj SK01, FI1C1 Varsinais-Suomi, Ανατολική Μακεδονία, Θράκη (Anatoliki Makedonia, Thraki) EL11, Ιόνια Νησιά (Ionia Nisia) EL22, EXTRA-REGIO NUTS 1 BGZ

Nanotechnologies

Figure 5 Distribution of regions with priorities in nanotechnologies[38]

■ EU regions with encoded Nanotechnology Priorities (inno survey)

■ EU regions with encoded Nanotechnology Priorities (inno survey and on @eyeS3 platform)

■ EU regions with encoded Nanotechnology Priorities (on @eyeS3 platform)

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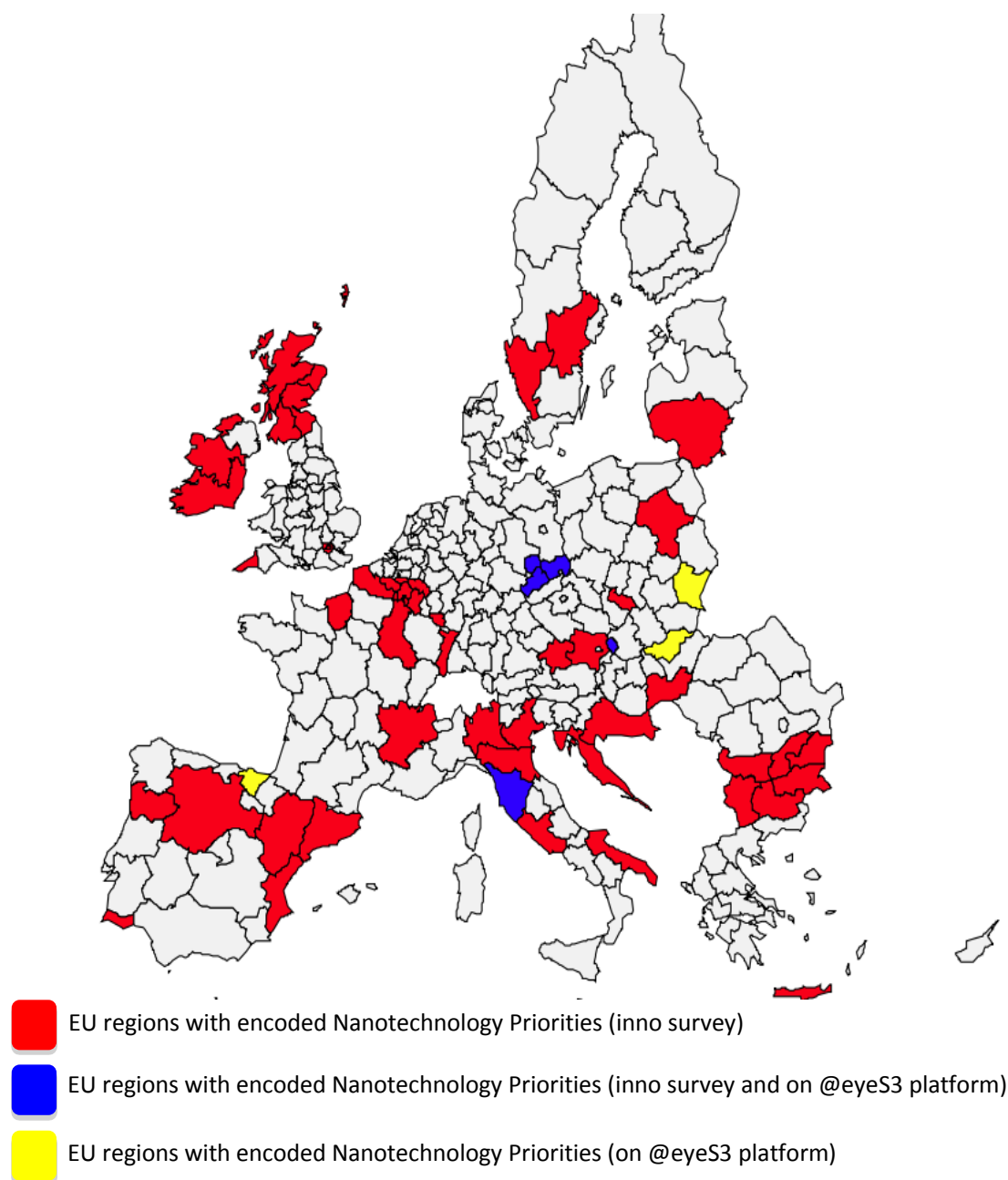
[38] Regions of Finland are not shown in the current map due to diverging NUTS classification. From the survey, the following regions demonstrated priorities in Nanotech: Pohjois-Karjala, Pirkanmaa, Varsinais-Suomi, Päijät-Häme

Table 4: Responding regions on Nanotechnologies subKET

SubKET category	Region
Developing next generation nanomaterials, nanodevices and nanosystems	Moravskoslezsko [CZ08]
	SACHSEN [DED]
	Castilla y León [ES41]
	Haute-Normandie [FR23]
	Puglia [ITF4]
	NORD-EST [ITH]
	Mazowieckie [PL12]
	Norte [PT11]
	Östra Mellansverige [SE12]
	SCOTLAND [UKM]
Ensuring the safe development and application of nanotechnologies	Castilla y León [ES41]
	Haute-Normandie [FR23]
	NORD-EST [ITH]
	SCOTLAND [UKM]
Promoting nanotechnology-based innovations with safety-by-design for consumers and industry	Haute-Normandie [FR23]
	HRVATSKA [HR0]
Developing the societal dimension of nanotechnology	N/A
Efficient synthesis and manufacturing of nanomaterials, components and systems	Moravskoslezsko [CZ08]
	HRVATSKA [HR0]
	Puglia [ITF4]
	Mazowieckie [PL12]
	Norte [PT11]
Developing capacity-enhancing techniques, measuring methods and equipment	RÉGION WALLONNE [BE3]
	Moravskoslezsko [CZ08]
	Haute-Normandie [FR23]
	Mazowieckie [PL12]
Leveraging the potential of nanotechnologies; bridging the gap between research and markets by demonstrating industrial capability, including pilot lines	Castilla y León [ES41]
	NORD-EST [ITH]
	Mazowieckie [PL12]
	Algarve [PT15]
	SCOTLAND [UKM]
Safety of nanotechnology-based applications and support for the development of regulation	Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest [BE10]
	NORD-EST [ITH]
	SCOTLAND [UKM]

In the area of Nanothechnology, the sector that seems to attract most interest from regions is the one related to developing <u>next generation nanomaterials, nanodevices and nanosystems</u>, with a clear majority of replies related to nanomaterials.

While the <u>societal dimension</u> and <u>safety-by-design</u> generate very few replies. Croatia (HR0) indicated that they were investigating the potential of nanotechnology in wood processing industry, defence and the health industry.

Concerning <u>efficient synthesis and manufacturing</u> of nanomaterials, components and systems, Puglia (ITF4) has developed articulate priorities concerning various sectors (aeronautics, health care, manufacturing, transport, etc.).

1. On <u>safe development and application</u> of nanotechs: a certain degree of possible overlap with the priority on safety and regulation can be noted. Haute Normandie (FR23) and North-East Italy (ITH) indicated specific priorities, and Scotland (UKM) indicated this was a strong theme given the SAFENANO center of excellence.
2.
3. Concerning <u>measuring methods and equipment</u>, Haute-Normandie (FR23) has developed a dedicated platform for instruments and analysis at the nanoscale (TA + LEAP atom probe).
4.
On <u>safety and regulation</u>: the Brussels Region (BE10) indicated through its initiative NanoIRIS its aim to build a centre of expertise i.a. on nanomaterial safety and regulatory requirements.

On gaps to market and pilot lines, priorities have been noted for North-Est of Italy (ITH) concerning textile and manufacturing in particular and for Scotland (UKM) through the James Watt Nanofabrication Centre at the University of Glasgow which has a pilot line open to industry.

Therefore the issues that can be identified at this stage include:

- It seems that the main interest of regions are aimed at developing next generation nano material, devices and systems – main focus nanomaterial;
- There may be a possible overlap between activities related to safety and regulation, safety by design, safe development and applications;
- There is also a possible overlap concerning techniques, measuring methods and equipments for nanotech.
- Whether the regional priorities are related to the EU Nanosafety strategy 2015-2025[39]
- How to bridge the gap to market on nanotech?
- Should further synergies be explored between calls for pilot lines within NMP programme and initiatives launched through ESIF (such as Vanguard)?
- How would it be possible to address the societal dimensions of nanotech? Should it be supplemented through LEIT programme specific actions?

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[39] Nanosafety in Europe 2015-2025: Towards Safe and Sustainable Nanomaterials and Nanotechnology Innovations, Finnish Institute of Occupational Health, 2013

Advanced Materials

Figure 6 Distribution of regions with Advanced material priorities[40]

■ EU regions with encoded Advanced Materials Priorities (inno survey)

■ EU regions with encoded Advanced Materials Priorities (inno survey and on @eyeS3 platform)

■ EU regions with encoded Advanced Materials Priorities (on @eyeS3 platform)

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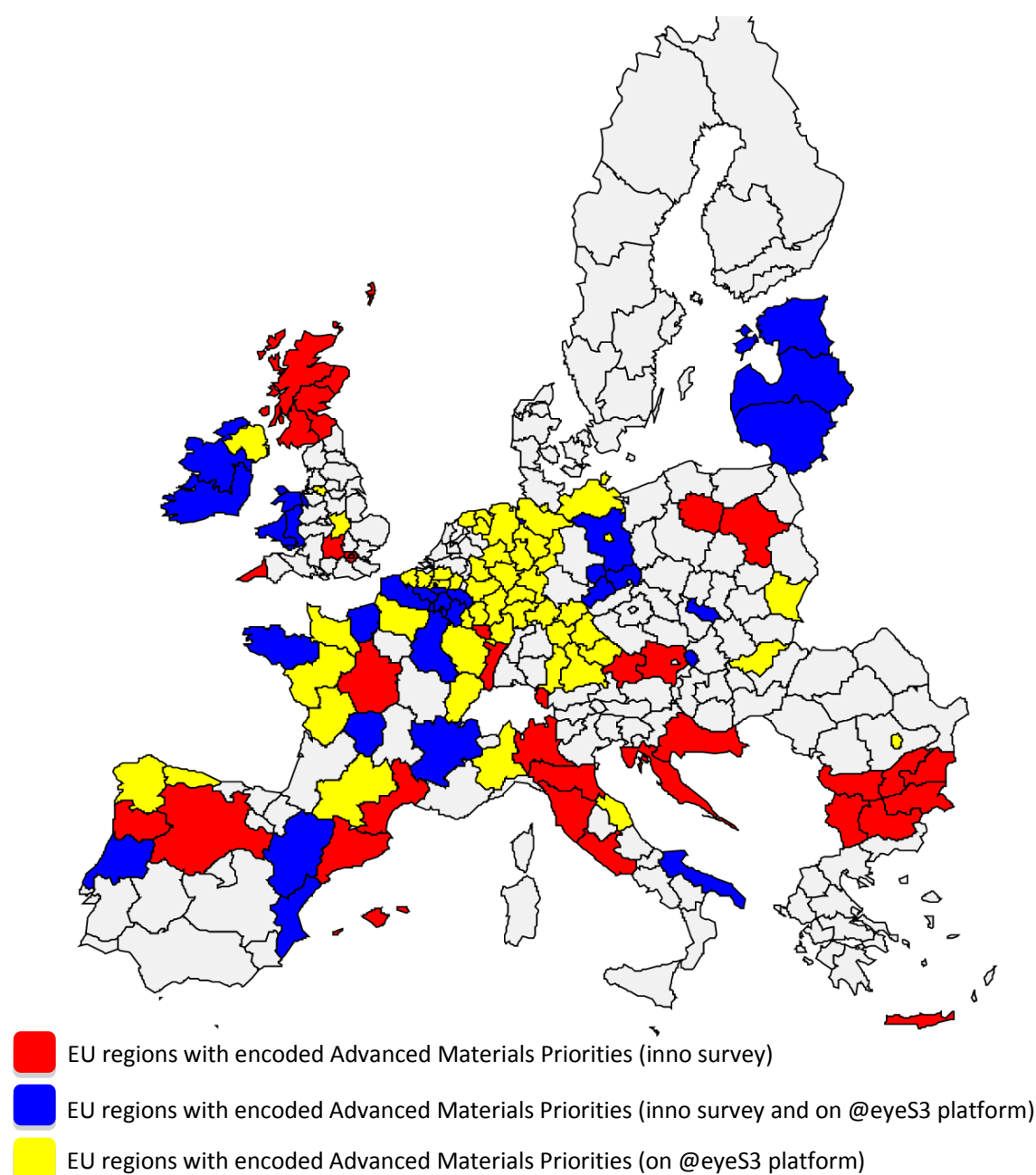
[40] Regions of Finland and Sweden are not shown in the current map due to diverging NUTS classification. From the survey, the following regions demonstrated priorities in Advanced Materials: Pohjois-Pohjanmaa (FI), Pohjois-Karjala (FI), Pohjanmaa (FI), Pirkanmaa (FI), Varsinais-Suomi (FI), Päijät-Häme (FI), Östra Mellansverige (SE), Norra Mellansverige (SE) and Västsverige (SE). From the s3 platform, the following regions demonstrated priorities in Advanced Materials: Östergötlands län (SE), Örebro län (SE), Skåne län (SE), Dalarnas län (SE), Västernorrlands län (SE).

Table 5: Responding regions on Advanced Materials subKET

SubKET category	Region
Cross-cutting and enabling materials technologies	Moravskoslezsko CZ08
	SACHSEN DED
	Castilla y León ES41
	Illes Balears ES53
	Bretagne FR52
	Centre FR24
	Haute-Normandie FR23
	Languedoc-Roussillon FR81
	Mazowieckie PL12
	Norra Mellansverige SE31
	SCOTLAND UKM
	Berkshire, Buckinghamshire and Oxfordshire UKJ1
Materials development and transformation	RÉGION WALLONNE BE3
	Moravskoslezsko CZ08
	SACHSEN DED
	BREMEN DE5
	Castilla y León ES41
	Illes Balears ES53
	Centre FR24
	Haute-Normandie FR23
	Languedoc-Roussillon FR81
	Puglia ITF4
	Pohjois-Pohjanmaa [FI1D6]
	Norra Mellansverige [SE31]
	SCOTLAND UKM
	WALES UKL
Management of materials components	BREMEN [DE5]
	Illes Balears ES53
	Puglia ITF4
	WALES UKL
Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions	RÉGION WALLONNE BE3
	Moravskoslezsko CZ08
	BREMEN DE5
	Illes Balears ES53
	Bretagne FR52
	Haute-Normandie FR23
	Languedoc-Roussillon FR81
	Puglia ITF4
	Mazowieckie PL12
	Norte PT11
	FI1D6 Pohjois-Pohjanmaa
	Norra Mellansverige SE31
	SCOTLAND UKM
	Berkshire, Buckinghamshire and Oxfordshire UKJ1

Materials for creative industries	BREMEN DE5
	Puglia ITF4
	Mazowieckie PL12
	Norte PT11
	Norra Mellansverige SE31
Metrology, characterisation, standardisation and quality control	Moravskoslezsko CZ08
	BREMEN DE5
	Bretagne FR52
	Haute-Normandie FR23
	Languedoc-Roussillon FR81
	Puglia ITF4
	Mazowieckie PL12
	Norte PT11
	Norra Mellansverige SE31
	Berkshire, Buckinghamshire and Oxfordshire UKJ1
Optimisation of the use of materials	RÉGION WALLONNE BE3
	Moravskoslezsko CZ08
	BREMEN DE5
	Haute-Normandie FR23
	Languedoc-Roussillon FR81
	Puglia ITF4
	Mazowieckie PL12
	Norra Mellansverige SE31
Delivering application-focused, advanced materials structures and systems (AMSS)	Castilla y León ES41
	Haute-Normandie FR23
	Norra Mellansverige SE31
	SCOTLAND UKM
Supporting SME innovation activities in a globalised economy; enabling European SMEs as first choice suppliers of advanced materials structures and systems (AMSS)	BREMEN DE5
	Haute-Normandie FR23
	Puglia ITF4
	FI195 Pohjanmaa
	Östra Mellansverige SE12
	Norra Mellansverige SE31
Materials-based solutions enabling active and healthy ageing	RÉGION WALLONNE BE3
	Castilla y León ES41
	Bretagne FR52
	Languedoc-Roussillon FR81
	Puglia ITF4
	Mazowieckie PL12
	Norra Mellansverige SE31

Advanced materials is the KET sector which generated the most information in the project survey. The cross-cutting and enabling materials technologies and material development and transformation and sustainable (low-carbon) material energy solutions are the categories where regions indicated most priorities. Also priorities have been indicated concerning metrology, standards and quality control. Fewer priorities have been indicated for creative industries, advanced materials structures and systems (AMSS), support for SMEs and healthy aging.

Cross-cutting and enabling materials technologies: French regions appear quite active in this field according to the replies of those who participated in the survey, notably Bretagne (FR52) indicated priority in Multi-purpose materials mainly for health and ICT applications, while Haute-Normandy (FR23) indicated the presence of a centre of excellence on this topics (Genesis[41]).

Material development and transformation: several regions identified priorities related to this sub-KET category, concerning notably textiles, carbon fibres, composites for aviation, special steels and other alloys, innovative materials for buildings, energy (absorption, generation, storage, etc.), and in other more traditional sectors like food and health etc. For example, Sachsen (DED) has

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[41] Groupe d'Etudes et de Nanoanalyses des EffetS d'IrradiationS.

indicated a priority related to advanced material as basis for advanced manufacturing (lightweight engineering).

The main issues which can be noted at this stage concerning advanced materials are:
- This is the KET sector which generated the most information in the project survey.
- The <u>cross-cutting and enabling materials technologies</u> and <u>material development and transformation</u> and <u>sustainable (low-carbon) material energy solutions</u> are the categories where regions indicated most priorities.
- Few priorities were identified for: <u>Creative industries</u>, <u>AMSS</u>, <u>support for SMEs</u> and <u>healthy aging</u>. Should these sectors be supported through the NMP programme?
- It is difficult to track the relation between certain specialisations and the priorities related to KETs in certain regions.
- The existence of centres of excellence related to advanced materials within the regions seem to play a role in fostering initiatives and priorities for ESIF support in this sector.

Advanced manufacturing systems

Figure 7 Distribution of regions with priorities in advanced manufacturing[42]

■ EU regions with encoded Advanced Manufacturing Systems Priorities (inno survey)

■ EU regions with encoded Advanced Manufacturing Systems Priorities (inno survey and on

■ EU regions with encoded Advanced Manufacturing Systems Priorities (on S3

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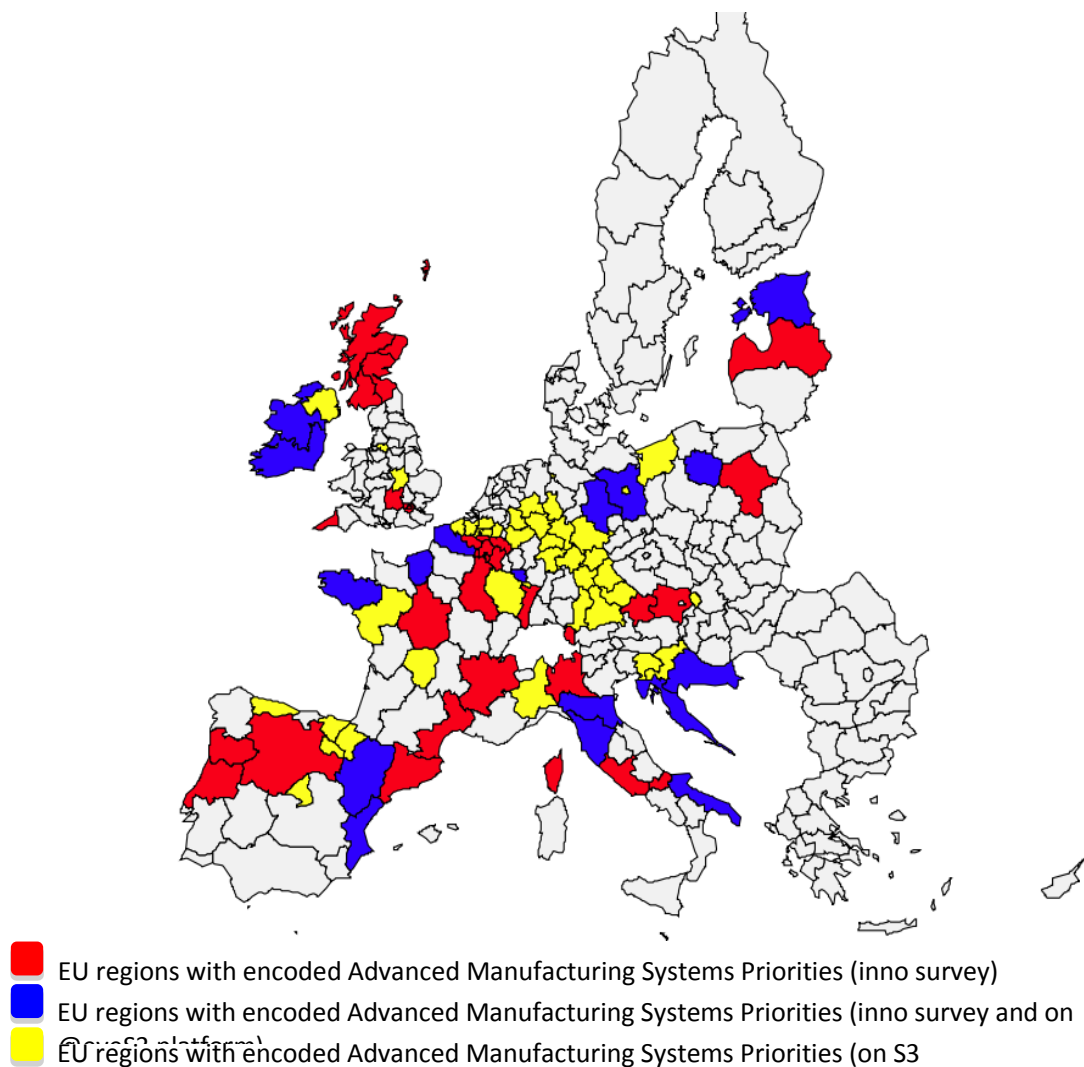
[42] Regions of Finland and Sweden are not shown in the current map due to diverging NUTS classification. From the survey, the following regions demonstrated priorities in Advanced Manufacturing Systems: Pohjois-Pohjanmaa (FI), Pohjanmaa (FI), Pirkanmaa (FI), Varsinais-Suomi (FI), Helsinki-Uusimaa (FI), Etelä-Pohjanmaa (FI),, Östra Mellansverige (SE), Norra Mellansverige (SE) and Västsverige (SE).

Table 6: Responding regions in Advanced manufacturing systems subKETs

SubKET category	Region
Technologies for Factories of the Future	Region Walonne
	SACHSEN DED
	Castilla y León ES41
	Cataluña ES51
	Bretagne FR52
	Haute-Normandie FR23
	Languedoc-Roussillon FR81
	Puglia ITF4
	Mazowieckie PL12
	Norte PT11
	Pohjois-Pohjanmaa FI1D6
	Norra Mellansverige SE31
	SCOTLAND UKM
	Berkshire, Buckinghamshire and Oxfordshire UKJ1
Technologies enabling Energy-efficient buildings	Region Walonne
	Moravskoslezsko CZ08
	Castilla y León ES41
	Bretagne FR52
	Languedoc-Roussillon FR81
	Puglia ITF4
	MALTA MT0
	Vorarlberg AT34
	Mazowieckie PL12
	Pohjois-Pohjanmaa FI1D6
	Norra Mellansverige SE31
	SCOTLAND UKM
Sustainable and low-carbon technologies in energy-intensive process industries	RÉGION WALLONNE BE3
	Moravskoslezsko CZ08
	Cataluña ES51
	Languedoc-Roussillon FR81
	Puglia ITF4
	MALTA MT0
	Mazowieckie PL12
	Norte PT11
	Pohjois-Pohjanmaa [FI1D6]
	Norra Mellansverige SE31
	Berkshire, Buckinghamshire and Oxfordshire UKJ1
New sustainable business models	Bretagne FR52
	Languedoc-Roussillon FR81
	MALTA MT0
	Mazowieckie PL12
	Norra Mellansverige SE31

Concerning Advanced manufacturing systems, the category related to technologies for Factories of the Future is clearly the one in which regions have expressed most priorities, possibly as this may be linked to the sectoral or thematic priorities for regional development. It might be linked to the presence of traditional industrial sectors or basins in the respective regions. The examples of Catalonia (ES51) and Puglia (ITF4) should be highlighted in this context. The two regions have the expressed Smart Specialisation priorities on the basis of articulated regional economic development strategies.

Technologies enabling Energy-efficient buildings are also a sector where regions have expressed priorities, possibly related to wider energy efficiency and energy transition strategies objectives within the regional plans. Regions also indicated some priorities concerning sustainable and low-carbon technologies in energy-intensive process industries. For example, Cataluña (ES51) indicated that through the Vanguard Initiative, several proposals for pilot projects in this field were being drafted together with other regions, in particular focusing on energy efficiency, emissions, waste and materials into global manufacturing processes. This also highlights another issue concerning

the inter-regional cooperation dimension. Finally, new sustainable business models attracted few responses and did not seem to be a priority amongst the respondents to this survey.

The advanced manufacturing thematic has been attracting increased interest in the recent period as one of the key sectors for supporting economic growth and job creation in Europe.

The overall strategy for EU industrial policy in the context of Europe 2020 is based on 2010 Industrial Policy Communication[43] followed up by the 2012 and 2014 Industrial Policy Communications (IPCs). The 2010 Communication includes a strategy that aims to boost growth and jobs by maintaining and supporting a strong, diversified and competitive industrial base in Europe offering well-paid jobs while becoming more resource efficient.

On 10 October 2012, the Commission adopted an Update of the Industrial Policy flagship initiative.[44] The Communication, in order to favour a recovery of industrial investments and a reversal of manufacturing's share in EU GDP, launched a new partnership between the EU, Member States and industry. The set of proposals in order to tackle the abovementioned challenges and to reinforce the industrial policy include i.a.:

- Investments in innovation on key industry sectors –with high growth and job prospects in six priority areas that are: advanced manufacturing technologies for clean production, sustainable industrial and construction policy and raw materials, clean vehicles, bio-based products, key enabling technologies, and smart grids. Member States are supposed to prioritize their own investments in these six areas.
- Access to finance and capital – to improve lending to the real economy by better mobilising and targeting public resources, including those of the EIB – which should allocate between EUR 10 and 15 billion in additional lending for SMEs - and of the Structural Funds, and by unlocking private funds through the elimination of remaining obstacles for venture capital funds and the facilitation of cross-border operations by smaller companies.
- The 2014 EU IPC[45] includes a number of key priorities, i.a.: use the instruments of regional development with national and EU instruments (Smart Specialisations and ESIF) in support of innovation, skills, and entrepreneurship; further facilitate the integration of EU firms in global value chains; the endorsement of the reindustrialisation efforts in line with the Commission´s aspiration of raising the contribution of industry to GDP to as much as 20% by 2020.

The EU Task Force on Advanced Manufacturing co-ordinates the Union's efforts to increase the competitiveness of the EU's manufacturing industry by fostering the development and speeding up the uptake of advanced manufacturing technologies by European industry. The Task Force Report,[46] published in March 2014, foresees in particular: (i) accelerating the dissemination and commercialisation of advanced manufacturing technologies; (ii) boosting the demand for advanced manufacturing technologies; (iii) reducing skills shortages and competence deficits.

The main instruments to implement the EU IPCs and Advanced Manufacturing Programme (AMP) priorities are the Horizon 2020 programme (AMP programme) and the Public Private Partnerships implemented through open calls under Horizon 2020, notably Factories of the Future €1.15 billion and SPIRE (Sustainable Process Industry through Resource Efficiency) with a €0.9 billion budget over the period 2014-2020.

The Public Private Partnership Factories of the Future (FoF) was established as a EUR 1.2 billion programme over the period 2014-2020, in which the European Commission and industry are collaborating in research to support the development and innovation of new enabling technologies for the EU manufacturing sector. The initiative is helping EU manufacturing enterprises, especially

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[43] European Commission Communication on Industrial policy An integrated industrial policy for the globalisation era, COM(*2010*) 614

[44] European Commission Communication on Industrial policy, A Stronger European Industry for Growth and Economic Recovery, COM/2012/0582 final

[45] European Commission Communication on Industrial policy For a European Industrial Renaissance, COM/2014/014 final

[46] Commission Staff Working Document, 'Advancing Manufacturing - Advancing Europe' - Report of the Task Force on Advanced Manufacturing for Clean Production, SWD(2014) 120 final.

SMEs, to adapt to global competitive pressures by improving the technological base of EU manufacturing systems.[47]

In addition, there are other PPP's which may be relevant for this sector in the area of Robotics, Photonics, Energy efficiency in Building (EeB) and the European Green Vehicles Initiative (EGVI).

The Horizon 2020 work programme for the years 2014-15 for KETS NMP programme, include €16,000,000 to be allocated to the AMP programme.

The main issues which can be noted at this stage concerning advanced manufacturing are:

- Many initiatives have been developed concerning advanced manufacturing. The successive Commission Industrial Policy Communications have established an articulated policy framework. The planning and coordination of the support measures and other programmes related to this sector should also be reviewed in detail. In this context for instance it is necessary to consider what may be the most effective types of intervention. The various types of dynamics between the possible instruments (LEIT-NMP, Vanguard, PPPs, etc.) should also be closely considered. How can the existing or planned initiatives be leveraged? How can possible synergies between the various instruments be further developed?

- Concerning technologies for Factories of the Future, where regions have expressed most priorities, the question arises whether the foreseen investments correspond to the need to support traditional industrial sectors or basins in the respective regions or to the establishment of new capabilities to meet the foreseen development objectives of the regions.

- There have been limited replies concerning new sustainable business models. Should this area be supported increasingly through the NMP programme?

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[47] http://ec.europa.eu/research/industrial_technologies/innovation-in-manufacturing_en.html

4. Main findings concerning other KETs

In this section we highlight the regions that have indicated priorities related to other KETs (industrial biotechnology, Photonics and Micro- and nanoelectronics) in their OPs and RIS3. The details regarding the concrete measures indicated by regions are listed in the annexes.

4.1. Industrial Biotechnology

Table 7: Responding regions in Industrial Biotechnology subKETs

SubKET category	Region
Boosting cutting-edge biotechnologies as a future innovation driver	Région Wallonne BE3
	Moravskoslezsko CZ08
	Illes Balears ES53
	Comunidad Valenciana ES52
	Bretagne FR52
	Centre FR24
	Haute-Normandie FR23
	Languedoc-Roussillon FR81
	Puglia ITF4
	Varsinais-Suomi [FI1C1]
	SCOTLAND UKM
Biotechnology-based industrial processes	Région Wallonne BE3
	Castilla y León ES41
	Illes Balears ES53
	Haute-Normandie FR23
	Languedoc-Roussillon FR81
	Puglia ITF4
	Mazowieckie PL12
	Varsinais-Suomi [FI1C1]
	Etelä-Pohjanmaa [FI194]
	SCOTLAND UKM
	Berkshire, Buckinghamshire and Oxfordshire UKJ1
	Ionia Nisia EL22
Innovative and competitive platform technologies	Bretagne FR52
	Haute-Normandie FR23
	Languedoc-Roussillon FR81
	RÉGION WALLONNE BE3
	Castilla y León ES41

Concerning industrial biotechnology, regions indicated priorities mostly related to biotechnologies as an innovation driver and biotech based industrial processes. Concerning the latter, priorities were noted mostly concerning agro-food, food safety, biomaterials and cosmetics. In particular, Languedoc-Roussillon (FR81) indicated that a project for a bioproduction unit was under consideration. Ionia Nisia (EL22) indicated a priority related to marine biotechnologies applied in aquaculture and the protection of the marine environment.

Innovative and competitive platform technologies attracted fewer replies although those of Languedoc-Roussillon (FR81) and region Wallonie (BE3) seemed quite structured and articulated.

Romania indicated that several priorities related to biotech industrial processes would be included in its ESIF plans.

4.2. Photonics

Table 8: Responding regions on Photonics

	Region
Photonics	RÉGION WALLONNE BE3
	SACHSEN DED
	Cataluña ES51
	Bretagne FR52
	Languedoc-Roussillon FR81
	IRELAND IE0
	Mazowieckie PL12
	SCOTLAND UKM
	Berkshire, Buckinghamshire and Oxfordshire UKJ1

Regions indicated a certain number of priorities related to Photonics, mostly related to lasers, photonic sensors, etc. Several regions signalled interest in the subject and the possible combinations with Micro-and nanoelectronics, in this context one region indicated that the rise of digital electronics & photonics has potential to impact on a range of industries and they will be exploiting photonics as an enabling technology in a horizontal fashion in their RIS3.

Desk research has highlighted the approach put in place in the Aquitaine region (FR) which has dedicated one of its 11 sector specialisations to the KET Photonics (others include such themes as Factories of the Future and industrial biotechnology). Meanwhile the Provence Alpes Cote d'Azur region also in France has produced an RIS3 with five specialisations and notes that three KETs will be particularly important in helping deliver and implement their RIS3. For example the KET Photonics will be involved in three of them (Health, Energy and Risks/Security). Photonics, together with ICT, have also been identified by Tuscany (ITI1) as one of its 3 main technological priorities in its draft RIS3 strategy.

4.3. Micro-and nanoelectronics

Table 9: Responding regions on Micro and nanoelectronics

	Region
Micro-and nanoelectronics	Région Wallonne [BE3]
	Moravskoslezsko [CZ08]
	Sachsen [DED]
	Cataluña [ES51]
	Centre [FR24]
	Languedoc-Roussillon [FR81]
	Ireland [IE0]
	Mazowieckie [PL12]
	Pohjois-Pohjanmaa [FI1D6]
	Östra Mellansverige [SE12]
	SCOTLAND [UKM]
	WALES [UKL]
	Berkshire, Buckinghamshire and Oxfordshire [UKJ1]

Concerning Micro-and nanoelectronics, regions indicated a number of priorities mostly related to advanced sensors and power components.

Ireland, Scotland and Wales notably indicated that their RIS3 would build on their existing strength concerning compound semi-conductors (Wales - UKL), the existence of centres of excellence related to this sector (Tyndall National Institute and Microelectronics Circuits Centre Ireland) (Ireland IE0) and an industrial base in this sector (Scotland - UKM).

The main issues which can be noted at this stage concerning other KETs (industrial biotechnology, Photonics and Micro- and nanoelectronic) are:

- Concerning industrial biotechnology, priorities are mostly related to <u>biotechnologies as an innovation driver</u> and <u>biotech based industrial processes (notably </u>concerning agro-food, food safety, biomaterials and cosmetics). <u>Innovative and competitive platform technologies</u> attracted fewer replies. Other priorities could be encouraged in this area through Horizon 2020 calls.

- Concerning Photonics a certain number of priorities have been identified, mostly related to lasers, photonic sensors, etc. Several regions signalled interest in the subject and the possible combinations with Micro-and nanoelectronics. Photonics may play a role in various RIS3 priorities and play a horizontal role. These aspects should be further investigated and additional research be encourage beyond lasers and sensors.

- Concerning Micro-and nanoelectronics, regions indicated a number of priorities mostly related to advanced sensors and power components. Consideration may be given to ways to further develop this KET beyond the more traditional focus on power components and also by involving other regions than those traditionally active in this field. In this context, existing centres of excellence and their possible link to industrial sectors can play a role and be used as model for establishing new partnerships in this sector.

4.4.   Cross-KETs

Table 10 Specific cross-sectoral KET thematic included in RIS3 and/or OP
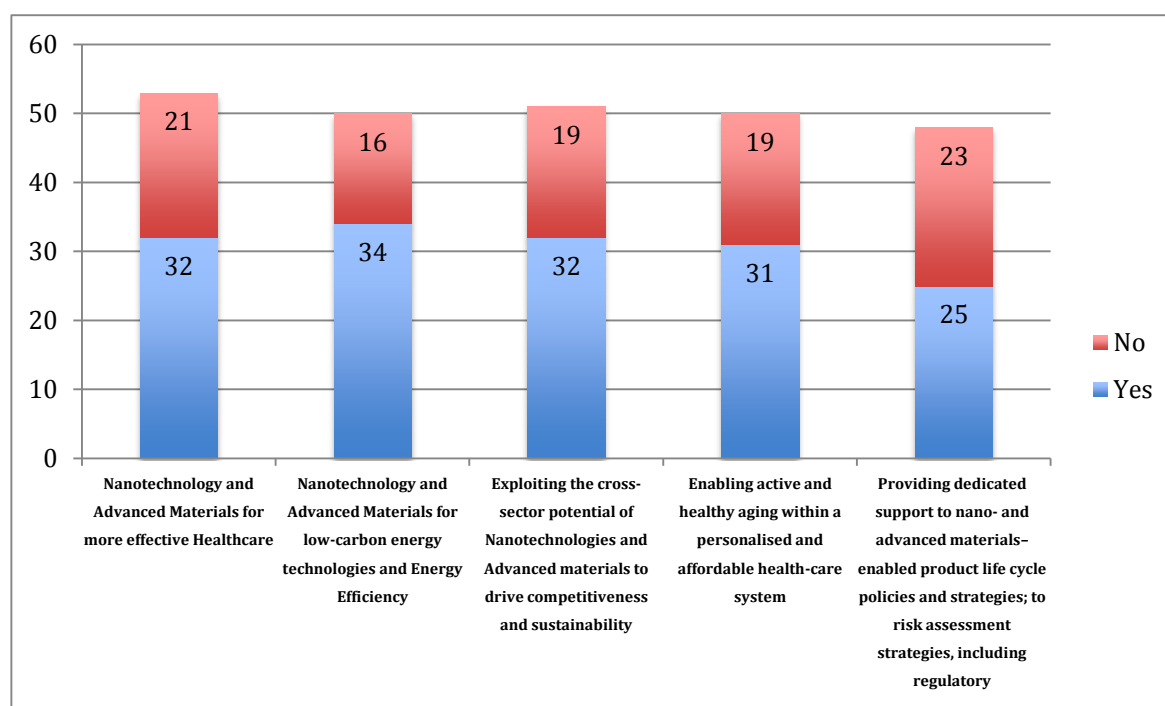
Please note that some regions have provided details in their replies which are compiled at Annex 5.

Cross-KETs are categories which have been defined for the purpose of the survey based on cross-sectoral KET thematic which may be included in Regional Operational Plans and/or RIS3 Strategies.

Cross-sectoral KETs-related activities are listed as follows:

1. Nanotechnology and Advanced Materials for more effective Healthcare
2. Nanotechnology and Advanced Materials for low-carbon energy technologies and Energy Efficiency
3. Exploiting the cross-sector potential of Nanotechnologies and Advanced materials to drive competitiveness and sustainability
4. Enabling active and healthy aging within a personalised and affordable health-care system;
5. Providing dedicated support to nano- and advanced materials–enabled product life cycle policies and strategies; to risk assessment strategies, including regulatory research; and to forward looking and other intelligence gathering activities for the future.
6. Other

As can be seen from the chart above, several regions expressed interest or priorities related to the theme of "cross-KETs". From the detail of the replies provided however emerges the impression that the concept of cross-KET is not widely understood. In fact most of those who provided detailed responses do not mention precise priorities.

The most notable examples of priorities concerning cross-KET are as follows:

Nano and materials for health: Work on slow release medications (London UKI); Nano and materials for energy efficiency: High-efficiency LED lighting and concentrator photovoltaics driven by compound semiconductors (Wales UKL); Cross sectoral potential of nano and materials: Development of new process and product for manufacturing (North-East Italy ITH); Healthy aging: Using nanodevices to reduce ageing impact (North-East Italy ITH), Assisted Living Innovation Platform and the stratified medicine catapult (London UKI); Support, strategies, Risk assessment etc.: Promotion of a research-industry network including feasibility studies, risk assessment and other nano-related topics (Saarland DEC).

Desk research and the workshop participants confirmed that the concept of cross KETs was an interesting one. For example in Aquitaine the photonics KET priority will be "crossed" with health, manufacturing and energy specialisations to create project collaborations. The implementation of these actions is being led by the regional photonics cluster Route des Lasers who in addition are closely monitoring H2020 Photonic project opportunities and active in Photonics 21 network. This approach is a good example of the potential synergies between ESIF funding (regional clusters) and H2020 opportunities.

At a European level, DG RTD and DG Enterprise are promoting cross-sectoral and value chain initiatives notably through H2020 and COSME and encouraging cluster initiatives to structure such approaches. New funding calls could result in the development of further cross KET initiatives and this trend is likely to also present an opportunity for encouraging cross border or internationalisation actions as part of the RIS3/OP implementation processes.

Desk research also shed some interesting light on these issues. For example in the UK the "Eight Great technologies" (equivalent to the KETs) were compared to the eleven priority sectors identified in the UK's Industrial Strategy. The subsequent matrix has enabled policy makers to identify the importance and application of emerging technologies to each of the 11 sectors, for example automotive and advanced materials. The results of the survey and desk research related to cross KETs raise a number of issues. The content and purpose of the cross-KETs categories should be better defined and explained as it is not sure that they are used and understood in the same way by regions. The use of these categories also may lead with duplication of reporting with the priorities and actions foreseen in the 6 main KETs categories. On the other hand cross KETs initiatives can be deemed to be based on a bottom up approach and require less of a top down structuring process.

5. Possible financing of KETs in the regions

The level of support given to research and innovation varies across regions and the notions of prioritisation and selecting areas of RDI excellence are relatively recent trends although policy guidance and initiatives from both DG Research and Innovation and DG Regio are succeeding in raising awareness and changing mentalities. The issue of the financing and implementation of KETs and related project was one of the biggest challenges faced by the study team. The main problem concerns the "draft" or non approved status of almost all EU OPs and hence the inability or unwillingness of survey respondents to provide this degree of information. This issue will require further study at a later stage.

Interviews with various regions and the participants at the workshop confirmed this state of play. For example discussions with the Provence Alpes Cote d'Azur Region in France indicated that even though they had identified 5 thematic specialisations areas and three related KETs that the nature of the financial support (i.e. regular open calls) it is impossible to identify the amounts of dedicated funding for individual themes or priorities. Furthermore the OP funding for these themes will be spread between at least three Thematic Objectives. Dedicated funding is also not clearly identified by the Wales region, as it is still currently the subject of negotiation and agreement at both EU and member state level. However, Research and Innovation funds will not be pre allocated to any specific KET area but individual projects will be assessed on merit and impact.

In addition workshop attendees confirmed this general situation and suggested that more information will become available in 2015.

5.1. Coordination of financial instruments (ESIF/H2020 synergies)

The Common Provisions Regulation (CPR) of Structural and Cohesion Funds include provisions for coordination and synergies between ESI funds and other union policies and instruments.[48] It establishes notably a shared responsibility between the Members States and the Commission, in accordance with their respective responsibilities, to ensure coordination between the ESI Funds and other relevant Union instruments at Union and Member State level. Notably concerning Horizon 2020 and other centrally managed Union programmes in the areas of research and innovation, "Member States and the Commission shall have due regard to strengthening coordination, synergies and complementarities between the ESI Funds and Horizon 2020, (...) COSME (...) while also establishing a clear division of areas of intervention between them".

According to the CPR, Smart specialisation strategies should include: "Upstream actions" to prepare regional R&I players to participate in Horizon 2020 ("stairways to excellence") to be developed, where necessary, through capacity-building. Communication and cooperation between Horizon 2020 national contact points and managing authorities of the ESI Funds shall be strengthened. "Downstream actions" to provide the means to exploit and diffuse R&I results, stemming from Horizon 2020 and preceding programmes, into the market with particular emphasis on creating an innovation-friendly environment for business and industry, including SMEs and in line with the priorities identified for the territories in the relevant smart specialisation strategy.

Finally, the CPR foresees a number of additional measures to ensure complementarity and creates synergies with Horizon 2020, in particular through joint funding. The proposed measures include:

(a) Linking excellent research institutions and less developed regions as well as low- performing Research, Development and Innovation (RDI) Member States and regions to create new or upgrade existing centres of excellence in less developed regions as well as in low-performing RDI Member States and regions;
building links in less developed regions as well as in low-performing RDI Member States and
(b) regions between innovative clusters of recognised excellence;
(c) Establishing "ERA Chairs" to attract outstanding academics, in particular to less developed regions and low-performing RDI Member States and regions;
(d) Supporting access to international networks for researchers and innovators who lack sufficient involvement in the European Research Area (ERA) or are from less developed regions or low-performing RDI Member States and regions;
(e) Contributing as appropriate to the European Innovation Partnerships;
(f) Preparing national institutions and/or clusters of excellence for participation in the Knowledge

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[48] **Regulation (EU) No 1303/2013, annex I, chap. 4, notably 4.3 coordination with Horizon 2020.**

and Innovation Communities (KICs) of the European Institute of Innovation and Technology (EIT); and

(g) Hosting high-quality international researcher mobility programmes with co-funding from the "Marie Sklodowska-Curie Actions".

Therefore, the Implementing Agencies have a responsibility for coordination of assistance at national and regional level. The Operational Programmes should include provisions for synergy actions with Horizon 2020, notably as regards operational aspects such as management and funding aspects.

In order to increase the synergies between ESIF and H2020, a recent Commission document[49] outlines the options for bringing together Horizon 2020 and ESIF money in the same project (that could be a single action or a group of coordinated actions/operations, but always provided that there is no double funding of the same expenditure item) in view of achieving greater impact and efficiency; successive projects that build on each other or; parallel projects that complement each other.

Take up projects in ESIF programmes should specifically be designed and implemented to take up high quality project proposals from Horizon 2020 or other centrally managed programmes, for which not enough budget available in the respective programmes.

Users or Market oriented projects: Such approaches also need to take into account the different perspectives and needs of "users" i.e. researchers and businesses, even at the pre-competitive and in early TRL stages.

ESIF programmes could also be specifically designed and implemented to take up high quality project proposals from Horizon 2020 or other centrally managed programmes, for which there is not enough budget available in the respective programmes. Such approaches also need to take into account the different perspectives and needs of "users" i.e. researchers and businesses, even at the pre-competitive and in early TRL stages.

Other initiatives are contributing to facilitate dialogue and planning practices of the regions, such as i.a. Vanguard Initiative pilot project for advanced manufacturing; Stairway to Excellence (S2E)[50] project; ERANET for the coordination of research activities; role of existing PPP; EU innovation partnerships; etc.

Possible solutions mentioned by regions in the survey, in the desk research and by participants at the workshop to address the issues of sequencing and coordination, include i.a.:

- Networking of companies and knowledge, of projects.
- Coordinating funding in order to exploit the results from Horizon 2020 projects, Use of "downstream sequential financing" with FP7 / Horizon 2020 projects.
- To build capacity of local actors to enhance participation in Horizon 2020.
- Establishing or using a single agency (ESIF and NCP) to coordinate the two instruments on the ground at regional level.
- Joint planning, common development of the strategy with all stakeholders, etc
- The use of foresight for improving regional planning concerning RDI policies;
- Project continuum processes, with related continuum or sequential funding approaches;
- Using advanced financial engineering approaches to optimise the allocation of resources to various type of complementary actions in order to exploit ESIF/H2020 overlap to support businesses;
- Building on existing strengths to build critical mass in capacities;
- Establish links between skills and capacity requirements;
- Coordination of calls (synchronous or sequential) between, EU/National/regional;
- Internationalisation actions and use of ERANET type instruments are valuable first steps for many regions. This was highlighted by the Nord Pas de Calais region (Fr) at the project workshop.

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[49] A guidance for policy-makers and implementing bodies on Synergies between European Structural and Investment Funds, Horizon 2020 and other research, innovation and competitiveness-related Union programmes, European Commission published in May 2014.

[50] The Stairway to Excellence (S2E) project is centred on the provision of support to enhance the value of two key European Union (EU) funding sources for research, development and innovation (ESIF and H2020) by actively promoting their combination, notably in support of new Member States. https://ec.europa.eu/jrc/en/research-topic/stairway-excellence-s2e

Replies provided by regions in the survey and at the project workshop indicate that many regions would welcome additional guidance on the possibilities to coordinate the actions which may be financed through a combination of ESIF and H2020 support.

Regions expressed the need to create a framework to coordinate actions between the two instruments. In particular, the need to underline coordinate action between the players at regional level and also between the various levels of intervention (EU/national/regional) was considered as essential. In this context some regional experiences were mentioned related to the creation of platforms or coordination mechanisms NCP/MA; the possible role of Vanguard in this regards.

In particular, regions requested more guidance towards public procurement and the application of state aid rules for RDI projects and revenue generating actions in ESIF. The DG Regio guide on synergies between financial instruments is a useful first step but the rules are considered complex and further guidance is needed. Some regions have difficulties in planning for ESIF. ERDF eligibility rules are considered not adapted for planning projects to support and complement RDI. Applied research and commercialisation type of actions are considered as difficult to be financed through ESIF.

The following section includes extracts from answers provided directly from respondents to illustrate the issues and challenges for policy makers.

"The whole RIS3 has been designed to exploit these synergies. H2020 is included as a source of funds for the RIS3 objectives and it's included in the financial plan." Region Castilla y León, Spain.

"Funding amounts within ESIF/Operational Programmes concerning KETs are still currently the subject of negotiation and agreement at both EU and member state level. However Research and Innovation is expected to be allocated funding in the order of several hundred thousand euros. This will not be pre allocated to any specific KET area but individual projects will be assessed on merit and impact." Region Wales, UK.

"Possible synergies are being explored, however there might be a mis-match between what is needed at national level and the level of excellence in H2020." Region Malta.

5.2. Possible financing foreseen by regions related to KETs

Overall, most survey respondents indicated that for the time being indicative amounts which may be dedicated to KETs were not available, known or defined yet. This is due in part to the degree of preparation or the degree of detail of their Operational Programmes. In most cases the OPs are not focused precisely on KETs but on thematic objectives. KETs may be included in Thematic Objective 1 Research and Innovation and Thematic Objective 2 – ICT.

The survey responses indicated that most regions (50/83) intend to finance the development of KET related activities primarily through ESIF and other possible EU and national sources.

Only a few regions in the survey were able to provide indicative funding volumes to support KETs within ESIF (see below), but none was in a position of providing indicative budget breakdowns by KET priority. This is clearly an area that will require further work. Concerning the funding amounts in particular within ESIF OPs concerning KETs, the majority of respondents indicated that this information was not available/known/defined yet, however four regions[51] were able to provide indications.

Some regions have mentioned explicitly H2020 as one of the sources for financing KETs. Only NORD-EST ITH indicated that H2020 would be the only source available for financing for KETs development in their region.

Analysing and identifying the funding sources was one of the major challenges of this survey. Telephone interviews with selected respondents indicated that this information was in most cases not available or not accessible for them. Most cited the lack of advancement in the various

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[51] Region Wallone BE3, Eesti EE0, Cataluña ES51, Haute-Normandie FR23, Lazio ITI4.

administrative processes such as the OP validation processes. But many also stated that given the funding methods (ie competitive calls) that it would be impossible for them to identify the breakdown of funding per KET, let alone at the sub KET level or the cross KET level. This is perhaps the biggest challenge now and in the future.

The desk research also showed that some regions use joint inter-regional calls in the previous OP programming period and stated that they are likely to continue to do so. For example the Midi Pyrenees (FR) and Aquitaine (FR) have been able to create synergies and critical mass around common research and innovation priorities through the use of such initiatives.

Finally around 25% of the regions surveyed indicated that funding would be allocated through competitive funding or a mix of competitive and block funding. Others were not in a position to identify funding mechanisms at this stage or simply did not reply. Only one instance (Kujawsko-Pomorskie PL61) indicated that block funding would be used to support KETs. As stated above, Regions were generally not in a position to indicate possible funding breakdowns per individual KET priorities.

Figure 8 Main financial instruments or programmes through which the KET proposals would be financed or implemented
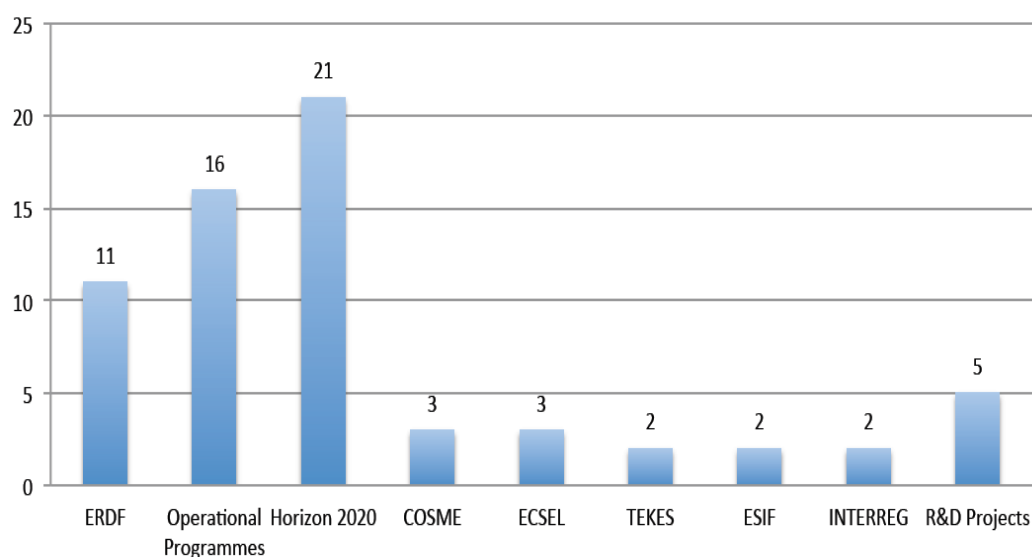
(Nota bene replies often involved a mixture of financing sources, the following were the most frequently mentioned in survey replies)

The following table is an illustration of the indicative funding amounts within the regions concerning KETs that were identified through the survey.

Table 11: Approximate funding volumes to support all the KETs identified in the survey
(amounts for 2014-20 period unless indicated)

Region	Budget
Praha CZ01	The relevant share of OP Prague intended for R&D&I support is € 125 million, but that will include cross-cutting (horizontal) support as well, not only domain-specific.
Moravskoslezsko CZ08	Approximately €1,5 million per year.
SACHSEN DED	€270 million
Puglia ITF4	€5 million per year
Emilia-Romagna ITH5	€100 million
Vorarlberg AT34	€100 million
Algarve PT15	€1 million
FI1D3 Pohjois-Karjala	€100 million
FI195 Pohjanmaa	€10-20 million
Norra Mellansverige SE31	€15 million public financing for innovation. Unknown private funding.

Regions that indicated possible funding amounts within ESIF OPs concerning KETS are indicated below:

Table 12: possible funding amounts within ESIF OPs concerning KETS

RÉGION WALLONNE BE3	ESIF allocated in Wallonia on the basis of calls for projects. Selection of projects on the basis of an independent evaluation.
EESTI EE0	approximately 30 million euros
Cataluña ES51	589 million € ERDF (R&D&i activities)
Haute-Normandie FR23	30 million € ERDF 2014-2020 will be focused on the S3 priorities
Lazio ITI4	Concerning Lazio ESIF/Operational Programmes, the funding allocated to Strategic Objective Research & Innovation is about 212 million €. Another 164 million € are allocated to the Regional Digital Agenda.

Regions which have indicated in the survey the <u>possibility of using H2020 to co-finance KETs</u>, mostly in combination with other funding sources are presented in the table below. The large number of regions is a positive sign and shows that regions will be proactive in trying to map H2020 call priorities with their RIS3 priorities.

Moravskoslezsko CZ08
Castilla y León ES41
Cataluña ES51
Rhône-Alpes FR71
Bretagne FR52
Molise ITF2
Lazio ITI4
NORD-EST ITH
Dél-Alföld HU33
MALTA MT0
Vorarlberg AT34
Oberösterreich AT31
Algarve PT15
FI1D6 Pohjois-Pohjanmaa
FI1D3 Pohjois-Karjala
FI197 Pirkanmaa
FI1C1 Varsinais-Suomi
Östra Mellansverige SE12
Ανατολική Μακεδονία, Θράκη (Anatoliki Makedonia, Thraki) EL11

Figure 9 Type of national funding approaches used to allocate funding to KETs
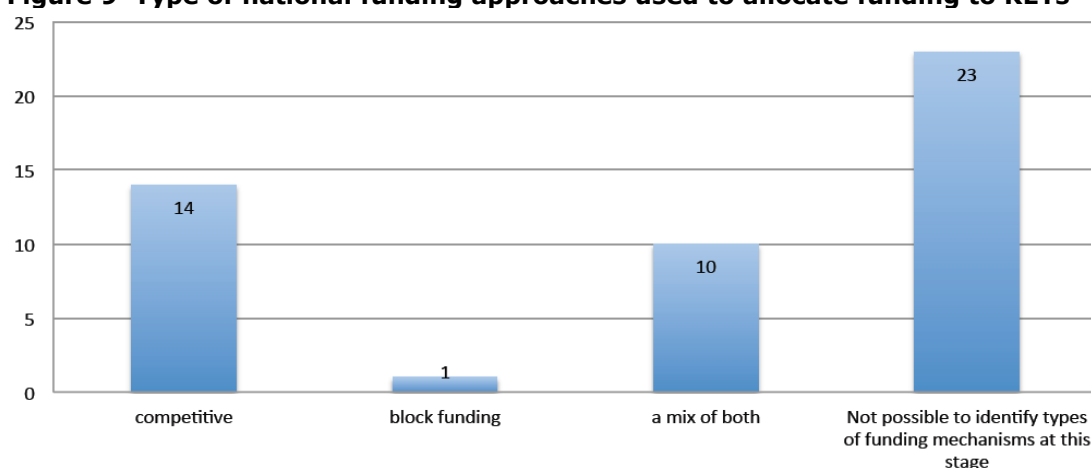
Survey respondents did not provide any particular comments about the type of national or regional funding approaches that are predominantly used to allocate funding to KET. Indeed the answers to this question indicate that a certain amount of uncertainty exists on how priority KET actions and programmes will be co-funded at a regional level within RIS3.

But through the desk research the team were able to access (early OP drafts) which attempt to identify potential leverage with national and regional funding. This area clearly requires further research once the OPs have been published along with their annexes.

6. Other survey aspects

6.1. Future KETs development

Under this heading, regions were invited to provide information about the further development of the KETs in their regions.

From the main results of the survey, it appears that a large number of regions would like to develop further the KETs within their regions indicating that they have not completed the selection or prioritisation processes or that they would like to develop other KETs to create synergies with their existing KETs (the region of Brittany in France for example). The strong impression however based on the survey results and desk research/interviews with regions is that the majority of KETs are based on existing strengths (academic, business, technology resources...) rather than new or emerging KETs that could represent future growth opportunities for the regions. Although (see below) some 25% of regions stated that they were actively considering or reviewing the scope for developing or using KETs, not currently used or present in their region, to support the development of their RIS3.

It should be noted that from the survey replies it appears that 53% of the regions are working to establish synergies by linking regional activities to EU programmes. Surprisingly 3% said they would not be seeking to develop synergies. In addition, 22 regions (over 25% of the survey) have indicated that there are KETs which are not currently present in their region that they would like to see developed or that are required to support the development of their region, while 29 indicated that they would not require further KETs to be developed.

6.2. Instruments to support the diffusion of Key Enabling Technologies

This is an important issue and was actively debated by the project workshop participants. It involves the practical means for channelling support for adoption and implementation of KETs.

Desk research also shows that the OPs will increasingly use both EU financial instruments and regional investment/VC etc. to support the development of SMEs in targeted (RIS3) sectors. Interviews with regions indicated however that is would be difficult to exclude SMEs not present in the RIS3 priority sectors from accessing such funding tools.

The survey results show that Regions intend to use a large variety of measures and/or approaches to support the diffusion of KETs. Technology transfer actions aimed at SMEs topped the survey followed by support for technological research support. Both are rather traditional measures and well embedded in regional RDI ecosystems.

The desk research and regional interviews shows that the maturity of technology transfer and commercialisation initiatives has been a major focus and priority of ESIF support in the previous programming period. For example in Germany we seen the establishment of PVA (Patent Valorisation Agencies) in most Lander and in France SATT (Technology transfer accelerators) have been set up in half of French regions. In both cases the transfer actions are focussed on the thematic strengths of the region and in line with the current RIS3 priorities.

Figure 10 Instruments/measures or approaches considered in regions to support the diffusion and adoption of Key Enabling Technologies
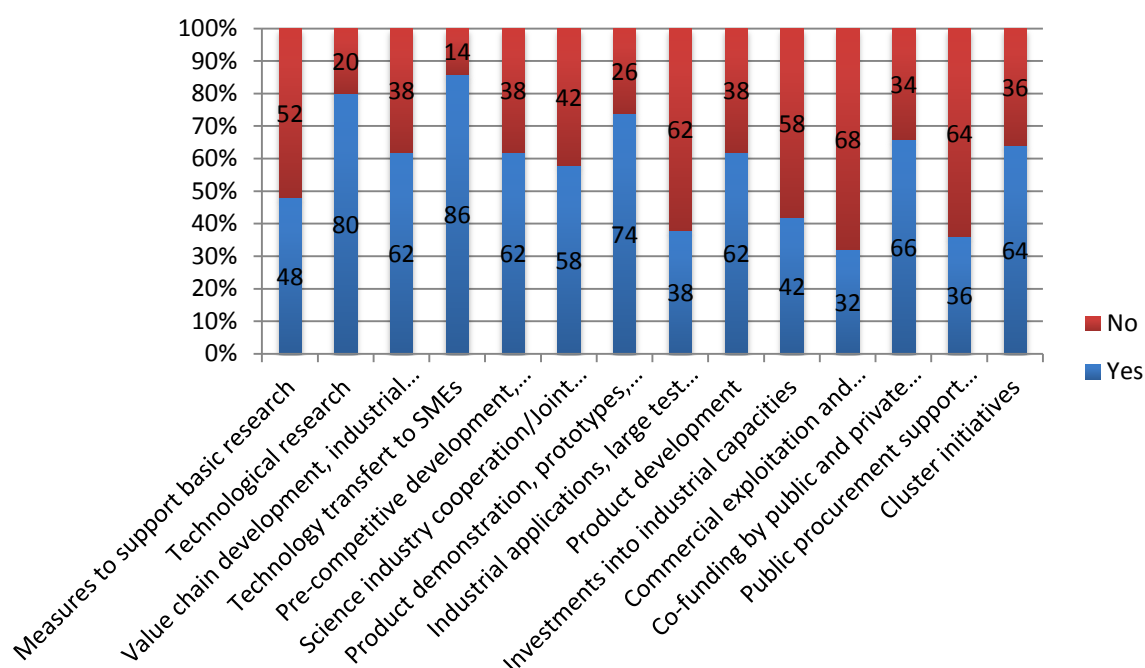
The establishment of project demonstrators/prototypes is an interesting trend showing greater interest in higher TRL's and co-funding with private actors shows that greater efforts for Public Private Partnership's (PPP's) will be required to turn this into reality. Support via cluster ecosystems and adopting an industrial value chain approach also received a high score.

The interview work highlighted the experiences of the Gävelborg region in Sweden. They have put in place a RIS3 with a focus on two KETs: Advanced Materials and Photonics. They have also a long track record in innovation procurement and the concepts of global value chains and sustainable business models are closely associated. The subsequent products that emerge from these innovation processes are often based on the combination of different technologies (cross KETs) and highlight the benefits of such measures to create new services/products based on a public private business model. Other measures implemented by the region such as cross cutting cluster development are also favoured and the project known as SLIM was awarded the Regio Star Award in 2011. The region will pursue these actions and "sees a strong connection between clustering and the development of KETs".

Furthermore a more detailed analysis of the survey results shows some interesting links between KET and instruments to support their adoption and diffusion. For instance most of the respondents involved in Photonics consider Technology transfer to SMEs as an instrument to support the diffusion of KET (73%). The table below illustrates the links between KETs and instruments (the highlighted parts correspond to the most frequently cited instrument per KETs):

Figure 11: Instruments/measures/approaches considered in regions by KETs

KET	Measures to support basic research	Technological research	Value chain development, industrial road-mapping	Technology transfer to SMEs	Pre-competitive development, experimental development	Science industry co-operation/Joint labs	Product demonstration, prototype, proof-of-concept	Industrial application, large test facilities	Product development	Investments into industrial capacities	Commercial exploitation and commercial development	Co-funding by public and private sector actors	Public procurement support instruments	Cluster initiatives
Nano-technology	34%	63%	49%	66%	54%	44%	56%	37%	44%	32%	22%	49%	29%	49%
Micro-and nano-electronics	37%	69%	54%	71%	63%	51%	69%	43%	54%	40%	34%	66%	34%	54%
Industrial bio-technology	37%	65%	48%	63%	41%	39%	48%	28%	43%	33%	26%	50%	30%	52%
Photonics	43%	70%	57%	73%	57%	40%	57%	30%	50%	40%	30%	53%	33%	57%
Advanced materials	37%	65%	50%	67%	52%	48%	57%	35%	52%	35%	28%	54%	28%	54%
Advanced manufacturing systems	39%	63%	47%	67%	49%	47%	57%	33%	47%	33%	27%	51%	31%	49%

The following table distributes the survey results concerning the possible instruments for diffusion of technologies by regions according to the RIM categories.

Table 12 Instruments for diffusion of technologies according to RIM categories

Support measure/type of Region	Leader		Follower		Moderate		Modest	
Measures to support basic research	3	21%	11	48%	7	29%	2	50%
Technological research	5	36%	15	65%	14	58%	3	75%
Value chain development, industrial roadmapping	5	36%	12	52%	11	46%	2	50%
Technology transfer to SMEs	8	57%	16	70%	14	58%	2	50%
Pre-competitive development, experimental development	6	43%	12	52%	10	42%	1	25%
Science industry cooperation/Joint labs	6	43%	11	48%	8	33%	2	50%
Product demonstration, prototypes, proof-of-concept	7	50%	14	61%	12	50%	2	50%
Industrial applications, large test facilities	5	36%	7	30%	5	21%	1	25%
Product development	8	57%	10	43%	8	33%	3	75%
Investments into industrial capacities	6	43%	7	30%	5	21%	2	50%
Commercial exploitation and commercial development	5	36%	6	26%	4	17%	1	25%
Co-funding by public and private sector actors	6	43%	11	48%	11	46%	3	75%
Public procurement support instruments	3	21%	4	17%	9	38%		0%
Cluster initiatives	6	43%	11	48%	10	42%	3	75%

Although these results should be treated with caution and do not represent a complete picture of the situation, it is however interesting to note that:

- Many of the leaders are supporting SMEs, product demonstration and development, whereas relatively fewer of the other groups specified an interest in these areas
- The other side of the coin is that the leaders are relatively more interested in development and closer to market activities than supporting basic research and are actively supporting cluster type initiatives and PPP type ventures. In particular, the followers are relatively more interested in basic research, pre-competitive development and joint labs
- The major interest in public procurement came from moderate innovators.

6.3. Regional cooperation

Regions which participated in the survey indicated that they welcome and will encourage additional forms of cooperation with existing instruments and also with other regions. A majority of respondents indicated that their regional OPs included provisions to facilitate inter regional cooperation. Although only 1/3 of respondents indicated that their region is currently involved in the exchange of KET related experiences and best practices with other Regions.

Desk research, for example the recent publication of the JRC Technical Report on the theme of Inter-regional collaboration in RIS3, provides an interesting reviewing of the issues and presents case study material based on the experiences around the Baltic Sea Region (BSR). For example clusters are given an important role to play in flagship projects and in enhancing inter-regional cooperation and supporting the establishment of a common BSR innovation strategy. Project based cooperation remains the norm and further efforts are required if more strategic based cooperation is to succeed.

The Hungary national RIS3 documents specifically highlights the efforts to cooperate and coordinate actions and priorities with neighbouring countries, notably those part of the among the Visegrád countries (Poland, Slovakia, Czech Republic, Hungary). They also note the difficulties of progressing such discussions given the varying progress or completion status of neighbouring national RIS3 documents and the interactions between national and regional documents, particularly in a large country such as Poland. They are also seeking to develop cooperation

actions with the Danube region countries. They also note that they have used the S3 Platform to gather information on neighbouring countries.

It should also be noted that the forms of cooperation structures or partnerships most often mentioned by survey respondents were INTERREG, VANGUARD and European Technology Platforms.

However, the existing platforms such as Advanced Engineering, NANOfuture, European Construction, were hardly mentioned as tools to provide exchange of KET related experiences and best practices with other Regions.

The Silicon Europe cluster alliance[52] is also a good example of cooperation for nano and micro electronics KET, however it was not mentioned by respondents in the survey but was highlighted in regional interviews.

In the survey, 29% of the regions indicated that their region was involved in the exchange of KET related experiences and best practices with other Regions. 27% of the regions surveyed indicated however that they were not involved in such exchanges of KET related experiences and best practices. 44% did not provide an answer to the question.

As previously noted cluster based inter-sectoral cooperation is deemed by many regions as a valuable tool for developing inter-regional collaboration. Cluster to Cluster (C2C) events are supported by DG Enterprise and a recent Brussels event attracted eighty clusters and over half of the 170 C2C meetings were between clusters of different sectors. Interviews with policy makers suggest that this trend is likely to continue and will be a funding priority in many RIS3 documents. For example, in the Basque Country clusters are highlighted as being a key actor for the implementation of the RIS3 priorities and notably the industrial (KET) priorities.

Figure 12 Regions involved in the exchange of KET related experiences and best practices with other Regions: type of exchange
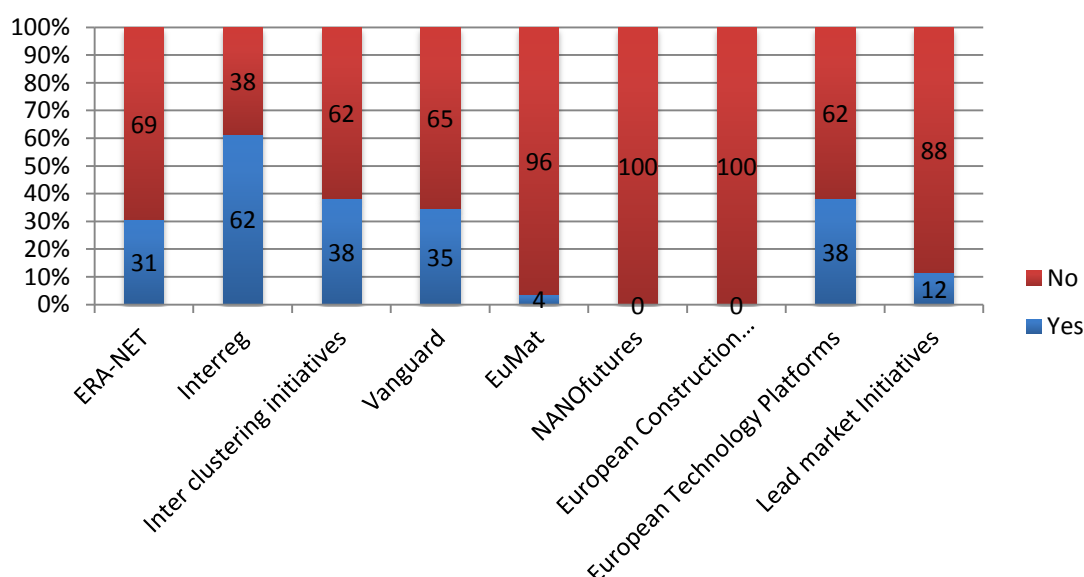
Of the regions surveyed, 73% indicated that their National or Regional Strategy (OP or RIS3) included provisions to facilitate inter regional cooperation, while 27% indicated that this was not the case.

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[52] http://www.silicon-europe.eu/about/silicon-europe/

6.4. Use of EYE@RIS3 database

Almost 1/3 of respondents (23/83) indicated that they found the EYE@RIS3 platform useful in discovering which other regions have included KETs as a priority activity for their future specialisations. About 15% of respondents indicated that they found the EYE@RIS3 platform of limited usefulness in discovering which other regions have included KETs as a priority activity for their future specialisations. Over half of the respondents indicated they had not used the platform or did not provide a reply.

Figure 13 Question "To what extent did you find the EYE@RIS3 database useful in discovering which other regions have included KETs as a priority activity for their future specialisations?"
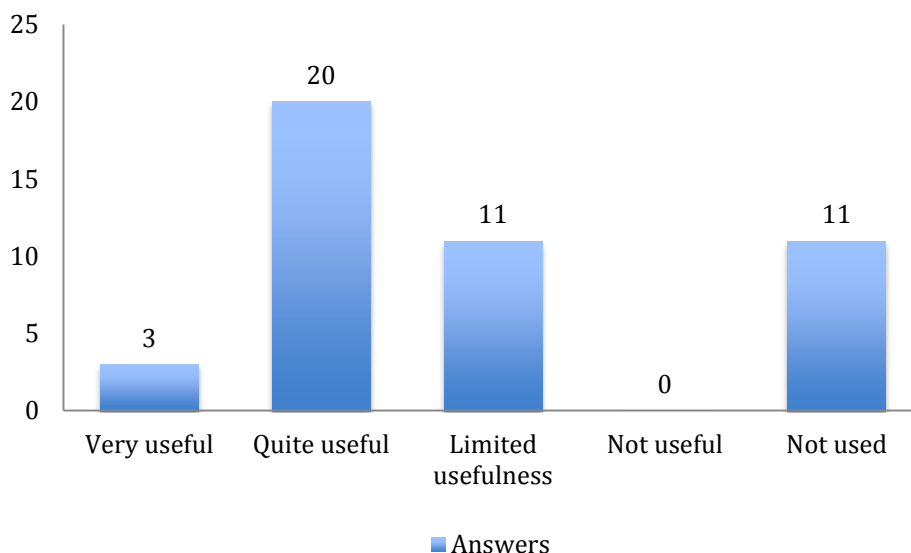
Concerning the use of the KETs observatory[53] only a minority (14/83) have been using this as a tool for planning KETs support. More regions have been using the Regional Innovation Scoreboard[54] (27/83).

A significant number of regions (37/83) indicated an existing/future need for a coordinated tool or framework for sharing KETs-related information, good practices and demonstration projects with neighbouring regions within their country. Indeed some Member States such as France have already begun to provide this review. Whilst in England the government have set up an "advisory Hub for Smart Specialisation" to gather evidence and help disseminate best practice and improve connections between different partners, advise on compliance with ESIF procedures and through this support LEP's in developing stronger collaborative proposals. This hub will also seek to encourage better coordination between different European Funds. The UK government also launched a social media group to maintain the momentum created between the various stakeholders during the RIS3 development process.

About half of the respondents (40/83) indicated that they would welcome training on state aid and financing of KETs (including rules of financing demonstration projects and infrastructures). This result coincides with the findings regarding the type of instruments that regions will be using to develop and implement KETs. Many regions (35/83) indicated that they would welcome further methodological guidance and training from the European Commission in this domain.

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[53] https://webgate.ec.europa.eu/ketsobservatory/

[54] Regional Innovation Scoreboard 2014.

7.   Overall conclusions

The KETs RIS3 research study (based on results drawn from desk research, the on-line survey with responses from 83 regions and follow up interviews and the project workshop) carried out in the context of the present project constitutes a snapshot of the situation concerning the development of RIS3 and the development of KETs in mid 2014. The study methodology initially proposed underwent some changes to take on board the data availability, notably the readiness of RIS3 documents and especially the Operational Programmes.

Notwithstanding these changes the research work has succeeded in providing a unique insight into the issues and challenges concerning the linkages and trends concerning RIS3 and KETs. It has also highlighted some of the major challenges that still need to be addressed. Indeed the on line survey has gathered data not available in a similar nor consolidated format elsewhere. The study and the feedback from the national and regional research and policy community have also highlighted the issue that the subject of RIS3 and KETs is still very much of an ongoing process. The results show however that the RIS3 and their associated OP's provide an important opportunity for funding and implementing KET related actions and that regional stakeholders are very interested in exploiting synergies between the various planning and funding frameworks to support KET actions.

The **main points and conclusions** of this work are set out below.

At a sectoral level, health and ICT are the top two priorities identified in RIS3 documents. The online survey provides results that are complementary to the information which is available on the EYE@RIS platform. Cross checking through interviews and desk research but especially with the work of certain MS such as France who have recently conducted an overall assessment of RIS3 documents also confirms the broad trends identified regarding sector priorities.

The online survey results concerning the sample of 83 regions who were able to fully complete the survey provides a snapshot of the interest of these European region's in the individual KETs. A general summary of their KET selections is as follows:

Advanced materials was the most selected KET with 63% of the respondents (52 regions), closely followed by Advanced manufacturing systems with 57% (47 regions) and Industrial Bio-technology with 54% (45 regions). The other group of KETs showed slightly less involvement with Nanotechnology (48% - 40 regions), Micro-and Nano-electronics (41% - 34 regions) and Photonics (33% - 27 regions)

One of the other major outputs of the study, notably gathered thanks to the results of the on-line survey, concerns the valuable insight into the details concerning the specific KETs categories; further finer grained details (the so called "sub-KETs" and "cross-KETS") and the areas of RDI excellence that regions wish to exploit. To our knowledge this is the first time such data has been gathered and presented in one place. Although the work of the IPTS team and the S3 platform covers the issues of KETs and RIS3 no information has yet been collected at the Sub KET level nor at the Cross KET level. This information based on the direct feedback of a representative sample of 83 EU regions provides an interesting insight into the possible programming priorities of H2020 programmes and the trends and scope for better linkages between ESIF and H2020 funding.

The desk research and interviews with stakeholders shows that a variety of different methods have been used to complete the RIS3 ex ante conditionality clause regarding the OPs. On line survey respondents also provided links to their publicly available documents. These results show that the sector specialisation or prioritisation process have almost invariably been undertaken in a comprehensive bottom up manner, notably through mapping and consultation with stakeholders. However the integration of KETs is much patchier and varies from simply a passing reference "consideration of KETs will be taken into account", to those regions that have launched detailed studies, for example in Scotland, for the identification of regional specialisations based on one of the KETs. Meanwhile desk research showed that in England the RIS3 document makes reference to KETs via their "Eight Great Technologies".

In addition, the online survey provided information on some of the concrete projects regions intend to implement and the types of instruments and measures they intend to deploy. The results show that technology transfer notably working with SMEs will remain a priority of OP funding actions. It illustrates also the interest, although limited, in new instruments such as public procurement. It highlights for example, the role that clusters are expected to play in supporting implementing regional priorities and supporting inter-sectoral collaboration. The interviews with stakeholders also

underlined the uncertainty regarding the integration of the new EU financial instruments into the OPs.

Given that OPs are almost all unapproved, it was very difficult for regions to provide information on the types and the possible financing volumes that are foreseen by the concerned regions.

Only three of the 83 survey respondents indicated that they had not been able to, or not made significant reference to or not fully incorporated the scope of KETs in their RIS3. In addition interviews with MS's who did not respond provided additional insights to this issue and most chose not to respond because their documents were simply not available. This would seem to indicate that supporting KETs will play an important part in the delivery of RIS3/OP priorities and helping regions face the challenges such as employment, RDI excellence, SME competitiveness.

Taking into account the fact that regions may have priorities in several KETs, the survey revealed that there is more interest from regions in the following KET sectors: Advanced materials, Advanced manufacturing systems and Industrial Bio-technology.

The other group of KETs showed a lower amount of responses with Nanotechnology, Micro-and Nano-electronics and Photonics. Cross KET activity was also common place and Advanced materials and advanced manufacturing were the most frequently associated with other KETs.

Most regions have undertaken wide ranging consultation exercises with key regional actors when defining the KET priorities and university and research actors are well represented. Companies and other private sector actors such as business networks and clusters suggest that the "entrepreneurial discovery process" encouraged by the S3 protagonists has been followed. Technology platforms are however less well represented in this process.

The on-line survey has provided some initial information about possible sources of funding and indicative allocations from some of the region's ESIF programmes. A significant number of the regions which replied to the survey (19/83) indicated that Horizon 2020 funding would be sought in addition to other funding mainly ESIF and national. This finding would seem to support the emphasis that both DG Research and Innovation and DG Regio are placing on securing greater synergies between their respective financial instruments.

Some actors such as cluster organisations are both present in the list of actors that have participated in identifying and selecting the RIS3 and KET priorities and are highlighted by many regions as being key actors for the implementation and "spending" on KET priorities. Greater use of PPP or at least joint ventures with private actors seems to be the priority in many regions especially in regions investing in pilot initiatives and demonstrator projects.

The desire to enhance international cooperation between regions is supported and many regions also see the need to introduce "new or missing KETs" into their regions to enhance the competitiveness of their economies and strengthen the exiting RDI excellence. A number of regions have actively participated in inter-regional efforts (Vanguard), have supported the creation of meta regions (Baltic, Danube etc) and clusters are often encouraged to take the lead in promoting such efforts.

The feedback on the services provided by the IPTS S3 platform indicated that they were broadly welcomed although it was noted that regions need to be more proactive in completing and maintaining up to date records on the platform.

The project workshop attendees broadly validated the study results and highlighted in particular the challenges in implementing concrete synergies between projects and finances from ESIF and H2020 programmes. For example, some workshop participants and the results of the on-line survey highlighted the interesting and important role that ERANET type initiatives can play. Indeed they are seen as a stepping stone towards creating more synergies and international collaboration. This issue will need to be dealt with rapidly given that regional OP calls for proposals are now starting to come on line.

The study has also highlighted the complexity of the stakeholder relations concerning the development and implementation of KET related actions. The interviews often highlighted the challenges that lie ahead when the following actors will need to work together:

- National and regional policy makers

- OP administrators and animators responsible for managing and promoting the calls (often two organisations);

- Research and innovation communities (academic and businesses)

- Sector specialists of federations

- Businesses especially SMEs

- Intermediary organisations such as tech transfer agencies, clusters ....

- Other public and private funding agencies

The interplay and synergies between these organisations will be essential if the OPs are to transfer the RIS3 and KET priorities into reality and concrete actions.

The main bottlenecks to synergies are mostly due to the difference in implementation and management modes and rules between the programmes[55], in particular:

- Different managing systems, eligibility criteria between the programmes,

- The EU countries administer ESIF funds on a decentralised basis (national and regional level) through shared management. Horizon is managed centrally by the Commission.

- In particular the fact that ESIF related projects (while respecting the non duplication rule) do not have any guarantee of receiving Horizon funding, which creates an additional uncertainty for regional project stakeholders .

- Difficulty in planning the deployment of compatible actions between different programmes,

- Risk of increased complexity in design and implementation of KETs projects

- Different programmes have different foci: H2020 focuses on excellence, while ESIF focuses mostly on transition or less developed regions and regional development.

- Need to ensure the 'non- cumulative principle' of the planned actions and avoid double funding

- Combined funding offers possibilities to promote KETS development across different TRLs via pilot or demonstrator projects, but may be complex to design and implement

- Different application rules regarding State Aid Rules between the programmes, notably concerning support to KETs deployment at higher TRLs, through ESIF which may lead to market distortions and problems with State Aid Rules.

- Coordination barriers and bottlenecks between various players, requires the establishment of strong thematic partnerships (see above)

In conclusion, this study has provided a first step into understanding the linkages between KETs and RIS3 documents. It is not possible at the moment to derive absolute conclusions on these matters but it has been possible to identify interesting trends, issues and challenges that would need further attention. A more precise assessment of national plans, which is not possible at the moment, would require a review of regional Operational Plans and Research and Innovation Smart Specialisation Strategies, funding instruments when these are finally and publicly available.

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[55] See in particular: Synergies between European Structural and Investment Funds and Horizon 2020 and other research, innovation and competitiveness-related Union programmes, European Commission, 2014; Horizon 2020: Key Enabling Technologies (KETs), booster for European Leadership in manufacturing, TNO, Study for the ITRE Committee of the European Parliament, October 2014; European Commission, Guidance for Beneficiaries of European Structural and Investment Funds and related EU instruments, 2014.

8.   Policy Recommendations

The following recommendations represent a selection of policy initiatives and ideas that are emerged from stakeholders' interviews, desk research findings and the on line survey results, as well as comments from the workshop participants.

In general and with respect to RDI programmes, the RIS3 approach provides opportunities to further enhance their efficiency and effectiveness. A systematic approach should be devised to coordinate financial instruments and to monitor regions' performances in RDI policies and programmes and would significantly help reduce funding bottlenecks and create greater synergies between project partners.

It should be noted that although the RIS3 approach is an ex ante conditionality clause for the OPs it has been undertaken in many different formats, not always publicly available. The KET component has also been treated in a heterogeneous manner manner and both bottom up and top down approaches have been identified.   It will be important therefore that strong social and political support, on the one hand, and steady improvements and corrections on the basis of accompanying monitoring measures, on the other, are maintained or put in place. Moreover, the RIS3 approach and associated KET activities should not be considered just as a monitoring tool. A dedicated monitoring system and methodology should be developed to inform about the regional strategies, allow comparison and track the results and achievements.

This final chapter highlights potential issues and policy challenges that need to be addressed. They are detailed below:

KET Definitions

-   Stakeholder interviews, especially with OP managers showed that the notion of KETs is still not fully understood. Indeed the definition or parameters of what is included/excluded in a KET need clarification and consistency. This is especially true at the sub KET level. The preparation of a set of KET Categories/typologies and common indicators would help RIS3 actors better understand their scope and the opportunities for synergies with their sector specialisations. This enhanced understanding and transparency would facilitate later synergies with H2020.
-   A subsequent recommendation could concern the definition or identification of KET related actions that are necessary or useful for KET development.
-   Technology actors (KET actors at the EU and MS/regional level) need to play a proactive role in disseminating relevant information to RIS3 and OP actors. A mix of bottom up and top down actions should be implemented to enhance understanding. A EU project workshop could be beneficial to develop these ideas and other recommendations presented in this report. Indeed the study results highlight the relatively low awareness and involvement of technology Platforms in the RIS3 process. This could be remedied through such actions.

Stronger policy and political support

-   The European Commission should consider how it can provide additional methodological guidance and training. Indeed the difficulty for some regions to mobilise their internal resources, combining technology and regional development advisors provides an insight into the challenges that lie ahead and should be addressed in the short term. Multi level governance will be a key issue for the implementation of RIS3 activities as RIS3 prioritisation process remains in its infancy in terms of implementation experiences through the new OPs.
-   Policy makers should organise and facilitate the provision of additional training on state aid and financing of KETs (including rules of financing demonstration and pilot projects and infrastructures) through ESIF. This is clearly a demand from regional actors and shown in the study results. Some Members States, for example England, have set up an "advisory Hub for Smart Specialisation" to gather evidence and help disseminate best practice.
-   Sharing of good practices requires a more proactive approach. For example the study shows that few regional policy actors are aware of opportunities to participate in H2020 actions such as ERA Nets or the methods of engaging and developing public-public partnerships (Art 185). Project proposers and actors on the ground are even less informed. The launching of OPs across Europe should be an opportunity to improve this situation.

- Indeed given the different funding procedures (ESIF and Horizon 2020) it will be difficult for policy makers and stakeholders to plan or foresee H2020 funding for KETs as a means for enhancing regional RDI excellence. A strategy process of targeting such funds linked to regional KETS can be developed, but the synergies will be often based on opportunistic approach. Furthermore it would not seem possible to use the existence of RIS3 KET priorities as a specific selection criterion for H2020 processes. Nevertheless policy makers need to consider implementing some form of action if RDI excellence and regional critical mass and complementarities are to be achieved.
- It could also be interesting for the EC to launch a type of Regional Pilot or Demonstrator call asking for expressions of interest from "model KET/RIS3 regions". The results could then provide practical results for use by other regions. DG Enterprise has recently launched such an initiative regarding cluster policy development and has selected six pilot regions. A KET inspired approach would allow the EC service to work with regions that have put in place interesting KET/RIS3 approaches and share the experiences with the wider stakeholder community.

Implementation Instruments

- A study of RIS3 documents and their associated OPs show that a great variety of instruments and measures will be mobilised to channel resources towards RIS3 and KET priorities.
- Technology transfer to SMEs remains a key RIS3/KET instruments and requires a mechanism or approach for sharing best practices in relation to the exploitation of regional KETs i.e. how can RDI strengths, KETs and uptake by SMEs be enhanced. Specific funding incentives could be provided to stimulate take up or launch pilot initiatives with SMEs and selected KETs.
- Public procurement initiatives also represent an interesting mechanism for supporting KET development or helping SMEs to participate in procurement processes that reflect regional priorities.
- Technology Foresight tools can help identify the needs for developing or introducing new KETs into a region. Indeed, the exploitation of KETs often plays an important part in the future economic growth of a region. Universities could play an important role in foresight type activities to help understand where and how future economic growth may come from.
- Clusters have been active in the RIS3 and KET prioritisation process and can continue to play a part in these processes, for example by acting as a resources channel towards SMEs and help structure KET based industrial value chains;

Stakeholder involvement

- Policy actors should continue to proactively **target key actors and users of KETs** such as SMEs and intermediary actors such as technology transfer agencies, business networks and clusters to enhance take up. Indeed by supporting cluster collaboration it is also possible to enhance inter KET actions, generating and or supporting emerging industries or enhancing industrial value chains. An interesting initiative supported in the Aquitaine region (FR61), where Photonics are one of the selected specialisations, has been launched by the French cluster Route des Lasers in which they have created a network called (EPCNET) to target H2020 calls involving Photonics, cross sectoral opportunities and support European SMEs.
- The RIS3 development and now the OP implementation phase and call for proposals processes should involve H2020 actors. The on-line survey results show that the research community is involved and the private sector often via clusters. Greater synergies with the research community can be developed following these RIS3 actions. Furthermore, opportunities in the design of OP calls could address issues such as "To what extent can ESIF funded university projects be focussed on regional KET priorities"?
- The new OP can also provide an opportunity for more "innovation" in proposal delivery, for example the scope for more PPP initiatives and for enhanced SME involvement via Eureka-Eurostars and the new SME Instrument. This could help build synergies between ESIF and H2020.
- Actors and organisations responsible for shaping EU level research priorities and developing European Innovation Partnership agendas should be made aware of bottom up RIS3 priorities. The mapping results presented in this study and on the EYE@RIS3 Platform represent a step in the right direction.

Internationalisation and Links with other initiatives

- The link-up between RIS3 and KETs as it provides a real opportunity to secure the goals of many regional strategies concerning economic growth, job creation and the competiveness and excellence of regional economies.
- Inter regional cooperation is a priority for many regions but there are insufficient policy or financial incentives for this to take place, especially in the OP's. New initiatives and the funding rules of Horizon 2020 necessitate inter regional cooperation and perhaps a greater emphasis can be placed on this need. The Interreg programme was often cited by respondents as helping cooperation.
- The role of clusters in supporting inter-sectoral and inter regional cooperation was also highlighted, as an example some of the most dynamic European clusters cover two regions (Gold Label Aerospace Valley in France covering Midi Pyrenees and Aquitaine) or two countries such as Medicon Valley cluster (Denmark and Sweden) or Inter regional cooperation such as in the Baltic Sea Region or the Danube region.
- Universities and research/innovation centres linked to the selected KETs could play an important role in regional Foresight type activities to help understand where and how future economic growth may come from.
- The question of the ESIF absorption capacity of some regions/countries, especially in the field of RDI needs to be carefully examined. Greater inter regional cooperation between strong and weak RDI regions could help meet this challenge. The recently launched Twinning project by DG Research is an interesting contribution to this process. Indeed workshop attendees highlighted the need to consider the different RDI and economic conditions across MS. KET support and implementation mechanisms and approaches are likely to be very different in Germany and Romania for example.
- Regional Innovation Monitor data and Regional Innovation Scoreboard studies can help regions position themselves along the regional RDI spectrum and determine what type of policies could be used to support and leverage KETs investment and identify potential partners.

Platforms and innovation infrastructures

- Survey respondents consider it important to promote the use of existing KET and RIS3 platforms and Regional Innovation Observatory as a tool for planning KET support. Indeed if regions are to adopt a targeted strategy then resources must be released for identifying suitable H2020 calls and regional support and resources (public and private) be devoted to securing H2020 funding.
- Some RIS3 authorities believe that the "platform approach" provides the best mechanism for developing regional specialisations and inter regional cooperation, creating critical mass and providing the visibility to attract and stimulate other investors and users: authorities from the Vanguard regional group have decided to examine the opportunities for working together in the Advanced Manufacturing KET. Such large scale initiatives can have a Europe wide impact.
- Survey results highlight the continued importance of technology transfer actions. These can provide an interesting link from H2020 project results to ESIF support and ensure downstream funding in TRL (4-9) actions.
- The study results support the trends for developing early/pilot production facilities (Fab Labs...), advanced manufacturing and new industrial value chains or emerging industries. These can be supported by ESIF and be in line with KET/RIS3 priorities.

Enabling synergies

- The study clearly shows that ensuring optimal synergies to reduce bottlenecks, maximise impact and efficiency of public funding requires better alignment of strategies and implementation modalities. At present this will remain a challenge given the different implementation and management processes associated with H2020/ESIF.
- In most project scenarios H2020 funding is likely to precede ESIF funding. Therefore there is a need to ensure project concept and planning synergies are considered at an early stage in the process.
- One (first) proactive step in this direction is by identifying a number of limited KET priorities to foster excellence, to provide strategic focus and create a critical mass of activities at a regional or national level and support this by targeting H2020 calls and all types of funding mechanisms (Research, innovation and support actions as well as ERA Nets...).

- A mechanism for the coordination of financial instruments and raising awareness could be devised to improve the management, performance and efficiency of the synergies between Horizon 2020 programme and ESIF Funds. Indeed given the different funding procedures (ESIF and Horizon 2020) it will be difficult to see how regional RDI excellence can be reinforced as opposed to a more opportunistic approach. Indeed it would seem difficult to use RIS3 KET priorities as selection criteria for H2020 processes. Nevertheless some form of action is required if RDI excellence and regional critical mass and specialisation is to be encouraged.
- Synchronisation of EU and MS calls can help create synergies and reduce efforts for project partners. Discussions with OP managers show that there is increased awareness of such an approach but pragmatic regional issues, such as committee cycles will remain the norm.
- These practical approaches can be supported by devising compatible and coordinated guidelines concerning data and terminology harmonisation to help facilitate interpretation of H2020 results and fit with RIS3 choices. More information regarding H2020 winning projects needs to be made available to OP Programme Management authorities and those designing and launching ESIF call for proposals.
- Helping OP managers create more transparency and clear linkages with H2020 should be encouraged. Radical ideas such as the alignment of ESIF selection criteria, for example offering to support winning H2020 projects with ESIF funding or supporting projects with an international outlook. Or using ESIF to fund H2020 projects that past the quality/excellence threshold but did not secure funding.
- More dissemination and awareness raising actions are required between the H2020 and the RIS3 communities to brainstorm about synergies. Ensure H2020 NCP's cooperate with regional structures and are aware of RIS3 choices and inform regions of H2020 "winners".
- Workshop participants made a interesting suggestions such as "Could the indication of synergies with RIS3/ESIF help improve the "score" of H2020 projects?"

Better training, coordination and monitoring

- Training considerations will need to be considered across all the above areas. Indeed the stakeholder interviews showed that some MS are already planning to organise workshops to highlight the interactions between KETs and RIS3. For example the CGET (FR) will be organising such a workshop in early 2015.
- The development of the RIS3 has put in place a more structured framework for project and programme implementation regarding regional/sector specialisations. This can help improve the knowledge that can be provided regarding KET related actions. Many MS have already identified the need to improve the articulation between KET and ESIF. It could therefore be interesting to encourage MS to monitor/coordinate exchanges on this theme at a MS level.
- New web links on funding portals. Sharing good practices via a dedicated platform will help OP managers increase the number of relevant project proposals.
- Policy makers should consider ways to enhance the use of coordinated tools or frameworks at national level for sharing KETs-related information, good practices and demonstration projects with neighbouring regions. ESIF has often been used to fund RDI actors and resulted in new university buildings, laboratories and equipment but to what extent can this type of funding be focussed on a limited number of priority sectors (RIS3/KETs)?
- Monitoring and evaluation methods and the gathering of strategic intelligence must be developed to take into account KETs and sub KET categories to ensure that the regional focus (funding) remains relevant and that the leverage effects are maximised. There seems to be a need to devise suitable KET indicators to enable policy makers to establish whether focussing on a limited number of KETs makes sense.
- Adopting similar project auditing and accounting systems for H2020 and ESIF would simplify project delivery and create more scope for creating synergies between projects.
- The European Commission should also consider how platforms such as the IPTS RIS3 can provide additional methodological guidance and training. Indeed the difficulty for some regions to mobilise their resources, combining technology and regional development advisors provides an insight into the challenges that lie ahead and should be addressed in the short term. Indeed multi level governance will be a key issue for the implementation of RIS3 and KET activities.

REFERENCES

- "A European strategy for Key Enabling Technologies - A bridge to growth and jobs", European Commission Communication (2012) COM (2012) 341 Final
- A guidance for policy-makers and implementing bodies on Synergies between European Structural and Investment Funds, Horizon 2020 and other research, innovation and competitiveness-related Union programmes, European Commission published in May 2014.
- Advanced Monitoring and Coordination of EU R&D policies at Regional level, ESPON, 2012.
- Commission Staff Working Document, 'Advancing Manufacturing - Advancing Europe' - Report of the Task Force on Advanced Manufacturing for Clean Production, SWD(2014) 120 final.
- Council Conclusions on Innovation Union for Europe, 3049th Competitiveness Council meeting. Brussels, 26 Nov. 2010.
- Directory of Non Nonsense Activities to build S3 minded regions, Eurada November 2011
- ESIF Common provisions regulation (CPR) (Regulation (EU) No 1303/2013).
- Europe 2020 Flagship Initiative: Innovation Union, COM(2010) 546 final.
- Europe 2020: A strategy for smart, sustainable and inclusive growth, Communication from the Commission, COM (2010) 2020 final.
- European Commission Communication on Industrial policy An integrated industrial policy for the globalisation era, COM(2010) 614
- European Commission Communication on Industrial policy For a European Industrial Renaissance, COM/2014/014 final
- European Commission Communication on Industrial policy, A Stronger European Industry for Growth and Economic Recovery, COM/2012/0582 final
- European Commission, Guidance for Beneficiaries of European Structural and Investment Funds and related EU instruments, 2014
- European Union, Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3), (2012)
- Expert group on synergies between FP7, the CIP and the Cohesion Policy Funds: Synergies Expert Group (SEG), Final Report of the Synergies Expert Group, June 2011.
- Foray D, David P.A., Bronwyn H, Smart Specialisation – The Concept, Knowledge Economists Policy Brief n° 9,June 2009.
- Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3 Guide). European Commission, 2012.
- High Level Group on Key Enabling Technologies, KETs for a competitive Europe, January 2014.
- Horizon 2020 Regulation (Regulation (EU) No 1291/2013)
- Horizon 2020: Key Enabling Technologies (KETs), booster for European Leadership in manufacturing, TNO, Study for the ITRE Committee of the European Paliament, October 2014.
- Innovation Patterns and Innovation Policy in European Regions - Trends, Challenges and Perspectives, annual report, Regional Innovation Monitor, 2010.
- Innovation-driven Growth in Regions: The Role of Smart Specialisation, OECD report, 2013.
- KETs Observatory: https://webgate.ec.europa.eu/ketsobservatory/
- Mendez C, Bachtler J & Wishdale F (2011) A budget and cohesion policy for Europe 2020 : let the negotiations begin, EoRPA Paper 11/4, European Policy Research Paper, Number 81, European Policies Research Centre.
- Nanodata project, inception report, RTD-NMP-2012-Nanodata contract for the production of an ex-post and ex-ante assessment of European efforts to encourage nanotechnology activities in the EU, 2014.
- Nanosafety in Europe 2015-2025: Towards Safe and Sustainable Nanomaterials and Nanotechnology Innovations, Finnish Institute of Occupational Health, 2013
- Preliminary report on KETs priorities declared by regions in the context of their work on Research and Innovation Strategies for Smart Specialisation (RIS3), JRC, 2013.
- Regional Innovation Monitor, Innovation Patterns and Innovation Policy in European Regions - Trends, Challenges and Perspectives 2013, Annual Report, 2014.
- Regional Innovation Scoreboard 2014.
- Regional Policy contributing to smart growth in Europe 202, COM(2010) 553 final
- Regional Policy For Smart Growth In Europe 2020, European Commission
- Regulation (EU) No 1303/2013, Common Provision on Structural and Cohesion Funds 2014-22.

- Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006.
- Silicon Europe: http://www.silicon-europe.eu/about/silicon-europe/
- Smart Specialisation Platform, EYE@RIS3 tool, IPTS, http://s3platform.jrc.ec.europa.eu/map
- Smart specialisation programmes and implementation, IPTS S3 Policy Brief 02/2013
- Synergies between European Structural and Investment Funds and Horizon 2020 and other research, innovation and competitiveness-related Union programmes, European Commission, 2014.
- The goals of Smart Specialisation, IPTS S3 Policy Brief 01/2013
- The Stairway to Excellence (S2E) project https://ec.europa.eu/jrc/en/research-topic/stairway-excellence-s2e
- Vanguard Initiative, new growth through smart specialisation. Brussels: Department of Economy, Science and Innovation, EWI, Flemish Government, 2014.
- Vanguard Initiative: http://www.s3vanguardinitiative.eu/

Annexes

Annex 1: List of KETs/sub-KETs used in the survey

Nanotechnology

1. Developing next generation nanomaterials, nanodevices and nanosystems;
2. Ensuring the safe development and application of nanotechnologies;
3. Promoting nanotechnology-based innovations with safety-by-design for consumers and industry;
4. Developing the societal dimension of nanotechnology;
5. Efficient synthesis and manufacturing of nanomaterials, components and systems
6. Developing capacity-enhancing techniques, measuring methods and equipment
7. Leveraging the potential of nanotechnologies; bridging the gap between research and markets by demonstrating industrial capability, including pilot lines;
8. Safety of nanotechnology-based applications and support for the development of regulation
9. Other

Micro-and nanoelectronics

Industrial biotechnology

1. Boosting cutting-edge biotechnologies as a future innovation driver;

2. Biotechnology-based industrial processes;
3. Innovative and competitive platform technologies;
4. Other

Photonics

Advanced materials

1. Cross-cutting and enabling materials technologies;
2. Materials development and transformation;
3. Management of materials components;
4. Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions;
5. Materials for creative industries
6. Metrology, characterisation, standardisation and quality control
7. Optimisation of the use of materials

8. Delivering application-focused, advanced materials structures and systems (AMSS);
9. Supporting SME innovation activities in a globalised economy; enabling European SMEs as first choice suppliers of advanced materials structures and systems (AMSS).
10. Materials-based solutions enabling active and healthy aging;
11. Other

Advanced manufacturing systems

1. Technologies for Factories of the Future;
2. Technologies enabling Energy-efficient buildings;
3. Sustainable and low-carbon technologies in energy-intensive process industries;
4. New sustainable business models
5. Other

Cross-sectoral KETs-related activities

7. Nanotechnology and Advanced Materials for more effective Healthcare

8. Nanotechnology and Advanced Materials for low-carbon energy technologies and Energy Efficiency
9. Exploiting the cross-sector potential of Nanotechnologies and Advanced materials to drive competitiveness and sustainability
10. Enabling active and healthy aging within a personalised and affordable health-care system;
11. *Providing dedicated support to nano- and advanced materials–enabled product life cycle policies and strategies; to risk assessment strategies, including regulatory research; and to forward looking and other intelligence gathering activities for the future.*
12. Other

Annex 2 Survey Questionnaire

Questionnaire on Smart Specialisation Strategies and Regional Operational Programmes and Linkages with Key Enabling Technologies

The European Commission, DG for Research and Innovation has launched a study to analyse the linkages between the KETs, especially the themes of Nanotechnologies, Advanced Manufacturing and Advanced Process technologies (NMP), and the regional and national Operational Programmes and the Smart Specialisation Strategies.

The study involves both an EU 28 survey and the identification and review of trends and regional case studies. The survey aims to complement work being undertaken in the framework of other studies/initiatives and is intended to consolidate knowledge, highlight successful experiences, allow for an exchange of know-how and practices across Europe and provide useful hints for an effective policy making process.

The preparatory work has been supported by the European Commission Joint Research Centre IPTS (RIS3 Platform team) and the results will help refine the information currently available on the Platform. The final results will be rendered available to all regions and interested stakeholders.

We hope you will kindly offer your support and take the time to complete this important survey. If you cannot answer all questions do not hesitate to seek help from relevant colleagues (technical, financial etc) or move on to the next question. Please note you can save your responses and come back to the questionnaire at a later time.

If you are not the right person to complete this survey please forward it accordingly.

Please note the deadline for completing the survey is the 16th of June 2014

There are 70 questions in this survey

1. Personal information

Country: *

Please choose **only one** of the following:

◯ BELGIQUE-BELGIË

◯ БЪЛГАРИЯ (BULGARIA)

◯ ČESKÁ REPUBLIKA

◯ DANMARK

◯ DEUTSCHLAND

◯ EESTI

◯ IRELAND

◯ ΕΛΛΑΔΑ (ELLADA)

◯ ESPAÑA

◯ FRANCE

◯ HRVATSKA

○ ITALIA

○ ΚΥΠΡΟΣ (KÝPROS)

○ LATVIJA

○ LIETUVA

○ LUXEMBOURG

○ MAGYARORSZÁG

○ MALTA

○ NEDERLAND

○ ÖSTERREICH

○ POLSKA

○ PORTUGAL

○ ROMÂNIA

○ SLOVENIJA

○ SLOVENSKO

○ SUOMI / FINLAND

○ SVERIGE

○ UNITED KINGDOM

Region/NUTS *:

Please select your Region/NUTS

Person completing the survey and organisation: *

Please write your answer here:

Contact details (mail/phone):

Please write your answer here:

2. Regional/National Innovation Smart Specialisation Strategy (RIS3) State of play

(Indicate whether the mapping the Smart Specialisation Strategy (S3) in your region/country has been drafted/approved and if so, is it available for consultation)

Status: *

Please choose **only one** of the following:

◯ Draft

◯ Approved

S3 Availability: *

Please choose **only one** of the following:

◯ Publicly available

◯ Reserved

If public please provide web address/links:

Only answer this question if the following conditions are met: Answer was 'Publicly available ' at question '33 [G2Q00002]' (S3 Availability:)

Please write your answer here:

If known, please identify the person(s) in charge of the preparation of these documents:

Please write your answer(s) here:

Name

Body

Email

3. Main sectoral specialisations or priorities identified

Please identify the main sectoral specialisations or priorities identified in the finalised Smart Specialisation Strategy and/or regional Operational Programme (or drafts if these are the only documents available).

A simple list of the smart specialisation priorities is sufficient for this answer: *

Please write your answer here:

4. Which of the following stakeholders have been involved in identifying these priorities?

Which of the following stakeholders have been involved in identifying these priorities?

Please choose **all** that apply:

☐ Other government units/departments

☐Academic organisations, universities and research institutes

☐Companies or industrial networks/organisations

☐Cluster organisations and business networks

☐Civil society groups and the general public

☐European technology Platforms

☐Other:

5. Key Enabling Technologies (KETs) related to the areas of specialisation in your region

Please indicate the Key Enabling Technologies (KETs) related to the areas of specialisation in your region: *

Please choose **all** that apply:

☐Nanotechnology

☐Micro-and nanoelectronics

☐Industrial biotechnology

☐Photonics

☐Advanced materials

☐Advanced manufacturing systems

<u>Nanotechnology</u>

Please identify and where possible provide further details of sub-sectors / segments / niches - referring to the market applications and / or technological fields - prevalent within this area of specialisation:

(3 or 4 lines per segment is sufficient)

Only answer this question if the following conditions are met: Answer was at question '38 [G5Q00001]' (Please indicate the Key Enabling Technologies (KETs) related to the areas of specialisation in your region:)

Please write your answer(s) here:

Developing next generation nanomaterials, nanodevices and nanosystems (if relevant please describe)

Ensuring the safe development and application of nanotechnologies (if relevant please describe)

Promoting nanotechnology-based innovations with safety-by-design for consumers and industry (if relevant please describe)

Developing the societal dimension of nanotechnology (If relevant please describe)

Efficient synthesis and manufacturing of nanomaterials, components and systems (If relevant please describe)

Developing capacity-enhancing techniques, measuring methods and equipment (If relevant please describe)

Leveraging the potential of nanotechnologies; bridging the gap between research and markets by demonstrating industrial capability, including pilot lines (If relevant please describe)

Safety of nanotechnology-based applications and support for the development of regulation (If relevant please describe)

Other (If relevant please describe)

General comments

Micro-and nanoelectronics **(Please describe)**

Only answer this question if the following conditions are met:
Answer was at question '38 [G5Q00001]' (Please indicate the Key Enabling Technologies (KETs) related to the areas of specialisation in your region:)

Please write your answer here:

Industrial biotechnology

Please identify and provide further details of sub-sectors / segments / niches - referring to the market applications and / or technological fields - prevalent within this area of specialisation

Only answer this question if the following conditions are met: Answer was at question '38 [G5Q00001]' (Please indicate the Key Enabling Technologies (KETs) related to the areas of specialisation in your region:)

Please write your answer(s) here:

Boosting cutting-edge biotechnologies as a future innovation driver (If relevant please describe)

Biotechnology-based industrial processes (If relevant please describe)

Innovative and competitive platform technologies (If relevant please describe)

Other (Please describe)

General comments

Photonics (Please describe)

Only answer this question if the following conditions are met: Answer was at question '38 [G5Q00001]' (Please indicate the Key Enabling Technologies (KETs) related to the areas of specialisation in your region:)

Please write your answer here:

Advanced materials

Please identify and provide further details of sub-sectors / segments / niches - referring to the market applications and / or technological fields - prevalent within this area of specialisation

Only answer this question if the following conditions are met:
Answer was at question '38 [G5Q00001]' (Please indicate the Key Enabling Technologies (KETs) related to the areas of specialisation in your region:)

Please write your answer(s) here:

Cross-cutting and enabling materials technologies (If relevant please describe)

Materials development and transformation (If relevant please describe)

Management of materials components (If relevant please describe)

Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions (If relevant please describe)

Materials for creative industries (If relevant please describe)

Metrology, characterisation, standardisation and quality control (If relevant please describe)

Optimisation of the use of materials (If relevant please describe)

Delivering application-focused, advanced materials structures and systems (AMSS) (If relevant please describe)

Supporting SME innovation activities in a globalised economy; enabling European SMEs as first choice suppliers of advanced materials structures and systems (AMSS). (If relevant please describe)

Materials-based solutions enabling active and healthy aging (If relevant please describe)

Other (If relevant please describe)

General comments

Advanced manufacturing systems

Please identify and provide further details of sub-sectors / segments / niches - referring to the market applications and / or technological fields - prevalent within this area of specialisation

Only answer this question if the following conditions are met: Answer was at question '38 [G5Q00001]' (Please indicate the Key Enabling Technologies (KETs) related to the areas of specialisation in your region:)

Please write your answer(s) here:

Technologies for Factories of the Future (If relevant please describe)

Technologies enabling Energy-efficient buildings (If relevant please describe)

Sustainable and low-carbon technologies in energy-intensive process industries (If relevant please describe)

New sustainable business models (If relevant please describe)

Other (If relevant please describe)

General comments

Are there any KETs which are not currently present in your region that you would like to see developed or that are required to support the development of your region Industry?

Please write your answer here:

6. Please identify any specific cross-sectoral KET thematics included in your S3 strategy and/or OP

Nanotechnology and Advanced Materials for more effective Healthcare *

Please choose **only one** of the following:

◯ Yes (Please describe in the comment box)

◯ No

Make a comment on your choice here:

Nanotechnology and Advanced Materials for low-carbon energy technologies and Energy Efficiency *

Please choose **only one** of the following:

◯ Yes (Please describe in the comment box)

◯ No

Make a comment on your choice here:

Exploiting the cross-sector potential of Nanotechnologies and Advanced materials to drive competitiveness and sustainability *

Please choose **only one** of the following:

◯ Yes (Please describe in the comment box)

◯ No

Make a comment on your choice here:

Enabling active and healthy aging within a personalised and affordable health-care system; *

Please choose **only one** of the following:

◯ Yes (Please describe in the comment box)

◯ No

Make a comment on your choice here:

Providing dedicated support to nano- and advanced materials–enabled product life cycle policies and strategies; to risk assessment strategies, including regulatory research; and to forward looking and other intelligence gathering activities for the future. *

Please choose **only one** of the following:

◯ Yes (Please describe in the comment box)

◯ No

Make a comment on your choice here:

Other

Please write your answer here:

7. Other KETs required

Are there any KETs which are not currently present in your region that you would like to see developed or that are required to support the development of your region Industry? *

Please choose **only one** of the following:

◯ Yes (Please describe in the comment box)

◯ No

Make a comment on your choice here:

8. Financing instruments

Please indicate/list the main financial instruments or programmes under which the KET proposals would be financed or implemented: *

Please write your answer here:

What are the approximate funding volumes in your Region to support <u>ALL</u> KETs?

Ajoutez un commentaire seulement si vous sélectionnez la réponse.

Please choose all that apply and provide a comment:

☐Estimated amount

☐Not known

If available please provide a breakdown per individual KET priority:

Only answer this question if the following conditions are met: Answer was at question '54 [G7Q00002]' (What are the approximate funding volumes in your Region to support ALL KETs?   )

Please write your answer here:

If available please indicate the funding amounts within ESIF/Operational Programmes concerning KETs:

If available please provide breakdown per KET priority previously identified (Nanotechnology, Micro-and nanoelectronics, Industrial biotechnology, Photonics, Advanced materials, Advanced manufacturing systems...)

Please write your answer here:

ESIF: European Structural and Investment Fund.

Can you please specify the type of national funding approaches that are predominantly used to allocate funding to KETs: *

Please choose **only one** of the following:

○Competitive

○Block funding

○A mix of both

○Not possible to identify types of funding mechanisms at this stage

Make a comment on your choice here:

9. Regional support for the diffusion and adoption of Key Enabling Technologies

Which of the following instruments/measures or approaches have been considered in your Region to support the diffusion and adoption of Key Enabling Technologies?

Please choose **all** that apply:

☐Measures to support basic research

☐Technological research

☐Value chain development, industrial roadmapping

☐Technology transfer to SMEs

☐Pre-competitive development, experimental development

☐Science industry cooperation/Joint labs

☐Product demonstration, prototypes, proof-of-concept

☐Industrial applications, large test facilities

☐Product development

☐Investments into industrial capacities

☐Commercial exploitation and commercial development

☐Co-funding by public and private sector actors

☐Public procurement support instruments

☐Cluster initiatives

☐Other:

Is your Region working towards obtaining synergies by linking regional activities to EU programmes, such as those sponsored under the research and innovation programme (Horizon 2020)?

(if Yes can you illustrate the type of actions or policies your region will implement) *

Please choose **only one** of the following:

◯Yes (Please describe in the comment box how your region intends to achieve these synergies)

◯No

Make a comment on your choice here:

Is your Region involved in the exchange of KET related experiences and best practices with other Regions? *

Please choose **only one** of the following:

◯Yes

◯No

If yes Please indicate type

Only answer this question if the following conditions are met:
Answer was 'Yes' at question '60 [G8Q00003]' (Is your Region involved in the exchange of KET related experiences and best practices with other Regions?)

Please choose **all** that apply:

☐ERA-NET

☐Interreg

☐Inter clustering initiatives

☐Vanguard

☐Advanced Engineering Materials (EuMat)

☐NANOfutures

☐European Construction Technology Platform (ECTP)

☐European Technology Platforms

☐Lead market Initiatives

☐Other:

Does your Regional Strategy (OP or S3) include provisions to facilitate inter regional cooperation? *

Please choose **only one** of the following:

◯Yes (Please describe initiative or approach you plan to implement in the comment box)

◯No

Make a comment on your choice here:

Has the information for your region been uploaded to the European Commission's EYE@RIS3 database[1]?

*

Please choose **only one** of the following:

◯Yes

◯No

[1] http://s3platform.jrc.ec.europa.eu/eye-ris3

If not, are you planning to do so in the next few months? *(Please describe)*

Only answer this question if the following conditions are met:
Answer was 'No' at question '63 [G8Q00006]' (Has the information for your region been uploaded to the European Commission's EYE@RIS3 database[1]?)

Please write your answer here:

To what extent did you find the EYE@RIS3 database useful in discovering which other regions have included KETs as a priority activity for their future specialisations?

Please choose **only one** of the following:

⚪Very useful

⚪Quite useful

⚪Limited usefulness

⚪Not useful

⚪Not used

To what extent do you or did you use the following resources in your work on RIS3?

Ajoutez un commentaire seulement si vous sélectionnez la réponse.

Please choose all that apply and provide a comment:

☐KETs-Observatory ? Yes/no and if yes please describe how

☐Regional Innovation Scoreboard ? Yes/no and if yes please describe how

KETs-Observatory: https://webgate.ec.europa.eu/ketsobservatory/

Regional Innovation Scoreboard: http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/innovation-scoreboard/index_en.htm

10. What kind of assistance (technical expertise) does your Region need on KETs?

Is there an existing/future need for a coordinated tool or framework for sharing KETs-related information, good practices and demonstration projects with neighbouring regions (in your country)? *

Please choose **only one** of the following:

⚪Yes (Please describe how in the comment box)

⚪No

Make a comment on your choice here:

Do you feel your Region would benefit further from training on state aid and financing of KETs (including rules of financing demonstration projects and infrastructures)? *

Please choose **only one** of the following:

◯Yes (Please describe how in the comment box)

◯No

Make a comment on your choice here:

Would your Region benefit from further methodological guidance and training from the European Commission? *

Please choose **only one** of the following:

◯Yes (Please describe what is required in the comment box)

◯No

Make a comment on your choice here:

11. Other relevant information

Please provide any additional quantitative and / or qualitative information regarding the areas of KET usage, development or specialisation that you wish to draw to the attention of the study team. For example the existence of a specialised research facility, cluster initiatives, pilot projects related to KETs....

Please write your answer here:

Annex 3 Country summary tables

Countries and KETs

Country/Region	Responses	Strategy approved	Nanotechnology	Micro-and nanoelectronics	Industrial biotechnology	Photonics	Advanced materials
AT	**3**	**2**	**2**	**3**	**2**	**1**	**3**
Niederösterreich AT12	1	1	1	1	1		1
Oberösterreich AT31	1	1	1	1	1	1	1
Vorarlberg AT34	1			1			1
BE	**2**	**1**	**2**	**1**	**1**	**1**	**1**
Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest BE10	1		1				
RÉGION WALLONNE BE3	1	1	1	1	1	1	1
BG	**1**		**1**	**1**	**1**		**1**
EXTRA-REGIO NUTS 1 BGZ	1		1	1	1		1
CZ	**2**	**1**	**1**	**1**	**1**		**1**
Moravskoslezsko CZ08	1	1	1	1	1		1
Praha CZ01	1						
DE	**4**	**3**	**2**	**2**	**2**	**2**	**4**
Brandenburg DE40	1	1		1	1	1	1

Country/Region	Responses	Strategy approved	Nanotechnology	Micro-and nanoelectronics	Industrial biotechnology	Photonics	Advanced materials
BREMEN DE5	1						1
SAARLAND DEC	1	1	1				1
SACHSEN DED	1	1	1	1	1	1	1
EE	**1**	**1**			**1**		**1**
EESTI EE0	1	1			1		1
EL	**4**	**2**	**1**	**1**	**2**	**1**	**1**
Ανατολική Μακεδονία, Θράκη (Anatoliki Makedonia, Thraki) EL11	1				1		
Δυτική Ελλάδα (Dytiki Ellada) EL23	1	1					
Ιόνια Νησιά (Ionia Nisia) EL22	1	1			1		
Κρήτη (Kriti) EL43	1		1	1		1	1
ES	**5**	**5**	**4**	**3**	**4**	**3**	**5**
Aragón ES24	1	1	1	1			1
Castilla y León ES41	1	1	1		1	1	1
Cataluña ES51	1	1	1	1	1	1	1
Comunidad Valenciana ES52	1	1	1	1	1	1	1
Illes Balears ES53	1	1			1		1

Country/Region	Responses	Strategy approved	Nanotechnology	Micro-and nanoelectronics	Industrial biotechnology	Photonics	Advanced materials
FI	**9**	**7**	**4**	**2**	**5**	**3**	**7**
FI194 Etelä-Pohjanmaa	1				1		
FI195 Pohjanmaa	1	1					1
FI197 Pirkanmaa	1	1	1	1	1	1	1
FI1B1 Helsinki-Uusimaa	1	1					
FI1C1 Varsinais-Suomi	2	1	1		2	1	1
FI1C3 Päijät-Häme	1	1	1		1		1
FI1D3 Pohjois-Karjala	1	1	1			1	1
FI1D6 Pohjois-Pohjanmaa	1	1		1			1
FR	**10**	**7**	**5**	**6**	**9**	**5**	**9**
Alsace FR42	1		1		1		1
Bretagne FR52	1	1			1	1	1
Centre FR24	1	1		1	1		1
Champagne-Ardenne FR21	1	1	1		1		1
Corse FR83	1	1					
Haute-Normandie FR23	1	1	1	1	1		1
Languedoc-Roussillon FR81	1	1		1	1	1	1

Country/Region	Responses	Strategy approved	Nanotechnology	Micro-and nanoelectronics	Industrial biotechnology	Photonics	Advanced materials
Limousin FR63	1			1	1	1	1
Nord - Pas-de-Calais FR30	1	1	1	1	1	1	1
Rhône-Alpes FR71	1		1	1	1	1	1
HR	**1**		**1**	**1**		**1**	**1**
HRVATSKA HR0	1		1	1		1	1
HU	**1**		**1**			**1**	
Dél-Alföld HU33	1		1			1	
IE	**1**	**1**	**1**	**1**	**1**	**1**	**1**
IRELAND IE0	1	1	1	1	1	1	1
IT	**7**	**2**	**6**	**4**	**6**	**4**	**5**
Emilia-Romagna ITH5	1	1	1	1	1	1	1
Lazio ITI4	1		1	1	1	1	1
Lombardia ITC4	1		1	1	1	1	1
Molise ITF2	1			1	1		
NORD-EST ITH	1		1		1		
Puglia ITF4	1	1	1		1		1
Toscana ITI1	1		1			1	1

Country/Region	Responses	Strategy approved	Nanotechnology	Micro-and nanoelectronics	Industrial biotechnology	Photonics	Advanced materials
LT	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Lietuva LT00	1	1	1	1	1	1	1
LV	**1**	**1**			**1**		**1**
LATVIJA LV0	1	1			1		1
MT	**1**	**1**		**1**			
MALTA MT0	1	1		1			
PL	**3**	**1**	**1**	**1**	**3**	**2**	**2**
Kujawsko-Pomorskie PL61	1	1			1	1	1
Mazowieckie PL12	1		1	1	1	1	1
Zachodniopomorskie PL42	1				1		
PT	**3**		**2**		**1**		**2**
Algarve PT15	1		1				
Centro (PT) PT16	1				1		1
Norte PT11	1		1				1
SE	**4**	**2**	**2**	**2**	**1**	**1**	**3**
Norra Mellansverige SE31	1	1		1		1	1
Östra Mellansverige SE12	1		1	1			1

Country/Region	Responses	Strategy approved	Nanotechnology	Micro-and nanoelectronics	Industrial biotechnology	Photonics	Advanced materials
Stockholm SE11	1						
Västsverige SE23	1	1	1		1		1
SK							
Bratislavský kraj SK01	1	1	1		1		1
UK	**5**	**1**	**3**	**4**	**3**	**3**	**5**
Berkshire, Buckinghamshire and Oxfordshire UKJ1	1			1	1	1	1
Cornwall and Isles of Scilly UKK3	1		1				1
LONDON UKI	1		1	1	1		1
SCOTLAND UKM	1		1	1	1	1	1
WALES UKL	1	1		1		1	1
Total	**70[i]**	**40**	**41**	**35**	**46**	**30**	**54**

Countries and Sub KETs

The following tables show the Sub KETs cited in the survey by countries:

Nanotechnology

	Nanotechnologies Sub Kets
Belgium	Developing capacity-enhancing techniques, measuring methods and equipment
	Safety of nanotechnology-based applications and support for the development of regulation
Croatia	Promoting nanotechnology-based innovations with safety-by-design for consumers and industry
	Efficient synthesis and manufacturing of nanomaterials, components and systems
Czech Republic	Developing next generation nanomaterials, nanodevices and nanosystems
	Efficient synthesis and manufacturing of nanomaterials, components and systems
France	Developing next generation nanomaterials, nanodevices and nanosystems
	Ensuring the safe development and application of nanotechnologies
	Promoting nanotechnology-based innovations with safety-by-design for consumers and industry
	Developing capacity-enhancing techniques, measuring methods and equipment
Germany	Developing next generation nanomaterials, nanodevices and nanosystems
Italy	Developing next generation nanomaterials, nanodevices and nanosystems
	Ensuring the safe development and application of nanotechnologies
	Efficient synthesis and manufacturing of nanomaterials, components and systems
	Leveraging the potential of nanotechnologies; bridging the gap between research and markets by demonstrating industrial capability, including pilot lines
	Safety of nanotechnology-based applications and support for the development of regulation
Poland	Developing next generation nanomaterials, nanodevices and nanosystems
	Developing capacity-enhancing techniques, measuring methods and equipment
	Efficient synthesis and manufacturing of nanomaterials, components and systems
	Leveraging the potential of nanotechnologies; bridging the gap between research and markets by demonstrating industrial capability, including pilot lines
Portugal	Developing next generation nanomaterials, nanodevices and nanosystems
	Efficient synthesis and manufacturing of nanomaterials, components and systems
	Leveraging the potential of nanotechnologies; bridging the gap between research and markets by demonstrating industrial capability, including pilot lines
Spain	Developing next generation nanomaterials, nanodevices and nanosystems
	Ensuring the safe development and application of nanotechnologies
	Leveraging the potential of nanotechnologies; bridging the gap between research and markets by demonstrating industrial capability, including pilot lines
Sweden	Developing next generation nanomaterials, nanodevices and nanosystems
United Kingdom	Developing next generation nanomaterials, nanodevices and nanosystems
	Ensuring the safe development and application of nanotechnologies
	Leveraging the potential of nanotechnologies; bridging the gap between research and markets by demonstrating industrial capability, including pilot lines
	Safety of nanotechnology-based applications and support for the development of regulation

Advanced material

	Advanced Materials Sub KETs (figures in brackets refer to the number of regions citing this sub Ket)
Belgium	Materials development and transformation
	Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	Optimisation of the use of materials
	Materials-based solutions enabling active and healthy ageing
Czech Republic	Cross-cutting and enabling materials technologies
	Materials development and transformation
	Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	Metrology, characterisation, standardisation and quality control
	Optimisation of the use of materials
Finland	Materials development and transformation
	Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	Supporting SME innovation activities in a globalised economy; enabling European SMEs as first choice suppliers of advanced materials structures and systems (AMSS)
France	(4) Cross-cutting and enabling materials technologies
	(3) Materials development and transformation
	(3) Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	(3) Metrology, characterisation, standardisation and quality control
	(2) Optimisation of the use of materials
	Delivering application-focused, advanced materials structures and systems (AMSS)
	Supporting SME innovation activities in a globalised economy; enabling European SMEs as first choice suppliers of advanced materials structures and systems (AMSS)
	(2) Materials-based solutions enabling active and healthy ageing
Germany	Cross-cutting and enabling materials technologies
	Management of materials components
	(2) Materials development and transformation
	Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	Materials for creative industries
	Metrology, characterisation, standardisation and quality control
	Optimisation of the use of materials
	Supporting SME innovation activities in a globalised economy; enabling European SMEs as first choice suppliers of advanced materials structures and systems (AMSS)
Italy	Materials development and transformation
	Management of materials components
	Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	Materials for creative industries
	Metrology, characterisation, standardisation and quality control
	Optimisation of the use of materials
	Supporting SME innovation activities in a globalised economy; enabling European SMEs as first choice suppliers of advanced materials structures and systems (AMSS)

	Materials-based solutions enabling active and healthy ageing
Poland	Cross-cutting and enabling materials technologies
	Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	Materials for creative industries
	Metrology, characterisation, standardisation and quality control
	Optimisation of the use of materials
	Materials-based solutions enabling active and healthy ageing
Portugal	Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	Materials for creative industries
	Metrology, characterisation, standardisation and quality control
Spain	(2) Cross-cutting and enabling materials technologies
	(2) Materials development and transformation
	Management of materials components
	Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	Delivering application-focused, advanced materials structures and systems (AMSS)
	Materials-based solutions enabling active and healthy ageing
Sweden	Cross-cutting and enabling materials technologies
	Materials development and transformation
	Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	Materials for creative industries
	Metrology, characterisation, standardisation and quality control
	Optimisation of the use of materials
	Delivering application-focused, advanced materials structures and systems (AMSS)
	(2) Supporting SME innovation activities in a globalised economy; enabling European SMEs as first choice suppliers of advanced materials structures and systems (AMSS)
	Materials-based solutions enabling active and healthy ageing
United Kingdom	(2) Cross-cutting and enabling materials technologies
	(2) Materials development and transformation
	Management of materials components
	(2) Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions
	Metrology, characterisation, standardisation and quality control
	Delivering application-focused, advanced materials structures and systems (AMSS)

Advanced Manufacturing systems

	Advanced manufacturing systems
Belgium	Technologies for Factories of the Future
	Technologies enabling Energy-efficient buildings
	Sustainable and low-carbon technologies in energy-intensive process industries
Czech Republic	Technologies enabling Energy-efficient buildings
	Sustainable and low-carbon technologies in energy-intensive process industries
Finland	Technologies enabling Energy-efficient buildings
	Sustainable and low-carbon technologies in energy-intensive process industries
France	(3) Technologies for Factories of the Future
	(2) Technologies enabling Energy-efficient buildings
	Sustainable and low-carbon technologies in energy-intensive process industries
	(2) New sustainable business models
Germany	Technologies for Factories of the Future
Italy	Technologies for Factories of the Future
	Technologies enabling Energy-efficient buildings
	Sustainable and low-carbon technologies in energy-intensive process industries
Malta	Technologies enabling Energy-efficient buildings
	Sustainable and low-carbon technologies in energy-intensive process industries
	New sustainable business models
Austria	Technologies enabling Energy-efficient buildings
Poland	Technologies for Factories of the Future
	Technologies enabling Energy-efficient buildings
	Sustainable and low-carbon technologies in energy-intensive process industries
	New sustainable business models
Portugal	Technologies for Factories of the Future
	Sustainable and low-carbon technologies in energy-intensive process industries
Spain	(2) Technologies for Factories of the Future
	Technologies enabling Energy-efficient buildings
	Sustainable and low-carbon technologies in energy-intensive process industries
Sweden	Technologies for Factories of the Future
	Technologies enabling Energy-efficient buildings
	Sustainable and low-carbon technologies in energy-intensive process industries
	New sustainable business models
United Kingdom	(2) Technologies for Factories of the Future
	Technologies enabling Energy-efficient buildings
	Sustainable and low-carbon technologies in energy-intensive process industries

Industrial Biotechnology

	Industrial Biotechnology Sub Kets
Belgium	Boosting cutting-edge biotechnologies as a future innovation driver
	Biotechnology-based industrial processes
	Innovative and competitive platform technologies
Czech Republic	Boosting cutting-edge biotechnologies as a future innovation driver
Finland	Boosting cutting-edge biotechnologies as a future innovation driver
	(2) Biotechnology-based industrial processes
France	(4) Boosting cutting-edge biotechnologies as a future innovation driver
	(2) Biotechnology-based industrial processes
	(3) Innovative and competitive platform technologies
Greece	Biotechnology-based industrial processes

Italy	Boosting cutting-edge biotechnologies as a future innovation driver
	Biotechnology-based industrial processes
Poland	Biotechnology-based industrial processes
Spain	(2)Boosting cutting-edge biotechnologies as a future innovation driver
	(2) Biotechnology-based industrial processes
	Innovative and competitive platform technologies
United Kingdom	Boosting cutting-edge biotechnologies as a future innovation driver
	(2) Biotechnology-based industrial processes

Annex 4 Detail of Regions NMPs KETs

NANOTECHNOLOGY
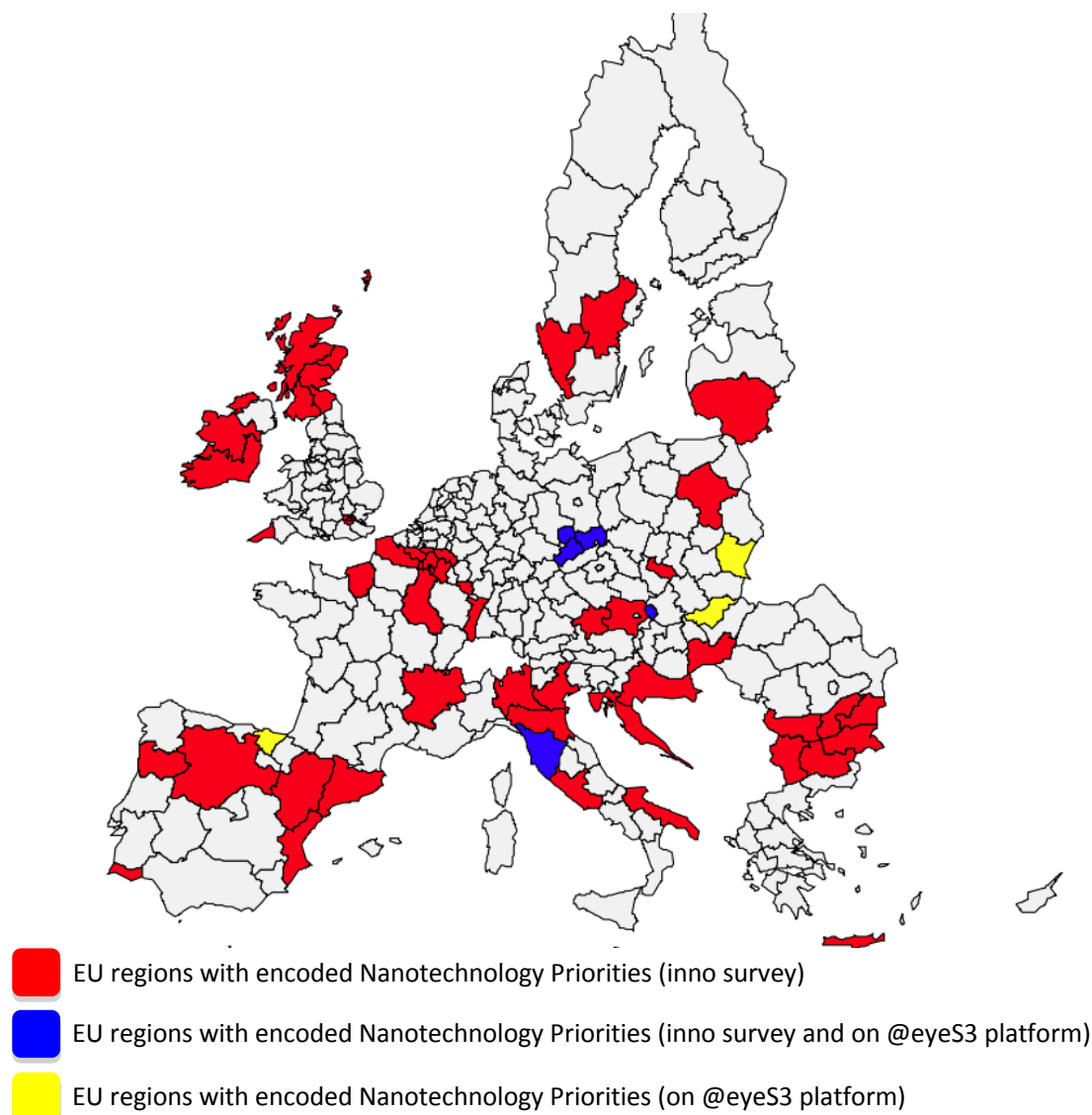
■ EU regions with encoded Nanotechnology Priorities (inno survey)

■ EU regions with encoded Nanotechnology Priorities (inno survey and on @eyeS3 platform)

■ EU regions with encoded Nanotechnology Priorities (on @eyeS3 platform)

*regions of Finland are not shown in the current map due to diverging NUTS classification. From the survey, the following regions demonstrated priorities in Nanotech: Pohjois-Karjala, Pirkanmaa, Varsinais-Suomi, Päijät-Häme

Countries and sub-KETs, Nanotechnology

Country	All responses	Developing next generation nanomaterials, nanodevices and nanosystems	Ensuring the safe development and application of nanotechnologies	Promoting nanotechnology-based innovations with safety-by-design for consumers and industry	Developing the societal dimension of nanotechnology	Efficient synthesis and manufacturing of nanomaterials, components and systems	Developing capacity-enhancing techniques, measuring methods and equipment	Leveraging the potential of nanotechnologies bridging the gap between research and markets by demonstrating industrial capability, including pilot lines	Safety of nanotechnology-based applications and support for the development of regulation
AT	3								
BE	2						1		1
BG	1								
CZ	2	1				1	1		
DE	4	1							
EE	1								
EL	4								
ES	5	1	1					1	
FI	9								
FR	10	1	1	1				1	
HR	1			1		1			
HU	1								
IE	1								
IT	7	2	1			1		1	1
LT	1								
LV	1								
MT	1								
PL	3	1				1	1	1	
PT	3	1				1		1	
SE	4	1							
SK	1								
UK	5	1	1					1	1
Total	**70i**	**10**	**4**	**2**		**5**	**4**	**5**	**3**

Detail of regional programmes: Nanotechnology

SubKET category	Region	Description of SubKET and actions
Developing next generation nanomaterials, nanodevices and nanosystems	Moravskoslezsko [CZ08]	Nanosystems are relevant – in relation to surface treatment of materials and also nanodevices – nanochips for healthcare
	Castilla y León [ES41]	Nananocomposites, new alloys, and collaboration in international initiatives such as Materials Genome.
	HAUTE-NORMANDIE FR23	Nanoanalysis irradiation, tomographic atom probe Nano-Materials, Nanotechnology and Functional Nanostructures Nanotechnology, nanoscience, new physical properties (Health, ICT, Engineering, ...)
	Puglia [ITF4]	Synthesis and treatment of nanostructured graphene
	NORD-EST [ITH]	Polymeric nanomaterials, nanodevices for electronic and TLC
	Mazowieckie [PL12]	Safe Food Intelligent Management Systems High Quality of Life
	Norte [PT11]	Relevant in terms of applications for surface coatings, but also in the miniaturization of machine components
	Östra Mellansverige [SE12]	Relevant for the priority "New industrial materials" and "Smart and secure connected products and systems"
	SACHSEN [DED]	Focus on materials
	SCOTLAND [UKM]	In life sciences, there are currently numerous nanotechnology-dedicated research groups with about 200 researchers involved in the industry. Seven multidisciplinary research centres across three universities link nanomaterial expertise with life sciences. Several companies in nano-electronics, coatings and

		chemical sciences have some capability.
Ensuring the safe development and application of nanotechnologies	Castilla y León [ES41]	Nanosecurity
	HAUTE-NORMANDIE FR23	Aging and degradation of nanostructured materials for their environmental impact.
	NORD-EST [ITH]	Developing save nano-process for manufacturing
	SCOTLAND [UKM]	Safety is a strong theme in Scotland with SAFENANO the leading institute in Europe.
Promoting nanotechnology-based innovations with safety-by-design for consumers and industry	HRVATSKA [HR0]	Investigating potentials of nano technology in wood processing industry, defence, health industry
Developing the societal dimension of nanotechnology	N/A	N/A
Efficient synthesis and manufacturing of nanomaterials, components and systems	Moravskoslezsko [CZ08]	It concerns new nanotechnologies for surface treatment of materials, regarding components, the development of nanochips for healthcare is performed within University Hospital Ostrava
	HRVATSKA [HR0]	Investigating potentials of nano technology in wood processing industry, defence, health industry
	Puglia [ITF4]	Aeronautics: development of hybrid architectures that improve energy management on board aircraft and to reduce the environmental impacts
		Health care: Medical device, diagnostics, biomedical Green and blue economy: Optoelectronic Devices
		Mechanical use of nanotechnology for the improvement of the mechanical strength and thermal insulation / acoustic

		Manufacturing - nanofilm deposition for the protection / activation of tissues
		Transport: application of nanofluids; development of architectures hybrid in degree of improve the management energy to board aircraft and of reduce the impacts environmental
	Mazowieckie [PL12]	Intelligent Management Systems
	Norte [PT11]	Maybe important in the Health priority domain for nanodrugs
Developing capacity-enhancing techniques, measuring methods and equipment	RÉGION WALLONNE [BE3]	Carbon nanotubes technology Nanopowder production Applications in materials and surface engineering (example: development of sol-gel dispersion and functionalization technology by means of industrially applicable nanomaterials)
	Moravskoslezsko [CZ08]	The measuring technologies are relevant – for purposes of testing and quality control in processing industry (automotive, precise engineering)
	HAUTE-NORMANDIE FR23	Instrumental platform and analysis at the nanoscale (LEAP atom probe + TA)
	Mazowieckie [PL12]	Safe Food Intelligent Management Systems High Quality of Life
Leveraging the potential of nanotechnologies; bridging the gap between research and markets by demonstrating industrial capability, including pilot	Castilla y León [ES41]	Applications in Transport, university - Industry collaborations.
	NORD-EST [ITH]	Application for textile and manufacturing
	Mazowieckie [PL12]	Safe Food

lines		Intelligent Management Systems
		Professional Services for Business
		High Quality of Life
	Algarve [PT15]	Sea food niches
	SCOTLAND [UKM]	The James Watt Nanofabrication Centre at the University of Glasgow has a pilot line open to industry.
Safety of nanotechnology-based applications and support for the development of regulation	Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest [BE10]	The Brussels Capital Region has founded, in cooperation with the universities, the research platform Nanoiris. The objective of NanoIRIS is to build in Brussels a centre of expertise in nanomaterial safety, offering a translational platform between academic research, industry needs, and regulatory requirements.
	NORD-EST [ITH]	Safety standard
	SCOTLAND [UKM]	Safety is a strong theme in Scotland with SAFENANO the leading institute in Europe.

ADVANCED MATERIALS
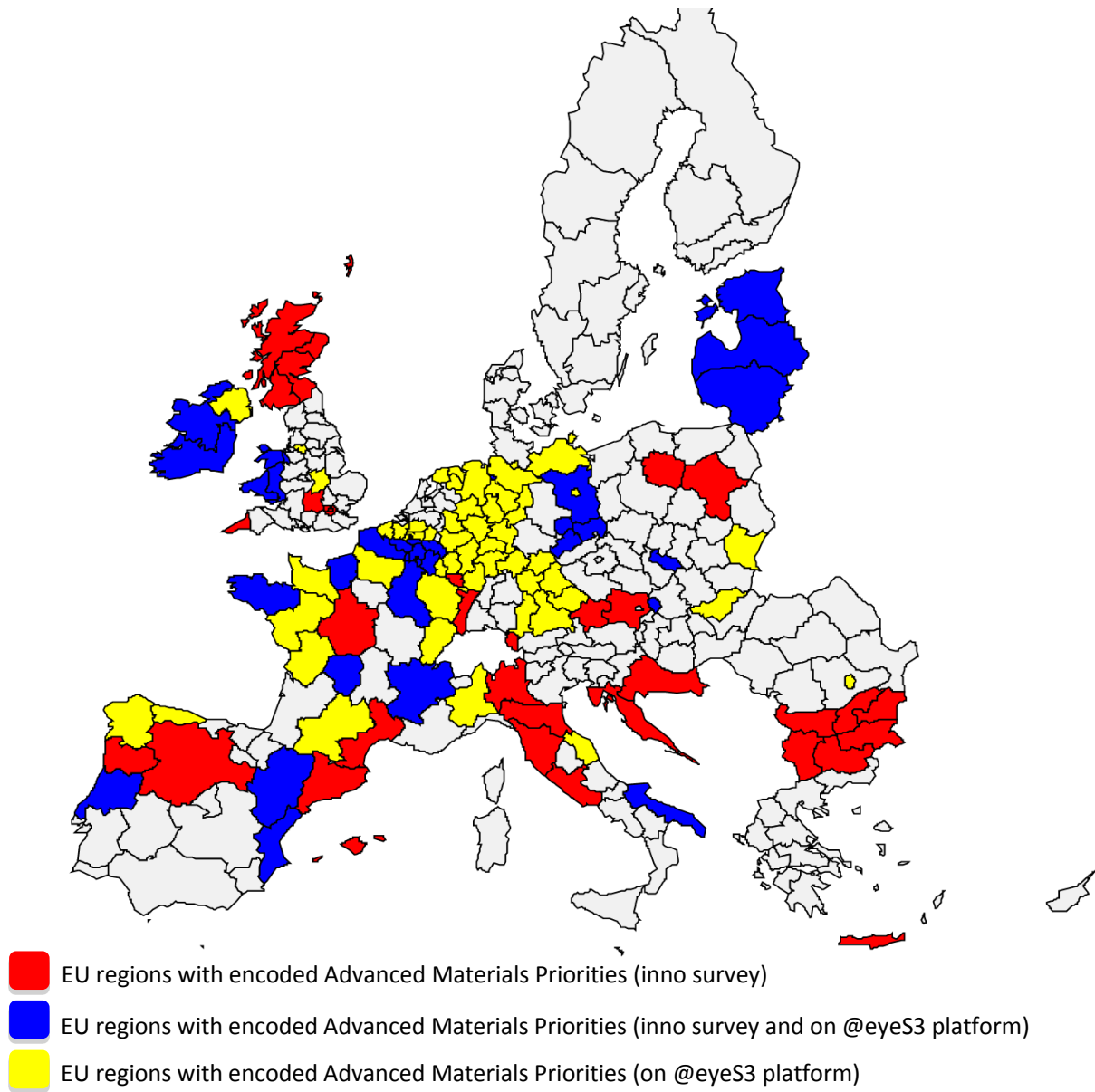
■ EU regions with encoded Advanced Materials Priorities (inno survey)

■ EU regions with encoded Advanced Materials Priorities (inno survey and on @eyeS3 platform)

■ EU regions with encoded Advanced Materials Priorities (on @eyeS3 platform)

regions of Finland and Sweden are not shown in the current map due to diverging NUTS classification. From the survey, the following regions demonstrated priorities in Advanced Materials: Pohjois-Pohjanmaa (FI), Pohjois-Karjala (FI), Pohjanmaa (FI), Pirkanmaa (FI), Varsinais-Suomi (FI), Päijät-Häme (FI), Östra Mellansverige (SE), Norra Mellansverige (SE) and Västsverige (SE). From the s3 platform, the following regions demonstrated priorities in Advanced Materials: Östergötlands län (SE), Örebro län (SE), Skåne län (SE), Dalarnas län (SE), Västernorrlands län (SE).

Countries and sub-KETs, Advanced materials

Country	All responses	Cross-cutting and enabling materials technologies	Materials development and transformation	Management of materials components	Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions	Materials for creative industries	Metrology, characterisation, standardisation and quality control	Optimisation of the use of materials	Delivering application-focused, advanced materials structures and systems (AMSS)	Supporting SME innovation activities in a globalised economy enabling European SMEs as first choice suppliers of advanced materials structures and systems (AMSS).	Materials-based solutions enabling active and healthy aging	Cross-cutting and enabling materials technologies
AT	3											
BE	2		1		1			1			1	
BG	1											
CZ	2	1	1		1		1	1				
DE	4	2	2	1	1	1	1	1		1		1
EE	1											
EL	4											
ES	5	2	2	1	1				1		1	
FI	9		1		1					1		
FR	10	4	3		3		3	2	1	1	2	
HR	1											
HU	1											
IE	1											
IT	7		1	1	1	1	1	1			1	1
LT	1											
LV	1											
MT	1											
PL	3	1			1	1	1	1			1	
PT	3	1			1	1	1					
SE	4	1	1		1	1	1	1	1	2	1	

Country	All respons es	Cross-cutting and enabling material s technolo gies	Materials develop ment and transfor mation	Management of materials components	Enabling energy efficiency for a competiti ve European industry by supplying sustainab le (low-carbon) materials –based energy solutions	Materials for creative industries	Metrolo gy, characte risation, standar disation and quality control	Optimisat ion of the use of materials	Delivering application -focused, advanced materials structures and systems (AMSS)	Supporting SME innovation activities in a globalised economy enabling European SMEs as first choice suppliers of advanced materials structures and systems (AMSS).	Materials-based solutions enabling active and healthy aging	Cross-cutting and enabli ng materi als techno logies
SK	1											
UK	5	2	2	1	2		1		1			
Total	70[i]	14	14	4	14	5	10	8	4	6	7	1

Detail of regional programmes, advanced Materials

SubKET category	Region	Description/Actions
Cross-cutting and enabling materials technologies	Moravskoslezsko CZ08	Development of technologies for processing of materials, technologies of mutual connecting different materials (for example metals and plastics) and technologies for surface treatment of materials
	SACHSEN DED	Advanced material as basis for advanced manufacturing (leightwight engineering)
	Castilla y León ES41	Nanomaterials, metal foams, biopolymers.
	Illes Balears ES53	Bio-construction
	Bretagne FR52	Within a same material, it is becoming possible to make various functions interact: a property may modulate another, or new ones may be produced when two or more properties coexist. Multi-purpose materials mainly have health and ICT applications (new optoelectronic components, optoelectronics, surface coatings, vector molecules, tracers and sensors, agri-food, biotech, photonics

	Centre FR24	confidential
	HAUTE-NORMANDIE FR23	Centre of analysis of irradiated material by atom probe and electron transmission microscope materials center: GENESIS
	Languedoc-Roussillon FR81	New materials for energy storage
	Mazowieckie PL12	Safe Food Intelligent Management Systems High Quality of Life
	Norra Mellansverige SE31	Research and development of special steel, including new applications and use of steel in new products and services.
	SCOTLAND UKM	Application of advanced materials to rugged equipment for hostile environments including oil, marine, power generation.
	Berkshire, Buckinghamshire and Oxfordshire UKJ1	Some minor composite strengths, but not a large sector
Materials development and transformation	RÉGION WALLONNE BE3	Thixoforming process (examples: manufacturing of quasi-finished steel parts by thixoforming, thixomolding of aluminium and magnesium alloys)
	Moravskoslezsko CZ08	We focus on development new special steels and other alloys, composites, plastics and natural materials
	SACHSEN DED	Advanced material as basis for advanced manufacturing (leightwight engineering)
	BREMEN DE5	Lightweight materials: hybrid textiles/ laminates; hollow carbon fiber; stretch broken carbon fiber.
	Castilla y León ES41	New materials for Transport (composites, materials with advanced mechanical properties, smart materials, etc.), Agrofood (packaging), Health (biopolimers, nanomaterials, biocompatible materials, and Energy (absorption, generation and energy storage).
	Illes Balears ES53	Building insulation Air conditioning energy Efficiency
	Centre FR24	Storage for hygrogen
	HAUTE-NORMANDIE FR23	Energy materials, thermoelectric materials, materials characterization, synthesis of polymers, including bio-based materials
	Languedoc-Roussillon FR81	New materials in the field of building using bio-based resources.
	Puglia ITF4	Aerospace field: development of novel composite materials, advanced

		biobased polymers,
	Pohjois-Pohjanmaa [FI1D6]	Corrosion-and wear-resistant and high-strength, light-weight steel grades and their application in various product solutions
	Norra Mellansverige [SE31]	Advanced research in steel alloys, including new technology for welding, forging, processing, cutting etc.
	SCOTLAND UKM	Technical textiles.
	WALES UKL	Wales is well represented in the primary production of metals, such as steel and titanium.
Management of materials components	BREMEN [DE5]	Lightweight materials: hybrid textiles/ laminates; hollow carbon fiber; stretch broken carbon fiber.
	Illes Balears ES53	Reuse and recycling of materials Waste recycling and energy generation
	Puglia ITF4	Policy of so-called 'package vertical system ', which includes the provision and also required the acquisition and management of materials needed for production, creates problems for subcontractors. To mitigate and alleviate these problems new management methods that invite companies to become promoters of tier 1 common purchases (Carbon-resins and Titanium for example in the aeronautic field) by increasing the quantities per order, in order to obtain better prices and reduce financial risks with the use of specialized laboratories in performing acceptance testing of materials.
	WALES UKL	Non destructive evaluation of (particularly) composite structures is a strength.

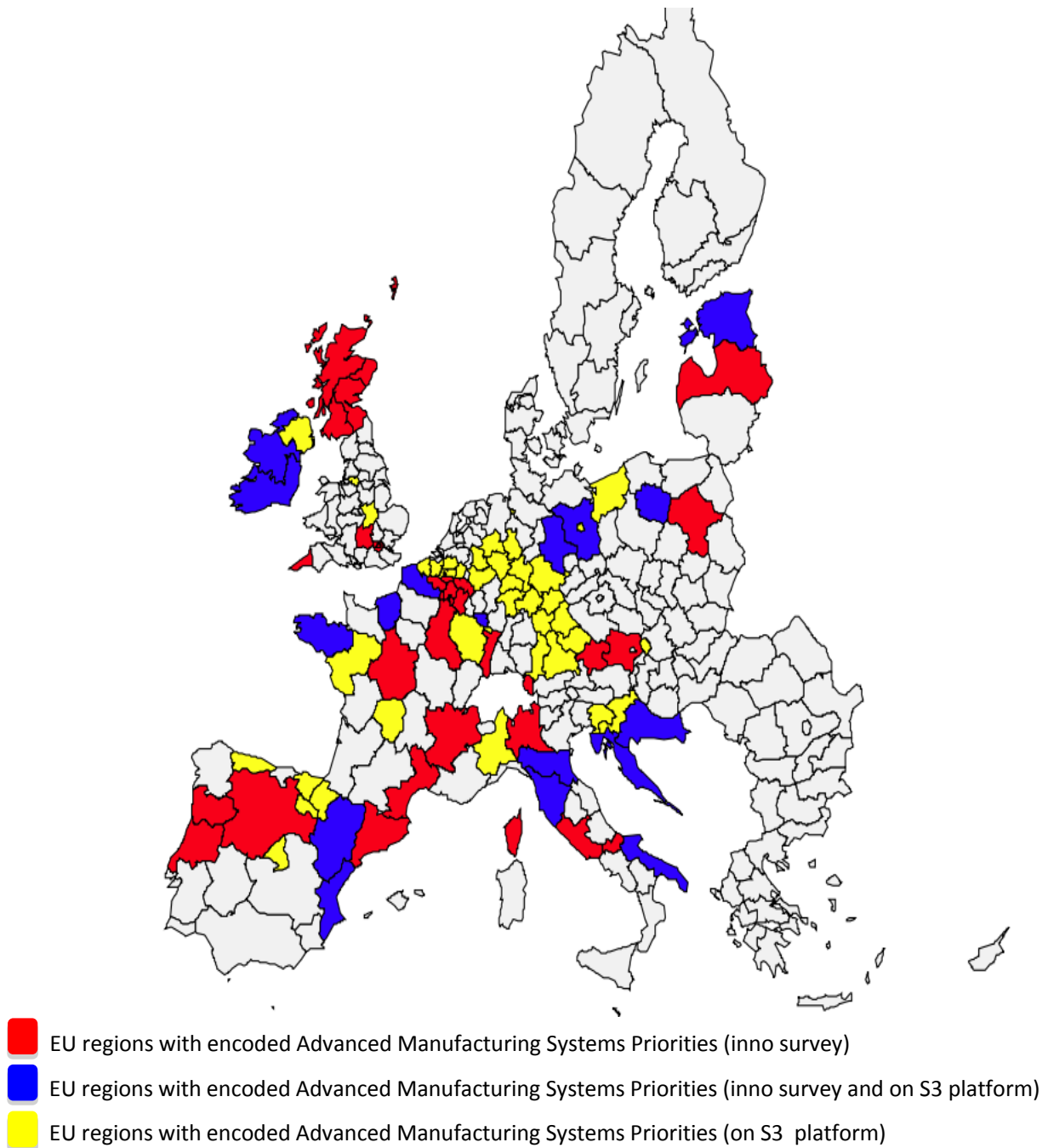| Enabling energy efficiency for a competitive European industry by supplying sustainable (low-carbon) materials-based energy solutions	RÉGION WALLONNE BE3	CO2 transformation Biosourced chemistry: first transformation and valorization of biomass resources from non-food products (waste, residues …); second generation biorefining.
	Moravskoslezsko CZ08	Development of materials with low energy demand (metals, plastics, composites)
	BREMEN DE5	Development of lightweight compoments e.g. for aearospace industry ("low weight= low emmission")
	Illes Balears ES53	Electricity cogeneration energy storage Solar and other renewable energy
	Bretagne FR52	Smart grids refer to the integration of ICT in electricity grids (and eventually in other energy networks: district and rural heating schemes, other fluids: in particular gas and water). The technologies, products and services developed within Smart grids cover the whole of the energy chain, which therefore includes energy control, storage, generation, as well as distribution. Further to this, technologies will be applied to smart cities with the issue of either silos (dedicated solution), or federative platforms providing the applications above.
	HAUTE-NORMANDIE FR23	Reliability and aging of materials for energy, transport and buildings energy materials, thermoelectric materials, characterization of materials, including bio-based materials, lighter, composite materials
	Puglia ITF4	New materials for alternative energy. In order to resolve some problems related to massive use of photovoltaic: - to develop substitution materials - develop materials recycling technologies
	Mazowieckie PL12	Intelligent Management Systems
	Norte PT11	Mobility industry looks for lighter, resistente materials, with better energetic properties.
	FI1D6 Pohjois-Pohjanmaa	The goal of innovation is to reduce the metal (steel) carbon footprint and improve its global competitiveness by integrating the digitization, sustainability and systems thinking principles into the production management.
	Norra Mellansverige SE31	Development of energy saving manufacturing for heavy industry. Fossile free solutions for heavy transportation (electric and hydrogen powered tranpsortations systems etc)
	SCOTLAND UKM	Strong research groups in materials for fuel cells. Also, films for solar PV.

	Berkshire, Buckinghamshire and Oxfordshire UKJ1	Lightweighting - particularly automotive, aero & space propulsion.

Materials for creative industries	~~BREMEN DE5~~	~~Rapid Prototyping; 3-D printing~~
	Puglia ITF4	Development of materials with improved properties (anticorrosion, waterproof, enhanced sensation effects, ecc.) for fashion, interior design, publishing, media support, cultural heritage industry
	Mazowieckie PL12	High Quality of Life
	Norte PT11	The development of new materials is importante for the fashion industries in terms of assigning new properties to materials
	Norra Mellansverige SE31	Application and software development.
Metrology, characterisation, standardisation and quality control	Moravskoslezsko CZ08	Measuring and testing systems for production processes, mostly in automotive, engineerging and energy sector
	BREMEN DE5	improved quality control especially for CFK materials by means of thermographics, CT scanning, microscoping
	Bretagne FR52	This field covers marine, coastal, terrestrial, aerial and space environments. The characteristics of human impact on the environment are observed, analysed and monitored. Natural phenomena are also studied with a view to predicting potential impacts on humans and their activities. This analysis provides a basis for achieving integrated environmental and eco-system management, supported by ecological engineering. Ecological engineering refers to scientific knowledge and practices that can be harnessed to manage environments and resources, and to adapt design methods for planning and producing equipment . The mechanisms governing ecological systems form the basis for ecological engineering and provide inspiration. Ecological engineering or eco-system engineering, also covers water and soil.
	HAUTE-NORMANDIE FR23	Reliability and aging of materials for energy, transport and buildings energy materials, thermoelectric materials, characterization of materials, including bio-based materials, lighter, composite materials
	Languedoc-Roussillon FR81	For water application
	Puglia ITF4	Standardisation of non-destructive tests

	Mazowieckie PL12	Safe Food Intelligent Management Systems High Quality of Life
	Norte PT11	This is also relevant for the sectores associated to production technologies
	Norra Mellansverige SE31	Included in sensors and manufacturing systems developed in the region.
	Berkshire, Buckinghamshire and Oxfordshire UKJ1	Significant Test & Measurement capabilities
Optimisation of the use of materials	RÉGION WALLONNE BE3	Circular economy: the Walloon NEXT initiative encompasses a platform and actions to enhance the shift towards a circular economy through support to industrial symbiosis projects Reverse Metallurgy platform: this initiative aims at developing techniques allowing to recycle and re-use rare metals.
	Moravskoslezsko CZ08	Wasteless production technologies
	BREMEN DE5	Improved quality control especially for CFK materials by means of thermographics, CT scanning, microscoping
	Puglia ITF4	high performance insulating materials, sensors based on active-materials for health monitoring of aging structures in aeronautic field
	Mazowieckie PL12	Intelligent Management Systems
	Norra Mellansverige SE31	New applications for new steel alloys.
Delivering application-focused, advanced materials structures and systems (AMSS)	Castilla y León ES41	In particular materials for the automotive industry and aeronautics.
	Norra Mellansverige SE31	To some extent
	SCOTLAND UKM	Composites, especially for aircraft.
Supporting SME innovation activities in a globalised economy; enabling European SMEs as first	BREMEN DE5	Planned development of the "EcoMaT" Technology Center (Center for Eco-efficient Materials & Technologies) in Bremen integrating regional SMEs

choice suppliers of advanced materials structures and systems (AMSS)	Puglia ITF4	increase the know-how on composite materials of suppliers in aeronautic supply chain; new polymers for the upholstered furniture industry
	FI195 Pohjanmaa	We have probably a lock-in situation where advanced production methods and materials would be requires be required
	Östra Mellansverige SE12	A "Materials Innovation Lab" is planned
	Norra Mellansverige SE31	Included in cluster initiative mission.
Materials-based solutions enabling active and healthy ageing	RÉGION WALLONNE BE3	Control systems for ageing people (example: development of an electronic patches to geolocate and detect falls by people who have deteriorated mentally).
	Castilla y León ES41	Health and well being is one of the priorities for Castilla y León. Materials-based solutions enabling active aging is relevant, but there is no any specific mention to this field in the RIS3.
	Bretagne FR52	PREVENTION – HEALTH - WELLBEING: A specific feature of this area is that It relies on know-how in the field of biotechnologies, the access to bio-resources and modelling.
	Puglia ITF4	biodegradable scaffold for tissue engineering for regeneration of nerve system
	Mazowieckie PL12	High Quality of Life
	Norra Mellansverige SE31	We participate in Exo-skeleton research and development, and have our nation's largest innovation procurement research project for healthy ageing.

ADVANCED MANUFACTURING SYSTEMS

■ EU regions with encoded Advanced Manufacturing Systems Priorities (inno survey)

■ EU regions with encoded Advanced Manufacturing Systems Priorities (inno survey and on S3 platform)

■ EU regions with encoded Advanced Manufacturing Systems Priorities (on S3 platform)

regions of Finland and Sweden are not shown in the current map due to diverging NUTS classification. From the survey, the following regions demonstrated priorities in Advanced Manufacturing Systems: Pohjois-Pohjanmaa (FI), Pohjanmaa (FI), Pirkanmaa (FI), Varsinais-Suomi (FI), Helsinki-Uusimaa (FI), Etelä-Pohjanmaa (FI), Östra Mellansverige (SE), Norra Mellansverige (SE) and Västsverige (SE).

Countries and sub-KETs, Advanced manufacturing systems

Country	All responses	Technologies for Factories of the Future;	Technologies enabling Energy-efficient buildings;	Sustainable and low-carbon technologies in energy-intensive process industries;	New sustainable business models
AT	3		1		
BE	2	1	1	1	
BG	1				
CZ	2		1	1	
DE	4	1			
EE	1				
EL	4				
ES	5	2	1	1	
FI	9	1	1	1	
FR	10	3	2	1	2
HR	1				
HU	1				
IE	1				
IT	7	1	1	1	
LT	1				
LV	1				
MT	1		1	1	1
PL	3	1	1	1	1
PT	3	1		1	
SE	4	1	1	1	1
SK	1				
UK	5	2	1	1	
Total	**70**[i]	**14**	**12**	**11**	**5**

Detail of regional programmes, Advanced manufacturing systems

SubKET category	*Region*	*Description/Actions*
Technologies for Factories of the Future	Region Walonne	Additive manufacturing/3 D printing Surface engineering (sol/gel, thin layer deposition, vacuum, wet/dry coatings) Example: "Made different"/FOF initiative (Agoria, Sirris), which aims at promoting innovation in manufacturing processes in order to transform Walloon technological companies into real "Factories of the Future".
	SACHSEN DED	Lightweight engineering, industrial use in e.g. car industry
	Castilla y León ES41	AgroFod: Bioindustries, Biorefineries, Food security, treatment of residues, energy efficency in industrial processes. High pressure processes. Transport: Process Modeling and discrete simulation, smart control systems, energy efficency. Helath: Development of advanced biomedical devices.
	Cataluña ES51	Advanced manufacturing processes (Processing novel materials and structures, Business models and strategies for disruptive manufacturing processes);Adaptive and smart manufacturing systems (Adaptive and smart manufacturing devices, components and machines);Digital, virtual and resource-efficient factories (Energy monitoring and energy management in future manufacturing enterprises Multi level simulation and analytics for improving production quality and throughput Design and management of production machinery and processes Integration of design methods and tools);Collaborative and mobile enterprises (Cloud based manufacturing business web for supply network collaboration Connected objects for assets and enterprises in the supply networks Collaborative demand and supply planning); Human-centred manufacturing (Advanced information models for knowledge creation and learning

		New ways of interaction and collaboration between workers and other resources in manufacturing systems

Enhanced visualisation of complex manufacturing and production data);Customer-focused manufacturing (ICT Solutions for energy efficient product life cycles and ECO usage

Data collection, analysis and anonymisation during product usage

On demand manufacturing of customer centred products

Implementation of creativity and user driven innovation through flexible design and manufacturing processes) |
| | Bretagne FR52 | The aim of advanced manufacturing systems is to enhance industrial processes as a whole. This specialisation is key to enabling our regional business and industry to keep ahead, providing high added value and drawing on several technologies: multifunctional materials, electronics, robotics, cobotics, virtual prototyping, design modelling (e-design), advanced manufacturing systems for small and medium batches. These provide and will provide industrial systems that are reconfigurable and flexible, able to react very quickly, producing high added-value products. Need to check if the wording sound right

Against a backdrop of increasing international development, Bretagne will be highly reliant on advanced manufacturing systems. Given our region's skills and industrial base, it is only natural to focus on this key European technology in order to better prepare the regional economy for the future.

This specialisation is related to many of the other areas which are also made up of priority components for Bretagne. The following fields are all vectors that contribute to our industries, some of them being vital : food quality and safety, new models for agricultural production, farms of the future, sustainable use of marine biomass and biotechnology, Smart Grids and storage, high-performance and sustainable construction systems, electronics, robotics and cobotics, virtual prototyping, digital modelling, multifunctional materials. |
| | HAUTE-NORMANDIE FR23 | INDUSTRIAL PERFORMANCE PLATFORM: fablab and 3D printer, workshop of simulation of a chain of industrial production, life cycle of products |

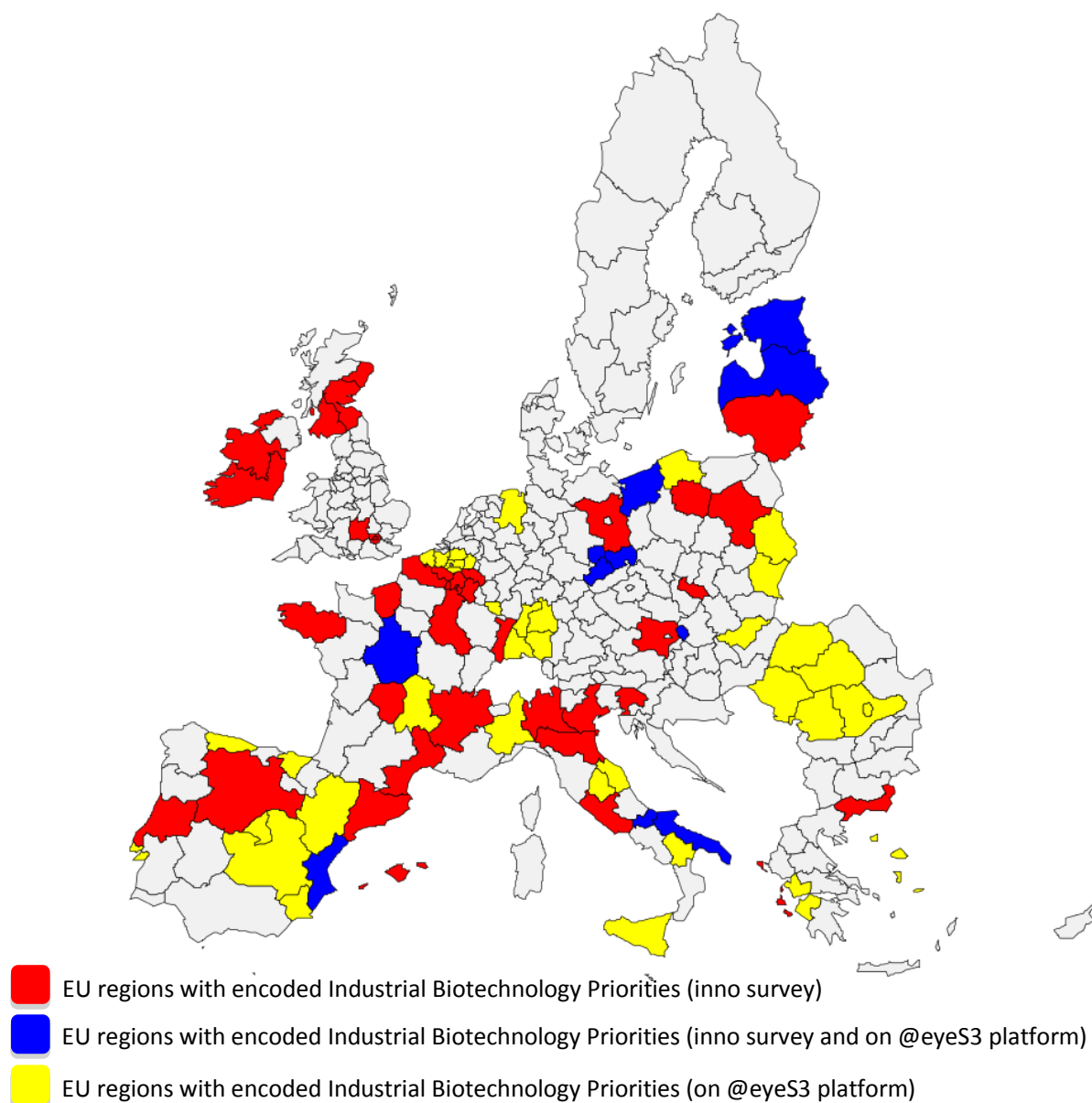|		
	Languedoc-Roussillon FR81	Development of collaborative robotic
	Puglia ITF4	Green economy: technologies for recovery industrial waste; Agrifood: • technologies and systems for the control of quality of produce • agricultural automation • technologies and systems for complex production processes Manufactoring/Transport: • technologies visual in processes of production; design of experimental assets for the validation of technologies innovative for the transmissions mechanical and of turbine of low pressure; development of new tools of simulation to support of mechanical processing
	Mazowieckie PL12	Intelligent Management Systems
	Norte PT11	The region has players that are active in this PPP as well as in the Manufuture. Relevant considering the strong industrial profile of the regional economic structure.
	Pohjois-Pohjanmaa FI1D6	Printed electronics
	Norra Mellansverige SE31	Development of efficient manufacturing systems, sensor technology, fiber optics, energy saving technology, fossile free heavy transportation etc
	SCOTLAND UKM	Advanced forming and forging of metals for industrial applications. Continuous manufacturing and crystalisation processes for high value chemicals.
	Berkshire, Buckinghamshire and Oxfordshire UKJ1	Some Automation (Robotics)Capabilities
Technologies enabling Energy-efficient buildings	Region Walonne	Energy storage and management Production of materials and building systems Eco-neighborhood Low-carbon footprint materials
	Moravskoslezsko CZ08	Smart grids and smart cities technologies, co-generation and accumulation systems

	Castilla y León ES41	Thermal networks (technologies for district heating and cooling), Systems for storage, and smart management of the energy, as well as hybridation and coordination of production systems. Geothermal energy.
	Bretagne FR52	This field relates to technological components and work methodologies (including training) for cutting energy consumption, preserving users' health (inside air quality, healthy materials, ageing etc.), reducing the environmental impact of activity (waste, materials' embodied energy) The aim is to come up with a set of innovative, affordable solutions that can be easily be installed to massify retrofit operations and meet the high demand for new homes (demographic growth in Bretagne, facilities at home) In this respect, several areas of research, development and innovation () can be envisaged : smart materials, equipment, integration of equipment using renewable energy.
	Languedoc-Roussillon FR81	Development of advanced system for the management and control of energy and efficient building. Development of system to optimize and finance their heating facilities, save energy and respect the environment. Development of innovative information system to optimize the efficient energy of building and group of building.
	Puglia ITF4	Development of systems for the management energy of buildings; development of a controller for optimization energy of buildings and the survey of anomalies of plants; development of a new framework of reasoning based on logic fuzzy; development of a tool for the management active electric energy of district. development of district energymodels, of tool for detection of best investment solution for buildings, of simulators for the evaluation of performance of district.
	MALTA MT0	Possible area of exploration
	Vorarlberg AT34	Solar systems, biomass

	Mazowieckie PL12	Intelligent Management Systems
	Pohjois-Pohjanmaa FI1D6	Corrosion-and wear-resistant and high-strength, light-weight steel grades and their application
	Norra Mellansverige SE31	Research in built environment at university of Gävle. Energy efficient buildings are a major part of the unique competence.
	SCOTLAND UKM	Timber-based modular construction. Heat storage systems.
Sustainable and low-carbon technologies in energy-intensive process industries	RÉGION WALLONNE BE3	CO2 transformation
	Moravskoslezsko CZ08	Mostly in metallurgy
	Cataluña ES51	Catalunya is part of the Smart Specialization Platform for Advanced Manufacturing (Vanguard Initiative). In this framework, we are drafting (jointly with other regions) several proposals for pilot projects in this field, in particular focusing on energy efficiency, emissions, waste and materials into global manufacturing processes
	Puglia ITF4	Technologies for the production of energy from garbage and fuels
	MALTA MT0	Possible area of exploration
	Mazowieckie PL12	Intelligent Management Systems
	Norte PT11	Relevant to improve competitiveness of industries, but also as na innovation product for equipment manufacturers given production efficiency is one of the most importante market trends
	Pohjois-Pohjanmaa [FI1D6]	Corrosion-and wear-resistant and high-strength, light-weight steel grades and their application
	Norra Mellansverige SE31	A major part of the mission at our cluster initiatives.
	Berkshire, Buckinghamshire and Oxfordshire UKJ1	Powertrain & Low Carbon Propulsion

New sustainable business models	Bretagne FR52	Throughout the economy, consumers are changing the way they consume: • different approach to ownership (with emphasis on use) • willingness to cooperate, contribute and create together• wish to salvage, recycle and reuse • strong tendency towards free products and services These new trends are bringing about economic and academic initiatives involving shifts in business models across industry and companies. • Layering and duality of local and global economic models • Non-technological innovation, both organisational or marketing based • User innovation• Innovation based on « new » economic models (product-service systems, circular economy, collaborative economy, social solidarity economy, long-tail economy) • Economic models based on no-cost• Alternative funding for businesses : local savings funds, crowdfunding, B2B barter • Development of enterprise networks (e.g. Entrepreneurs d'avenir), that uphold a vision and shared values with a view to redesigning global and sustainable performance. Alternative enterprise models are particularly alive and kicking in Bretagne. • Social solidarity economy• Worker cooperative • Social enterprises
	MALTA MT0	Possible area of exploration
	Mazowieckie PL12	Professional Services for Business
	Norra Mellansverige SE31	This is a main focus area for us in the future. It is a key part of the innovation procurement development, and a major part in the cooperation between our cluster initiatives and our regional incubator. It is the key success factor being looked into concerning development of fossile free systems for heavy transportation.

Annex 5 Other KETS

INDUSTRIAL BIOTECHNOLOGY

🟥 EU regions with encoded Industrial Biotechnology Priorities (inno survey)

🟦 EU regions with encoded Industrial Biotechnology Priorities (inno survey and on @eyeS3 platform)

🟨 EU regions with encoded Industrial Biotechnology Priorities (on @eyeS3 platform)

regions of Finland are not shown in the current map due to diverging NUTS classification. From the survey, the following regions demonstrated priorities in Industrial Biotechnology: Pirkanmaa, Varsinais-Suomi, Varsinais-Suomi, Päijät-Häme and Etelä-Pohjanmaa.

Countries and sub-KETs, Industrial Biotechnology

Country	All responses	Boosting cutting-edge biotechnologies as a future innovation driver;	Biotechnology-based industrial processes;	Innovative and competitive platform technologies;
AT	3			
BE	2	1	1	1
BG	1			
CZ	2	1		
DE	4			
EE	1			
EL	4		1	
ES	5	2	2	1
FI	9	1	2	
FR	10	4	2	3
HR	1			
HU	1			
IE	1			
IT	7	1	1	1
LT	1			
LV	1			
MT	1			
PL	3		1	
PT	3			
SE	4			
SK	1			
UK	5	1	2	
Total	70[i]	11	12	6

Detail of regional programmes, Industrial Biotechnology

SubKET category	Region	Description/Actions
Boosting cutting-edge biotechnologies as a future innovation driver	Région Wallonne BE3	Medical devices Molecules production processes based on microfluidics and micromechanics. Intraocular implants (innovative process for making soft intraocular lenses from a nanocomposite material)
	Moravskoslezsko CZ08	Key focus is regenerative medicine and genomics with strong development potential up to the future, in close connection to this the bioinformatics is very important
	Illes Balears ES53	Health therapies and tourism Personalized biomedicine
	Bretagne FR52	With over 90% of marine biodiversity still untapped, there are many possibilities of discovering new species and applying marine biotechnology which is set to grow by 10% every year. If new processes, products and services are to be put on the market, then it is vital to support both the exploration and exploitation of the enormous potential that marine biodiversity and biomass can offer. Sectors in which these may be applied include the chemical industry, materials, pharmaceuticals, fishing and aquaculture, the agri-food industry, the environment (energy supply [heat or electricity, e.g. methanisation, biofuels, biogas], pollution management (water and soils) and cosmetics
	Centre FR24	Especially biopharmaceuticals
	HAUTE-NORMANDIE FR23	BIOMARKER, diagnostic and therapeutic new technologies, decontamination by pulsed light, organic chemical analysis, new molecules of pharmaceutical interest (drug design)
	Languedoc-Roussillon FR81	Development of synthetic biology, systems biology, innovative stem cells treatment (regenerative medicine), drug delivery systems, biosensors, biomarkers (imaging, proteomic, genomic, metabonomic, …), Informatics for Health ((Big Data, treatment, analysis and qualified data, storage capacity,…), bioelectronics, biochips, nanotechnologies based diagnostic.
	Puglia ITF4	Heath:

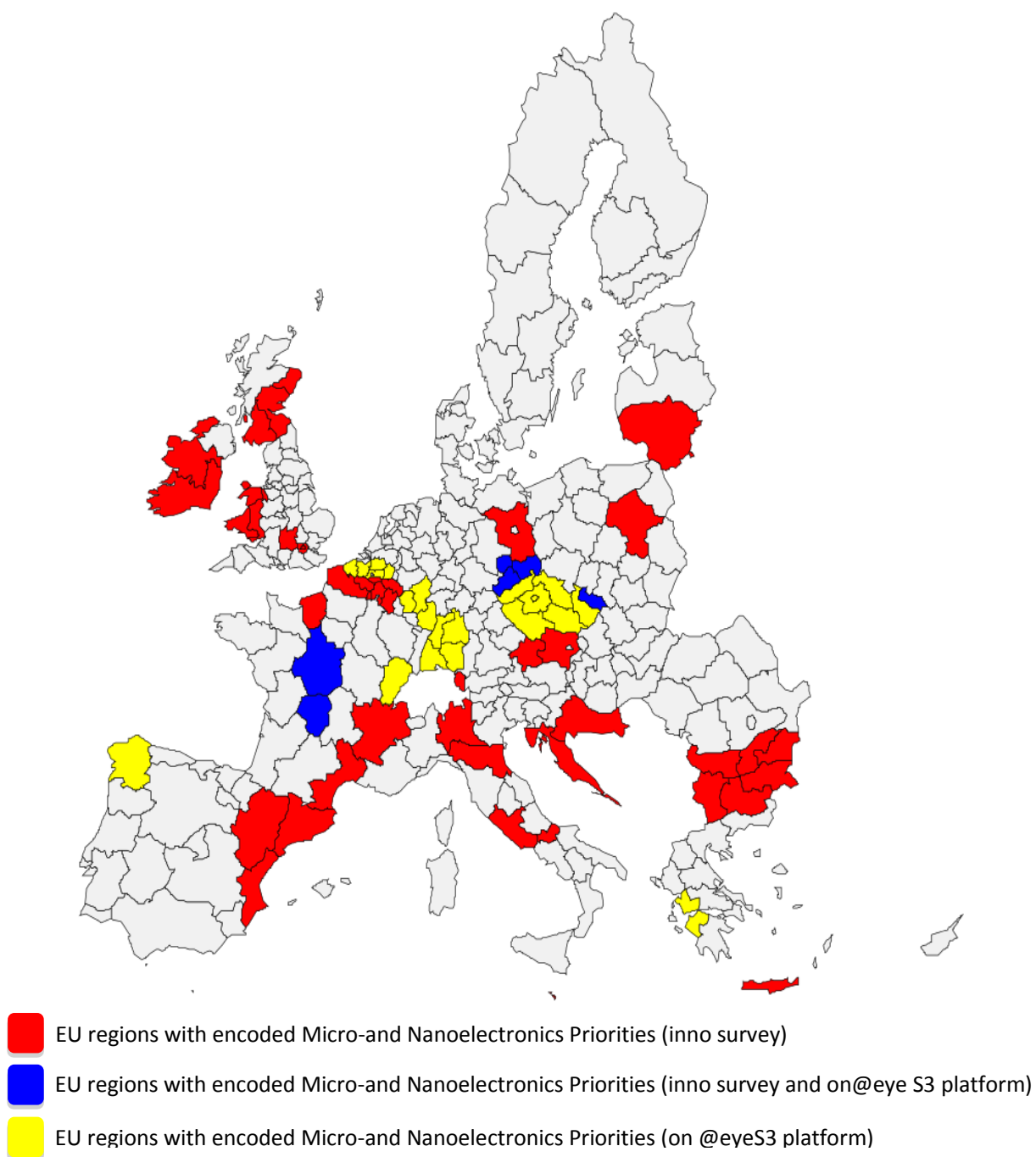|		• development of drugs biotechnological
		• technologies for the diagnostics biomedical also for images;
		• development of diagnostic kit
		Agrifood:
		• applications biotechnological for the control of fermentations alcoholic;
		• tools of control of quality of products;
		• technologies for the improvement of characteristics nutrients and organoleptic of produce
		Green economy:
		• development of technologies for the conversion of biomass
		• design of plants of bio-treatment of civil and industrial
		• wastewater;
	Varsinais-Suomi [FI1C1]	BioTurku® focuses on the expertise in human health within the Life Science field. Pharmaceutical industry and diagnostics are traditionally strong areas. Turku region enterprises generate nearly half of the turnover of Finnish pharmaceutical industry. Special areas of application include hormonal diseases and cancer, inflammatory and infectious diseases, as well as central nervous system diseases. These established Life Science strengths are complemented by materials and nanotechnology.
		Bioimaging also represents international top quality. The national PET Centre (positron emission tomography) is located in Turku University Hospital in the Turku Science Park area. This imaging method provides information about the functioning of tissue, metabolic

		function of the body, and behaviour of pharmaceutical substances in tissues. A number of internationally recognised Life Science products have been invented and are being manufactured in the Turku region. The best known brands include e.g. Mirena intrauterine device, Benecol cholesterol lowering ingredient of foods and beverages, Xylitol for preventing caries, GenomEra testing system for hospital bacteria, and BonAlive bioactive glass for repairing bone damage. For more information: http://www.turkusciencepark.com/en/about-science-park/focal-areas/bioturku/areas-application/
	SCOTLAND UKM	Synthetic biology and diagnostics are key areas for Scotland.
Biotechnology-based industrial processes	Région Wallonne BE3	Symbiose Biomaterials: this Walloon Innovation Platform aims at bringing to the market new innovative products and processes in the field of Molecular Biomimetics, which means through technologies drawing their inspiration from nature's biological structures at molecular-scale. Symbiose Biomaterials can help companies meet their needs through scientific development.
	Castilla y León ES41	Applications in the Agro Food industry (in particular new processes providing added value in the wine production, dairy industry and meat industry). Also, Health.
	Illes Balears ES53	Food technology Packaging and food preservation
	HAUTE-NORMANDIE FR23	Safety, food and cosmetics decontamination, and welfare
	Languedoc-Roussillon FR81	A project of bioproduction unit is currently being considered.
	Puglia ITF4	Development of process for production of biogas from industrial waste

	Mazowieckie PL12	Safe Intelligent Management Systems	Food
	Varsinais-Suomi [FI1C1]	The global biotechnology market is growing steadily and the competition is tight. In this field also service companies need to aim at international markets right from the start, because the domestic market is not big enough. Turku Science Park Ltd's BioTurku unit is there to help especially to increase the companies' business know-how and readiness for international markets, as well as marketing Turku-based expertise in international partnering and other events.	
	Etelä-Pohjanmaa [FI194]	Sustainable food production.	
	SCOTLAND UKM	Our focus is on projects that develop solutions for the manufacturing of high-value products including speciality and commodity chemicals.	
	Berkshire, Buckinghamshire and Oxfordshire UKJ1	Particular industrial strengths in Drugs Manufacture/Delivery Technologies. Increasing emphasis on Bioprocessing & BioPharma going forward.	
	Ionia Nisia EL22	Marine biotechnologies applied in aquaculture and the protection of the marine environment	
Innovative and competitive platform technologies	RÉGION WALLONNE BE3	Proton Therapy Platform: the Proton Therapy project is an initiative introduced jointly by the BIOWIN and MECATECH clusters. This public/private partnership project is led by the company IBA and contributors are the Cliniques Saint Luc, the Université Catholique de Louvain and the Walloon Region. The project consists of constructing and using, for an initial period of 20 years, a proton therapy system for the treatment of localised cancers (mainly paediatric) which does not currently exist in Belgium. The centre will also host research projects (radiobiology etc.) in association with all the Walloon universities and possibly also with other universities from Belgium or further afield, often in partnership with industry. It will also enable IBA to carry out a series of research activities in Wallonia that currently can only be carried out abroad and will also enable other companies working in nuclear medicine and radiopharmacy to pursue new industrial developments. Cell Therapy Platform: the Walloon Government commissioned the BIOWIN cluster to create an infrastructure for clinical trials in the final phase and for the commercial production of cell therapy products in response to the requirements of three Walloon companies at various stages of development in the field of cell therapy. The project	

Smart Specialisation Strategies and Regional Operational Programmes and Linkages with Key Enabling Technologies

		became reality with the creation of Masthercells, a company offering a wide range of services related to cell therapy. The company also attracts interest from companies from outside the region. Walloon Biobank platform: The aim of the Walloon biobank is to create a formal structure and network for the biobanks currently housed in hospital laboratories. This project is intended to enable access to a large inventory of samples for the whole scientific community, academic and industrial. The creation of a Walloon biobank is thus an essential tool in the development of translational medicine in Wallonia.
	Castilla y León ES41	Applications in the Agro Food industry (from genetic breeding to food safety), and in Health.
	Bretagne FR52	Biogenouest
	Haute-Normandie FR23	Cellular imaging, proteomics, biomarker and peptides spectrometry and nuclear magnetic resonance, decontamination by pulsed light
	Languedoc-Roussillon FR81	Genomics, meta-genomics, proteomics, metabolomics, molecular combing, histology, vectorology, recombinant proteins production, etc. Biotechnology-based healthcare solutions (diagnostics, diagnostic equipment, regenerative medicine). Informatics for Health (big data, treatment, analysis and qualified data, storage capacity,…), imaging (human and small animal), … Biorefinery is based on biomass conversion processes that includes biotechnology-based industrial processes. Using biotechnologies to better perform the non-food markets from vegetables such as green chemistry or biofuels is part of the laboratories and companies objectives in this area of specialization Aquaculture and blue biotechnology are a sub-sector of Coastal Economy. For aquaculture

		the aim is to develop genetic selection of some oysters' species which could be adapted to Mediterranean growth. For the blue biotechnology, challenges are to explore and understand the marine biodiversity and the potential of microorganisms (health, cosmetics, food, biofuel…). We're working on the entire value chain (genetic, process, biological activities…
	Puglia ITF4	bioinformatic infrastructure for the analysis of the Next-generation sequencing (NGS) data

MICRO-AND NANOELECTRONICS

■ EU regions with encoded Micro-and Nanoelectronics Priorities (inno survey)

■ EU regions with encoded Micro-and Nanoelectronics Priorities (inno survey and on@eye S3 platform)

■ EU regions with encoded Micro-and Nanoelectronics Priorities (on @eyeS3 platform)

regions of Finland are not shown in the current map due to diverging NUTS classification. From the survey, the following regions demonstrated priorities in Micro and Nanoelectronics: Pohjois-Pohjanmaa, Pirkanmaa.
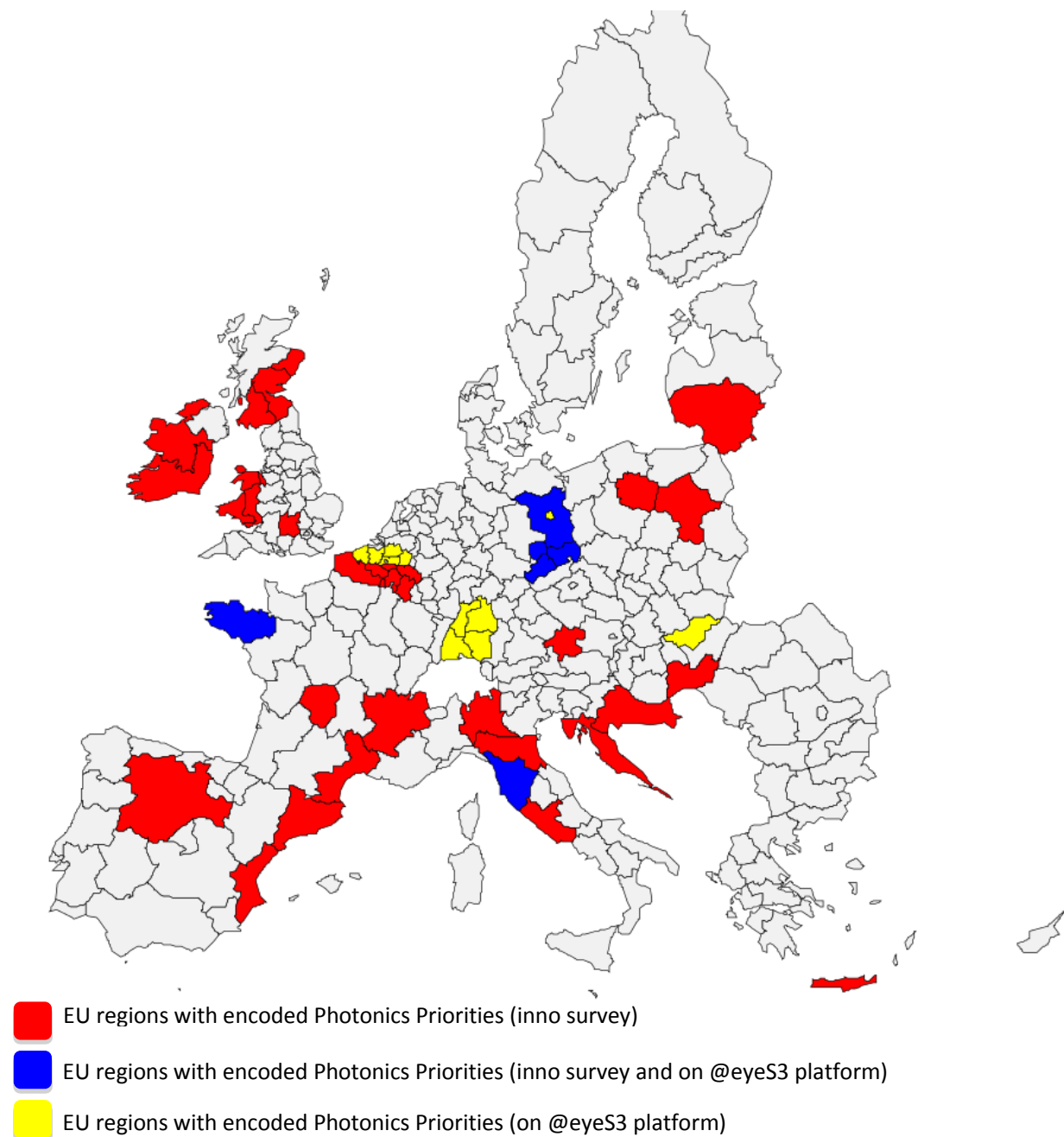
Detail of regional programmes: Micro-and nanoelectronics

	Region	Description/Actions
Micro-and nanoelectronics	Région Wallonne [BE3]	Micro technologies, microelectronics and power electronics (example: high temperature encapsulation for power semiconductor components)
		Special sensors (example: development of a wireless sensor embedded in windowpanes for home automation applications).
	Moravskoslezsko [CZ08]	This KET is relevant in our case only in the research specialization industrial automation and mechatronics
	Sachsen [DED]	3D-integration, smart systems
	Cataluña [ES51]	Micro and Nano electronics is also a KET present in our region, through a broad definition of ICT technologies.
	Centre [FR24]	Power components
	Languedoc-Roussillon [FR81]	Design and manufacture of innovative sensors with high added value for the environment, health and smart cities.
		Design and manufacture smart systems and sensors for internet of things.
		Design and manufacture sensors systems for facilities and efficient energy.
		Design and manufacture of smart building systems and for neighbourhoods.
		Design and manufacture system to control, to measure and decision support system for

		marine and coastal environment These KETs could be used on 2 sub-sectors of "Coastal Economy" 3S: - to monitor the marine water quality and to follow biodiversity - to monitor the resources consumption and summer comfort of Mediterranean buildings
	Ireland [IE0]	Tyndall National Institute:The key areas in micro/nanoelectronics research being pursued at Tyndall include: •The fabrication and characterisation of novel nanoscale device structures on silicon. This work is designed to help industry to continue along the trajectory defined by Moore's Law. •The heterogeneous integration of nanoscale materials into practical working devices of interest to the electronics industry. •The integration of novel functional materials onto active silicon devices, designed to permit the delivery of added functionality for systems-on-chip (SoC) applications including on-chip power, sensing and actuation. Looking forward, the long-term aim of this research is to deliver a fully integrated post-processing capability for novel materials onto silicon CMOS platforms that will be compatible with current and future wafer processing technologies. Microelectronics Circuits Centre Ireland is a Technology Centre (industry - academic partnership) addressing Analogue, RF and Mixed-Signal circuit research
	Mazowieckie [PL12]	The smart specialisation in Mazovia is not technology-oriented, but concerns the functional sectors of the economy. Therefore, specialisation is not determined by the areas of

		research, but the areas of implementation. The specialisation is not an objective, but a way to achieve the strategic objectives of Regional Innovation Strategy.
	Pohjois-Pohjanmaa [FI1D6]	Printed electronics, r-to-r -pilot factory.
	Östra Mellansverige [SE12]	The priority "Smart and secure connected products and systems" is fully dedicated to this.
	SCOTLAND [UKM]	Scotland has a critical mass of companies with analogue design expertise sustaining a highly skilled workforce. Another strength is sensors technology including image sensors, infrared etc.
	WALES [UKL]	Wales has notable strengths across the entire compound semiconductor supply chain from wafer growth and equipment through to devices. • Compound semiconductors underpin photonics, power, RF, wireless, LED, defence and space applications
	Berkshire, Buckinghamshire and Oxfordshire [UKJ1]	Indigenous industrial strengths in Power & Analogue Electronics. Digital Electronics and RF Engineering increasingly impacting on a range of 'legacy' industries, including Medical Imaging, Assisted Living, Industrial Test & Measurement, Consumer Devices (IOT) etc

PHOTONICS

■ EU regions with encoded Photonics Priorities (inno survey)

■ EU regions with encoded Photonics Priorities (inno survey and on @eyeS3 platform)

■ EU regions with encoded Photonics Priorities (on @eyeS3 platform)

regions of Finland are not shown in the current map due to diverging NUTS classification. From the survey, the following regions demonstrated priorities in Photonics: Varsinais-Suomi, Pirkanmaa. Pohjois-Karjala

Detail of regional programmes, Photonics

	Region	Description/Actions
Photonics	RÉGION WALLONNE BE3	Applications in laser (example: manufacturing process energy savings through the use of clean and effective new laser technologies).
	SACHSEN DED	organic electronics
	Cataluña ES51	A multidisciplinary scientific field based on know-how and applications related to light, basically the generation, control, treatment and detection of photons in the visible and non visible ranges of the spectrum.
	Bretagne FR52	Photonics is about light. In its broadest sense it includes the emission, modulation, detection, and analysis of light. It's a meta-industry that brings together lasers, imaging and sensing. As a major contributor innovative functions and sousensembles, photonics has outlets in numerous industries (airspace, automotive, defence and security, robotics, health, science, telecommunications, agri-food etc.). For future energy too, photonics is set to play an essential role in delivering novel solutions. This industry has delivered pioneering solutions, high-performance products, and production techniques Among these are special fibre optics for developing innovative sensors and lasers, optical materials and components for mid-infrared used for safety purposes (safety of people, food and environmental safety). There are also optical sensors and laser with applications in defence, health, the environment, agri-food, industry, energy, construction etc. Photonics is now perceived as one of the vital generic technologies for all industrial sectors.
	Languedoc-Roussillon FR81	Design and manufacture of innovative photonics sensors with high added value for the environment, health and smart cities. Smart systems and photonics sensors.

		Some sensors indicated earlier (micro/nano-electronic) could be photonics sensors
	IRELAND IE0	iPIC (Irish Photonic Integration Centre), is a research centre is working with 18 industry partners to develop the next generation of highly-compact and miniaturised photonic technologies
		NCLA (National Centre for Laser Applications), is a research centre focussed on the area of laser materials processing
		Tyndall National Institute: Tyndall's Photonics Centre comprises over 100 researchers and support staff working on many of the key aspects of photonics, ranging from quantum processes and materials at the atomic level, photonic devices and device physics, integrated photonic- and electronic-circuits and packaged sub-systems, to advanced photonic communication and sensing systems.
	Mazowieckie PL12	The smart specialisation in Mazovia is not technology-oriented, but concerns the functional sectors of the economy. Therefore, specialisation is not determined by the areas of research, but the areas of implementation. The specialisation is not an objective, but a way to achieve the strategic objectives of Regional Innovation Strategy.
	SCOTLAND UKM	Laser design and manufacturing; Imaging; Photonics applied to sensor systems and instrumentation, especially MIR; Biophotonics; Design and application of LED arrays; Fibre-optic cable and components.
	Berkshire, Buckinghamshire and Oxfordshire UKJ1	Rise of digital electronics & photonics has potential to impact on a range of industries

Annex 6 Cross-KETs: Detail provided by regions in their replies

Nanotechnology and Advanced Materials for more effective Healthcare

Region	*COMMENTS*
Moravskoslezsko CZ08	We utilize nanotechnologies for development new medical materials (articular compensations, etc.)
SAARLAND DEC	Financial support of research centres with respective activities
Castilla y León ES41	Health and Well being is one of the priorities and specifically nanotechnology is included as a KET for this priority.
EESTI EE0	Multi-purpose materials mainly have health and ICT applications (new optoelectronic components, optoelectronics, surface coatings, vector molecules, tracers and sensors, agri-food, biotech, photonics
Mazowieckie PL12	High Quality of Life
Pohjois-Pohjanmaa [FI1D6]	Printed electronics: diagnostic research
Östra Mellansverige SE12	General topic within the identified priorities
LONDON UKI	Work on slow release medications

Nanotechnology and Advanced Materials for low-carbon energy technologies and Energy Efficiency

Moravskoslezsko CZ08	Focus on research and development of materials with low energy demand
BREMEN DE5	Lightweight materials for aerospace industries for low emission
EESTI EE0	So far it is not so precisely determined, the process to narrow wide technology areas is going on
Bretagne FR52	One of the main aims is to develop multifunctional and reconfigurable materials. This concerns all the smart and reconfigurable technology sectors. Such properties lend themselves fully to the purposes of sustainable development: the same product made from these materials can be adapted (to a working environment, a particular function, standards etc.) and thus fulfill various purposes (including recycling).
HAUTE-NORMANDIE FR23	Reliability and aging of materials for energy: work on materials for energy, power plants, offshore wind farms, irradiated materials
Languedoc-Roussillon FR81	Development of salor energy : new materials and systems for renewable energy production and storage Advanced materials for best buildings insulation (Coastal economy)
HRVATSKA HR0	Usage in electric mobility niche and electro engineering
NORD-EST ITH	Use of Hydrogen to reduce carbon emission
Mazowieckie PL12	Intelligent Management Systems
Norte PT11	Relevant for the industrial users that can be importante in pulling innovation
Bratislavský kraj SK01	Exploration of domestic energy sources, including fossil fuels, uranium, geothermal energy and their use development of technologies for obtaining electricity and heat from renewable sources (water, sun, wind, biomass)
Östra Mellansverige SE12	General topic within the identified priorities
WALES UKL	High-efficiency LED lighting and concentrator photovoltaics driven by compound semiconductors
LONDON UKI	Graphene and it's conduscting properties

Exploiting the cross-sector potential of Nanotechnologies and Advanced materials to drive competitiveness and sustainability

Moravskoslezsko CZ08	Utilization of nanotechnologies for surface treatment of materials and improving characteristics of materials (strength, thermal resistance, etc.)
SACHSEN DED	We understand KETs as cross cutting technologies and advanced manufacturing as a cross cutting KET.
BREMEN DE5	Cross cluster activities will be a key issue of the RIS strategy. Detailed activities in the field of advanced materials will be developed in the frame of the Ecomat center.
EESTI EE0	So far it is not so precisely determined, the process to narrow wide technology areas is going on
Castilla y León ES41	Applications in the transport sector, based on close links between the regional automotive industry and research groups.
Bretagne FR52	One of the main aims is to develop multifunctional and reconfigurable materials. This concerns all the smart and reconfigurable technology sectors. Such properties lend themselves fully to the purposes of sustainable development: the same product made from these materials can be adapted (to a working environment, a particular function, standards etc.) and thus fulfill various purposes (including recycling).
Languedoc-Roussillon FR81	For example, R&D in New materials with lower dependency of oil.
HRVATSKA HR0	Plan is to open and develop potential of exploiting Nanotechnologies and Advanced materials in more industrial sectors.
NORD-EST ITH	Development of new process and product for manufacturing
Bratislavský kraj SK01	To develop of technological investment units, particularly in the field of metallurgy, engineering, energy the use, placement and replacement of previously used materials for advanced materials with a new and

	more complex performance, including technological processing (machining, forming, joining) and integrated industrial equipment, with respect to the application and use of light metals and advanced materials in the manufacture of transport and construction facility to reduce overall weight and contribute to the green economy (development and application usage of composite materials)

Enabling active and healthy aging within a personalised and affordable health-care system

Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest BE10	The Brussels Capital Region has identified Healthcare as a priority in its ERDF operational program, with special attention for active aging, personalised healthcare and e-health
Castilla y León ES41	This is a broad topic, which in the RIS3 is mainly linked to ICT.
Cataluña ES51	By applying ICT
Bretagne FR52	In the field of "health and nutrition, environment and health, health at work, biotechnologies and cosmetics", balanced diet and lifestyle choice, including sport and the environment, are assets that meet the challenge of "living old and ageing well".
Centre FR24	Through biopharmaceutical
Languedoc-Roussillon FR81	A prioritary activity for Languedoc Roussillon
HAUTE-NORMANDIE FR23	Personalized medicine with innovative diagnostic and therapeutic technologies
NORD-EST ITH	Using nanodevice to reduce aging impact
MALTA MT0	This has been identified as an area of smart specialisation.
Mazowieckie PL12	High Quality of Life
Bratislavský kraj SK01	Technologies and services for the active life and aging, i.e. health care, diagnostics and wellness
FI1D6 Pohjois-Pohjanmaa	Please contact Ms Noora Jansson: noora.jansson@businessoulu.com or maritta.perala-heape@oulu.fi

Stockholm SE11	Care for the elderly and digital health care
LONDON UKI	Assisted Living Innovation Platform and the stratified medicine catapult can contribute to this
Berkshire, Buckinghamshire and Oxfordshire UKJ1	Brings together Nonoelectronics & photonics

Providing dedicated support to nano- and advanced materials–enabled product life cycle policies and strategies; to risk assessment strategies, including regulatory research; and to forward looking and other intelligence gathering activities for the future.

|	
Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest BE10	NanoIRIS combines three complementary activities focused on nanomaterial safety: testing and consultancy services, leading edge translational academic research to prepare expertise for tomorrow, and strong education and training in nanomaterial safety of the next generation of experts.
SAARLAND DEC	Promotion of a research-industry network with the following activities: - Networking in national and internetional level - Feasibility Studies - Risk assessment for Nanotechnology - Regional Communication of Nano-related topics
BREMEN DE5	Detailed activities in the field of advanced materials will be developed in the frame of the Ecomat center.
EESTI EE0	So far it is not so precisely determined, the process to narrow wide technology areas is going on
HAUTE-NORMANDIE FR23	Organization of a laboratory of excellence bringing together industry and best research teams to address cross-locks
HRVATSKA HR0	Considering certain elements
NORD-EST ITH	Development of standard process ISO compliance for industry
Mazowieckie PL12	Professional Services for Business
Bratislavský kraj SK01	R & I in the field of linking dynamic parts of machines and mechanisms in order to increase the life and performance of devices to develop of production processes in industry focusing on better use of available resources, greater use of recycling materials and environment-friendly materials through the R&D&I development to make more efficient the production and logistics processes

Countries and cross-sectoral KETs not currently present in your region that you would like to see developed or that are required to support the development of your region Industry.

Country	All responses	Nanotechnologies and Advanced Materials for more effective Healthcare	Providing dedicated support to nano- and advanced materials–enabled product life cycle policies and strategies; to risk assessment strategies, including regulatory research; and to forward looking and other intelligence gathering activities for the future.	Enabling active and healthy aging within a personalised and affordable health-care system;	Exploiting the cross-sector potential of Nano techlogies and Advanced materials to drive competitiveness and sustainability	Nanotechlogy and Advanced Materials for low-carbon energy technologies and Energy Efficiency
AT	3	2	2	2	2	3
BE	2	0	1	1	0	0
BG	1	1	1	1	1	1
CZ	2	1	0	0	1	1
DE	4	2	2		2	2
EE	1					
EL	4	0	0	0	0	0
ES	5	2	1	4	3	0
FI	9	5	3	5	5	4
FR	10	5	4	5	3	7
HR	1		1		1	1
HU	1	1			1	
IE	1	1	1	1	1	1
IT	7	4	4	3	6	5
LT	1	0	0	0	0	0
LV	1	0	0	0	0	0
MT	1			1		
PL	3	2	1	1	1	2
PT	3	3		2	2	2
SE	4	3	2	3	2	2
SK	1		1	1		1
UK	5	1	1	2	1	2
Total	70[i]	33	25	32	32	34

Annex 7 Countries and instruments/measures or approaches considered in Region to support the diffusion and adoption of Key Enabling Technologies

Country	All responses	Public procurement	Cluster initiatives	Public and private sector co-funding	Commercial exploitation and commercial development	Investments into industrial capacities	Product development	Industrial applications, large test facilities	Science industry cooperation/Joint labs]	Product demonstration, prototypes, proof-of-concept	Pre-competitive development, experimental development	Technology transfer to SMEs	Value chain development, industrial roadmapping	Technological research	Basic research
AT	3		2	1		1	3	3	1	2	1	3	2	3	1
BE	2		1	1		1			1	2	1	2	1	1	1
BG	1		1	1		1	1	1	1	1	1			1	
CZ	2	1	1	2	1		2	1	2	2	1	1	1	2	
DE	4		2	3		1	2	3	2	3	3	3	2	3	3
EE	1	1	1	1					1		1	1		1	
EL	4	1	2	1	1	1	1		1	1		2	2	2	1
ES	5	1	2	1			1	1	1	2	1	2	1	2	1
FI	9	2	4	3	3	3	5	32	4	4	3	5	3	2	1
FR	10	3	5	4	2	2	3	1	4	5	3	5	4	5	4
HR	1	1	1	1			1	1	1	1	1	1	1	1	
HU	1											1	1	1	1
IE	1			1	1	1			1			1	1	1	1
IT	7	3	3	4	1	1	2	3	1	3	4	4	3	4	1
LT	1														
LV	1					1	1					1		1	1
MT	1									1					
PL	3	1	2	3	1	2	3		2	2	1	3	3	3	2
PT	3					1	1		1	2	2	2	2	1	1
SE	4	2	2	2	2	2	2	1	2	2	2	2	1	2	2
SK	1		1	1	1	1	1	1	1	1	1	1	1	1	
UK	5	2	2	3	3	2	2	1	2	3	3	3	3	3	3
Total	70i	18	32	33	16	21	31	19	29	37	31	43	31	40	24

Annex 8: Regions that responded to the online survey
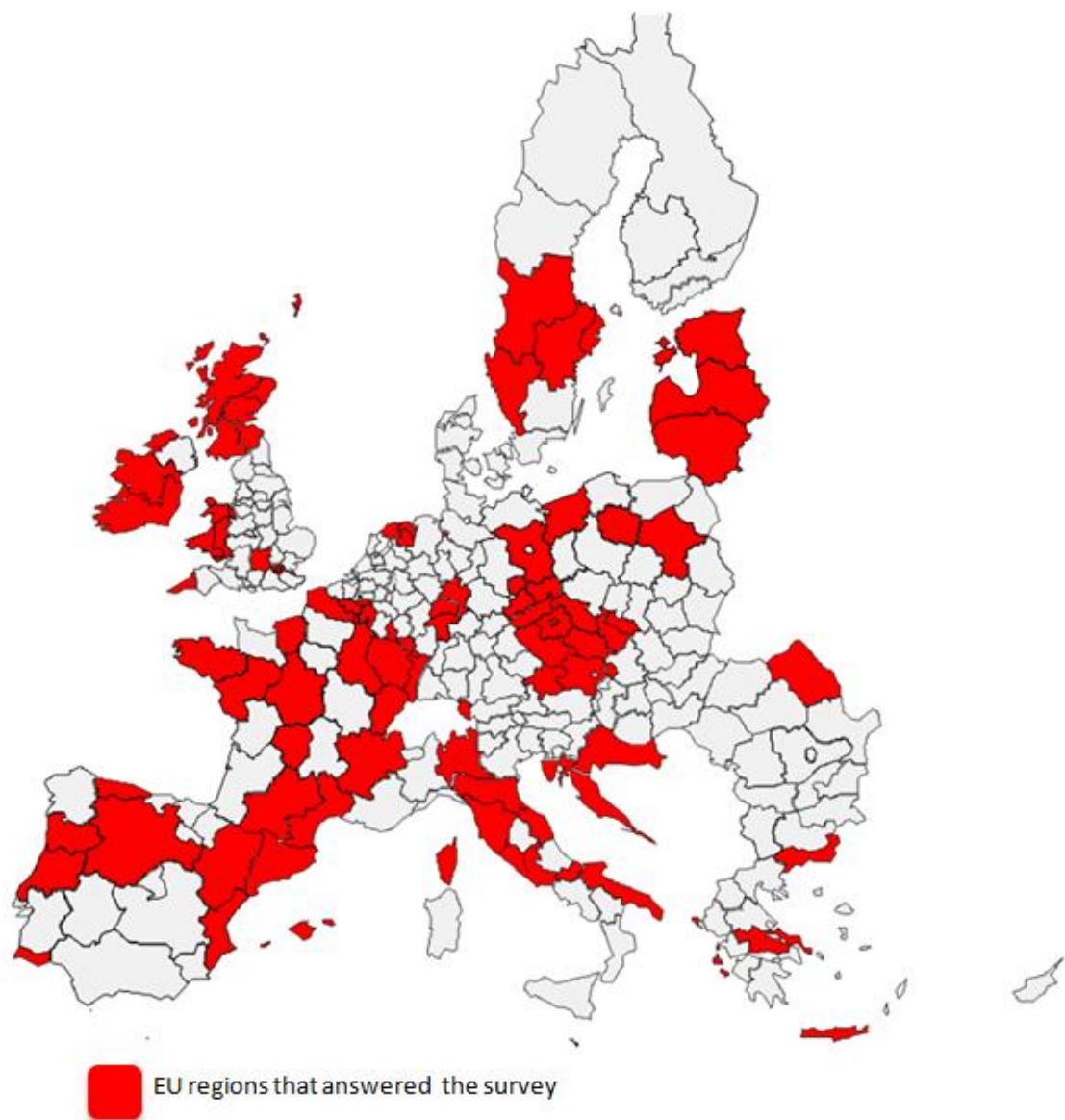
EU regions that answered the survey

regions of Finland are not shown in the current map due to diverging NUTS classification. From the survey, the following regions demonstrated priorities in KETs: Pohjois-Pohjanmaa, Pohjois-Karjala, Pohjanmaa, Pirkanmaa, Varsinais-Suomi, Helsinki-Uusimaa, Päijät-Häme, Etelä-Pohjanmaa, Etelä-Karjala, Satakunta

 i. 83 responses in total. 13 of these have no or NA response to most questions. These have been excluded from the survey.

Smart Specialisations Strategies help European regions to plan R&D priorities to face development challenges in a globalised economy. Key Enabling Technologies (KETs) are essential elements of such an approach. The study has gathered data from regions that are planning to develop and support their KETs through RIS3 strategies. In many cases, regions use these technologies to leverage their technological advantages to develop new products and services. This study has provided an initial understanding of challenges and the possible synergies that may be established between the EU R&D programmes and the regional structural development funds to use enabling technologies to foster the competitiveness of EU regions.

Studies and reports

Publications Office