

# IoT4Industry

## Project Deliverable

### Report on European regional strategies and European Structural and Investment Funds with relevance to smart industry

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### Abstract

This report aims at:

- Identifying national & regional policies fostering Industry 4.0 implemented in the countries and regions in which one consortium partner is inscribed;
- Exploring Smart regional strategies and their focus on Industry 4.0, as well as relevant EU initiatives;
- Comparing the regional policies, EU supporting schemes and analyse the potential approach to be developed by IoT4Industry for inscribing itself within these strategies;
- Identifying the potential leveraging effect induced by the IoT4Industry voucher scheme and elements for its monitoring

The report focuses on the European, national and regional stakeholders and schemes.

### Keywords

Industry 4.0; smart manufacturing; IoT; regional innovation strategies; European Structural and Investment Funds; Smart Specialisation; national schemes; SME support for innovation; clusters



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## Acronyms and definitions

Acronym	Meaning
AB	Advisory Board
AFPC	Association Française des Pôles de Compétitivité
AI	Artificial Intelligence
AIF	Alliance Industrie du Futur
ARCSIS	Association for Research on Components and Secure Integrated Systems
ARII	Agence Régionale pour l'Innovation et l'Internationalisation des entreprises
AURA	Auvergne Rhône-Alpes
BEIS	Business, Energy and Industrial Strategy
BERC	Basic Research and Centers of Excellence
BMBF	Bundesministeriums für Bildung und Forschung
BMWi	Bundesministerium für Wirtschaft und Energie
BPI	Banque Publique d'Investissement
CCI	Chambre de Commerce et d'Industrie
CI 4.0	Connected Industry 4.0
CIC	Centro de Investigación Cooperativa
CIM PACA	Centre Intégré de Microélectronique Provence-Alpes-Côte d'Azur
CPS	Cyber Physical System
DIH	Digital Innovation Hub
DOMEX	Domaine d'Excellence
EC	European commission
EFFRA	European Factories of the Future Research Association
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Funds
ESM	Efficient and Sustainable Manufacturing
ETI	Entreprise Taille Intermédiaire
EU	European Union
GDP	Gross Domestic product
GDPR	General Data Protection Regulation
GVA	Gross Value Added
HVMC	High Value Manufacturing Catapult
I4.0	Industry 4.0
I4MS	Innovation for Manufacturing SMEs
ICT	Information and Communication Technologies
IdF	Industrie du Futur
IDT	Innovation Diffusion Theory
INE	Instituto Nacional de Estadística
IoF	Industry of Future
IoT	Internet of Things
IRICE	Installations de Recherche et d'Innovation Centrées Entreprises
KET	Key Enabling Technologies



KIT	Karlsruhe Institute for Technology
MDER	Mission de Développement Economique Régionale
NDA	Non Disclosure Agreement
PACA	Provence-Alpes-Côte d'Azur
PPP	Public Private Partnership
PRIDES	Pôles régionaux d'innovation et de développement économique solidaire
R&D	Research & Development
R&I	Research & Innovation
RIO	Regional Interest Operation
RIS3	Smart Specialisation Strategy
RTD	Research and Technical Development
RVCTI	Red Vasca de Ciencia, Tecnología e Innovación
S3	Smart Specialisation Strategy
S3P-Industry	Smart Specialisation Platform for Industrial Modernisation
SaaS	Software as a service
SME	Small and Medium-sized Enterprise
SOHOs	Small Office and Home Office
SPRI	Sociedad para la Transformación Competitiva
ST&I	Science, Technology and Innovation
ToR	Terms of Reference
UK	United Kingdom
UNR	Usine Numérique Régionale



## The IoT4Industry project

The proportion of the manufacturing industry is currently decreasing in developed European countries' GDP. Industry 4.0 – also called smart manufacturing, digital industry or industry of the future – provides several technological responses to the challenging competitive market. The Industry 4.0 focuses on the development of processes based on technologies and devices autonomously communicating with each other along a value chain. Indeed, the integration of the Internet of Things (IoT) and related components – Cyber-Physical Systems (CPS), Digital Security, Cloud Computing and Big Data – in manufacturing SMEs will improve efficiency and flexibility in production and consumption.

IoT4Industry is an EC-funded project aiming at fostering this integration by connecting ICT clusters having capacities in IoT with Advanced Manufacturing clusters having access to process manufacturers and manufacturing SMEs. Based on a cross-border and cross-sectorial approach, a hundred of SMEs will be selected to receive funding and support to develop their access to smarter means of production and to modernize their processes and security. In fine, the project and this integration aims at creating new or improved value chains and new business opportunities.



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# 1. Executive Summary

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Industry 4.0 as a new way to organize industrial production methods with innovations derived from Internet of Things (IoT), advanced manufacturing and digital technologies can be considered the 4<sup>th</sup> industrial revolution. European Members States are facing a challenging global environment and Industry 4.0 solutions induce an important lever with the potential of transforming EU industries and creating enormous growth of the European economy, by supporting the processes in industry rather than creating new industries. Large corporates and small and medium enterprises (SMEs) active in manufacturing are equally affected, with the latter being often not yet sufficiently advanced in the digital transformation process.

A number of nation-wide initiatives exist across the EU to develop Industry 4.0 solutions, but local and regional authorities with their closeness to the territory are required to build strategic co-operation schemes with a private sector that is rapidly evolving towards more ‘hybrid’ models of production in increasingly complex market dynamics. Indeed, the involvement of local industry representatives in designing an industrial strategy is fundamental to meet entrepreneur needs, limit labour mismatches and strengthen the innovative capabilities of enterprises. Moreover, monitoring and evaluation of entrepreneurial industrial activities and the labour market, as well as collecting and elaborating data on key industrial variables, are crucial for a clear overview of local industrial problems.

Smart Specialization (S3) strategies are one among the various tools set by the European Union for fostering the Industry 4.0 at regional level, and can be strengthened through complementary initiatives, set at local, regional or global level, notably through the Digitising European Industry initiative, the Digital Agenda and specific instruments aiming at industrials, SMEs, and citizens.

The IoT4Industry project aims at enhancing the digital transformation of manufacturing processes by supporting SMEs in a cross-sectoral and cross-border approach. Clusters are herein considered a major channel for accessing local research and innovation stakeholders, namely SMEs, from both the IoT and the manufacturing side across Europe. An analysis has been conducted to identify existing support schemes on local, regional or national levels, in order to ensure the project activity complements them successfully. More specifically, this analysis:

- Provides an overview of the Industry 4.0 initiatives implemented on the territories “covered” by the clusters involved in the consortium (Belgium, France, Germany, Italy, United Kingdom).
- Identifies the European regions – outside the ones included in the consortium through the clusters - that are developing an Industry 4.0 strategy, and which could / should thus be prioritized / involved in the IoT4Industry dissemination process towards European SMEs
- Defines concepts and elements that are to be key in designing a methodology for framing and estimating potential leveraging effects from IoT4Industry support schemes, namely innovation vouchers.

Through desk research, interviews, funding opportunities outlook and exchanges with key experts, main outcomes identified are:

- The need to inform and convince business stakeholders on Industry 4.0 benefits. The dissemination levers at the level of the project will certainly get ‘outsiders’ on board, specifically informing them on opportunities through the IoT4Industry trainings;



- The necessity to design programs that correspond to business stakeholders' needs by providing the opportunity for existing companies to get adapted solutions for their structure and activities. IoT4Industry-supported SMEs could provide tailored feasibility studies, prototypes or demonstrator by building the projects upon the I4.0 diagnoses made in the frame of the regional schemes;
- Collaborating with regional agencies for 'lagging' SMEs. IoT4Industry project could foster the synergies between the European ESIF funding and H2020 Innovation Action programme on the field requiring coordination between entities. The way to proceed on that specific scheme supposes the following levels of dissemination / interaction:
  - Establishing a framework for exchanges between clusters and regional agencies on IoT4Industry voucher schemes early on
  - Scouting diagnoses reports – if made available by the regional entities – and identifying the companies potentially interested in further exploring IoT/Advanced manufacturing solutions
  - During the matchmaking sessions, engage with the regional representatives / agencies on concrete collaborations with the companies accompanied within the regional scheme
  - Ensure the 'solution provider' involved in the IoT4Industry-supported project do understand / agree with the conclusions set in the diagnosis and develop the adapted solution, fostering a 'digital by design' approach rather than 'digital by default' solutions
- Relay information on European, National and Regional funding, raising awareness and readiness for such opportunities.

Focusing on the IoT4Industry voucher scheme potential synergies and leverage effects, several opportunities were identified, for all stakeholders involved in its processes.

- Collaborating with Vanguard initiatives and Industrial Modernisation Thematic platform(s). The IoT4Industry project environment and collaboration with ambassadors can be an interesting input for the next endeavours related to the European strategy for smart specialization. IoT4Industry could also constitute a co-investment source for this scheme's protocols.
- Interacting with I4.0 PPPs. The IoT4Industry project, through its structure (beyond the voucher scheme), could provide business stakeholders – that are not yet aware / involved in these PPPs – to get a better grasp on what these initiatives could provide them with.
- Reinforcing Industry 4.0 project proposals' business cases for transnational cooperation funding opportunities. IoT4Industry demonstration voucher could thus enable business stakeholders to illustrate the solutions provided towards European authorities and their interregional / INTERREG projects and thus have a better chance to get access to these schemes and related benefits
- Fast tracking towards EU-funded innovation schemes. IoT4Industry voucher for Feasibility Studies could notably constitute a stepping stone for innovators eligible / willing to apply for "Fast track innovation" / SME instrument programmes by raising the readiness level of their solution and providing an adapted framework for the required building of trust between potential partners.

These outcomes are of high relevance for the project's next steps:

- Provide regional stakeholders (clusters, regional authorities, agencies, etc.) with a set of tools for further improving their approach towards Industry 4.0 stakeholders.
- Designing a voucher scheme that inscribes itself in national and regional environments.
- Implementing a tailored dissemination strategy fostering the wide outreach of the calls for projects.



- Implement collaborative schemes that enable the maximization of successes / impacts of the projects implemented.
- Provide IoT4Industry consortium with useful tools for measuring these impacts and assessing the leveraging effects implied by the implementation of the project.



## 2. Introduction

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"The fourth industrial revolution is still in its nascent state, but with the rapid pace of change and disruption of business and society, now is the time to join" according to Deloitte Consulting. Industry 4.0 (I4.0) is a new way to organize industrial production methods with innovations derived from Internet of Things (IoT), advanced manufacturing and digital technologies such as Cyber-Physical Systems (CPS), Digital Security, Cloud Computing and Big Data. IoT and cyber-physical systems are thus the two entities of technology for Industry 4.0, powering smart factories activities, technologies and processes.

As underlined in the Regional Innovation Monitor Thematic Report<sup>1</sup>, this fourth industrial revolution will affect current systems of industrial production and value chains in multiple ways, including:

- The creation opportunities for entirely new business models;
- An increased reliability and productivity once fully adopted;
- A decrease in economies of scales through mass customisation;
- Automation at smaller batch sizes;
- More flexibility in production;
- A reduction of production lead time;
- New product-oriented services; and
- Improved safety and attractiveness of the working environment.

These changes are induced by the eight main technology drivers<sup>2</sup> impacting the industrial framework, as displayed in Figure 1.

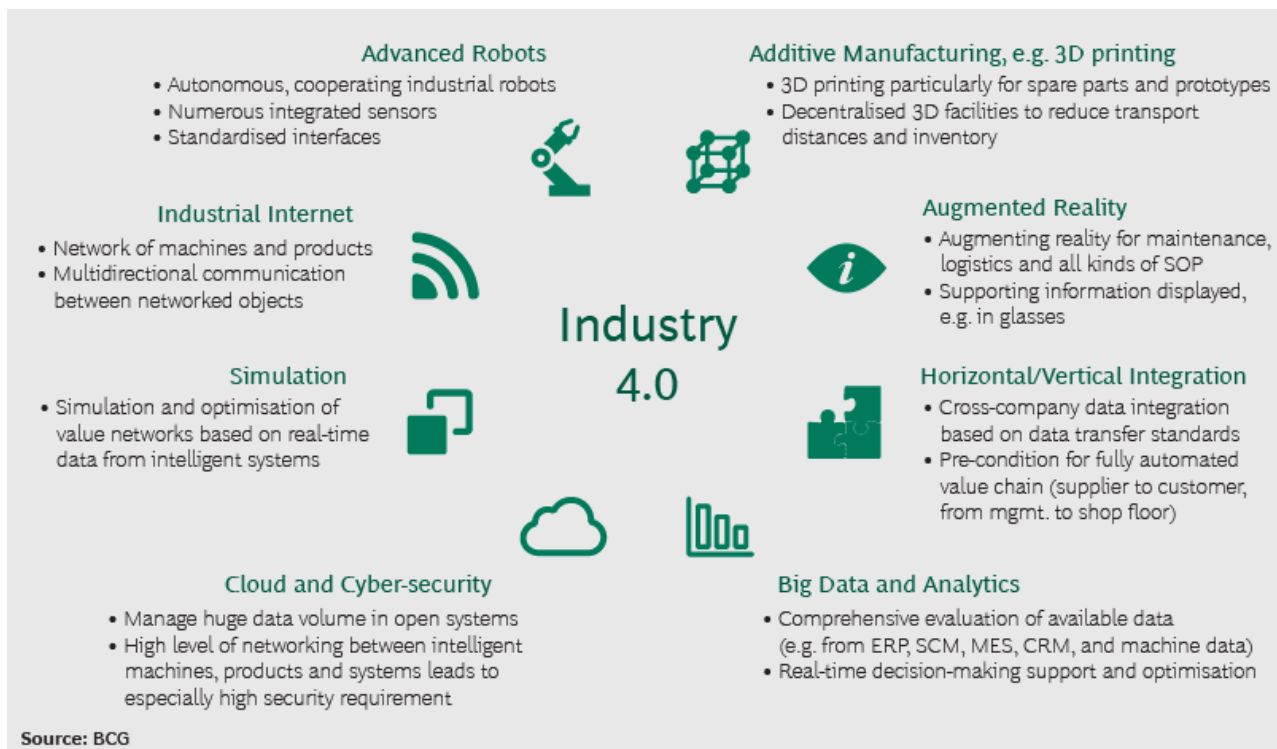
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<sup>1</sup> Technopolis Group, Regional Innovation Monitor Plus

<sup>2</sup> Boston Consulting Group, Is UK industry ready for the Fourth Industrial Revolution ?



**Figure 1: Technology drivers for industries 4.0 (source: Boston Consulting Group)**



European Members States are facing a challenging global environment and Industry 4.0 solutions induce an important lever with the potential of transforming EU industries and creating enormous growth of the European economy. Rather than creating new industries, the greatest digital opportunity for Europe lies in the transformation of existing industry and enterprises<sup>3</sup>. A crucial aspect lies in the fact that cities and regions have an important role to play in both the demand and supply side of the market to create an environment that supports the processes in the economy and strengthens the competitiveness of SMEs.

Industry is a key sector for job creation and still has a major role in boosting employment in Europe. In 2014 only 9.9% of enterprises in the EU were active in industry, even though these provided work for 23.6% of employed people. The difference between these shares is because the average size of industrial enterprises (as measured by the number of employees), is considerably higher for industry than for services<sup>4</sup>.

It is to be noted that the low adoption rate of digital technologies in enterprises – over 41% of EU companies have yet to adopt any of the new advanced digital technologies – is just one example that enterprises are facing challenges in the wake of this transition. However, a recent survey of EU businesses gives reason for hope: It shows that 75% of respondents regard digital technologies as an opportunity, while 64% of companies investing in digital technologies have generated positive results.<sup>5</sup>

<sup>3</sup> Strategic Policy Forum on Digital Entrepreneurship, Accelerating the digital transformation of European industry and enterprises

<sup>4</sup> T33, The Future of Industry in Europe

<sup>5</sup> Digital Transformation Monitor, Key lessons from national industry 4.0 policy initiatives in Europe



In response to the challenges, most of the EU governments have made I4.0 a priority adopting large-scale I4.0 policies to increase productivity and competitiveness and improve the hightech skills of their workforce. While often united in their goals, national I4.0 policies differ in their policy design, funding approaches and implementation strategies<sup>6</sup>. Figure 2 displays notable national initiatives fostering the uptake of Industry 4.0 upon their territories.

**Figure 2: Key facts of some national I4.0 policies (source: Digital Transformation Monitor)**

	Launch date	Target audience	Budget	Funding approach
	2015	Industry & production base, SMEs & mid-caps	Approx. €10 billion	Mixed
	2011	Manufacturers / producers, SMEs & policy-makers	€200 million	Mixed
	2012	Large companies, SMEs, universities, research centres	€45 million	Public
	2014	General business community	€25 million	Mixed
	2016	Industry, above all SMEs & micro-enterprises	€97.5 million	Public
	2013	Research, academia & industrial & service SMEs	€50 million	Mixed
	2012	Business, industry & research organisations	€164 million	Mixed
	2016	Industry & service sector companies, trade unions	Not yet defined	Public

Beyond these nation-wide initiatives, local and regional authorities are the closest institutional level to territories, and, as such, are better positioned to identify local industrial strengths, weaknesses and the potential for development. The first strategic step for an industrial policy is indeed to discover and elicit more information about what constrains industrial sectors. This requires these authorities to establish close and strategic co-operation schemes with a private sector that is rapidly evolving towards more ‘hybrid’ models of production, is less place-based and is surrounded by increasingly complex market dynamics.

The involvement of local industry representatives in designing an industrial strategy is fundamental to meet entrepreneur needs, limit labour mismatches and strengthen the innovative capabilities of enterprises. Moreover, monitoring and evaluation of entrepreneurial industrial activities and the labour market, as well as collecting and elaborating data on key industrial variables, are crucial for a clear overview of local industrial problems.

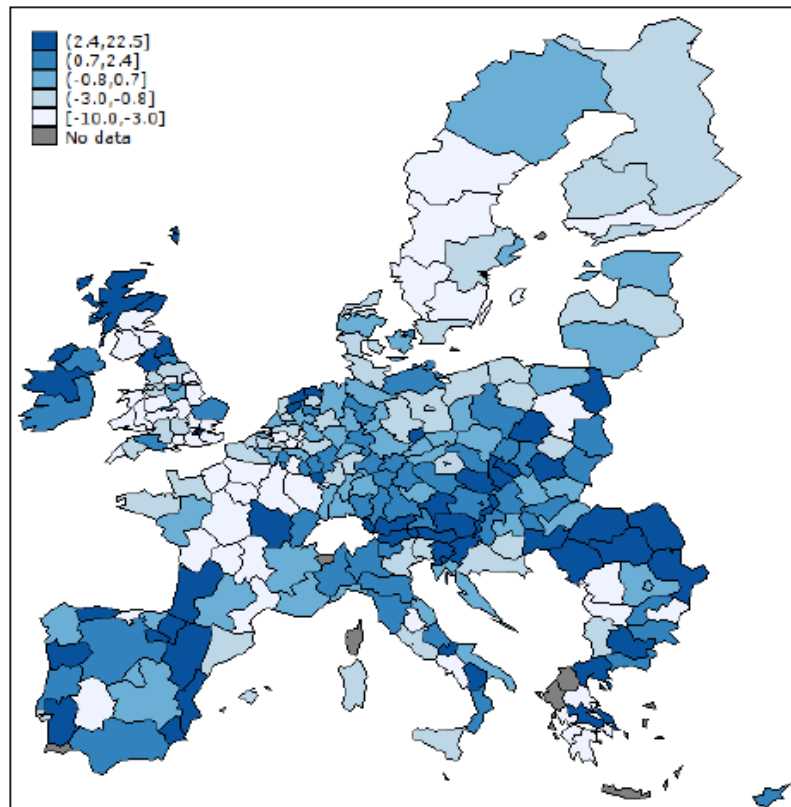
<sup>6</sup> *ibid*





Moreover, according to the Policy Learning Platform's Policy Brief<sup>7</sup> on the topic, regional policies fostering Industry 4.0 could further help 'structurally weak' regions to overcome their weakness and barriers for growth like lack of talents, distance to the economic centres and visibility by actively promoting the process. Cities and regions can contribute to the development of innovative ecosystems by bringing together local resources and stakeholders. Digital transformation needs leadership: an active involvement from policy makers and higher management in both the public and private sectors is key for success.

**Figure 3: High and medium high-technology manufacturing, Percentage of total employment, average yearly change (% , 2008-2015) (source: Committee of Regions)**



For fostering these regional initiatives, a notable approach set up by the EC since 2011 consist in the Smart Specialisation Strategies (S3). Smart Specialisation is a place-based approach characterised by the identification of strategic areas for intervention based both on the analysis of the strengths and potential of the economy and on an Entrepreneurial Discovery Process (EDP) with wide stakeholder involvement. It is outward-looking and embraces a broad view of innovation including but certainly not limited to technology-driven approaches, supported by effective monitoring mechanisms.

The S3 strategies are however one among the various tools set by the European Union for fostering the Industry 4.0 at regional level, and complementary initiatives, set at local, regional or global level, notably through the Digitising European Industry initiative, the Digital Agenda and specific instruments aiming at industrials, SMEs, and citizens.

<sup>7</sup> Digital transformation and SMEs: what regions can do, Policy Learning Platform on SME competitiveness

The IoT4Industry project inscribed itself among these European initiatives, fostering this process by connecting ICT clusters having capacities in IoT with Advanced Manufacturing clusters having access to process manufacturers and manufacturing SMEs. Based on a cross-border and cross-sectorial approach, a hundred of SMEs will be selected to receive funding and support to develop their access to smarter means of production and to modernize their processes and security. In fine, the project and this integration aims at creating new or improved value chains and new business opportunities.



### 3. Methodology

This document aims at providing the IoT4Industry project with the relevant information linked to these aspects for achieving the following results:

- Provide a complete overview of the Industry 4.0 initiatives implemented on the territories “covered” by the clusters involved in the consortium in order to further define the adapted strategy and approach for the funding scheme to be implemented upon the territories
- Identify the European regions – outside the ones included in the consortium through the clusters - that are developing an Industry 4.0 strategy, and which could / should thus be prioritized / involved in the dissemination process towards European SMEs
- Define concepts and elements that are to be key in designing a methodology for framing and estimating potential leveraging effects from IoT4Industry voucher schemes

The information extracted from this document are targeting several stakeholders:

- IoT4Industry partners responsible for the definition of the scope of IoT4Industry vouchers
- SMEs interested in the planned “calls for collaborative projects” which aim at supporting the collaboration among SMEs from different European regions, bringing together the IoT and the manufacturing side
- Regional stakeholders outside the consortium interested in understanding Industry 4.0 strategies in other European regions
- Stakeholders from regions that can play the role of “ambassadors” and as thus be involved in the project endeavors

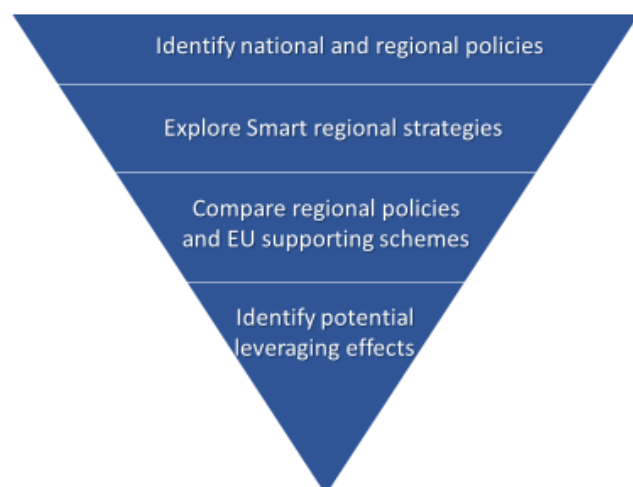
The report is focusing upon the “main regions” covered within the project. Indeed, the open calls are to be open to projects gathering European SMEs and industries that have one step in one of the regions represented within the partnership.

Considering the scope of the strategies explored, the methodology was to consider overarching European and national initiatives fostering the uptake of Industry 4.0 and then downsize the study to regional level, widening the scope of the analysis to IoT and Industrial domains, when relevant.

The approach developed is the following one:

- Identify national & regional policies fostering Industry 4.0 (and potentially IoT and Advanced manufacturing) implemented in the countries and regions in which one consortium partner is inscribed;
- Explore Smart regional strategies and their focus on Industry 4.0, as well as relevant EU initiatives;

**Figure 4: Deliverable's approach**



- Compare the regional policies, EU supporting schemes and analyse the potential approach to be developed by IoT4Industry for inscribing itself within these strategies;
- Identify the potential leveraging effect induced by the IoT4Industry voucher scheme and elements for its monitoring

For building upon the approach described, the methodology was based on two main activities: literature review (desk research) and interviews performed by the partners.

- **Desk research**

The literature review included the research, analysis and processes of the following sets of sources:

- Digital Industry Strategy and Digital Transformation Monitor<sup>8</sup> for national strategies
- Smart Specialisation strategies made available through the S3 platform<sup>9</sup> for regional levels and relevant European Commission (EC) sources focusing on regional enabled approaches
- Eurostat for data analysis and comparisons
- Regional Innovation Monitor; Committee of Regions reports, and other studies performed by European organisms
- Relevant reports from the regional authorities and agencies from the regions considered
- Experts reports from various sources (Price Waterhouse Cooper (PWC), Roland Berger, etc.)

The complete list of references is available in chapter

- **Interviews with regional representatives**

Beyond desk research, the partners involved within the task did perform 14 interviews with regional stakeholders to complement the information gathered through desk research with qualitative feedbacks on the regional strategies and priorities implemented. These interviews were conducted by four partners on the basis of a common interview guide designed by inno TSD, which was focused on regional strategies, tools and sectorial approaches (available in **Erreur ! Source du renvoi introuvable.**).

The interviewed stakeholders' positions and organisations are listed in Table 1 below.

**Table 1: List of interviewees**

Organisation	Country / region	Partner / Interviewer
ARII PACA (Regional agency for innovation and internationalisation)	France / Provence Alpes Côte d'Azur	INNO
Provence Alpes Côte d'Azur regional authority	France / Provence Alpes Côte d'Azur	INNO
Auvergne Rhône-Alpes regional authority	France / Auvergne Rhône-Alpes	INNO
Manufacturing Technology Center*	UK	INNO

<sup>8</sup> Digital Transformation Monitor, State of play and key trends of digital transformation in Europe

<sup>9</sup> Smart Specialisation Platform, Home



Agence du Numérique (Regional agency for Digital strategy - Wallonia)	Belgium / Wallonia	PMT
Wallonia regional authority	Belgium / Wallonia	PMT
VLAIO - Agentschap Innoveren en Ondernemen (Innovation and entrepreneurship agency – Flanders)	Belgium / Flanders	PMT
SRPI - Agencia de Desarrollo Empresarial (Business development agency – Basque Country)**	Spain / Basque country	PMT
Ministry of Economy	Germany / Baden-Wuerttemberg	mTSW
Allianz Industry 4.0	Germany / Baden-Wuerttemberg	mTSW
Zentrum Digitalisierung Bayern (Center for Bavaria)	Germany / Bavaria	mTSW
Business Upper Austria	Austria / Upper Austria	mTSW
Piedmont Regional Authority	Italy / Piedmont	MESAP
Abruzzo Regional Authority	Italy / Abruzzo	MESAP

\* MTC, while being a partner of the project, is also the best contact for UK Industry 4.0 funding schemes

### Interview - Personal data protection

Considerations on data privacy of regional stakeholders interviewed are of special importance for IoT4Industry project partners. Data collected through these interviews (name, e-mail, organisation, etc.) are stored & processed by each interviewer, who disclosed the interviews contents to relevant projects' partners only.

As stated on the European Commission's website, "Under EU law, personal data can only be gathered legally under strict conditions, for a legitimate purpose. Furthermore, persons or organisations which collect and manage personal information must protect it from misuse and must respect certain rights of the data owners which are guaranteed by EU law<sup>10</sup>". As such, INNO, MESAP, mTSW and PMT opted for a common policy detailed below on interviewee information and own management of data:

- At the start of the interview, information upon the use of the data to be collected were provided.
- Upon request, the interview guidelines filled with the interviewee's answers were communicated to the interviewee for review.
- Interview transcripts and interviewee names aren't disclosed outside IoT4Industry partnership
- Interviewees were asked to provide with a feedback after each interview, stating:

"I confirm that the information indicated in the attached form is correct and reflects the reality of my organisation.

I am aware that the completed form could be provided to the European Commission, and that the "ID information" and "quotes from the interview" may be included in published documents."

The outcomes resulting from both the desk research and the qualitative interviews were processed, analysed and put into perspective in the following chapters.

<sup>10</sup> European Commission, Data protection



## 4. Overview of national and regional schemes supporting Industry 4.0

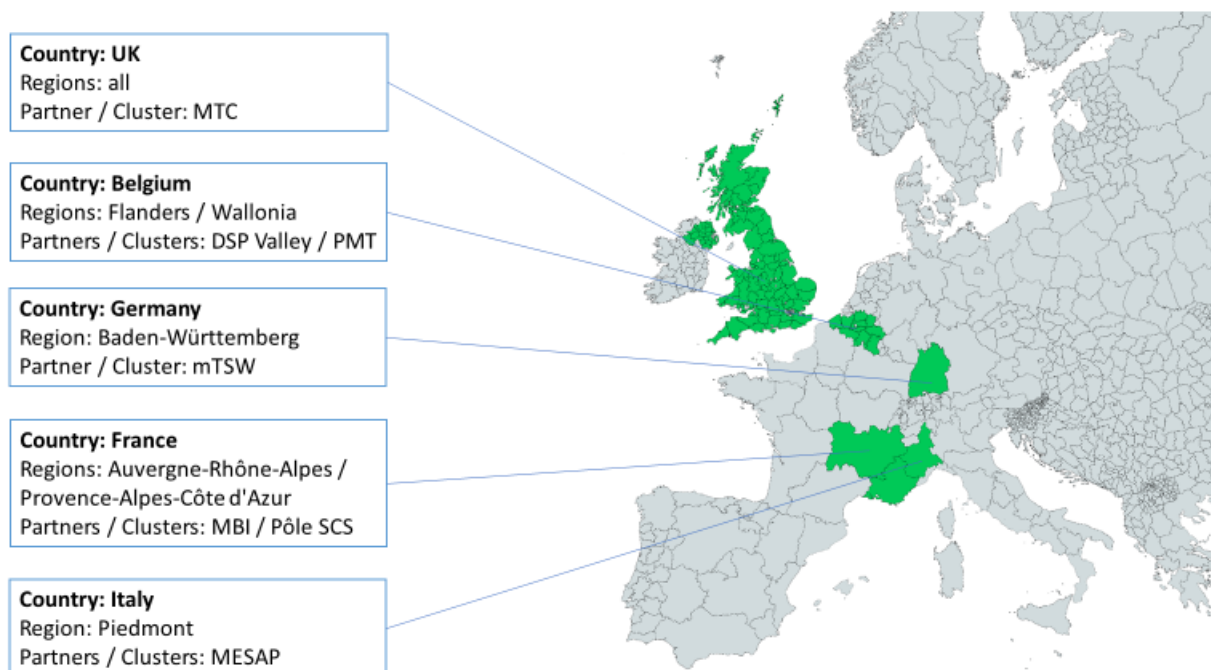
As underlined in the “Key lessons from national industry 4.0 policy initiatives in Europe” report<sup>11</sup>, each Member State defined wide frameworks or strategies laying out nation-wide visions and approaches of the research, innovation and industrial policies. These approaches are clearly overlapping in the objectives and targets they follow, while their associated policies vary on how to reach them. The national I4.0 policies in Europe have already produced tangible qualitative and quantitative outputs.

This chapter is divided in two parts, the first one providing a thorough analysis of the national & regional schemes supporting the uptake of Industry 4.0 over the territories ‘covered’ by one of the IoT4Industry partners, as well as regions which are not involved in the consortium but considered as ‘witness’ or ‘case control’. The second part covers the countries / regions identified as potential ‘IoT4Industry Ambassadors’ in this document.

### 4.1. Regions / countries involved in the consortium

The following section rapidly introduces the main objectives and approaches of the 5 national Industry 4.0 policy initiatives from the involved clusters’ respective Member States, and further dive into each of the 7 regions’ set of initiatives (as pictured in Figure 5).

**Figure 5: IoT4Industry countries / regions ‘covered’ by the partnership**



<sup>11</sup> Digital Transformation Monitor, Key lessons from national industry 4.0 policy initiatives in Europe

#### 4.1.1. Belgium

An ANALYSIS OF NATIONAL INITIATIVES on DIGITISING EUROPEAN INDUSTRY report<sup>12</sup> is available for Belgian ecosystems.

The Belgian federal system is highly decentralised in policy making, in particular regarding competences for innovation and industrial policies. The successive state reforms aimed at a devolution of most of these competences to the regions as main policy level, avoiding hierarchy. As result the federal and regional governments have complementary competences and act as direct interlocutor with the EU on those competences. Belgium is represented in the European Platform for national initiatives on digitising industry by the regional governments. The Federal Government represents the national platform in the EU Coalition for Digital Skills and Jobs.

Policies to support are developed under the policy declarations of different Belgian governments for the period 2014-19. Due to the different institutional settings, initiatives for digitising industry/ I4.0 emerged in different settings:

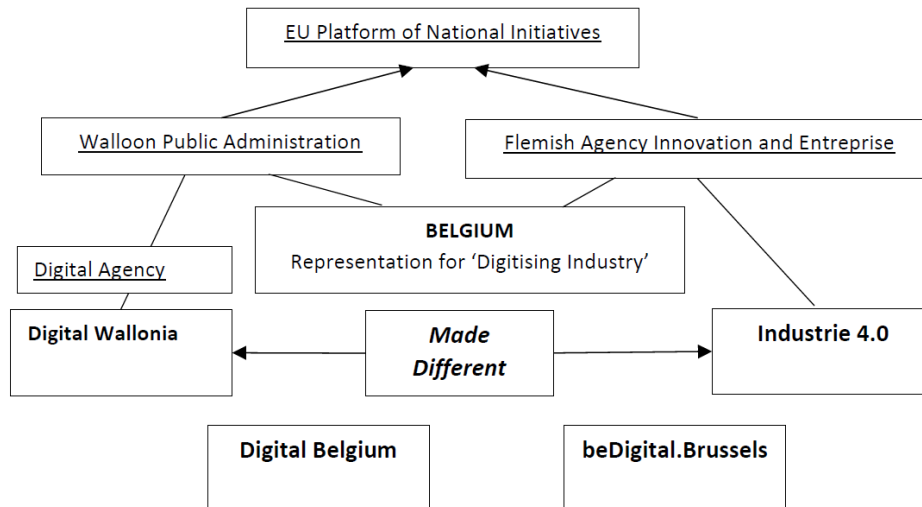
- ‘Digital Belgium’, at federal level. Among different measures related to the federal competences (e.g. also on infrastructures) several types of investments for digital transformation can benefit from tax reductions.
- ‘Industrie 4.0’, in Flanders Region. The digital transformation is part of a general transition strategy ‘Vision 2050’, driven by major societal challenges: ‘Making the leap to Industry 4.0’, is one of the seven transitions.
- ‘Digital Wallonia’ In Wallonia Region. The actions for digitising industry are connected to the overall transformation strategy (Marshal Plan) and coordinated through a Digital Agency.
- ‘beDigital.brussels’, in the Brussels Region. Under this umbrella the ‘NextTech Plan’ was introduced in 2017 to support digital start-ups.

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<sup>12</sup> Larosse Jan, Analysis of national initiatives on digitizing European industry



**Figure 6: National initiatives in Belgium supporting digitising industry (source: analysis of national initiatives on Digitising European Industry)**



There is no formal alignment of the different digital action plans in Belgium, neither for the industry 4.0 initiatives. But important steps are taken towards integration of policy initiatives of different domains within the different policy levels. The 'digital policy' combines policies from the digital agenda point of view. The 'industrial policy' combines with other elements of the economic transformation strategies. Interaction with stakeholders and the leading role of industry is institutionalised, often in a dynamic of top-down policy design with bottom-up policy shaping and implementation by industry-driven stakeholder fora.

'Made Different' is a support action initiated by the Belgian federation of technology companies (Agoria) and the Collective Research Centre for the technology industry (Sirris). It is addressing companies on the whole Belgian territory. The Made Different initiative was originally launched in 2013, in Flanders, with the aim to increase the competitiveness of the manufacturing industry by supporting the digital transformation of production processes. The overall goal of this initiative is to transform manufacturing companies into 'Factories of the Future' (FoF). Wallonia followed a similar path more recently, with the implementation of the Made Different initiative in January 2017.

This programme accompanies individual companies with advisory services in their transition to Factories of the Future, according to seven transformations: world-class manufacturing technologies; end-to-end engineering (integrated design approach); digital factory (digitising operational processes); human-centred production; production network (optimal eco-system); eco-production (sustainability standards); smart production systems (smart interconnection)

It has four, interlinked components:

- Awareness raising events: roadshows and workshops to advertise the opportunities and need of becoming a Factory of the Future.
- Coaching: providing a tailored guidance and assessment-on-demand.
- The Factory of the Future Awards: to label the success cases (16 companies have been selected up to 2017)





- Managing several company-led learning networks within the different Made Different transformation areas

Companies can execute an on-line diagnostic to discover the most relevant transformation opportunities, and receive an advisory site-visit as a stepping-stone towards a (paid) full assessment and coaching process. This process starts with a commitment of the top-management and leads to a tailored action plan and to implementation process that can last one to two years. These transformation plans address one or several of the seven transformation challenges. The assessment and advisory services are provided basically through a pool of 40 dedicated experts of Agoria and Sirris. The assessment service stands for on average 10-15 days of consultancy (around 10.000 euro).

Made Different is mainly an industry-driven program with a very flexible structure which follows a bottom-up approach. The main activities of the Made Different initiative involve the organization of awareness-raising events, the provision of tailored and long-term guidance services to companies willing to transform their production processes (i.e. up to around two years). Also, the 'Factory of the Future Awards' are organized every year in order to distinguish companies that successfully achieved their transformation.

#### **Made different leveraging effect**

More than 300 companies have already completed or are in the process of one or more transformations. The objective is to reach 500 companies and have 50 FoF by the end of 2018. The effect on new investments of these assessments and action plans is substantial. The 16 Award winning companies report almost 500M € investments in new technology, 11% job increase and reduction of lead-times by 80% after these investments.

#### ***Flanders***

Flanders region provides 58% of the national gross domestic product (GDP, 249 million euro, 2016). In 2013, 20% of the gross value-added (VA) in the Flemish region came from industry. Manufacturing industry represents 15.9% of Flanders' total employment. Value added generated by medium high-tech and high-tech industries, accounted for 8.6% of the total VA in 2013. The employment figures in these industries follow the same trend: 4.45% of the total employment in Flanders was in medium high-tech and high-tech industries in 2013, compared to 3.9% (2014) in the EU28. Four strategic research centers cover research in nano-micro and digital technology, biotech, product and process engineering and technological innovation. These research centers have fostered close partnerships with the five universities of Flanders.

The Flemish government (in place since 2014) has developed further the transformation policies started previously with 'Flanders In Action' and 'New Industrial Policy'. The comprehensive transition strategy 'Vision 2050' is driven by societal challenges in seven transition areas. The 'Spearhead Cluster Policy' is building critical mass in innovation for economic transformation in key industrial areas. Digital transformation is integrated horizontally in the 7 strategic transition strategies, including "Industrie 4.0". The program "Industrie 4.0" unites existing and new Flemish initiatives to boost digital business and manufacturing concepts in industrial companies.

In Flanders a range of horizontal instruments for the technology supply side can support bottom-up digital innovation projects. The transition programmes are driving the demand side for . In addition, a more mission-oriented support to research and innovation for industrial transformation is given through the 'Strategic



Research Centres' imec (for micro-electronics and ICT) and Flanders Make (for advanced manufacturing) and through the spearhead clusters in specific industrial areas that are implementing digital transformation (e.g. food, chemistry, logistics, construction, ...). Aside these stakeholders, the cluster organisation DSP Valley is at the core of these processes.

In 2017, a working programme has been developed for “Industrie 4.0” along 5 axes:

1. Sustain a platform: organizing a central point of information (hub) for all stakeholders concerning Industry 4.0 and its implications; awareness raising and promotion through events; stakeholder discussion and input to policy making.
2. Strengthen the knowledge base: additional research in the domains supporting the transition towards Industry 4.0 and the dissemination of the knowledge; networking of present actions; support of imec, Flanders Make and other institutes.
3. Accelerate application: supporting the transition of individual companies, in particular SMEs; promotion of support instruments; demonstration units and pilots; collaboration with spearhead clusters, etc. These horizontal measures are available for all companies that are dealing with innovation issues, they range from SME voucher (from 1000 to 25.000 € to get the support of consultants), to subsidies for large R&D projects.
4. Relate to framework conditions and society: connecting with policies on learning and competences, legal consequences, EU standardisation, ...; inventory of actions to be taken; study of impact on worker competences and labour organisation. There also exists an awareness building programme which aims at informing small businesses on IoT.
5. Support international cooperation: representation in EU policy initiatives; supporting the participation in the programmes and projects of the European Commission and stimulating internationalisation in general (e.g. international fairs and events).

The Transition ‘Industrie 4.0’ started in 2017 rolling out its work programme, with a focus on streamlining the existing Research & Innovation (R&I) actions in Flanders and connecting to international networks. Project groups on communication and internationalisation will be active. The main budget in 2017 will come from the open instruments of the agency Flanders Innovation & Entrepreneurship and the funding of the strategic research organisations. Including the direct funding of companies investing in R&D, innovation or investments supporting the transformation, the funding from Flanders for activities related to Industry 4.0 exceeds 50 million euro/year. In 2017, 4 million euro will be spent to support the set-up and strengthening of innovation hubs and pilot lines, and a not yet determined budget will be given to collaboration projects between spearhead clusters and other organisations supporting the transition towards Industry 4.0.

The implementation of the work programme is supported by different organisations already active in this field, including the strong and diverse research community and sectorial and technological innovation centres and professional organisations. Two research centers are notably involved in this approach: SIRRIS (that recently opened a flagship site dedicated to industry 4.0 in Kortrijk), and to a lesser extend CENTEXBEL.

There will also be a narrow collaboration with the network of spearhead clusters (in the domains of sustainable chemicals and plastics, materials, logistics and transport, energy and agro-food) - notably Flanders foods (Industry 4.0 is one of their 3 cores programs), The logistics cluster, Energy Groen Chemie (to a lesser extend) and the Innovative Business Networks. The cluster policy introduced in 2017 new instruments for Spearhead Clusters (up to 50% of the budget, and max €500,000 a year over a ten year



period) and Innovative Company Networks (up to 50% for coordination costs and cluster activities of maximum €150,000 a year during maximum three years).

## **Wallonia**

Industrial transformation in Wallonia benefits from a long-term strategy for revitalisation of the economy with a broad societal support that is in place since 2005, the Marshall Plan for Wallonia. The Government elected in 2014 updated in May 2015 this strategy to 'Plan Marshall 4.0'. The Plan mobilises 2,9 billion euro public investments in the period 2015-2019 on five priority axes: human capital development; industry development by innovation; territorial development; circular economy. The fifth, new priority axis is 'digital innovation', with a budget of 250 million euro.

This fifth priority on digital innovation in the Marshall Plan 4.0 was translated end of 2015 in a strategy for digitalisation, 'Digital Wallonia'<sup>13</sup>. The "Agence du Numérique" (Digital Agency) is in charge of the coordination of its implementation.

Digital transformation of the entire economy, through digitising operations in all companies is a core dimension of Digital Wallonia. Among its 50 measures several are linked to the transition in companies, such as 'Made Different Digital Wallonia' with a total budget of 500 million euro for the period 2015-2020 (with an important contribution from ERDF). This program is currently running and features 24 partners (Research Technology Offices - RTO, competitiveness Clusters, Clusters, industry associations...). The logic behind lies in developing the ecosystem within all sectors at the same time, enabling a maximization of the effects and thus maximizing the programme's impact.

Besides, the 'Digital Wallonia Hub' was launched early 2017 to support high-potential companies (champions) in their scale-up and internationalisation, through financing of innovation with recoverable advances. It also gathers the information on ICT companies over the region in a mapping available on the platform, sorting notably IoT companies.

The Pole 'MecaTech' (for mechanical engineering) – IoT4Industry partner - is the one most involved in the digital transformation actions. The MecaTech cluster projects are developed in four strategic fields: materials and surfaces of the future; comprehensive forming technologies; microtechnologies and mechatronics, and intelligent maintenance. With about 200 partners involved in projects carried out jointly by companies and research and training units, the MecaTech Cluster has created a new dynamic for "hybridisation of mechanical engineering", enhancing groundbreaking innovations. The other Poles are also fully implicated in the digital transition programmes, like Skywin (aeronautics), Greenwin (green technologies for the construction sector), Wagralim (food industry), Logistics in Wallonia, ...

Besides the Poles, the Walloon Government also conducts a cluster policy for smaller networks, of which two are digital clusters: INFOPOLE cluster ICT (a centre of excellence in ICT bringing together academic and industrial expertise) and TWIST (business cluster of audiovisual service providers).

There are also seven Creative Hubs located in the Walloon region following a logic of territorial coverage (network). They act as collaborative co-creation laboratories (under the Creative Wallonia programme for

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<sup>13</sup> Wallon Region, Digital Wallonia



the creative industries) aiming at the creation of innovative and creative projects, the networking of actors, the creation of a community, and the accompaniment of new ideas.

But there are also a number of technical facilities to support digital transformation: Fablabs / Living Labs / Incubators.

- The Fablabs (currently 12) are open laboratories for testing and experimenting. They are open places where various tools – mainly digital such as 3D printer and laser cutting – are available for the design and realization of objects of all kinds.
- The Living labs are design places of innovative products and services. Work in these places is organised around research, analysis, exchange of experience and co-creation to enable project developers to achieve exploitable results. The user is at the core of the innovation process. The areas already covered are: e-health, industrial innovation, creative industries and technologies, and food.
- The certified Collective Research Centres (42 under the association ‘Wal-tech’) are supporting the digital transformation for the companies in their technology fields (in particular CETIC for ICT; CENAERO for aeronautics; CENTEXBEL for textiles; CSTC for construction; ULTITEL for telecom and signal processing; SIRRIS for manufacturing). In addition, there are 5 ‘Digital Competence Centres for vocational training’.

#### **Digital Innovation Valley in Mons**

Digital Innovation Valley currently includes about thirty companies, specializing in new technologies such as biochemistry, telecommunications, civil engineering or computer science. The presence on this site of the company and a permanence provides support to young innovative companies by providing them infrastructures and skills necessary for their development. The park also houses two research centers, erected with the help of the Universities of Mons (the Catholic University Faculties of Mons and the University of Mons): Multitel (telecommunications) and Materia Nova (new materials). Initialis also houses laboratories, service companies with high intellectual or technological value. There is also a Microsoft research center specializing in the field of health (E-Health).

Under the management of the administration of the Public Service of Wallonia in charge of economic affairs, technology and research (DGO6), various grants and public aid for enterprises, especially those related to economic development and SME’s, are now available via an online platform where Walloon SMEs can apply for virtualized business vouchers (“Chèques entreprises”<sup>14</sup>), including those related to digital transformation. These are three-fold:

- Vouchers for Operational Excellence and Industry 4.0
  - Focus: smart process, smart products, smart business model
  - 2 phases (audit + transformation) implemented by an expert (30+60k€)
  - Capacity building can be part of the voucher (for up to 20k€)
- Vouchers for digital transformation
  - Potentially complementing ‘operational excellence’ vouchers

<sup>14</sup> Wallon Region, Chèques entreprises



- 2 phases (audit + transformation) implemented by an expert (20+60k€)
- Cyber security vouchers
  - Focus: risks assessment, definition of an action plan
  - 1 phase (20k€)

This voucher system is limited per company to 100k€ per year / 200k€ over 3 years.

Other supporting schemes for technological innovation are also available, such as the open innovation support system (“OP IN”) fostering processes and organizational transitions (50% co-financed), technological vouchers (“Chèques technologiques”) or Interreg Factory 4.0 support programme (which include 10 to 12 days of consultancy). On a side note, Intellectual Property vouchers (15k€) enable to quickly give any Walloon SME the chance to pool the necessary intellectual property resources and tools to back up its innovation strategy with services entrusted to a recognised partner (patent attorneys, PatLib centre, OPRI). This aid is cofunded by the European Regional Development Fund.

#### 4.1.2. France

An ANALYSIS OF NATIONAL INITIATIVES on DIGITISING EUROPEAN INDUSTRY report<sup>15</sup> is available for French national initiatives.

The cross-cutting programme ‘Industrie du Futur’ (IdF) was launched in April 2015 to lead the second phase of the overarching strategy ‘La Nouvelle France Industrielle’. This programme’s goal is to modernise France’s industrial fabric by engaging all companies on the road for the modernisation of their production instruments and the transformation of their business models.

The 5 pillars of the IdF programme are of notable interest:

- Develop cutting-edge technologies: supporting companies developing major projects in
  - Additive Manufacturing
  - The Virtual Plant and the Internet of Things
  - Augmented Reality

A network of regional platforms enables companies to pool and test new technologies and train their workforce to use these new tools.

Financing within the Programme Investissement d’Avenir (PIA) programme, €305m in subsidies and repayable loans under the PIAVE (promising industrial projects) initiative, and €425m from the SPI (industrial project companies) fund could partly finance this ambition.

- “Help companies adapt to the new paradigm”, through
  - Personalised support: regional platforms will offer audits to industrial SMEs and mid-tier firms, with the support of the ‘Alliance Industrie du Futur’ (AIF). The objective is to support 2.000 companies over two years.

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<sup>15</sup> Larosse Jan, Analysis of National Initiatives on digitising European Industry, France



- Financial support: €2.5bn in tax incentives (over one year); €2.1bn in loans earmarked by Bpifrance for SMEs (over two years) investing in Industry of the Future projects (digitisation, robotics, energy efficiency, etc.)
- Employee training

Upskilling the industrial workforce and training the next generations in these new jobs, involving trade unions active in the National Council for Industry (CNI) with the training aspect, through two dimensions:

- A forward-looking dimension with the launch of interdisciplinary research programmes on the Industry of the Future and the role of human beings in this new paradigm.
- An operational dimension with formulation and implementation of initial and ongoing training responding to the challenges of the Industry of the Future
- A common approach for promotion and dissemination
- A reinforcement of international cooperation

One of the main characteristics of this more focused and result-oriented approach was the establishment of the AIF in order to secure coordination with stakeholders through a bottom-up approach. AIF is the governing body composed of representatives of industrial players, research centres, trade unions and professional organizations. Its objective is to support 3400 SMEs and mid-market companies. One of the 6 axes of the work programme is of interest:

Deployment in companies at regional level

- The mobilisation and enticement of companies to engage in the Industry of the Future is supported with different instruments and a network of appointed correspondents (representing the members) and ambassadors (business leaders) in the regions. Also the 'Chambres de Commerce et d'Industrie' (CCI) play an active role in this mobilisation.
- A three step methodology has been elaborated for the accompaniment of companies into investing in Industry of the Future: the diagnostic that would identify the priority projects; the coaching of implementation; the support in financing. The government has opened a new financial support channel through loans of BPI.
- The initial objective of the IdF to reach 2000 companies with accompaniment by the end of 2016, has been largely met. At the end of 2016 already 4100 SMEs were accompanied, of which more than half in regional schemes. More than 8000 others are identified as potential candidates. In all regions there are programmes to support SMEs in their industrial modernisation and digital transformation, with strategic diagnostics, technology coaching, human resources management and investment support (more than 550 experts). The regional correspondents of the AIF ensure alignment with the AIF at national level.
- Promotion of Industry of the Future is organised through more than 170 use-cases (with a mapping tool) and regional promotion events ('Caravanes Industrie du Futur').
- Another important instrument to help the accompaniment trajectories is the 'Technological Referential'. This is a common reference framework developed by the AIF professionals, and shared with all actors of IoF, to help companies identify the main dimensions of their digital transformation, encompassing all necessary technologies and disciplines (nearly 400 blocks, 60 macro-blocks and six scenarios to lever competitiveness).

In addition to 'Industrie du Futur', the programming for the new industrial policy is based on '9 industrial solutions', that provide real-world responses to key economic and social challenges: Data economy; Smart objects; Digital trust; Smart food production; New resources; Sustainable cities; Eco-mobility; Medicine of the future; Transport of tomorrow. is perceived as an opportunity to rejuvenate the industrial production infrastructure in general. The investments in solutions for Data economy, Smart objects, Digital trust and





others have the most direct digital focus. Large-scale means have been implemented (in particular via the “Programme Investissement d’Avenir”) to support ambitious industrial projects and step up the deployment of the goods and services of tomorrow in a world in which digital technology is erasing the boundary between industry and services.

The *Pôles de Compétitivité* (regional clusters, combining R&D, industry and education), which account notably Mont-Blanc Industries and Pole SCS, are also an important channel to enhance digital transformation across all sectors. The programme started already in 2004 to support industrial policy with a cluster approach in the territories. They can receive subsidies and fiscal advantages for projects, mainly on collaborative R&D at the level of renewal of specific value chains. In its third phase (2013-2018) the government has focussed the objectives of this programme more strongly on economic impact and accompaniment of SMEs. The Association Française des Pôles de Compétitivité (AFPC) became a member of AIF. It established in March 2016 a ‘Plateforme de Coordination pour L’Industrie du Futur’, with 34 Pôles that are most engaged in “Industrie du Future” (IdF), to promote inter-cluster projects in line with the IdF.

### ***Auvergne Rhône Alpes***

Auvergne-Rhône-Alpes (AURA) region is the leading French region in terms of volume of industrial employment. Its GDP reached 244 billion euro in 2016 and the region has many research centers, 8 regional clusters ‘*pôles de compétitivité*’ and 18 local clusters. It is to be noted that 8 industrial technical centers focus on Industry of Future to help technology transfer. There is also a strong entrepreneurial environment, ranking 2nd region of France in terms of volume of company creation<sup>16</sup>. The region supports each year 10 000 companies including 150 start-ups and the creation of 10 000 jobs in digital economy and carried 150 implementations of new companies per year. Auvergne-Rhône-Alpes region aims to be the first industrial region in Europe and to become a lead partner in Europe. Its principal sectors of focus are:

- Environmental chemistry, industrial processes and eco-efficient plant;
- Construction of industrial equipment, intelligent machines, internet of things, simulation chains;
- Mechanical, bar turning, complex machining and high precision, additive manufacturing; robotics, mechatronics, digital technologies;
- Composite and biobased materials, technical textiles, plastic parts, etc.

The “Industry of The Future” strategy was launched in Auvergne Rhône-Alpes in June 2016. This plan aims to support 200 SMEs over 3 years around their production system and information and their organization of work (€ 3.2 million). It defines four priorities:

- Supporting the local industrial SMEs to invest in technological development such as 3D processes, robotics and automation, virtual reality, etc.;
- Reshaping the regional support for training to better adapt skills to the needs of businesses;
- Create an efficient ecosystem coordinated by a unique agency linked with the departments;

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<sup>16</sup> Région Auvergne Rhône-Alpes, Schéma Régional de Développement Economique, d’Innovation et d’Internationalisation



- Reinforce the links and collaboration with the partners, such as those from the “Four Motors for Europe” partnership.<sup>17</sup>

In line with these priorities, AURA adopted two S3 strategic domains related to the topic of digitisation:

- Industrial processes and eco efficient plant – low carbon processes, environmental instrumentation and metrology, recycling, waste processing and bio sourced chemistry (in 2016, it has been renamed the Industry of Future regional Domain of Excellence).
- Digital technologies - advanced manufacturing and industrial robotics, ambient intelligence, data processing<sup>18</sup>.

Recently, the regional authorities took another step towards Industry 4.0 cross-fertilisation by launching an *Pôles de compétitivité* regional collective. 8 regional clusters involved in the Industry 4.0 process and Grenoble INP (research institute) decided to further encourage new cross-thematic projects within AURA region by creating a collective. The clusters involved are:

- AXELERA: chemistry and environment
- IMAGINOVE: content and digital uses
- MINALOGIC: digital technologies
- MONT-BLANC INDUSTRIES: precision machining and mechatronics
- PLASTIPOLIS: plastics
- TECHTERA: textiles and soft materials
- TENERRDIS: energy transition
- VIAMECA: intelligent mechanical systems

This initiative provides these stakeholders to mutualise their ecosystems and share a unified voice towards regional authorities, notably upon the 7 fields identified below:

- Advanced manufacturing processes
- Adaptative and smart manufacturing systems
- Digital Virtual factories
- Resource efficient factories
- Collaborative and mobile enterprises
- Role of Human in factories
- Customer-focused manufacturing

Since 2005, more than 250 research, development and industrialization projects have been carried out in direct relation with the strategic areas and key technologies of the industry of the future. They have been supported by at least one of the eight poles of the collective and involve companies and academic actors from the Auvergne-Rhône-Alpes Region.

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<sup>17</sup> Regional Innovation Monitor Plus, Rhône Alpes

<sup>18</sup> Marcuglia Silvia, Sole D’Orazio Maria, Smart Space project, Benchmarking report concerning the policy contributes to digitalise AS industry





The collective also allows the clusters to coordinate their representation with the AFPC - French Association of Competitiveness Clusters and the Alliance for the Industry of the Future, in consultation with the services of the Region and the regional innovation agency.

The recent fusion of Mont-Blanc Industries and E-Cluster to AURA Industry 4.0 is another initiative – sparked by the stakeholders involved - to lead a common strategic roadmap for the regional innovation ecosystem. This initiative implements a network and deliver actions to develop and disseminate good practices at regional level under the banner Industry 4.0. This new format also enables to widen the scope and mutualises upon the expertise and resources of these components. AURA Industry 4.0 will notably provide training courses to students and company workers on tools for solving industrial problems, from design to production through modeling and algorithmics, relying on reliable big data resources. This action is inscribed in the regional scheme to fit to the local growing needs for IoT / Industry 4.0 education components, thus strengthening the regional industrial ecosystem.

As another example, an interregional cluster in ICT was created in 2016, Digital League, covering the new region Auvergne Rhône-Alpes and thus supported by regional authorities. It promotes the exchange of good practices between entrepreneurs, schools, laboratories, investors and institutions to create winning synergies. As an example, the presence of Microsoft helped the company COPA DATA to develop a software (Zenon) to connect sensors, Microsoft cloud and mobile devices to the industrial production.

A large panel of funding schemes is made available at regional scale, some of these are further detailed below:

- The region launched a call of interest for Industry of the Future in the Operational Program, axe 1 (innovation for societal challenges), thematic objective 3 (reinforce SME competitiveness), specific objective 9 (SME growth), type of action 9-1 (regional instrument for collective action). Dedicated to SMEs, this initiative proposes assistance (vouchers) to SME to integrate a new technology (additive manufacturing, robotic and smart manufacturing, and augmented reality). The financial grant can support feasibility studies and tests of innovative solutions.
- The region has assets in construction of industrial equipment, smart machines, IoT, TIC, clusters *pôles de compétitivité* for the development of regional ecosystem. It supports technology transfer through a strong concentration of technology platforms associated with the largest regional network of Industrial Technical Centers and several Carnot institutes (technology transfer institutes) to create a regional ecosystem in this area.

The Institutes of Technology IRT BIOASTER in the field of microbiology and Nanoelec in nanoelectronics support the implementation of the “Industry of the future” strategy, playing an important role in the support of advanced manufacturing. SMEs participate in many think tanks with BIOSTAR, one of whose main missions is to contribute to the development of the regional socio-economic fabric. BIOSTAR is thus the vehicle for the dissemination of financial opportunities offered by the region and participates in the process of reflection in the project of implementation of new technologies in SMEs.

- The region supports SMEs, through ‘coaching vouchers’ providing advices on best practices and technologies in the field of digital, organizational and management skills, and production processes. This offer builds upon “plan SME” or “Securise'ra” (administration advices) supporting schemes. The goal is to support 250 to 300 companies each year over its implementation.



- Support for individualized projects of technological "breakthrough" or reconfiguration of industrial site by means of experimental grants / expertise on these projects. 40 experimental projects will be evaluated for a public intervention of around 25 K € per project.<sup>19</sup>
- Usine Numérique Régionale (UNR), Regional Program for Digital Factory (supported by ERDF funds) is a program dedicated to SMEs that aims to evaluate a software application in real conditions during a 6 months period, before taking the decision to invest in it; conduct a Proof of Concept of an innovative process (demonstrator) or of a technology not yet mastered by the SMEs.
- The Call of interest and projects 'Industry of the Future' are punctually issued, fostering experimentations on specific thematic.

The region Auvergne Rhône-Alpes recently launched a call of interest for SMEs "Innovation Solution - Industry of the Future" in June 2018 until October. It focuses on additive manufacturing, robotics and intelligent production lines, virtual reality and augmented reality, financial engineering of the project. This call is for the support of projects for relocation, extension or creation of industrial sites, related to major challenges of modernization of the production tool or industrialization of new products. The support to the company concerns feasibility studies, advice, engineering, tests and development studies to allow after this action to engage a secure investment plan. The grant will be capped at 30 000 euros HT or 40 000 euros HT depending on the theme, with support for the Region up to 50%.

- The implementation of R&D platforms through calls for projects. The IRICE call for project<sup>20</sup> aims to set up or strengthen technological and innovation facilities within the Region's Areas of Excellence where Industry of Future is a main topic. These installations bring together, within an R&D platform, a set of resources (technological equipment, testing facilities, design, etc.), skills and associated services, offered to companies for the realization of their R&D project. They constitute a vector of innovation for regional companies thanks to their functions of technological resourcing, development of new processes, realization of R&D work, tests and qualifications.

#### **IoTize – a spin off created from a national funded project set in AURA**

IoTize is a R&D collaborative research project lead by KEOLABS with the participation of STMicroelectronics, Gemalto, the Laboratoire Informatique de Grenoble (LIG) and the ISEN engineering school of Toulon. The project ended up in 2018 with the addition of a complete, scalable infrastructure for cloud-to-core security. The project is endorsed by the French innovation clusters -- Pole SCS and Minalogic, and benefits from national and regional funding and support. KEOLABS' IoTize project patented turn-key connectivity solution that allows companies to add Radio Frequency interfaces such as NFC, Bluetooth and Wi-Fi to their products without redesigning their product's firmware. KEOLABS introduced the first IoTize modules featuring NFC and Bluetooth connectivity with software-based local security for management of user profiles, access control and data encryption.

<sup>19</sup> Ardi, Industries 2020 First

<sup>20</sup> IRICE 2018, guide de procédure, Région Auvergne-Rhône-Alpes



## ***Provence Alpes Côte d’Azur / South Region***

Provence-Alpes-Côte d’Azur (PACA) region / South Region has a GDP of 155 billion euro in 2016 supported by an economic ecosystem of 10 000 companies employing 40 000 people among which 9 000 on IoT<sup>21</sup>. The South Region economy is characterised by a strong presence of service related activities and represents 80,6% of regional employment. Industrial employment (including construction) represents 16.1% of regional employment, compared to 20.4% at the national level (Eurostat, 2017). Employment in both sectors has been relatively stable between 2012 and 2016.

The South Region has identified the following seven strategic sectors<sup>22</sup>: silver economy, tourism, culture, lifestyle and sports, renewable energies and eco-technologies, maritime, ports and logistic industries, aeronautics, space, naval and defense sectors, health, agriculture, agri-food and cosmetics (SRDEII, 2017). clusters: SAFE in the defense and security sector, CAPENERGIES in the energy sector , EUROBIOMED in the health sector, SCS in the ICT sector, OPTITEC in the optics sector, PASS in the cosmetic sector , AQUAVALLEY in the water sector, Mer Méditerranée in the blue economy sector, TERRALIA in the plant and agricultural sector and TRIMATEC on eco-technologies for industrial applications.

The Regional Council is the managing authority in charge of coordinating and facilitating the liaison between stakeholders of the South Region innovation ecosystem, including:

- The Regional Innovation and Internationalisation Agency (Agence régionale pour l’innovation et l’internationalisation – ARII); ARII is also entrusted by the government with monitoring the “Industry of the Future” project
- The four metropolises (Aix-Marseille, Avignon, Nice and Toulon) who are engaged in the implementation of the innovation policy across their territory.
- 10 competitiveness clusters, including SCS cluster
- SATT Sud-Est (Société d’Accélération du Transfert de Technologie) in charge of technology transfers, a public institution that is supported by public research stakeholders and local entrepreneurs to facilitate technology transfer activities based on publicly funded research;
- The regional research centres and affiliated technology platform (cf. RTDI) and since 2017 the region hosts a satellite office of the Saint-Exupéry Institute of Technology (space and aeronautical sectors) located in Sophia Antipolis
- 3 regional hubs :
  - PICTO : circular economy for green company, focus on Fos-sur-Mer harbour.
  - System factory - software engineering for industry of future, focus on aerospace and marine sectors / pole Mer-med
  - Henri Fabre: technologies and expertise in advance manufacturing

PACA is involved in the Alliance for the Industry of the future which support investments in factories to make them more environmentally friendly, smarter, more digital and better integrated into their regional ecosystems and associated value chains. As part of this strategy regional authorities have been tasked with

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<sup>21</sup> Région PACA, Schéma Régional de Développement Economique, d’Innovation et d’Internationalisation

<sup>22</sup> Regional Innovation Monitor Plus, PACA



financing 2-3,000 industrial diagnoses for SMEs and medium-sized companies. To be noted: these diagnoses are deemed as essential for raising awareness and involving industrials in a 'smart' process. These diagnoses are performed by specialized consultants, ARII providing firms with a voucher covering up to 50% of the service (funded by the region) for up to 7000 euros. SCS cluster is partner of this initiative, essentially representing the offer of ICT solutions for smart industry.

Other 'acceleration programmes' are launched by the ARII with its partner institutions, such as the regional chamber of commerce, for implementing supporting schemes for industrials. It also collaborates with industrials' associations for defining its scope. Also, several COSME project carried out and / or in which clusters are participating are of interest for this process: SCS cluster, Digital Industry Alliance project for the preparation of the internationalisation of the European SMEs in the Digital Industry value chain, or OPTITEC / Connected wave supported projects.

The Bpifrance finance and innovation agency is also involved in supporting some of these companies with loans. Appointed by the PACA Region, ARII, in partnership with industrial business assistance stakeholders, is entrusted with the implementation of « SMEs and ISEs regional industrial excellence programs ».

In its evolving environment, PACA region created the regional council for innovation, which gathers the innovative actors of PACA, clusters, researchers, private and public financiers and business owners. For the implementation of innovation policies, support to companies and economic opportunities, the region launched the Regional Economic Development Mission (MEDER).

Pole SCS, leader of the project, listed South regional and national calls for projects available for I4.0 stakeholders .

**Table 2: PACA calls available for Industry 4.0 projects (source: Pole SCS)**

Fund / project	Type	Budget	Duration	Funding type	Calendar
<b>FUI (Fonds Unique Interministeriel)</b>	collaborative	1 to 5 M€	2 to 4 years	Grants, State and local funding	Filing projects with fixed dates - 2 Calls for projects per year
<b>ANR (agence nationale de la recherche)</b>	Collaborative		2 to 4 years	Subventions	2 steps : pre-proposal then complete file deposit
<b>BPI / regional collaboration Partenariat Régional d'Innovation – développement et industrialisation</b>	mono-partner SME	600 K€ to 5 M€	1 to 3 years	2/3 Subventions & 1/3 repayable advances (+ financial return if commercial success for budget projects > 800 K €)	Fixed-date Call for Projects



<b>Partenariat Régional d'Innovation Faisabilité</b> –	Mono-partner, downstream stage of developments and industrialization	> 200 K€	2 years max.	Refundable advance	Run-of-water deposit until the funds are exhausted
<b>PSCPC (programme investissements d'avenir national)</b> –	Collaborative	5 to 50 M€	3 to 5 years	Subventions, repayable advances and returns to the State up to 50% of expenditure	Run-of-river deposit
<b>RAPID (national department for security)</b>	Collaborative or not, targeting civil and military applications	500 K€ to 4 M€	18 to 36 months	Grants according to the TRL of the project and the type of company up to 80%	Filing projects run-of-river
<b>ANR</b>	Collaborative		2 to 4 years	Subsidies	2 stage submission

#### 4.1.3. Germany

In 2015, the ministry for economic affairs and energy (BMWi) announced that they would, together with the ministry of education and research (BMBF) enforce the platform towards a national instrument for the development of the economy. In 2015 /2016, "Industrie 4.0" has evolved from a lighthouse counseling project to a national platform that would work out the central economic and location policy perspectives for Germany as a production location.

Platform Industrie 4.0 is the central alliance to coordinate the shaping of the digital structural shift of German industry. It brings together all those who are shaping Industrie 4.0 and bundles the forces and know-how of a diverse range of actors – be they companies, associations, trade unions, science or politics. With over 300 participants from over 150 organisations the Platform is one of the largest international and national networks, it supports German companies – particularly small and medium-sized companies – in implementing Industrie 4.0. It offers decisive input by providing practical solutions and examples of company practices from across Germany, concrete recommendations for action and test environments.<sup>23</sup>

Today, there is a broad consensus in Germany that Industrie 4.0 can increase the profitability of production, the competitiveness of industry in Germany can be strengthened and the flexibility of production increased.

<sup>23</sup> French, German, Italian Shared Action Plan, Industry of Future



Next to the platform Industrie 4.0 initiative, the digital transformation of the industry was promoted through a number of other measures and initiatives by the government, for example:

- the technology transfer / uptake of Industry 4.0 to SME through a number of SME 4.0 Competence centers (11 centers started in 2016, more centers started their work in 2017).
- a national lighthouse project “IUNO” for IT Security in Industry 4.0.
- *broad discussions of societal, legal and ethical aspects of the digital transformation of industry.*

The government has expressed its digitisation policies in a number of strategy documents, such as the “Digital Strategy 2025” (2016, Federal ministry for economic affairs and energy; BMWi), the “Digital Agenda 2014-2017” (BMWi, ministry of the interior, ministry of traffic and infrastructure) and the “New Hightech Strategy” (2016), being the leading strategy of the Federal ministry of education and research; BMBF. To modernize Germany by applying Industrie 4.0 technologies is one of the major foci of these strategies. Germany aims to develop autonomy and leadership in various high technology fields, such as IT security, big data, cloud offerings, service platforms and other. BMWi and BMBF both have launched a number of initiatives in these areas. BMWi has announced plans to implement the recommendations developed by the five working groups of the platform Industry 4.0, particularly in the areas of standardisation, legal framework, IT security and work. Furthermore, BMWi announced to introduce a 1 bn. Euro funding program in microelectronics as part of a European IPSEI. Other innovations are especially intended in the area of data economy and in SME based research via the BMWi Central Innovation Program Mittelstand “ZIM”. Concerning infrastructure development, the government has initiated the “Network Alliance for a Digital Germany” that will invest 8 bn in broadband network deployment (“Gigabit society”). Other strategies set priorities in skills development, and in eGovernment (“Digital Administration 2020”, “Open Government Partnership Action Plan 2017-2019”).

### **Baden-Wuerttemberg**

According to the Regional Innovation Scoreboard, Baden-Württemberg (BW) is one of the innovation leaders in Europe, in 2016 its GDP was 478 million euro. In 2014, the industrial sector accounted for 30.3% of Baden-Württemberg's total employment. The industrial sector is performant notably on 'manufacture of machinery and equipment' as well as 'manufacture of motor vehicles, trailers and semi-trailers'. The employment share of ICT in Baden-Württemberg (3.4%) is above the national average. Several big companies based in Baden-Württemberg implement industry 4.0 solutions, among which SAP, Festo, ebm-papst, SEW-Eurodrive, Trumpf, Pilz, Wittenstein, Sick, CAS and Seeburger.

Baden-Württemberg has a long tradition in innovation and manufacturing industry. Due to the economic importance of the manufacturing activities Baden-Württemberg has a special interest in the promotion of advanced manufacturing. In 2014 its Ministry for Financial and Economic Affairs published a structural study called “Industrie 4.0 für Baden-Württemberg”. This study concludes that BW already has a high potential in advanced manufacturing and provides companies with advice on their way towards this “new industry”. In this regard, Baden-Württemberg's Minister for Finance and Economics expressed the aim that the Land becomes lead market and lead producer for industry 4.0. Consequently, various activities have been launched in order to promote the topic. The following list provides examples of these activities:

- Establishing the Alliance Industrie 4.0 Baden-Württemberg started in March 2015. It is comprised of almost 60 partners. Among these are the ministry itself, networks and clusters (microTEC Südwest is the central contact point for microsystems technology and partner of regional alliance – and other





like bwcon Baden-Württemberg Connected, CyberForum, Manufacture BW, Leichtbau BW, Photonics BW, Mechatronik BW, Technology Mountains, etc.), research institutes (like the Fraunhofer institutes IAO, IOSB, IPA, ISI, the Hahn-Schickard-Gesellschaft, Steinbeis), industrial associations (e.g. VDI, VDMA, ZVEI), associations of the universities and universities of applied sciences, the chambers of industry and commerce, Baden-Württembergischer Handwerkstag as well as trade unions. The alliance is coordinated by the VDMA (German Engineering Federation). With respect to aspects like setting standards and norms, the alliance is in exchange with the national Platform Industry 4.0 as these topics cannot be handled at the regional level. The aim of the alliance is to combine the skills of production technology and information and communications technology to link all the main actors and to accompany manufacturing SMEs by providing innovative transfer offerings towards industry 4.0.

#### **Vouchers for digitizing BW SMEs**

The federal State of Baden-Württemberg has an initiative which goal is to give digitalization premiums (10 000€) to SMEs (up to 100 employees) in order to support them implementing digitalization.

Hightech Digital Vouchers are made available to support pilot projects in the field of research and development at established companies that involve the implementation and use of digitalisation solutions. The success of this initiative induced that existing 'Hightech' innovation voucher will be split up into the 'Hightech Start-Up' and 'Hightech Digital' innovation vouchers, fostering Industry 4.0 application projects, interconnected systems and processes, Internet of Things, smart services, high-flexibility automation, big-data projects, simulation models, use of virtual and augmented reality or embedded systems. These vouchers are articulated around 2 phases, covering 50% of the costs (up to 20K€ + 40k€) of an expert consultancy support to SMEs willing to implement a digital solution

- Establishment of an Application Centre at the Fraunhofer IPA and a Research Factory Campus East at the KIT to test industry 4.0 applications. "Applikationszentrum Industrie 4.0" is an open innovation environment, designed as application centre, which is cross-value-chain. The goal is to put know-how in the SMS, and to promote the matching of cooperations.

#### **Dissemination best practices: "Digitalization advice center for SMEs in Baden-Württemberg" ("DigiRegioBW")<sup>24</sup>**

Establishing competence centers to disseminate information and demonstrate best-practice examples has an important role to play in supporting the widespread digitalization of industry (Industry 4.0 and Smart Services) and advancing this in the long term. This is specifically aimed at the target group of small and medium-sized enterprises, skilled trades and craftsmen, especially in important future markets and fields. The primary focus of the planned project is to design and set up a "Digitalization advice center for SMEs in Baden-Württemberg" in the German state of Baden-Württemberg. This should act as an exchange and demonstration hub linking the two cities Stuttgart and Karlsruhe with each other and regional locations as the first easily accessible point of contact for local firms. The foundation for this is an interactive platform

<sup>24</sup> Fraunhofer ISI, Project, SMEs 4.0 Competence center Stuttgart



where the partners and the target group exchange ideas and information, and a specially designed training program for SMEs, skilled trades and craftsmen that integrates existing and selected additional demonstration centers in the state of Baden-Wuerttemberg.

Process development and introductory strategy:

- Survey and analysis of the specific requirements and concerns of the later users in the form of several workshops with the close involvement of representative companies
- Development of a simple system to monitor the different and constantly changing contents and possibilities at the different companies and institutes
- Working out the model stages to design the competence center and the range of services offered
- Selecting and adapting existing concepts to assess the economic efficiency of new digitally-induced business models for SMEs, craftsmen and skilled trades.

- Establishment of "learning factories 4.0" (Lernfabrik 4.0) at 16 vocational schools in Baden-Württemberg. Target groups of learning factories 4.0 are apprentices in dual system of vocational education and training of metal and electrical engineering, as well as participants at technical schools or training courses of medium-sized enterprises in the context of offers of support associations of vocational schools and from collaborations with business organizations, universities of applied sciences and the Alliance Industry 4.0 Baden-Württemberg. In these schools, the students learn application-oriented processes which combine mechanical and electrical engineering, through production control systems in laboratories. These laboratories are disseminated in 16 schools in the region.
- Initiation of research projects, e.g., focusing on the development of energy and re-source efficient product planning in an open and secure IT platform which can be used by SMEs or on the impact of industry 4.0 on competencies of the workforce. For example, "CPS-BW" project aims to approach the theme "Cyber-Physical-System" in an application-oriented manner, and to transfer it into praxis. For this purpose, some of the best research institutes of the region (Innovationsallianz Instituten: Hahn Schickard, FZI, IMS Chips) are pooled with successful enterprises and the cluster microTEC Südwest. Another example is the "Steinbeis Transferplattform BW Industrie 4.0" which is an initiative to strengthen the cooperation between the universities of applied sciences and the local economy in the field of Industry 4.0
- Implementation of a web-based competence atlas based on a study on the prevalence of Industry 4.0 competencies in Baden-Württemberg
- Launch of a project "Readiness I4.0": The project develops an online benchmarking instrument for self-assessment of "Industrie 4.0 Readiness" for companies of the manufacturing industry in Baden-Württemberg on the basis of representative operating data for the use of digital technologies in production. The project is conducted by Fraunhofer ISI.





#### 4.1.4. Italy

An ANALYSIS OF NATIONAL INITIATIVES on DIGITISING EUROPEAN INDUSTRY report<sup>25</sup> is available for Italy

The Piano Nazionale Industria 4.0 (PNI4.0) initiative (2017-2020) outlines four strategic guidelines: (1). Innovative investments, (2). enabling infrastructures, (3). skills and research, (4). awareness and governance and (5) Public financial support instruments.

National Strategies towards “Digitizing European Industries”:

The PNI 4.0 was launched in late September 2016 and was largely received by the 2017 Budget Law. The Plan puts in place horizontal measures, i.e. adopting a technology neutrality approach, addressed to all types of enterprises, regardless of their size or sector, with the purpose to boost the investment in new technologies, research and development, and revamp the competitiveness of Italian companies. This is complemented by: an Ultra Broadband Plan, to improve connectivity; international cooperation for the definition of IoT standard platforms; measures to trigger private investment to support I4.0, especially venture capital and private equity. In addition, the PNI 4.0 seeks to contribute to the empowerment of skills by promoting I4.0 education programmes, strengthening vocational training, skills development, Competence Centres, Digital Innovation Hubs and the financing of I4.0 Technology Clusters and Industrial PhDs. The PNI 4.0 governance involves several Ministries – with the Italian Ministry of Economic Development playing a pivotal role – and embraces a multi-layer – with Regions involved – and multi-stakeholder approach, encompassing a plurality of players ranging from academia and research centres to industrial associations and trade unions.

- Digitising European Industry (DEI) - Pillar 1 – Digital Industrial Platforms and R&I actions

Digital industrial Platform actions: The PNI 4.0 considers the implementation of complementary guidelines with the objective of leveraging enabling infrastructures boosting the competitiveness of the Italian industry and encouraging private investment in new technologies and innovative processes through fiscal. Beyond the national funds made available as part of research programmes and smart specialisation strategies, one of the main incentives consists in 50% tax credit on incremental R&D expenditure, up to an annual ceiling of €20 million a year per beneficiary. By doing so, the tax credit aims to boost R&D by more than 11€ billion within the 2017-2020 timeframe. The combination of super- and hyper-depreciation aims to increase private investment in capital goods by 10€ billion just in 2017. These two measures, jointly with the tax credit on R&D, costs about 13B€.

- Digitising European Industry (DEI) - Pillar 2 - Standardization actions, regulation and testbeds

Standardization actions: The Piano Industria 4.0 promotes open standards and interoperability criteria that should ensure that Industrial IoT does not result in disconnected islands of equipment and data that would hamper data-driven industry 4.0 services and applications. As part of the international cooperation effort to promote standardization, in June 2017, at the Digitising Manufacturing in the G20, it has been announced that the key digitising manufacturing initiatives of France, Germany and Italy have agreed on a trilateral

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<sup>25</sup> Lazaro Oscar, Analysis of National Initiatives for Digitising Industry. Italy: Piano Nazionale “Industria 4.0”














cooperation to support and strengthen the digitalisation processes of their manufacturing sectors as well as to promote according European efforts.

- Digitising European Industry (DEI) - Pillar 3 - Digital Innovation Hubs actions.

Digital Innovation Hubs actions: The initiative Piano Industry 4.0 has defined in May 2017 the national network for Industry 4.0 and provides for different types of organizations aimed at supporting technology transfer and a broader cooperation between the academia and businesses. Notably, the newly-introduced network comprises (1) Digital Enterprise Points (PID). Local Dissemination of basic knowledge in the field of technologies for Industry 4.0. 45 M€ are budgeted as part of the support to the national network of chambers of commerce to deploy this digital one-stop-shop. (2) Innovation Hubs (DIH). Advanced training on technologies and development of industrial solutions for specific areas of competence. Consolidation and coordination of structures for digital transformation and technology transfer centers. (3) National Competence Centres. Higher education and research and experimental development of projects. The national initiative has already budgeted 200M€ for the establishment of selected I4.0 competence centers and 240M€ for the Strengthening of technological clusters "Fabbrica Intelligente" and "Agrifood". The national network for Industry 4.0 brings together the capabilities from chambers of commerce, national industrial associations and sectorial associations to leverage a harmonised and coordinated network for provision of high quality services for the digital transformation of Italian industry.

**Figure 7: Distribution of activities between Italian infrastructures (source: Analysis of national initiatives for digitising industry)**

Activities	PID	Hub	Center
Spreading knowledge about technologies for Industry 4.0			
Mapping of digital maturity of enterprises			
Training courses on basic skills			
Orientation towards Innovation Hub & Competence Centre Services			
Sector specific courses on advanced skills			
Guide to the digital transformation facilities, technology transfer centers and Competence Centers			
Advanced training through pilot production lines			
Development of industrial research and development projects			

- Digitising European Industry (DEI) - Pillar 4. Skills development.

Skills development: The Piano Industria 4.0 considers 6 actions for digital skills development addressing the implementation of the "Scuola Digitale" (budget 355M€), selected learning initiatives on "Industria 4.0", specialization of academic courses, masters and executive masters on "Industria 4.0" topics in partnership with industrial and technological players (100 M€), increase the number of students attending professional



institutes focused on "Industria 4.0" topics and development of working class skills through dedicated funds and programs. These 6 actions complement the two major actions for the development of a national support network of Industry 4.0.

The Italian national plan for industry 4.0 provides and allows a combined application of such fiscal incentives, already approved by the 2017 budget law, which are intended to increase the investment, retrofitting and development of productive competitive advantages through industry 4.0 technologies and products. Moreover, the favourable tax scheme for digital businesses is also intended for the attraction of international investments in the country economy. Italy is the second most attractive country (from a tax perspective) for setting up and operating a digital business just after Ireland (effective 2017 tax rate of -8,84% compared to 22,81% of Germany or 12,39% from France and 12,85% from Spain). To stimulate private investments in I4.0 technologies, the national initiative considers the "Nuova Sabatini" to leverage more credit (up to 2M€ per project) for innovation supporting businesses requesting bank loans to invest in new capital goods, machinery, plant, factory equipment for use in production and digital technologies. They are also complemented by the Patent Box scheme with an optional special taxation system applicable to income from use of intangible assets (industrial patent rights, registered trademarks, industrial designs and models, copyrighted know-how and software) consisting a reduction of 50% in the corporate income tax (IRES) and regional production tax (IRAP) rates. These actions will be complemented by a new framework to bolster the finance in support of I4.0, VC and Start-ups (2,6B€ activated in the Italian economy). In particular the initiative considers a tax deduction for investments in start-ups and innovative SMEs, that allows a 30% break on personal income tax for investments up to 1 million euros, or a 30% deduction from corporate income tax basis, up to 1,8 million euros and a "sponsor" company programme that in case of failure/bankruptcy the schemes exempts from regular bankruptcy regulations. To activate re-investment of company profits the national initiative is proposing "PIR" – Detaxation on capital gains from medium/long term investments, reducing fiscal pressure for companies that invest in the future by keeping profits in the company. The scheme reduces corporate income tax (IRES) cut from 27.5% to 24% and for individual entrepreneurs and partnerships to opt for a single rate of 24% (IRI) instead of the current personal income tax (IRPEF) rates of up to 43%. Finally, to ensure the Italian industry competitiveness, the national plan is making available a Guarantee Fund (22,9B€), covering up to covering up to a maximum of 80% of the loan with a maximum contribution of 2,5 M€ per business. Finally, the national initiative considers the implementation of a Productivity – salary taxation exchange.

### ***Piedmont***

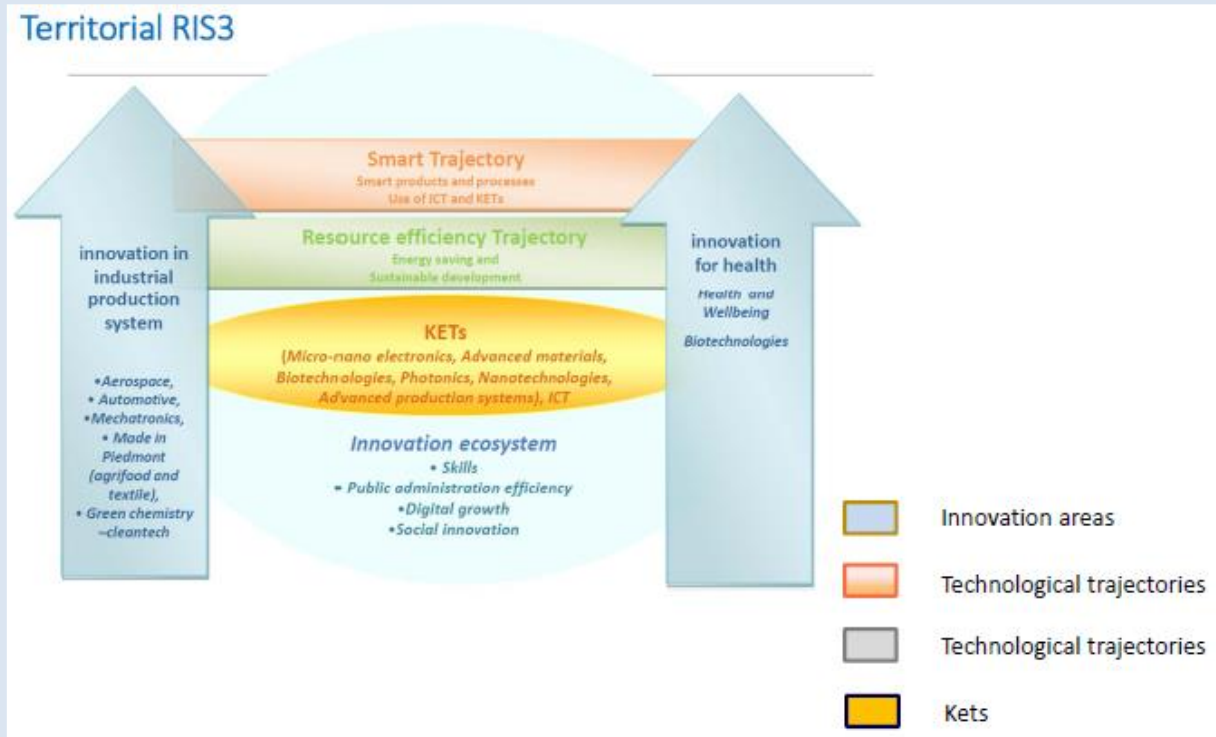
Piedmont region is Italy's leader in terms of investment in RTD. In Italy, Piedmont is also in first place concerning the percentage of expenditure on innovation in the manufacturing sector. In its path of development, Piedmont, a region renowned for the size of its automotive industry, has turned towards diversification, investing in sectors linked to the knowledge economy: in addition to the automotive industry, which also continues to be one of the region's driving sectors, there are other strategic sectors such as robotics, ICT, renewable energies, environmental technologies, design, aerospace, life sciences, pharmaceuticals and health, and logistics. There are over 4.4 million inhabitants and a GDP of 126 billion euro (estimates for 2016), which makes it one of the top regions in the country. Research in innovation are supported by 4 universities, 380 laboratories, 4 science and technology parks and 7 innovation clusters (among which MESAP Innovation Cluster on Smart Manufacturing and ICT Cluster).



## Piedmont RIS3 strategy

Italian regional ecosystem supporting Industry 4.0 is strongly linked to the European smart strategy.

Figure 8: Piedmont strategy at a glance (source: MANUMIX interreg project)



A regional committee aims at connecting the regional community to the regional system of research and innovation and fostering the cooperation. The committee participates to the drafting of the General Guideline for R&I and a three-year Research Program. A scientific commission provides a wider intellectual context for the implementation of the Plan in the light of global best practice and knowledge about economic and technological opportunities within Piedmont. A team evaluates the policies and programmes of the law.

The Piedmont Region and the Ministry of Education, University and Research signed an agreement in 2012 which included actions to promote Aerospace and Automotive platforms. Under this agreement, in 2015 it was realized the Intelligent Platform Factory (Piattaforma Fabbrica Intelligente) with a total budget of €25m. In this respect "Innovation Clusters" represent a further tool to promote the "generation and sharing of knowledge" among the participating enterprises, in continuity with the previous policy cycle. In Piedmont 7 Innovation Clusters are operational, serving as a stimulus to innovative activity, encouraging interaction, the common use of facilities and the exchange of knowledge and experience, as well as technology transfer activities.

Piattaforma Fabbrica Intelligente<sup>26</sup> finances industrial research projects and experimental development projects that promote the development of innovative technologies and the application of advanced

<sup>26</sup> Piemonte Regione, Piattaforma Tecnologica Fabbrica Intelligente



production systems. It enhances the use of the technological platform tool conceived as an integrated, coordinated and organic set of industrial research and experimental development actions. Its priorities are :

- Production processes, mechatronics and robotic systems for advanced manufacturing;
- ICT solutions as enabling technologies for the factory of the future;
- Production and use of innovative materials in the manufacturing sector.

#### 4.1.5. United Kingdom

Manufacturing remains vital to the UK. The sector contributes over £6.7 trillion to the global economy. And, while the UK's manufacturing contribution has declined over the past 20 years, it still produces 3 percent of the world's manufacturing output (compared with Germany at 9 percent). It accounts for 9.8 percent of the UK economy (£162 billion GVA in 2015). The UK is still one of the top ten manufacturing nations in the world (the eighth largest in 2017) and is the third largest in the EU. It employs 2.6 million people directly, and approximately 5.1 million across the whole manufacturing value chain. UK exports of manufactured goods totaled £257 billion in 2015 (50 percent of all UK exports). The sector accounts for 70 percent of business R&D and 14 percent of business investment<sup>27</sup>.

The UK R&D&I support scheme is complex and evolving – recent changes in the structuring of the government agencies are not yet fully implemented.

For the time being, the UK entities supporting R&D&I schemes for Industry 4.0 throughout the country are:

Innovate UK

- the Knowledge Transfer Network (KTN)
- European Enterprise Network (EEN)
- Research Councils (RC)
- Catapults: High Value Manufacturing Catapult (HVMC) and Digital Catapult (DC)

Another structure funding research and innovation in UK is the Engineering and Physical Sciences Research Council (EPSRC). The EPSRC is the UK's main agency for funding research in engineering and the physical sciences. EPSRC invests around £800 million a year in research and postgraduate training, to help the nation handle the next generation of technological change.

#### **Example of EPSRC call (under review) - Future Manufacturing Research Hubs 2018**

EPSRC invites outline applications for three large-scale, multidisciplinary research Hubs. Hubs should address major, long-term challenges facing manufacturing industries, and/or capture opportunities from emerging research areas.

<sup>27</sup> UK government, Made Smarter Review, 2017



EPSRC will provide up to £30 million (Research Council contribution) to support three Future Manufacturing Research Hubs. Research Council funding for each Hub will be up to £10 million over seven years, supporting a programme of innovative research in the engineering and physical sciences, related to the challenges in commercialising early stage research. The Hubs will feature high quality, multidisciplinary research, strong engagement with relevant manufacturing industries, and will take a leadership role in their national network.

*Innovate UK – the national innovation agency - came together with the research councils and the newly-formed Research England (formerly the research funding element of the Higher Education Funding Council for England) in one single strategic body, UK Research and Innovation, in April 2018.*

Innovate UK priority areas are:

- using digital technologies in new ways to increase productivity, systems flexibility and resource efficiency
- manufacturing readiness at scale
- supporting automotive and aerospace research
- early stage manufacturing and materials concepts

For setting these priorities into motion, Innovate UK built up a network of Catapults. These are technology and innovation centres that bridge the gap between universities and businesses. Catapults help businesses undertake late-stage R&D and commercialise traditional academic research. The Catapult for this sector is the High Value Manufacturing Catapult. The HVM and Digital Catapults will lead on upgrading UK digital manufacturing capability.

Innovate UK is also responsible for the implementation of the Industrial Strategy Challenge Fund (ISCF) across 6 key areas over the next 4 years<sup>28</sup>.

Recently, Innovate UK developed a loan scheme for innovation (which goes beyond Industry 4.0). Through the pilot, innovation loans will be offered through loan competitions to UK small or medium-sized enterprises (SME) that want to scale up and grow by developing new or improved products, processes or services. They can be used for late-stage research and development (R&D) projects that have not yet reached the point of commercialisation. Experimental development includes:

- producing plans, arrangements and designs for your products, processes or services
- developing commercially-usable prototypes and pilots
- experimental production and testing of products, processes and services

You could borrow between £100,000 and £1 million, to cover up to 100% of your eligible project costs. The loan period is up to 10 years.

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<sup>28</sup> Innovate UK, Delivery Plan, Shaping the Future





The HVM Catapult is the catalyst for the future growth and success of manufacturing in the UK. This Catapult combines seven world class centres of industrial innovation into one cohesive force and offer companies of all sizes access to:

- capability which spans basic raw materials through to high integrity product assembly processes.
- world-class facilities and skills to scale-up and prove-out high value manufacturing processes
- a network of leading suppliers who contribute to key UK industry supply chains
- a partnership between industry, government and research in a shared goal to make the UK an attractive place to invest in manufacturing

**Figure 9: HVMC main facts**



Fostering innovation at regional level, UK government set a £1.4bn Regional Growth Fund in 2011. The fund provides focused investment for projects that offer significant potential for private sector-led economic growth and sustainable employment.

This fund notably supports the establishment of Growth Hub within Local Enterprise Partnerships (LEP). There are 38 Local Enterprise Partnerships across England. They are voluntary partnerships between local authorities and local private sector businesses. They play a central role in determining local economic priorities and undertaking activities to drive economic growth and job creation, improve infrastructure and raise workforce skills within the local area. LEP boards are led by a business Chair and board members are local leaders of industry (including SMEs), educational institutions and the public sector. Growth Hubs are local public/private sector partnerships led by the Local Enterprise Partnerships (LEPs). They join up national and local business support, so it is easy for businesses to find the help they need. Growth Hubs drive SME growth by:

- bringing coherence to the business support landscape
- raising awareness



- improving understanding and accessibility of the support available.

These institutions thus disseminate information on the R&D&I funding schemes available at local level.

**Example of ERDF initiative fostering Industry 4.0 regionally - LCR4.0 project – Liverpool area**

LCR 4.0 is a UK manufacturing first that aims to put the Liverpool City Region at the heart of an evolution which is set to transform production in the modern world economy. Part funded by the European Regional Development Fund (ERDF), LCR 4.0 creates a collaborative community that connects SMEs to expertise and support from key knowledge assets in the region. A dedicated LCR 4.0 team helps SMEs explore the potential of Industry 4.0 technologies by providing support ranging from research and development, knowledge transfer and the acceleration of ideas from concept through to commercialisation.

LCR 4.0 will:

- Deliver fully subsidised support to 300 SMEs in the Liverpool City Region.
- Enable collaborations between 200 businesses and partners
- Support 70 new product development cases across a number of firms
- Create 60 new jobs in supported businesses
- Create a virtual workspace for LCR manufacturing community
- Demonstrate the potential of data-driven innovation in manufacturing

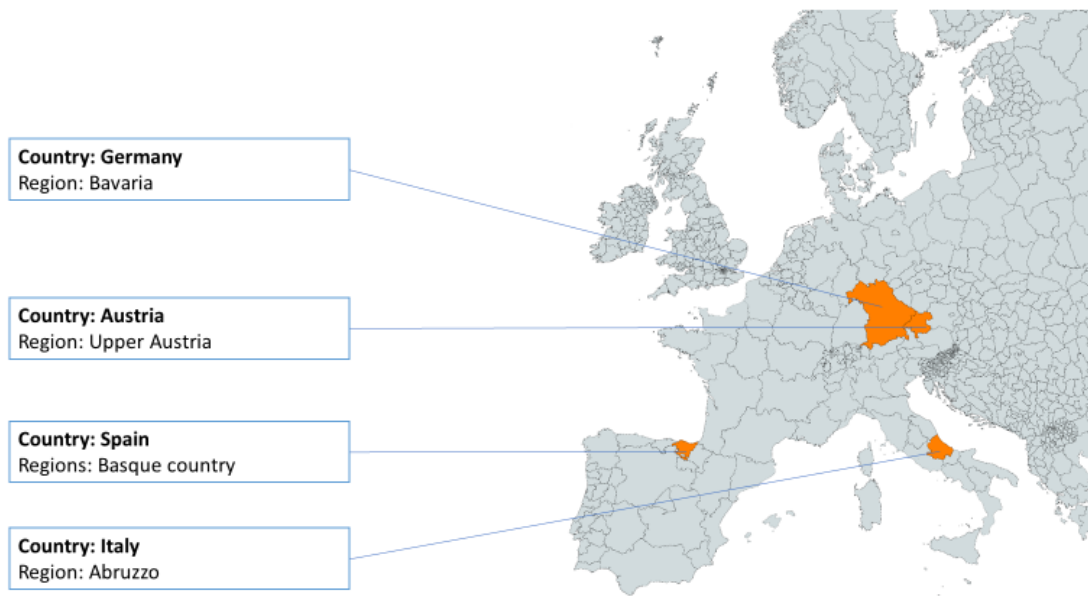
## 4.2. Countries / Regions of interest (not 'covered' by a partner)

Beyond the regions 'covered' by IoT4Industry partners, interviews were performed with interested / interesting stakeholders, selected by the stakeholders involved in the task. These interviews serve both as 'witness', enabling comparisons between the EU territories and enabling a first dissemination activity on the potential benefits for EU SMEs beyond the partnership and potentially constituting IoT4Industry 'Ambassadors'.





**Figure 10: Regional / national stakeholders interviewed beyond the partnership**



This chapter provides an overview of the strategies, funding schemes, and initiatives launched at European level complementing and fostering the national and regional developments detailed in previous chapter.

#### **Remarks – ‘other’ regions’ analysis methodology**

The information introduced below are extracted from the regional profiles available on the Regional Innovation Monitor pages<sup>29</sup> and completed with the interviews performed by IoT4Industry partners.

#### **Austria / Upper Austria**

<b>RIS 3 priorities</b>	Advanced manufacturing systems / Manufacturing & industry  Industrial production processes
<b>Relevance for the project</b>	Region/ country with an important ecosystem of Industry 4.0 stakeholders on both IoT and Advanced manufacturing aspects. Highly relevant but not among the priority geographical areas defined by the project
<b>Contact</b>	Business Upper Austria

Upper Austria is a federal state of the Republic of Austria. Austria is divided into nine such states (Bundesländer). The states are in turn divided into municipalities (Gemeinden) and districts (Bezirke), these

<sup>29</sup> Regional Innovation Monitor, Home



having no legislative capacity. Each Austrian state has an elected legislature, a state government (Landesregierung) and a governor (Landeshauptmann or Landeshauptfrau). Administration in the federal states is the duty of the state government. Despite this constitutional set-up, however, Austrian Länder are both formally and practically far less independent than German federal states.

Austrian ministries responsible for innovation include the Austrian Federal Ministry of Education, Science and Research (BMBWF) and the Federal Ministry of Transport, Innovation and Technology (BMVIT).

In Upper Austria, the state government is responsible for innovation policies. However, the final responsibility for innovation policy on regional level is borne by the Upper Austrian government's office with its directorates for "education and society" as well as "regional planning, the economy and rural development".

There are a number of additional regional players who are relevant for both the design and implementation of innovation-related policies. The Council of Research and Technology in Upper Austria, advises the government concerning long-term strategic perspective. A further complementary institution is Business Upper Austria, the regional development agency, which is the operational arm. It implements strategies and innovation measures that concern the business sector. Business Upper Austria is for example in charge of the Innovationsnetzwerk. In addition to the main actors, there is the Wirtschaftskammer Oberösterreich, or Economic Chamber Upper Austria, which is a classical chamber fulfilling the typical functions of a chamber of commerce.

Several federal agencies and institutions are also active promoting RTDI in the different Austrian states, for example: the Austrian Federal Economic Chamber (WKO), the Austrian Research Promotion Agency (FFG), which is the national promoter of applied and business-friendly research in Austria, as well as the Austrian Council for Research and Technology Development, and the Christian Doppler Association (CDG) which promotes applied basic research and operates at the interface between science and business. Therefore the CDG provides CD laboratories in which enterprises can gain from the latest findings. Other business-promoting and enterprise-supporting federal agencies are the Austrian Business Agency (ABA), which conducts settlement policies for industries, and the Austria Wirtschaftsservice (AWS), which among other things provides enterprises with loans and other financial support.

Strategic programs are a well-established instrument in Upper Austria to develop and implement innovation policy measures on a mid-term scale. Already in 1998, with its first "Strategic Programme Upper Austria 2000+", the government devised a strategy to build up regional research activities in the public as well as in the private sector. The success of this strategy has led to implementing "Innovative Upper Austria 2010" and its follow-up programme "Innovative Upper Austria 2010+" - two initiatives that aimed at developing an extensive research network and providing further professional qualification.

The current Upper Austria Smart Specialisation Strategy, implemented by the Office of Innovative Upper Austria 2020, aims to create more radical innovations and pursue the goal of pushing research companies to stretch their technological limits. By doing so, it will strengthen Upper Austria as a technology exporter. At the same time, innovation orientation will also be strengthened through The Upper Austria Smart Specialisation Strategy, especially among smaller companies in specific niches.

The Upper Austria Smart Specialisation Strategy also aims to maintain and strengthen the participation of Upper Austrian actors in central funding programmes at national and international level. In addition to the



continuation of the counselling programme for these funding instruments, incentive systems for participation are to be created. Highly specialised international industry must also strengthen overall economic productivity through technology-based organisational improvements while at the same time ensuring that industrial products contain an increasing degree of service components.

Specifically, the objectives of the Upper Austria Smart Specialisation Strategy are:

- Attract the best scientific and business minds;
- Strengthen science and research as a basis for future economic development;
- Create sustainable jobs related with knowledge-based business models;
- Strengthen international orientation of the education, research and business sectors;
- Support the internationalisation of local companies;
- Strengthen entrepreneurial and research spirit of local engineers and researchers.

The Upper Austria Smart Specialisation Strategy benefits from a number of national framework programmes to achieve its objectives. Those programmes are:

- “Arbeitsplatz Oberösterreich 2020” (“Workplace Upper Austria 2020”)

Framework programme that links the active labour market policy of the Upper Austrian government with the formulated economic and research policy focal points of the Smart Specialisation Strategy in order to create an ideal interplay between regional, economic and labour market policy.

- “Oö. Gesamtverkehrskonzept 2008” (“Upper Austrian General Transport Concept 2008”)

This policy foresees a sustainable transport policy for Upper Austria, which will secure employment and the expansion of industry in the region, as well as reducing environmental impact. The measures and topics for this field are aimed at promoting resource-efficient multi-modal mobility and logistics systems in Upper Austria.

- “Energiezukunft 2030” (“Energy Future 2030”)

Framework programme that assumes various consumption trends, energy scenarios were established through 2030 related to electricity, heating, transport and the total primary energy demand.

- “Kursbuch Tourismus Oberösterreich 2011 – 2016” (“Upper Austrian Tourism Guidelines 2011 – 2016”)

A policy that lays down strategic guidelines for the dynamic and successful advancement of the tourism industry at all operational, organisational and institutional levels. As a result of cross-topic integration, one key emphasis in the policy is the “health & wellness” motif that highlights the need for preventive medicine facilities and therefore directly related with the Smart Specialisation Strategy of Upper Austria.

#### *Activities linked with Advanced Manufacturing*

Upper Austria is one of Austria’s leading industrial regions with a long-standing tradition in advanced manufacturing and home to many international competitive market leaders in different sectors and niches, be they focused on advanced products and processes (e.g. Additive Manufacturing) in traditional industries or in new sectors that are considered genuine high-tech industries. The broad and sectoral diverse



composition of industrial firms ranges from agile, small to mid-size enterprises to large international players in the technology markets. Important industrial branches include:

- Steel and related technology (key players: voestalpine, AMAG);
- Automotive (BMW, KTM, Bombardier-Rotax, Miba, Reformwerke Wels, Rosenbauer, FACC);
- Chemistry and paper (Lenzing AG, DSM, Borealis, Papierfabrik Nettingsdorf, ESIM);
- Machinery and plant engineering (Engel, Trumpf, Primetals Technologies, Plasser & Theurer, Wacker); and
- Food industry (Berglandmilch, Brau Union, S. Spitz, Vivatis).

The strengthening and upgrading of the region's industrial basis has been a core, structuring element of all its regional strategic programmes since 1998. Moreover, the region is internationally known for its ground-breaking and successful approach to cluster policy (Business Upper Austria) including an Automotive Cluster, Plastics Cluster, Furniture & Timber Construction Cluster, Medical Technology Cluster, Mechatronics Cluster, Cleantech Cluster, IT Cluster, Food Cluster.

In the current RIS3 (2014-2020) strategy Innovative Upper Austria 2020, an emphasis is put on the field of industrial production processes, whereas activities are aligned along the innovation chain education-research-business. Considerations include:

- Establishing Upper Austria as a Location for Production in 2050, focusing on Industry 4.0:
- Involve all relevant major enterprises;
- Streamline regional research and (higher) education with the needs of industry;
- Pool existing R&D competences in the field of Smart Factory to achieve critical mass;
- Create 'lighthouse' activities based on thematic networking between existing clusters;
- Extend Upper Austrian support for research on intelligent production; and
- Encourage networking with international know-how.

Positioning Upper Austria as a leading industrial regional in the Innovation Union:

- Organise participation and involvement in relevant initiatives, from Horizon 2020 to Joint Technology Platforms;
- Support the transfer of results from European research project into the regional research and innovation system;
- Drive and support international and cross-border activities, e.g. in the framework of the European Union's Danube Strategy and European region Danube-Vltava (ERDV).

In this context, advanced manufacturing topics are also considered in the other more application oriented RIS3 fields such as Mobility and Logistics (e.g. lightweight technology – Austrian Advanced Lightweight Technology, Initiative Smart Plastics and Health and Ageing (e.g. functionalised surfaces and materials).

At the European level, the region is currently positioned prominently through its government's involvement in the S3 Vanguard Initiative, the INTERREG-CE projects NUCLEI and InnoPeer AVM, die INTERREG DTP project MOVECO as well as through leading regional players' (Linz Center of Mechatronics, Profactor, Wood kplus) in the framework of EFFRA, JTI ECSEL, JTI Biobased Industries or similar initiatives.

## Germany / Bavaria



<b>RIS 3 priorities</b>	Advanced manufacturing systems / Manufacturing & industry  Industrial production processes; Efficient production technologies, mechatronics, automatisisation and robotics; ICT (including Industry 4.0)
<b>Relevance for the project</b>	Region/ country with an important ecosystem of Industry 4.0 stakeholders, notably on manufacturing side. In a country 'covered' by the partnership.
<b>Contact</b>	Centre Bavaria

The governance of the innovation ecosystem of Bavaria is characterised by a multilevel governance. The State is the main implementing body of the innovation strategy, and works according to frameworks enacted at both federal and European levels.

As a German federal state, Bavaria has substantial autonomy with regard to legislation and tax-raising powers, as well as a say in some matters of federal policy. The German Basic Law gives the states considerable autonomy in R&D policy. This is particularly the case for higher education policy where each state independently enacts its own legislative framework. Similarly, within the single states, the degree of autonomy of single higher education institutions is rather high in terms of profile and research agenda-setting. The responsibility for regional RTDI policy in Bavaria lies with the regional government (Bavarian State Chancellery) and is currently divided between two main ministries: the Bavarian Ministry for Economic Affairs and Media, Energy and Technology (STMWI) and the Bavarian Ministry for Education and Culture, Science, and Arts (KM).

The STMWI is responsible for R&D and technology funding. The KM is responsible for the universities, universities of applied sciences and the large-scale research institutions. In addition to STMWI and KM, the Bavarian Ministry of Interior, for Building and Transport (STMI) and the Ministry of Environment and Consumer Protection (STMUV) are also playing a role in the R&D technology funding. For the implementation of the Bavarian RTDI policy instruments, several (semi-)public bodies have been established: e.g., "Bavaria Innovative" (Bayern Innovativ GmbH), is responsible for technology-transfer activities, "Bayern Kapital GmbH", is responsible for venture capital financing.

The Bavarian Research and Innovation Agency, is an important agency which supports innovative research projects and knowledge transfer activities, with the goal to support Bavarian based stakeholders in sustaining and strengthening its performance. In order to achieve this, five partner organisations are working together: Bayerische Forschungsallianz GmbH (BayFOR), Bayerische Forschungsförderung (BFS), Bayerische Patentallianz GmbH (BayPAT), Bayern Innovativ GmbH and Projektträger Bayern (ITZB).

Innovation policies in Bavaria are designed at three levels:

At the European level, the ERDF/ESF 2014-2020 OP and the Regional Innovation Smart Specialisation Strategy (RIS3);

In 2014, the Federal Cabinet adopted a new German High-tech Strategy entitled "Innovation for Germany". The Federal Government and the Länder consult with each other in describing and presenting the various relevant programmes and measures;



At the regional level, the strategy towards social, economic and technical development is described in one major strategic document (Gesamtkonzept für die Forschungs-, Technologieund Innovationspolitik der Bayerischen Staatsregierung).

Relevant policy documents can be found both at the European, and state level. At the European level, the innovation policy is shaped both by the ERDF operational programme (OP) 2014 – 2020 which defines the allocation of structural funds, and the Regional Innovation Smart Specialisation Strategy (RIS3), a document elaborated in collaboration with the state authorities to define the strategic areas of specialisation of the region.

The Bavarian government defines its regional innovation policy as a major element to strengthen the regional economy. The main underlying assumption is the overall global competition of regions for investors, growth and jobs. At the present time, there are several interconnected funding programmes with relevance to regional innovation policy. Major thematic areas of funding are: traditional industries such as the automotive industry, mechanical engineering, plant construction; cross-section technologies such as laser technology, micro-systems technology, mechatronics and new materials; innovative future technologies such as biotechnology, nanotechnology, aerospace technologies and information- and communication technologies; support of networks and clusters. A special emphasis lies on the support provided to networks and clusters.

The overall objective of the Bavarian research, technology and innovation policy is to permanently secure Bavaria a top position in the competition for innovative leadership in Germany and Europe. An excellent research environment, innovative companies, highly qualified employees and an active technology start-up scene attracts high-quality performers and creates the framework conditions for a creative environment, good social security, prosperity and high-quality jobs.

Further, Bavaria`s RTI policy is based on a broad support/funding of key enabling technologies as well as their underlying scientific fields, which in turn establishes the pre-conditions for many applications. Within this context, the following applications or technology fields have been deemed priority sectors:

- Life Sciences, especially biotechnology and system biology;
- Information and communication technologies;
- Efficient production technologies, mechatronics, automation and robotics;
- New materials, intelligent materials, nano-and microtechnology;
- Clean Tech – resources preserving energy-, transport- and environmental technologies, renewable resources (i.e. biofuels), e-mobility; and
- Innovative, technology-based services.
- These fields feature in the Bavaria smart specialisation areas as described in the regional Smart Specialisation Strategy (RIS3).

Recently, the Bavarian government has presented the BayernFIT programme, which subsumes a variety of different RTDI policy measures to strengthen the regional innovation potential within the next years until 2020 and beyond. It provides a comprehensive overview of the innovation policy mix of Bavaria by presenting all relevant measures with their geographical scope (whole of Bavaria vs. single sub-regions in Bavaria), financial volume, target groups, expected outcomes and a brief description of the measure.

Since 2005, the federal state has set up an agreement with the Bavarian universities regarding an innovation alliance, in which higher education policy objectives and the necessary services for their achievements by the





state and the universities are agreed upon. For the first time, the six state Bavarian art schools are also involved. With the continuation of this innovation alliance for the period 2014 to 2018, the universities have the necessary resources in order to face successfully the upcoming future challenges. These include in particular (Innovationsbündnis Hochschule 2018):

- Provide attractive study conditions for a continued increasing number of students;
- Secure the qualitative performance of the Bavarian universities within national and international competition; and
- Guarantee scientific contribution of university research to future issues such as energy, demographic change, climate, health and mobility.

In May 2011, the Bavarian state government adopted a comprehensive approach for research, technology and innovation policy for the upcoming years. Assuming that research, technology and innovation are crucial for social and economic development; the following strategic objectives of the Bavarian research, technology and innovation strategy have been formulated:

- Strengthen public awareness of science and research;
- Optimise conditions for research and technology;
- Boost competitiveness and growth of businesses at all levels;
- Align instruments of research, technology and innovation policy regionally balanced;
- Strengthen Bavaria in the competition of EU and federal funds; and
- Identify main issues of research and technology policy.

Further, as advances in ICT and the rapid development of the internet and its applications lead to profound modifications in the economy and society, Bavaria established a strategy for digitalisation which was finalised in 2015 (BAYERN DIGITAL I). In this context, several measures have been established in order to cope with these challenges, opening up new opportunities for the future and secure jobs and sustainable prosperity. The key areas of action of the campaign are the advancement of infrastructure (broadband coverage), IT security, the selective expansion of research, technology transfer and training, and the support for new business creation in the digital economy.

At the beginning of 2017 the Council (STMWI) adopted the BAYERN DIGITAL II plan, a comprehensive package of measures, which describes how to further develop the BAYERN DIGITAL strategy in the future. Together with the state government's first digitalisation programme, the BAYERN DIGITAL I master plan, some €5.5b are budgeted for the years 2015 to 2022. The BAYERN DIGITAL II master plan comprises a volume of €3.0b and an expected 2,000 new jobs. In the supplementary budget of 2018 alone, the state government plans to invest more than €1.0b and create 460 new jobs as a first step. The second stage of BAYERN DIGITAL is more broad based and presents 10-key points for the digitalisation of the region.

### ***Activities linked with Advanced Manufacturing***

Bavaria is one of the strongest economic regions in Europe and enjoys an excellent reputation worldwide as a high-tech and industry location. The industry sector is the main engine of the economic development in Bavaria and a key driving force in the Bavarian value creation process. In addition, Bavaria is one of the leading international regions for high technology fields such as information and communication technologies (ICT).



Following this, Bavaria offers favourable conditions for advanced manufacturing (mostly discussed under as “Industry 4.0”). Overall, Industry 4.0 requires “embedded systems” in all manufacturing sectors for the realisation of intelligent, self-configuring and controlling products and production systems. Technologies such as big data, cloud computing, cyber-physical systems, machine-to-machine communication, RFID chips, etc. move more into the focus. These new developments result in various challenges.

In 2016, Bavaria established the Centre of (Zentrum Digitalisierung Bayern ZD.B). The centre is a science-based network established at the Technical University of Munich. It brings together activities of companies, entrepreneurs, industry, higher education institutions and research institutes in Bavaria. So far, the focus is on the following topics: interconnected mobility, IT security, digital production, digital health/medicine, and digitalisation in the field of energy.

In order to ensure Bavaria becomes one of the leader’s in the start-up scene, the Bavarian Ministry for Economic Affairs and Media, Energy and Technology have founded the initiative Founding country Bavaria (Gründerland Bayern). The focus is on technology-intensive areas with the goal to establish a supportive ecosystem for start-ups, offering advice coaching and network support (BayStartUP).

The Fraunhofer Institute for Applied and Integrated Security (AIESEC) is being further developed into a security centre of excellence of national and European importance. In order to address the new security problems associated with the topic of digitalisation and networking.

Much of the success of Bavaria in research and technology is based on the large-scale promotion of key technologies such as ICT. Following this, BICCnet, the Bavarian Information and Communication Technology Cluster, aims at activating and interlinking the innovation and productivity potential of the Bavarian enterprises, research centres and universities. With activities in the areas of embedded systems, IT services and mobile applications, BICCnet supports the Bavarian IT-companies in the implementation of marketable and market-oriented innovations. As the official cluster it is initiated by the Bavarian State Ministry for Economic Affairs and Media, Energy and Technology.

Another important network in the region is the “VDMA, Forum Industrie 4.0”, with its 3,200 members the largest network organisation of its type it represents an important mouthpiece for mechanical engineering in Germany and Europe.

## Italy / Abruzzo

<b>RIS 3 priorities</b>	Advanced manufacturing systems / Manufacturing & industry  Industrial production processes; Automotive 4.0; Advanced technologies for health and living care services (life science)
<b>Relevance for the project</b>	Region with priorities relevant to IoT4Industry project with a relatively advanced ecosystem, country ‘covered’ by a partner and within a geographic area in line with the project target
<b>Contact</b>	Regione Abruzzo - Department of Economic Development





The Regional Department of Economic Development, Labour, Education, Research and University Policies is the body responsible for the implementation of the innovation policies in Abruzzo.

In the case of Abruzzo, initiatives in the field of R&D, Innovation and Entrepreneurship, accounted for 47.5% of the total allocated budget of the ROP ERDF 2014-2020. This is the first priority in terms of the volume of funding of the operational programme. Initiatives are delivered by the regional administration, with the support of Sviluppo Abruzzo, a development agency controlled by the regional authority.

For the Smart Specialisation Strategy (S3), the Region established a system of governance based on the two levels:

The first level relates to the programming, implementing and monitoring of the strategy. These activities are carried out by the Board of Control, which is composed of the following actors: ERDF Managing Authority, the Department of Economic Development, Labour, Education, Research and University Policies, and the Department of Presidency and European relationships;

The second level relates to the updating of the strategy with the support of the stakeholders engaged. This activity is carried out by the Control Committee.

Over the last decade, the regional administration has become more aware about innovation and research policy, even if the implementation of a regional strategy has been slowed down for several reasons. The regional budget deficit has surged since the beginning of the economic crisis and a violent earthquake in 2009 that has destroyed the city of l'Aquila, changing the priorities of regional policy.

The most significant step towards the implementation of an innovation strategy has been the creation of fourteen innovation Poles that cluster SMEs, large firms and research institutions along the principal regional value chains. The creation of the Poles prepared the ground for the definition of the Smart Specialisation Strategy and the ROP-ERDF 2014-2020. The ROP-ERDF 2014-2020, Axis I "Research and Innovation," aims to promote business investment in R&D by developing links and synergies between businesses, research and development centres and the higher education sector. Furthermore, by promoting investments in product and service development, technology transfer, social innovation, eco-innovation, public service applications, stimulus demand, networks, clusters and open innovation through smart specialisation as well as supporting technology and applied research, pilot lines, early validation actions for products, advanced manufacturing capacity and first production, especially in key enabling technologies, and the diffusion of general purpose technologies. The Smart Specialisation Strategy (S3) is the main regional innovation policy document, which aims at strengthening the innovation of the regional production system, enhancing research and the results achieved, promoting mutual knowledge and communication among research and business stakeholders, supporting the quality of local entrepreneurship and workforce. The specialisation areas identified by the S3 are:

- Automotive/Mechatronics.
- Life science.
- ICT/Aerospace.
- Fashion and design.
- Agrifood.
- Activities linked with Advanced Manufacturing



The Innovation Poles represent the most evident step that the regional administration took in the direction of advanced manufacturing. The Poles are government-sponsored institutions specialised in one industry and in specific value-chains. There are at present fourteen Innovation Poles in Abruzzo. The poles are specialised in the following industries:

- Advanced services,
- Agrofood,
- Artistic craftsmanship,
- Automotive,
- Energy,
- Fashion industry,
- Furniture industry,
- ICT & electronics,
- Internationalization,
- Logistics and transports,
- Chemicals-pharmaceuticals,
- Social services,
- Sustainable construction industry,
- Tourism.

Abruzzo Sviluppo identified several technologies in the field of advanced manufacturing overlapping with the areas of specialisation of the Innovation Poles. In particular, the S3 identifies relevant technologies for the following Poles:

- Agrofood,
- Automotive,
- Energy,
- Fashion industry,
- ICT & electronics,
- Chemicals-pharmaceuticals,
- Social services,
- Sustainable construction industry.

One measure that has been launched is a free training course, called “Tecnico Industria 4.0”, that aims at developing new skills of Automotive and Mechatronics Systems technicians and by doing so, contribute to creation of new positions and new job opportunities.

#### Spain / Basque Country

<b>RIS 3 priorities</b>	Advanced manufacturing systems / Others (including Industry 4.0)
<b>Relevance for the project</b>	Region with priorities relevant to IoT4Industry project, with an lighthouse initiative, country not ‘covered’ by a partner and within a geographic area in line with the project target
<b>Contact</b>	SPRI – Basque Agency for Business development



In Spain, the Council for Science, Technology and Innovation Policy (Ministry of Economy, Industry and Competitiveness of Spain) defined the Spanish Strategy for Science, Technology and Innovation (ST&I) 2013-2020. This Strategy sets the priorities for the elaboration of the National Plan for ST&I 2017-2020 as well as the Regional ST&I Plans, whose interaction resulted in the Regional Smart Specialisation Strategies.

It is important to note that Spain is a decentralised country and therefore the regional governments and its assigned agencies are the main responsible for the RDTI steering.

The governance of innovation policies in the Basque Country is shared by different departments and government organisations. Regional innovation policies in the Basque Country have evolved from the traditional view of industrial innovation policies. This view has been developed by the former Department of Industry of the Basque Government (now Economic Development and Competitiveness) towards a more systemic view in which other departments such as education, with a stronger emphasis on science and health, have been involved in the joint definition of the last regional science, technology and innovation plan (PCTI2020), articulated by the Presidency Department (Lehendakaritza). Other relevant actors in the regional innovation system, such as Innobasque, the Basque Innovation Agency, have also participated in the definition of the PCTI2020, through the Technical Secretariat.

Innobasque coordinates the RVCTI. This network comprises the main agents in the Basque innovation system, and has recently undergone a process of reconfiguration resulting in a new structure. Being part of the network provides the actors with advantages especially through the advantage access to certain innovation programmes.

In addition, another important actor of the innovation policy governance in the Basque Country is SPRI, the Basque Business Development Agency, which is responsible for managing regional innovation programmes that are launched under the umbrella of the economic development and competitiveness department. SPRI also supports the Basque Government's Department of Economic Development and Competitiveness in developing the Basque Country's strategy for smart specialisation.

The Basque Government has defined its smart specialisation strategy (RIS3) based on previous plans, which include a focus on three priorities:

- Advanced Manufacturing;
- Energy; and
- Health.

These focus points will become a key aspect for the region's future, with the particular objective of developing a strong and competitive economy based on R&D.

Moreover, the Basque Government's Department of Economic Development and Competitiveness has a budget of €146.85m to support innovation activities in 2016 aiming at strengthening the business sector in the region. This budget has increased 8.99% from 2015 and has an accumulated increase from 2014 of 18.24%. The R&D expenditure amounted to 2.02% of GDP in 2014. The main plan that sheds light on current innovation policy practices in the region is the science, technology and innovation plan 2020 (PCTI2020). In this plan, the main science, technology and innovation measures, as well as priority markets focused on by the Basque Country, are defined. This constitutes the basis for the smart specialisation strategy.



While the core programmes of the innovation policy remain focused on R&D, there are also a set of programmes focused on improving innovation in SMEs as well as the innovation management processes in firms. In addition, demand-side measures such as innovative public procurement are currently being promoted.

### ***Activities linked with Advanced Manufacturing***

The historical importance of manufacturing in the region and the declining competitiveness of more traditional manufacturing activities in the context of today's Basque economy have turned attention to the upgrading of existing activities through a concerted focus on advanced manufacturing. Consequently, a range of policy measures are being employed to facilitate the upgrading of the current activities towards an approach that is better linked to the region's RIS3 strategy.

Primary support for advanced manufacturing is coordinated through SPRI and the Department of Economic Development and Competitiveness is responsible for the region's advanced manufacturing strategy. Other regional agents also play roles in supporting advanced manufacturing activities. They include many of the agents within the RVCTI.

Advanced manufacturing is explicitly included as one of the priorities of the region's research and innovation strategy for smart specialisation (RIS3), alongside with energy and health.

### ***Pilot / Demonstrator Projects:***

- Advanced manufacturing for energy-related applications in harsh environments; and
- CFAA Aeronautics Advanced Manufacturing Centre.
- Regional Good Practices:

Implementation of the Euskadi 2020 Advanced Manufacturing Strategy: Basque Industry 4.0 steering group

According to the Smart Specialisation Platform, the Basque Country is a leading region in Advanced Manufacturing for Energy Applications (ADMA). It is also a participating region in the thematic areas regarding Bio-Economy and Efficient and Sustainable Manufacturing.

RIS3 Euskadi has defined three priorities that are related with industrial modernisation. The relation between these priorities and the thematic areas included in the Smart Specialisation Platform for Industrial Modernisation is presented below:

- Energy (related to ADMA Energy and to Bio-economy);
- Advanced manufacturing (related to Efficient and Sustainable Manufacturing); and
- Bio-science and health (related to Medical technology).

### **Remarks – potential ambassador regions**

It is to be noted that common trends have been observed in the interviews performed with stakeholders that aren't connected to IoT4Industry project yet. Indeed, all interviewee mentioned:

- the lack of 'horizontality' / cross-disciplinarily as a major barrier hindering the uptake of Industry 4.0. solutions
- the lack and difficulty to access EU / national funding for SMEs beyond the first steps



Some underlined the need to support the cluster approach for engaging stakeholders into the process. An important aspect IoT4Industry could provide these stakeholders with are ‘train the trainers’ sessions / materials. These could indeed serve as another source of inspiration for their regional developments.

Further dissemination towards potential ambassador clusters / regions will take place in the next steps of the project, further refining the “business model” suitable for these stakeholders.



## 5. European initiatives for fostering industry 4.0 at regional scale

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This chapter provides an overview of the strategies, funding schemes, and initiatives launched at European level complementing and fostering the national and regional developments detailed in previous chapter.

### 5.1. European strategies and initiatives

Beyond the regional strategies undeniably fostered by EU'S S3 presented in previous chapters, the EU aligned several initiatives fostering the uptake of Industry 4.0 on its territories. This chapter aim at providing an overview of the current EU-fueled initiatives that involve public and private stakeholders for reinforcing EU's competitiveness through digital innovation in the industries.

#### 5.1.1. EU Regulatory frameworks

Both IoT and manufacturing aspects of the I4.0 are regulated under EU law. However, the EU, as reglementary body, issued various nomenclatures and regulations framing the developments and impacts from EU industries. Listing the EU regulation per verticals covered within the I4.0 would be too broad to be considered and is notably the core of MAKERS project<sup>30</sup>

On the digital side, several important and transversal regulations covering all the domains concerned by the I4.0 concept, as part of the Digital Single Market strategy:

- Data management: In line with the General Data Protection Regulation (GDPR) regulatory framework, the safe and secured management of non-personal data will be key to unlock localisation restrictions, enhancing the I4.0 implementation. As such, the EC continues to work on a regulation on free flow of nonpersonal data to address this challenge
- Cybersecurity: Essential parameter for ensuring the deployment of 'smart' manufactures, cybersecurity is a key and evolving concept. Lately, the Commission adopted a cybersecurity package. The package builds upon existing instruments and presents new initiatives to further improve EU cyber resilience and response.
- "Side frameworks": There are various other regulatory frameworks that are concerned with the I4.0 priorities: online platforms; connectivity (and use of telecommunications); energy... are regulations that impact on the I4.0 Regulatory framework

#### Evolution of EU policies supporting Industry 4.0 developments<sup>31</sup>

2014 Communication 'For a European Industrial Renaissance' set the grounds for European support policies, identifying the process as an essential factor for EU industrial growth, building upon 2012 Industrial policy communication, which laid down the 6 priorities concerned by the process.

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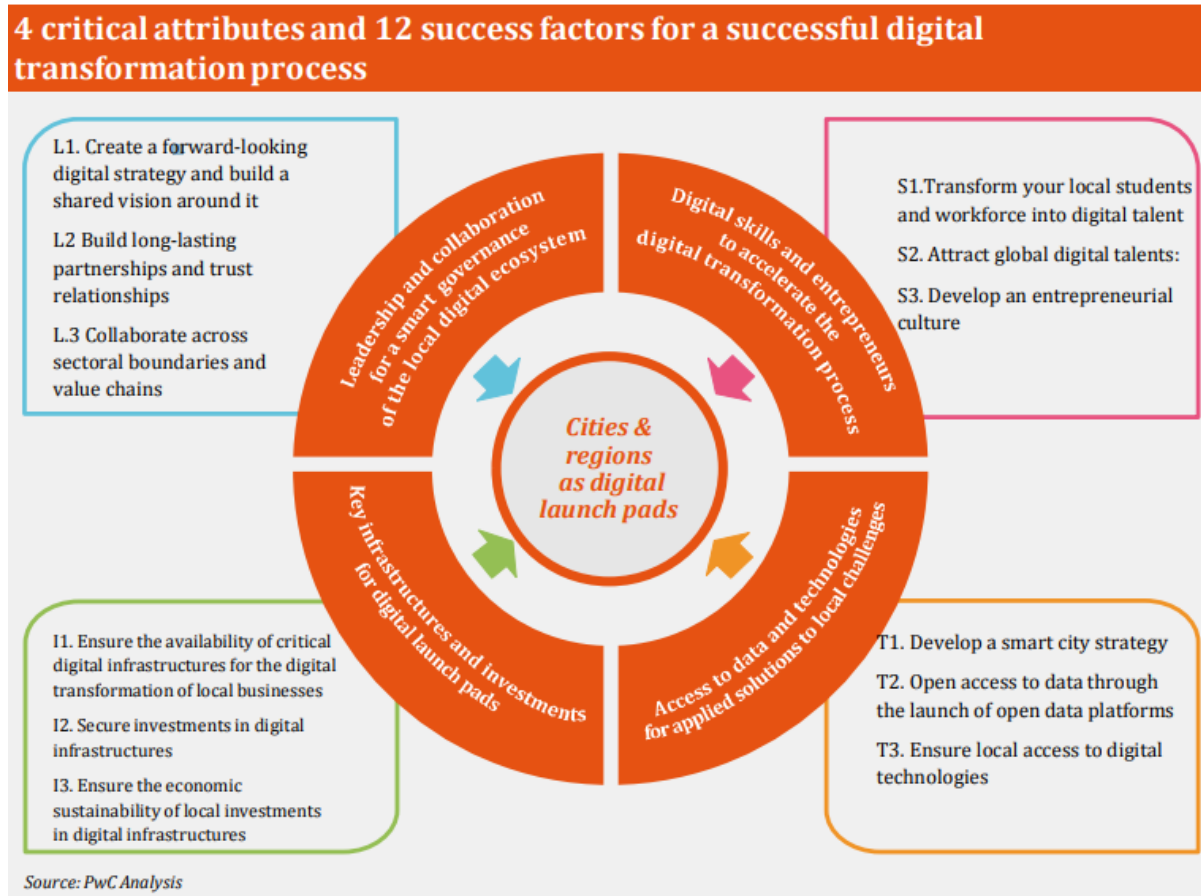
<sup>30</sup> Rouse Vanessa, MAKERS Business Academia Policy for Policy Forum and Consortium Meeting

<sup>31</sup> Davies Ron, Industry 4.0 Digitalisation for productivity and growth



In parallel to these communications, the EC set up the Strategic Policy Forum on Digital Entrepreneurship, constituting a think tank composed of business leaders, academia, international organisations and policy makers. This innovative group notably identified the key challenges for Europe and proposes thirteen recommendations for political and business leaders to help Europe promote jobs and growth. In its 'Blueprint for cities and regions as launch pads for digital transformation'<sup>32</sup>, the forum notably identified the success factors associated to regional & city strategies for Industry 4.0 as illustrated in Figure 11.

**Figure 11: Success factors for regional & city implementation of I4.0 strategies - source: Strategic Policy Forum on Digital Entrepreneurship**



In the direct line of these initiatives, the EU launched the European platform of national initiatives on digitising industry.

### 5.1.2. EU platform for the of industry

Through its platform for the digitisation of industry, launched in April 2016, the EU seeks to create synergies among the MS for synchronizing and leveraging upon their respective strategies. The goals of the European Platform include sharing lessons, doing joint investments, assisting in the pooling of resources and pushing

<sup>32</sup> Strategic Policy Forum on Digital Entrepreneurship, Blueprint for cities and regions as launch pads for digital transformation



the agenda of clean technologies, where the European Commission clearly wants EU companies to take a lead.

The platform builds on and complements the 15 national initiatives that already exist across the EU and it will expand to welcome new initiatives as they are launched – at least 5 Member States are preparing a national initiative. This coordination is at the core of the Digitising European Industry strategy and it provides a forum to:

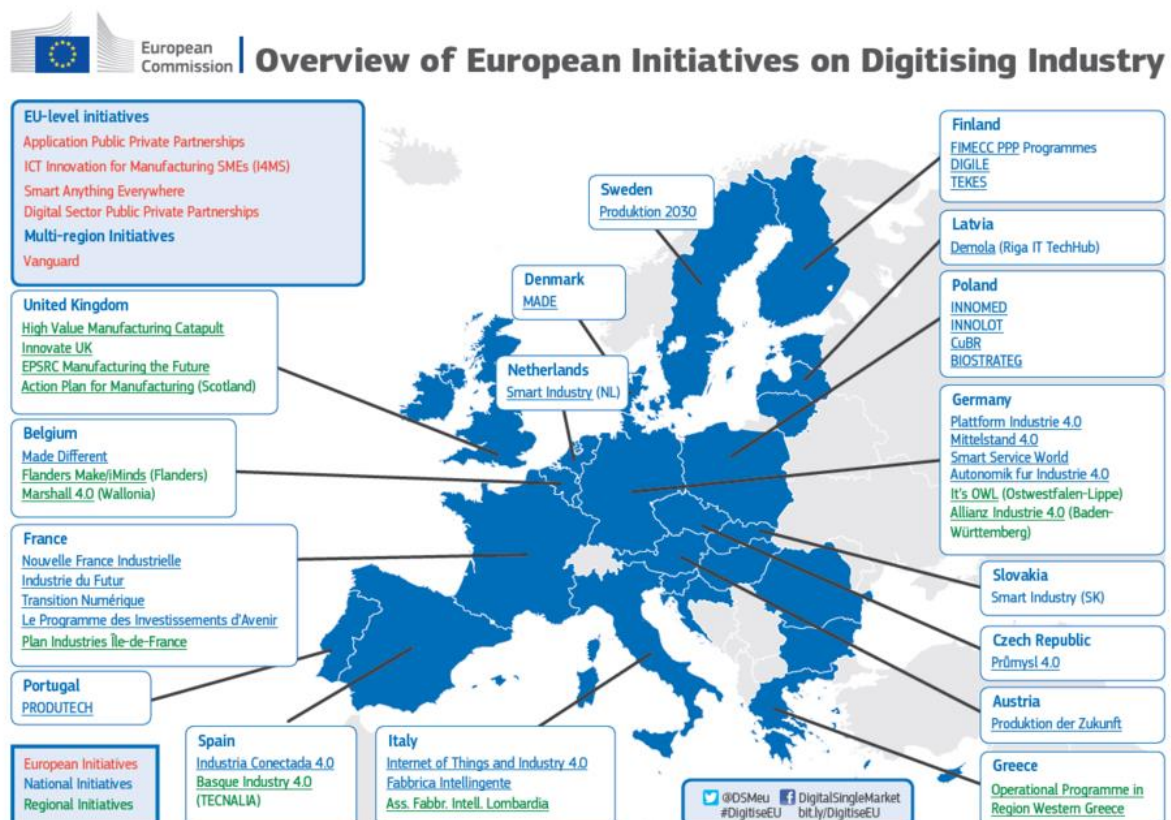
- Identify challenges that need to be addressed at EU level.
- Share experiences and best practices
- Trigger collaboration and boost co-investments
- Explore common approaches to regulation, skills and jobs

The initiative builds upon 5 pillars :

- European platform of national initiatives on digitising industry

This EU coordination forum brings together all Member States to ensure coherence and collective steer. The goal is to build a critical mass of initiatives and investments for digitising industry, and to ensure the commitment of Member States, regions and private sector to achieve the DEI goals.

**Figure 12: EU Initiatives (source: EU – information society)**





For monitoring the developments set by the EU MS member of the platform and disseminating the results achieved, the EC set the Digital Transformation Monitor<sup>33</sup>.

- Digital innovations for all: Digital Innovation Hubs (see below)
- Strengthening leadership through partnerships and industrial platforms

To reinforce the EU's competitiveness in digital technologies, the DEI initiative supports both the development of digital industrial platforms and large-scale piloting and Public-Private Partnerships (PPPs) that provide the digital technology building blocks of the future.

- A regulatory framework fit for the digital age

A digital-friendly regulatory framework is important for the EU's industry and economy to thrive. Within the Digital Single Market strategy, the European Commission has already proposed several measures to update regulations in key fields for industry such as cybersecurity and free flow of data.

- Preparing Europeans for the digital future

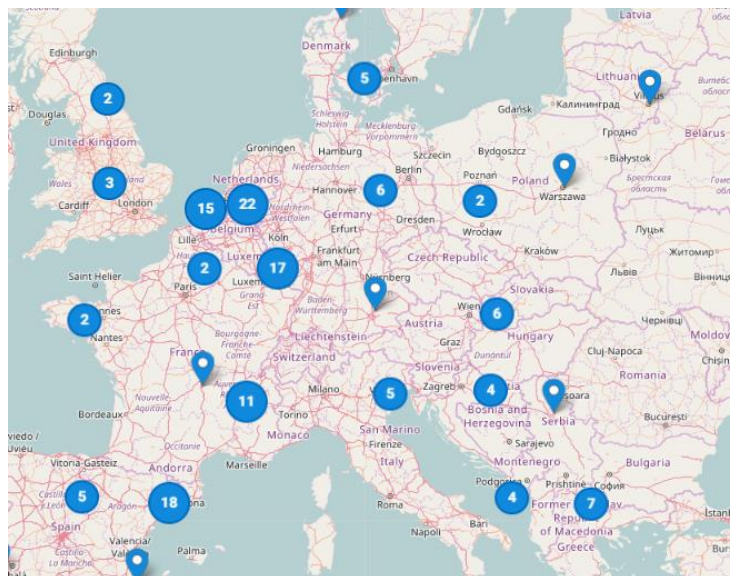
To make the most of the digital transformation we must ensure that all Europeans are ready for these changes. Adapting the workforce and our education and learning systems, together with major investments in reskilling citizens are needed. European initiatives such as the digital skill and jobs coalition and the digital opportunity scheme can help to bridge the gap.

### 5.1.3. Digital Innovation Hubs

An important tool serving the implementation of the strategy at regional level resides in the creation of the Digital innovation Hub (DIH) scattered across EU regions. These DIH are based upon technology infrastructure (competence centre) and provide access to the latest knowledge, expertise and technology to support their customers with piloting, testing and experimenting with digital innovations.

At the core of the DIH there is normally a regional competence centre such as a research and technology centre or an innovation-oriented university

**Figure 13: Digital Innovation Hub map - S3 platform**



<sup>33</sup> Digital Transformation Monitor, National Initiatives

department. Digital Innovation Hubs offer the following service<sup>34</sup>s:

- Access to digital technologies and competences
- Infrastructure and training to test digital innovations
- Financing advice
- Market intelligence
- Networking opportunities

The EC aims at creating one Digital Innovation Hub per European region *a minima*, by 2020. For reaching such objective, the European Commission has launched training programmes for new DIHs. These efforts will be reinforced in 2019 with €8 million under the EU's research programme Horizon 2020 to support new DIHs in underrepresented regions with strong industrial activity.

*In its documentation framing the priorities for the next programming period, (2021 – 2027) the European Commission proposes to create a new Digital Europe programme with an overall budget of €9.2 billion to shape and support the digital transformation of Europe's society and economy.*

## 5.2. European Structural and Investment Funds

Over half of EU funding is channeled through the 5 European structural and investment funds (ESIF). They are jointly managed by the European Commission and the EU countries.

The purpose of all these funds is to invest in job creation and a sustainable and healthy European economy and environment.

The ESIF mainly focus on 5 areas:

- research and innovation
- digital technologies
- supporting the low-carbon economy
- sustainable management of natural resources
- small businesses

The European Commission has encouraged Member States to use the European Fund for Strategic Investments (EFSI) and the European Structural and Investment Funds (ESIF) to meet the demands of their national initiatives for . Overall, the planned ICT investments under ESIF with relevance to smart manufacturing research and dissemination greatly exceeds 10 billion euro.

According to the DG CONNECT, ESIF support for digital growth is based on national or regional Digital Growth Strategies and Research and Innovation Strategies for Smart Specialisation, including:

- Around EUR 2 billion will support digitising EU industry, in particular SMEs, to develop ICT products and services, e-commerce and the take-up of ICT,
- Around EUR 1.2 billion will support e-Inclusion, eAccessibility, e-Learning etc. to enhance human capital for the digitised economy and society,
- Around EUR 7.6 billion will go into intelligent transport, smart grids, e-health and e-government, offering also procurement opportunities for IT firms,

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<sup>34</sup> European Commission, Digitising Industry, 2 years after the launch



- Over 100 regions and 14 countries at national level will also invest in ICT-related research and innovation. Total funding for RIS3 accounts for 42 billion euro.

While regional ESIF schemes are rather diverse depending on the focus areas favored, aggregated numbers provide an overview of the efforts level set by regional stakeholders for implementing the investments planned by regional authorities.

**Table 3: H2020 and ESIF funding for research and innovation - totals per regions**

Region	Total H2020 (M€)	Total ESIF (M€)
Flanders	618,3	171,4
Wallonia	143,8	226,7
Auvergne Rhone-Alpes*	461,4	244,5
Provence Alpes Côte d'Azur	178,4	119,1
Baden-Württemberg	734	209,5
Piedmont	243,1	208,1
UK*	3.967,5	2.523,3

Source: Regional R&I viewer - S3 platform

\* own calculation

From the table above, there are some extrapolations possible:

- ESIF funding are – by definition – more intensive on regions with lower GDP/inhabitants. Wallonia and Piedmont are thus implementing operational programmes with higher rate of ESIF funding than the other regions from the consortium;
- H2020 funding are fostering research and innovation initiatives, providing regions with the more vibrant innovation ecosystems to benefit from leveraging effects from grants and projects involving stakeholders upon their territories.

ESIF funding are thus of importance for all the partners' regions involved in the consortium to various degree. The final 'exact' distribution at regional level is however difficult to assess due to the dilution of ESIF funding within the regional tools made available to R&D stakeholders and beyond.

### 5.3. S3 smart specialization strategies

Regional Smart Specialisation strategies are built upon the concept of differentiation. Indeed, comparative advantages lie at the very heart of RIS3 programm. The key to successful differentiation is to exploit related variety, suggesting that a regional economy can build its competitive advantage by diversifying its unique, localised knowledge base (existing specialisation) into new combinations/innovations which are close or adjacent to it.

Smart Specialisation Strategies (RIS3 or S3) set priorities at national and regional level to build competitive advantage by developing and matching research and innovation own strengths with business needs, to address emerging opportunities and market developments in a coherent manner, while avoiding duplication



and fragmentation of efforts. They are also a backbone of national or regional research and innovation strategic policy frameworks in Europe.

In 2014–2020 Cohesion Policy will guide the investment of over EUR 450 billion (including national co-financing) to help achieve the EU-wide goals of growth and jobs and reduce economic and social disparities. It is the biggest investment instrument at EU level for pursuing the objectives of the Europe 2020 strategy. Investments will be concentrated on 4 key priorities with EUR 125 billion allocated to these areas:

- Innovation and research,
- The digital agenda,
- Support for small and medium-sized businesses (SMEs),
- The low-carbon economy.

In the frame of this project, a research on the relevant priorities encoded on Eye@RIS3, the EC tool providing an overview of the priorities encoded by regions related to their strategies. It is to be noted that several priorities (beyond the one explicitly related to I4.0) are relevant to the thematics tackled within the IoT4Industry project, especially since some ‘gaps’ were identified<sup>35</sup>.

The 4 priorities were thus considered:

- D.24 - Digitising Industry
- D.29 - ICT Trust cybersecurity and network security
- D.31 - Internet of Things (e.g. connected devices, sensors and actuators networks)
- E.37 - Advanced manufacturing

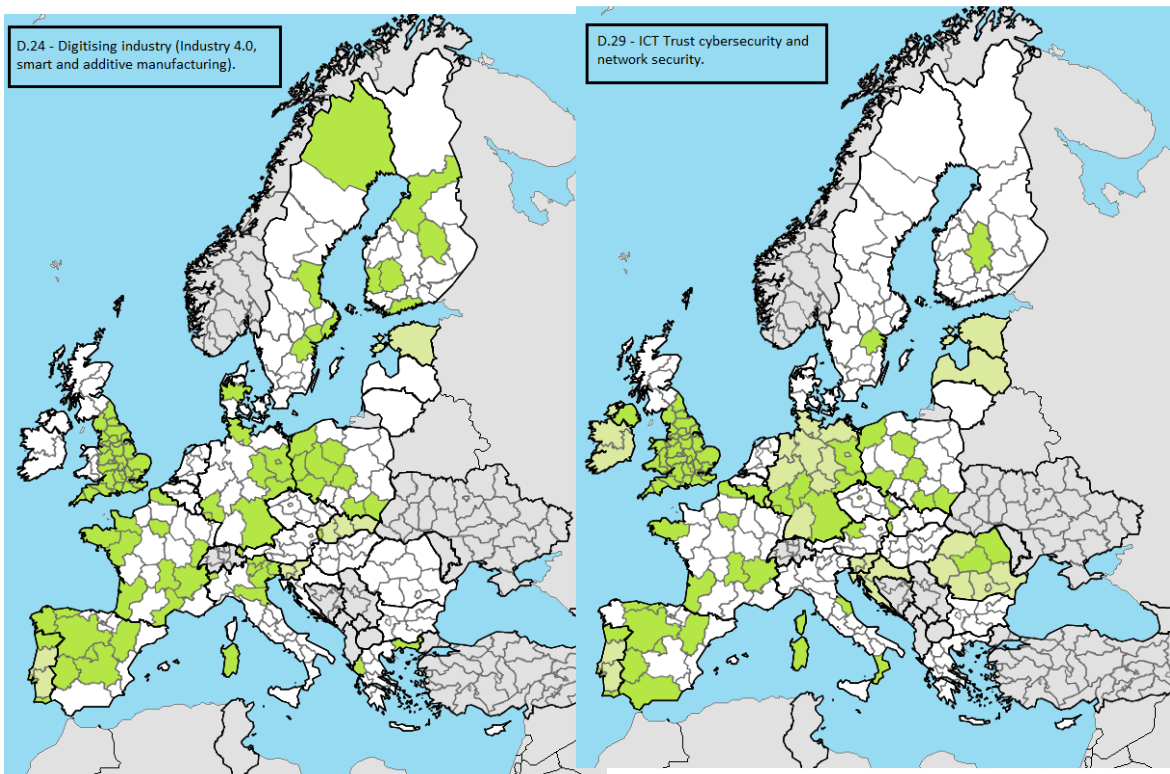
Following maps provide an overview of the priorities (and, considering previous chapter’s developments, the approach taken by the regions involved in the partnership and / or associated to the project at this stage) and wording associated to the Industry 4.0 evolutions.

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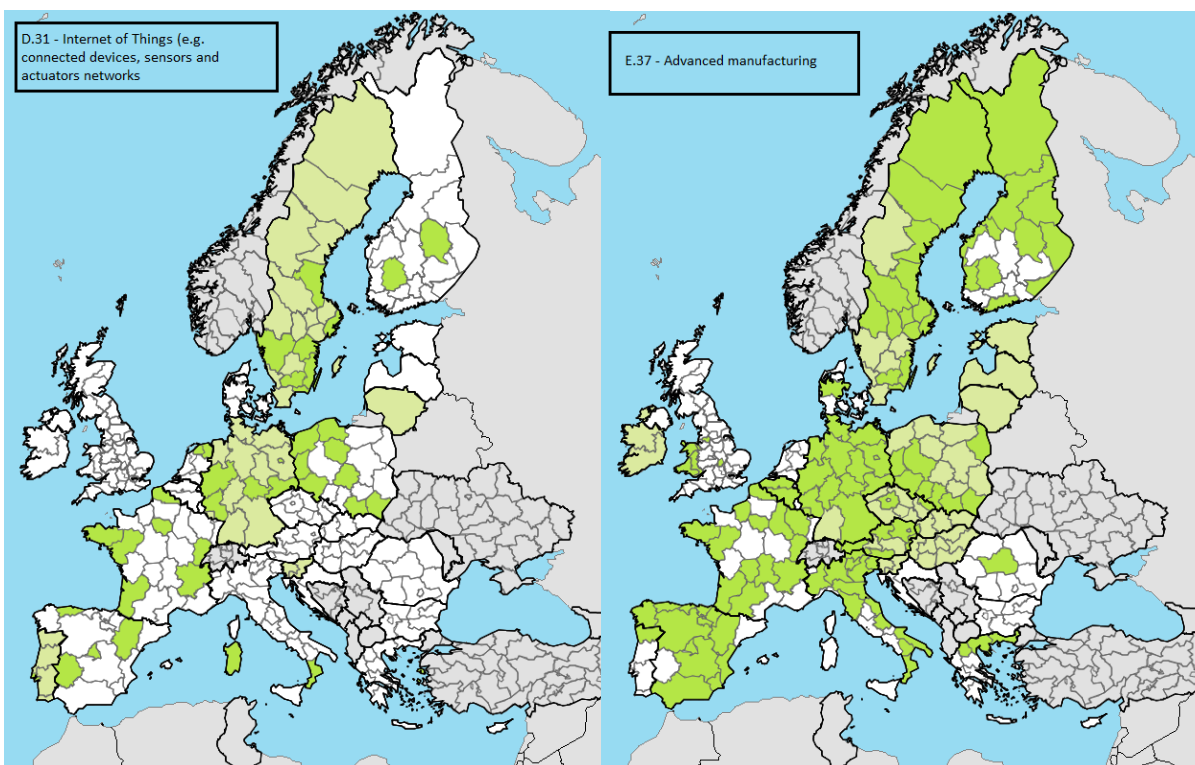
<sup>35</sup> When considering IoT4Industry partnership, the regions involved do not all have encoded I4.0 priorities encoded in their RIS3 profile. As a side note, it may be interesting for the clusters involved in the proposal to alert the regional authorities of the regions they are based in to ensure such encoding is made in the next updates.



**Figure 14: Smart specialisation priorities - D.24 / D.29**



**Figure 15: Smart specialisation priorities - D.31 / E.37**



A first outcome from the RIS3 priorities mapped on the S3 platforms provide us with complementary information to the regional descriptions provided in the previous chapter:





- Advanced manufacturing is a common priority across EU regions, notably in the ones associated to the project (Latvia, Basque Country, etc.), reinforcing the potential collaborative schemes at this level;
- While Industry 4.0 / IoT are priorities in numerous specialization strategies, these aren't always recorded on the tools available (e.g. Provence Alpes Côte d'Azur, Piedmont, Baden Wuerttemberg). Thus, the appropriate information need to be sought within the regional-edited documents;
- On a similar note, countries with IoT / Industry 4.0 strategies (e.g. Czech Republic are not always correctly indicated on these tools.

Another interesting indicator from the S3 strategy lies in the Industrial Modernisation Platforms designed per topics.

### **5.3.1. Thematic smart specialisation platform - SME integration to Industry 4.0**

The Smart Specialisation Platform for Industrial Modernisation (S3P-Industry) aims to support EU regions committed to generate a pipeline of industrial investment projects following a bottom-up approach - implemented through interregional cooperation, cluster participation and industry involvement. The S3P-Industry co-developed and co-led by the regions themselves ensuring an active participation of industry and related business organisations such as clusters, as well as research institutions, academia and civil society.

The projects can be joint large-scale demonstrators, shared technology centres, other cross-regional projects, small projects bundled together in 'investment platforms', single cross-regional large-scale projects, or large-scale individual projects to be developed across European industrial value chains. The organisation of partnering and matchmaking events for industrial partners will be important in order to discuss, facilitate and accelerate the development of joint industrial investment projects.

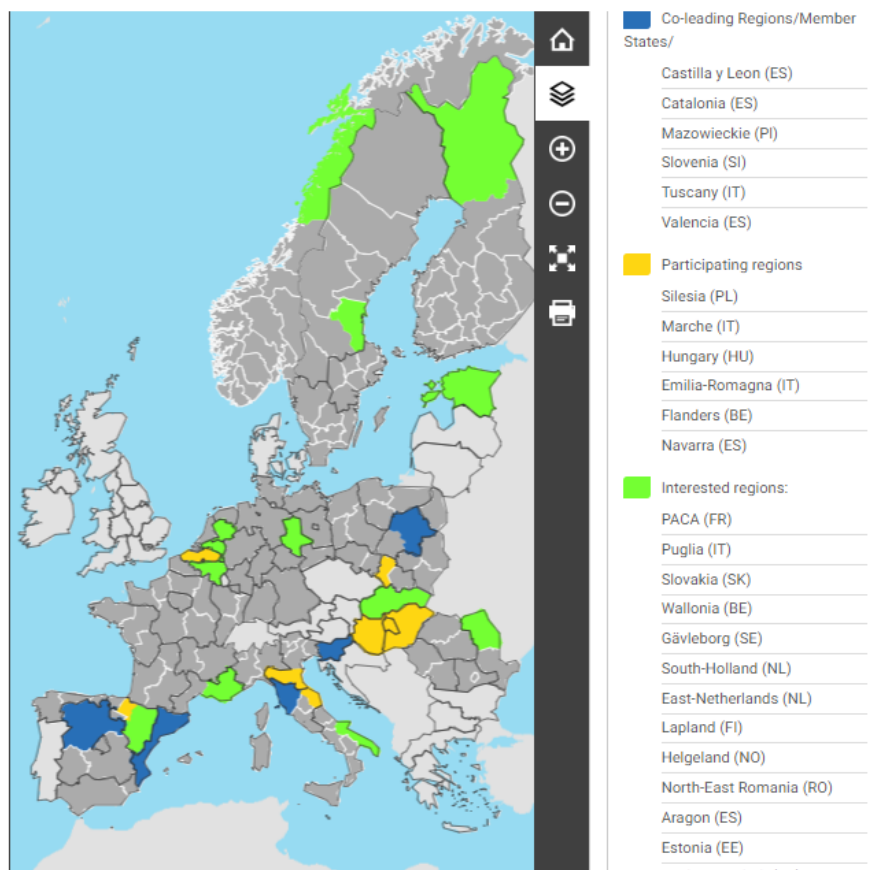
Throughout the integration of SMEs into the Industry 4.0 concept, the partners will develop common projects based on an open source platform and to reinforce cooperation, together with SMEs and other stakeholders (sectorial clusters and competence centres), along European value chains, surveying both the demand and supply side and providing demonstrational and development services in order to accelerate and catalyse the process of matchmaking within the European Value Chain. The partnership will be structured in vertical thematic projects, so that the relevant topics of Industry 4.0 paradigm will be covered, and proper solutions developed.

The partnership will:

- focus on KET and roadmaps to increase productivity and added value, but also promoting new business models for SMEs;
- integrate systems according to the paradigm of the Industry 4.0. considering production, training, knowledge and skills, investments and actions using Software as a Service (Saas) platform;
- have a market-oriented approach;
- focus on fast growing sectors, as well as traditional sectors (i.e. fashion industries, mechanics, tourism, agri-food, quality of life, etc.) as a tool to renew them and to compete in the global market (i.e. smart factory);
- favour interaction between emerging and traditional clusters and innovation cooperative processes.



**Figure 16: Regions involved in IM thematic platform – SME integration for industry 4.0**



The stakeholders involved / interested in this initiative are of interest notably for dissemination and outreach purposes, providing an optimal solution for involving IoT4Industry potential Ambassadors and reach relevant clusters and industrials in these regions.

### **5.3.2. Vanguard initiative – Efficient and Sustainable Manufacturing**

Vanguard Initiative is a European network of industrial regions that seeks to speed up the market uptake of new technologies through the establishment of industry-led, cross regional joint-demonstration platforms. The network has initiated five thematic pilot projects to explore opportunities for developing interregional joint-demonstration.

The Vanguard Initiative Efficient and Sustainable Manufacturing (ESM)<sup>36</sup> Pilot project addresses the development of a European network of pilot plants in the area of manufacturing efficiency and sustainability. Led by Lombardy and Catalonia regions, It is aimed at sustaining the competitiveness of the European Manufacturing sector, by allowing the exploitation in Europe of innovative efficient technologies, methods, processes and standards in production, contributing to pollution and energy consumption reduction and facilitating smart usage of resources.

<sup>36</sup> Vanguard Initiatives, Efficient and Sustainable Manufacturing



## 5.4. Inter-member states cooperation schemes

Beyond national / regional funding and initiatives, the EU supports transnationals and trans-regional initiatives under various formats, further developed below.

### 5.4.1. French-German-Italian trilateral coordination

Alliance Industrie du Futur, Plattform Industrie 4.0 and Piano Industria 4.0 agreed to cooperate during a high-level conference in March 2017 in Berlin and started their trilateral cooperation in June 2017 in Torino.

The trilateral cooperation focuses on three core subjects of shared interests, which are dealt with in the following three working groups:

- Standardisation and reference architectures. Common standards are crucial for digitalised manufacturing. Therefore, the first working group will identify relevant standards, align standardisation activities, work on the harmonisation of an administration shell and find ways to integrate SMEs in the field of standardisation. The group will capitalise on the achievements of the French-German joint working group.
- SMEs engagement and testbeds. To make more accessible for SMEs, the second working group will map use cases from all three countries and interlink them, diffuse and complete Industry 4.0 scenarios and promote an international network of test infrastructures.
- Policy support. Industry needs a favourable environment to efficiently benefit from . The working group will therefore exchange best practices on policies and programs in various fields and levels and coordinate shared positions of the three countries at the European level and in international forums.

### 5.4.2. Danube Region Strategy

Among EU macro-regional strategies, several put one of their priorities on Industry 4.0. Danube's region Working Group "Digitalization" of the Priority Area 8 of the EU Strategy for the Danube Region, organizes workshops on "Digitalization processes within small and medium enterprises (SMEs) and their effects on the vocational education". During these workshops, innovative models developed within a transregional project - e.g. DIGITRANS (supported by the Danube Transnational Programme), which can offer effective solutions for SMEs in the whole Danube Region.

### 5.4.3. Interreg projects

Multiple Interreg projects are occurring upon (and across) IoT4Industry partnership's regions. While an exhaustive list isn't available, each Interreg programme account at least one priority on Industry 4.0 and / or one project running. Most notable examples include:

#### ***Interreg France-Wallonie-Vlaanderen - Factory 4.0: Démonstrateur 'Usine du futur'***

6-cells assembly line open demonstrator

#### ***Interreg Alpine Space - SMART SPACE***

SMART-SPACE will contribute to the improvement of the framework conditions for innovation in Alpine Space. It will promote economic, technological, social and sustainable growth. SMART-SPACE addresses clusters and SMEs from traditional industrial branches and all innovation actors to strengthen the application





of digital technologies and eco-innovation procedures to processes and outputs. Ultimately the competitiveness and innovation capacities of traditional sectors will be enhanced.

The objectives are :

- Policy makers and Innovation stakeholders integrate smart manufacturing innovation processes within the Alpine Space industrial system with a shared model of sustainable growth.
- Public and private intermediaries increase their competences to assist SMEs in traditional industrial sectors to foster smart innovation processes.
- SMEs from traditional industrial sectors are assisted in adopting the digital technology and added value services to improve their products and business model.

### ***Interreg North Sea Region - GrowIn4***

GrowIn 4.0 aims to build strong competences and tools in the participating regions for the benefit of manufacturing SMEs. The approach is to establish a strong partnership which pools knowledge on the manufacturing industry and Industry 4.0. Main challenges and solutions in regards of implementing Industry 4.0 will be investigated.

### ***Interreg V-B Adriatic-Ionian programme - FUTURE 4.0***

The main objective of the project is the support of competent regional and national administrations to design an Industry 4.0 suitable and effective industrial knowledge and technology transfer governance model, in order to facilitate the manufacturing system enhancement.

Collaboration with these trans-national / trans-regional programmes will be key for the dissemination efforts of the project and implication of non-cluster members of the regions covered by the partnership and ambassadors. Moreover, the compatibility of approaches (on macro-regional and interreg program levels, notably) could confer an additional added value to the IoT4Industry voucher, the 'right' combination to be further explored during next networking activities.

## **5.5. Public-private partnerships at EU level**

Beyond the regional approaches fostered by the EU, several public private partnerships are of interest for the project within its application scope rather than the geographical one.

### **5.5.1. 'Factories of the Future' and EFFRA support**

The European Factories of the Future Research Association<sup>37</sup> (EFFRA) is a non-for-profit, industry-driven association promoting the development of new and innovative production technologies. It is the official representative of the private side in the 'Factories of the Future' public-private partnership. 'Factories of the Future' is the European Union's €1.15 billion public-private partnership (PPP) for advanced manufacturing research and innovation. It is the European Union's main programme for realising the next industrial revolution: materialising Factories 4.0.

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<sup>37</sup> European Factories of the Future Research Association, Home



The key objective of EFFRA is to promote pre-competitive research on production technologies within the European Research Area by engaging in a public-private partnership with the European Union. EFFRA was established jointly by the MANUFUTURE technology platform and key industrial associations to shape, promote and support the implementation of the 'Factories of the Future' public-private partnership.

The partnership aims to bring together private and public resources to create an industry-led programme in research and innovation with the aim of launching hundreds of market-oriented cross-border projects throughout the European Union. Such projects will produce demonstrators and models to be applied in a wide range of manufacturing sectors.

The research and innovation priorities of the partnership are identified in the 'Factories of the Future 2020' roadmap. The priorities of the partnership are identified in the 'Factories of the Future 2020' roadmap which was developed by EFFRA after Europe-wide consultations.

In response to the call topics interested organisations form consortia and submit proposals which are then independently evaluated. Following evaluation, a project is assigned a percentage of funding from the European Union with the rest of the funding and resources coming from the members of the project consortium. Since the launch of the partnership 208 projects have been launched with the participation of over 1,000 organisations from across Europe.

### 5.5.2. I4MS

I4MS, ICT Innovation for Manufacturing SMEs<sup>38</sup>, is a European initiative supporting manufacturing SMEs and mid-caps in the widespread use of information and communication technologies (ICT) in their business operations. Under I4MS, SMEs can apply for technological and financial support to conduct small experiments allowing them to test digital innovations in their business via open calls.

Phase 3 of the initiative was launched in September 2017 and aimed at reinforcing the I4MS ecosystem. During this phase, European SMEs and mid-caps will be exposed to new approaches and methodologies on business models, access to financing, and training opportunities to re-skill staff. A total funding of €34 million is made available under this phase.

Focus under Phase 3 of I4MS project is on four technology areas important to the digital transformation of companies in the manufacturing sector: (i) additive manufacturing, (ii) CPS and IoT, (iii) robotics and, (iv) HPC.

*Within IoT4Industry consortium, certain partners are members of I4MS organization.*

#### Example of I4MS open call

Manufacturing Industry Digital Innovation Hubs (MIDIH) - Data driven applications and experiments in CPS/IoT<sup>39</sup>

<sup>38</sup> I4MS, The EU initiative to digitalise the manufacturing industry

<sup>39</sup> I4MS, Open Calls



MIDIH First Open Call targets the development of data driven applications, by IT SMEs as technology providers, and experiments in CPS/IoT by Manufacturing SMEs.

The open call aims at complementing functionalities around MIDIH reference architecture and performing experiments in CPS/IOT based on the components provided by the architecture. The experiments must cover one of the three main scenarios: Smart Factory or Smart Product or Smart Supply chain. The types of activities to perform that qualify for receiving financial support are data driven experiments in CPS/IoT under the following topics:

#### 1. Technological topics which address technologies around the MIDIH architecture

Expected applicants are IT SMEs as technology providers

- T1. Modeling and Simulation innovative HPC/Cloud applications for highly personalised Smart Products.
- T2. Smart Factory Digital Twin models alignment and validation via edge clouds distributed architectures.
- T3. Advanced applications of AR / VR Technologies for Remote Training / Maintenance Operations (Smart Product and Smart Factory).
- T4. Machine Learning and Artificial Intelligence advanced applications in Smart Supply Chains management and optimisation.

#### 2. Experimentation topics must cover one of the three main scenarios: Smart Factory, Smart Product or Smart Supply chain. The usage of components of the reference architecture is mandatory.

Expected applicants are manufacturing SMEs

- E1. Integrating CPS / IOT subtractive production technologies in Additive Manufacturing experimental facilities.
- E2. Integrating CPS / IOT factory automation technologies in Robotics experimental facilities.
- E3. Integrating CPS / IOT discrete manufacturing technologies in Process Industry experimental facilities.
- E4. Integrating CPS / IOT factory logistics technologies in Warehouse management experimental facilities

In any case, applicants must be legal entities established in countries eligible for participation in EC H2020.

Total budget: € 960,000.

Maximum funding request per proposal: € 60,000.

Expected duration of experiments: 6 months.

Publication date: 29th March 2018.

Deadline for applications' submission: 29th June 2018, at 17:00 Brussels local time



### 5.5.3. EPoSS / Smart Anything Everywhere

EPoSS, the European Technology Platform for Smart Systems<sup>40</sup> is the European Technology Platform for Smart Systems Integration representing a dynamic ecosystem formed by a variety of engaged large companies, small and medium-sized enterprises (SMEs), public and private research organizations, and universities in the fields of microsystems, micro- and nanoelectronics, sensor technologies, micro-nano-bio systems and related application areas. EPoSS has been created in 2005, counts now 50 active member organisations and is registered as an association under German law since 2013.

Currently, the platform is organised in six working groups as operational elements, each chaired by an industrial representative and covering the fields of automotive, healthy living, manufacturing & robotics, communication for smart devices, applied micro-nano-bio systems, and key technologies.

As part of this environment, the EC launched the “Smart Anything Everywhere” (SAE) Initiative. The initiative comprises about a dozen projects amounting to approx. € 60 million funding to date. By setting up and implementing an exhaustive network of regional “Digital Innovation Hubs” (DIHs), all partners in projects under the SAE-Initiative guarantee local access for SMEs to experts in digitisation limiting thereby the risk of isolation. The role of the regional DIHs is manifold as they shall educate SMEs about the opportunities offered by digital technologies both in terms of hardware and software, and support them to integrate digital technologies in their products, services, and processes.

### 5.5.4. EIT Digital

EIT Digital delivers breakthrough digital innovations to the market and breeds entrepreneurial talent for economic growth and improved quality of life in Europe. It does this by mobilising a pan-European ecosystem of over 156 top European corporations, SMEs, start-ups, universities and research institutes. EIT Digital invests human and financial resources in key high-potential activities for the development of ICT business and talent in Europe. The investments are clustered in a total of 8 pan-European Innovation and Education Action Lines - portfolios of thematic activities targeting impactful outcomes. Action Lines are executed within its European ecosystem of top Corporations, SMEs, universities, research institutes and start-ups, and in its Co-Location Centers.

Digital Industry Action Line targets value creation from big data collection, aggregation, analysis and visualisation services (and their enabling technologies) for decentralised production management covering the complete product lifecycle: design, simulation, production, operation, consumption, maintenance, and consumer relationship frameworks.

EIT Digital provides entrepreneurs with the possibility to access customers, raise fund among the investors involved, find the competencies required or find a potential integrator of IoT solutions.

**Example of Digital Industry project – *Potentially of interest for IoT4Industry voucher users...***

<sup>40</sup> EPoSS - The Product Driven Platform



The goal of the OEDIPUS project is the concrete creation of products and services for a “blended industry”. Therefore five European I-Centers (Innovation Centers) will be established to generate valuable business opportunities for European industrial players including big corporation, existing and new SMEs

*While being highly relevant in the European ecosystem of PPPs fostering Industry 4.0 uptake, few information on actual supporting programmes / activities are available for non-members.*

Also, the EC launched its open call for creating a Knowledge and Innovation Community (KIC) focusing on “Added value manufacturing” in January 2018. The results of this call are pending.

### 5.5.5. Silicon Europe

Silicon Europe unites the strongest European clusters in an alliance with access to the most advanced technologies and expertise in all fields of the electronics and software value chain. Silicon Europe is the brand under which the leading European electronics and digitization clusters collaborate to represent, support and promote the companies and organizations of their regional business networks at European and global levels. Silicon Europe acts as an intermediary between all the relevant partners from research and academia, public authorities and industry.

Twelve renowned European clusters including SCS cluster, DSP Valley and MESAP, have joined forces to support Europe’s goal to be the world’s leading center for innovative electronics & software technologies. These clusters bring together the technological expertise and resources of Europe’s leading research institutes and companies in the digital technologies and IoT areas such as micro and nanoelectronics, photonics, ICT and software.

Together, the cluster’s ecosystems and their 2,500 cluster members working on science and industry represent more than 400,000 jobs. Among these are ground-breaking research organizations, innovative SMEs and global players like Arm, ASML, ASM International, Atos, AT&S, Bosch, Cisco, Epcos, Gemalto, Globalfoundries, HPE, Infineon, Intel, Nexperia, NXP Semiconductors, Orange, Philips, SAP, Schneider Electric, STMicroelectronics, T-Systems and Thales.

## 5.6. Other EU funding sources for innovation

Numerous EU programmes, initiatives and funding opportunities among / beyond ESIF are available for innovative Industry 4.0 stakeholders. While an exhaustive list would be irrelevant in the framework of this deliverable (information can be found on the EC websites), certain examples are of particular interest, as introduced in Table 4)

**Table 4: notable EU calls**

Fund / project	Type	Budget	Duration	Funding type	Calendar
<b>H2020 collaborative projects</b>	/ Collaborative	Variable	Variable	Subvention	See website



<b>BPI France / PARTNERSHIPS INNOVATION FRANCE-GERMANY</b>	Collaborative	50 K€ to 3M€	3 years maximum	Subventions	<i>Unknown</i>
<b>EUREKA Clusters*</b>	Collaborative	3-5 M€	2 to 4 years	Subventions	Run-of-water deposit
<b>EUREKA Network</b>	Collaborative	500K€ - 5M€	2 to 3 years	Refundable advance up to 65%	Run-of-river deposit
<b>EUROSTARS</b>	Collaborative	2-3 M€	2 to 3 years	Subventions	<i>Unknown</i>
<b>H2020 / SME INSTRUMENT – phase 1</b>	Individual or collaborative	50 K€	6 months	Subventions until 70%	Run-of-water deposit
<b>H2020 / SME INSTRUMENT – phase 2</b>	Individual or collaborative	1-3 M€	1 to 2 years	Subventions until 70%	Run-of-water deposit
<b>H2020 / FAST TRACK TO INNOVATION</b>	Collaborative	1-5 M€	1 to 2 years	Subventions	<i>Cluster based</i>
<b>ECSEL JU / IA – RIA - CSA</b>	Collaborative	0.5 to 110M€	Variable	Subvention (national rates)	<i>See website</i>

\* EUREKA are collaborative projects between RDI stakeholders across Europe (and the world) on a thematic focus

Taking into considerations the information presented in the two previous chapters, some conclusions can be drawn on the approach to be taken.



## 6. Maximising IoT4Industry vouchers' scheme impact within European, national and regional strategies

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Across the desk research outcomes and discussions with the regional representatives and experts on the field of Industry 4.0 financing schemes at regional and national levels, several trends common to the regions appear:

### **The need to inform & convince business stakeholders on I4.0 benefits**

A potential issue mentioned by the regional stakeholders is critical for the implementation of IoT4Industry voucher schemes: there isn't forcibly a lack of funding for implementing IoT solutions to an industry. There already are funding sources and schemes available in European regions that are made available to SMEs, which aren't always meeting the anticipated demand, for several reasons.

On the positive side, SMEs that are involved in the local innovation landscape – through their involvement in clusters, notably - do access to the relevant level of information. The fact that clusters are involved in the design of the IoT4Industry voucher scheme will enable us to meet the requirements from the SMEs' demand.

On the other side, companies that aren't already involved in a process of Industry 4.0 on their own and / or that do not get the required level of information from clusters or expert sources will prove to be more difficult to reach. Indeed, the prerequisites identified below (peer to peer learning, first diagnosis phase, etc.) for reaching the maturity level for the demand to get an Industry 4.0 project running on one's facility may constitute a barrier. The dissemination levers at the level of the project will certainly try to get 'outsiders' on board, specifically informing them on opportunities through the IoT4Industry trainings.

It is to be noted that there is the need to convey through IoT4Industry (and other regional initiatives) a clear and pragmatic message on the impact of Industry 4.0 on employment. Certain countries / regions identify the need to convince business stakeholders as well as the policy makers about the positive balance in job creation / destruction prior to any development. The "general public" may even be more hesitating. The need to embed this message in the frame of an improved process transparency, by providing an overview of the impacts on working conditions - potentially through the prism of the EU policy framework (GDPR).

### **Designing programs that correspond to business stakeholders' actual needs**

Industry 4.0 initiatives launched at European and national levels do foster 'disruptive' innovations in the sectors. The large-scale programmes foster I4.0 schemes that require heavy investments and enable paradigm changes in the manufacturing sector and beyond.

Regional and local programs are focusing on the existing ecosystems on their territories. These initiatives aim mainly at enabling local stakeholders to a) understand the technologies available b) identify the potential gains associated to their implementation at company level. These actions start by establishing a diagnosis adapted to the structure and foster the uptake of best practices by providing peer learning opportunities at local level.

European and national approaches seem to focus on a prospective / "technology push" that does not forcibly match with the reality on the field, experienced by regional and local stakeholders. These schemes, while





focusing on the bigger picture and / or wider time-scale, seem to overlook the actual state (in terms of ) at which the companies are.

As such, there is a gap identified between these two approaches, that could be tackled by IoT4Industry vouchers. Indeed, by providing the opportunity for existing companies to get adapted solutions for their structure and activities. Namely, by building the projects upon the diagnoses made in the frame of the regional schemes, IoT4Industry-supported SMEs could thus provide tailored feasibility studies, prototypes or demonstrator in the companies and plants that were accompanied.

### **Collaborating with the regional agencies for ‘lagging’ SMEs**

This approach described above could foster the synergies between the European ESIF funding and H2020 Innovation Action programme on the field. However, it entails a level of coordination that may prove to be difficult to reach. Indeed, this process implies to coordinate the accessibility of funding with the regional or local entities responsible for the implementation of diagnoses, while collaborating with the clusters from the ‘technology provider’ and ‘solution receiving’ companies, with a set timeframe aligned on the call for projects.

The way to proceed on that specific scheme supposes the following levels of dissemination / interaction:

- Establishing a framework for exchanges between clusters and regional agencies on IoT4Industry voucher schemes early on
- Scouting diagnoses reports – if made available by the regional entities – and identifying the companies potentially interested in further exploring IoT/Advanced manufacturing solutions
- During the matchmaking sessions, engage with the regional representatives / agencies on concrete collaborations with the companies accompanied within the regional scheme
- Ensure the ‘solution provider’ involved in the IoT4Industry-supported project do understand / agree with the conclusions set in the diagnosis and develop the adapted solution, fostering a ‘digital by design’ approach rather than ‘digital by default’ solutions

### **National / regional funding schemes**

Funding opportunities are highly diverse in terms of formats, goals and targets across the partners regions. Interestingly, the “lack of funding” traditionally underlined by regional stakeholders when considering the opportunities from national sources are not the prime shortcoming identified. Indeed, while some regions ‘covered’ by a partner from the IoT4Industry consortium point to the need for more budgets to allocate to the Industry 4.0 processes, all stress first the fact that these budgets should be targeting:

- Vocational trainings, education on IoT solutions for industries both within the education systems and at the life-long learning levels
- Consultancy for ‘pragmatic’ approaches towards new and traditional industries, providing these stakeholders with an adapted level of understanding of the opportunities and adapted technologies
- Networking / trainings along the industrial value chains on the solutions available and to be developed
- Flexible funding approaches: adapt administrative burden to the capacities of business stakeholders as well as the size of the support provided.

IoT4Industry will take these suggestions into consideration for the development of its support services (training, matchmaking, vouchers).



### **EU funding schemes: multiple frameworks and formats with a common objective**

As presented in chapter **Erreur ! Source du renvoi introuvable.**, there exists a wide array of EU programmes / initiatives fostering the uptake of Industry 4.0 solutions by business stakeholders, completing national / regional policies.

Potential levers to be pulled by the IoT4Industry in line with these initiatives are:

- Relay information on the calls, events and overall news from the programmes and initiatives (both up and downstream)
- Inscribe the IoT4Industry project in the portfolio of the S3 IM partnership and Vanguard initiatives, by linking with their members, further developing the outreach effort and easing the processes towards ‘Ambassadors’
- Explore with relevant industrials on potential combination with the EU PPPs-conferred opportunities (I4MS / EIT Digital)

### **EU funding schemes: the IoT4Industry project format is adapted to stakeholders supporting SMEs’ and industries’ transitions towards I4.0**

Stakeholders from clusters and regional authorities underlined during the interviews the fact that a ‘cascading fund’ format, as planned in the “innovation voucher” support by IoT4Industry was adapted to the needs of regional end-users. In line with the approach taken by IoT4Industry project, several stakeholders indicated the need for a case-to-case financing, involving experts who are aware / involved in the local dynamics.

### **Complementary funding schemes**

There was no incompatibility identified between the existing regional funding schemes and IoT4Industry voucher from the interviews and desk research. Should an SME applying for an IoT4Industry voucher be directly financed through an ERDF-financed initiative, the voucher could induce a conflict of EU funding use. However, ESIF / ERDF management schemes should prevent such case.

On a related note, some regions indicate that the national / regional formats of funding are sometimes incompatible with the objectives set on territories.

The compatibility of EU funded schemes (e.g. combining MIDIH project with an IoT4Industry voucher) will depend on the criteria designed by the partnerships involved. As such, this aspect will be considered further down the project implementation.



## 7. Assessing IoT4Industry synergies and leveraging effects

As illustrated in previous chapters, differences from a region to another widely depends on the economy. Regions with a slowing or growing industry will set up different policies. Moreover, there are significant differences in terms of ‘advanced’ manufacturing and digital integration of companies from different countries which imply the need for adapted answers from national and local authorities.

The IoT4Industry project aims to inscribe itself into these various environments for triggering and fostering European, national and regional ecosystems. As such, beyond the maximization of impacts introduced in previous chapters, the voucher scheme has to set itself in the policy and funding mixes made available to its targets (SMEs, industrials, etc.) for inducing leveraging effects aside and upon these initiatives. This chapter explores these synergies and leverage effects by

- introducing scenarii of potential funding mixes within which IoT4Industry could maximise its potential impacts for SMEs;
- on a wider scope, identify socio-economic levers, notably with the ambassadors’ clusters

### 7.1. Potential leverage effects at policy and funding mix level

Focusing on the IoT4Industry voucher scheme potential synergies and leverage effects, several opportunities were identified, for all stakeholders involved in its processes.

#### **Invest in Vanguard initiatives and Industrial Modernisation Thematic platform(s)**

The IoT4Industry project environment and collaboration with ambassadors can be an interesting input for the next endeavours related to the European strategy for smart specialization.

Indeed, the regions of IoT4Industry partners and Ambassadors and relevant stakeholders involved in IoT4Industry activities and projects will further highlight the sectors in which their regional ecosystems are investing / innovating. This sectorial distribution of projects (should it be regarded as evident) could confer regional authorities, agencies and / or clusters with the opportunity to further enlarge their panels of tools, by joining or creating an IM thematic platform(s) and / or joining a Vanguard Initiative.

The next European Commission framework programming period will notably build upon the approaches taken within these platforms, and regions (and its R&D and business stakeholders) with living and strong sectorial ecosystems (further highlighted and developed through IoT4Industry vouchers) would constitute an asset for these endeavours.

On a related note, IoT4Industry voucher could constitute a co-investment source (and inspiration) within Thematic Platform co-investment protocols.

#### **Conferring another lever for mobilizing stakeholders into regional open calls**

Regional authorities and agencies from all of the territories studied in this document foster (under various formats) market-oriented R&D projects. However, as underlined in previous chapters, certain



national / regional open calls for innovation can fail to meet their ‘demand’, often due to a lack of ‘readiness’ from the regional business stakeholders to engage in such processes.

By positioning itself at a higher TRL than these funding opportunities, IoT4Industry vouchers could provide business stakeholders with a better / more pragmatic insight of Industry 4.0 solutions, therefore mobilizing these companies on the benefits further R&D could add to their practices. These stakeholders would thus be more inclined to co-develop adapted solutions to these schemes.

Another potential lever lies in the support conferred by IoT4Industry voucher for better validating / providing solid assets in the loans schemes made available to innovative SMEs, in the form of a feasibility study or first prototype.

### **A stepping stone for accessing PPPs environments**

The various EU PPPs introduced in previous sections constitute important initiatives for business stakeholders interested in innovative approaches or further developing their solutions. The funding opportunities conferred by some (e.g. I4MS) and the scale up programmes (e.g. EIT KIC Digital) are optimal tools for fostering the uptake of Industry 4.0 solutions.

However, the ‘entry costs’ associated to these schemes are relatively high for structures that are not able to confer much time / investment in such initiatives with no proper overview of associated benefits.

The IoT4Industry project, through its structure (beyond the voucher scheme), could provide business stakeholders – that are not yet aware / involved in these PPPs – to get a better grasp on what these initiatives could provide them with.

IoT4Industry training and matchmaking events could serve as information relay on these activities. Moreover, interactions between IoT solution providers and industrials could confer the opportunity for the first to disseminate upon the potential opportunities available for the latter, notably through demonstrations.

### **Reinforcing Industry 4.0 project proposals’ business cases for transnational cooperation funding opportunities**

Transnational and transregional initiatives in the EU take multiple forms depending on their objectives (e.g. German-French-Italian cooperation scheme on Industry 4.0, Danube region program, etc.). Some of these initiatives provide SMEs, research centers, etc. with collaboration (and funding) opportunities.

- Funding by inter-member states programmes (e.g. BPI French-German project fund)

These funding opportunities are designed for interregional collaborations between stakeholders from the financing countries. These schemes usually build upon national venture capital players, enabling them to invest bigger tickets to meet the needs of scale up of fast growing start-ups. These tickets are allocated to bi/trilateral projects with stakeholders from both sides of the borders.

Depending on the TRL associated to such collaborations, an ‘IoT solution provider’ could both (1) better showcase the market readiness of its solution by adapting a new prototype or demonstrating



its developments, thus providing further assets towards financing bodies and (2) pre-select, exchange and collaborate upon the potential submission to such funding schemes

- Funded by an INTERREG call (e.g. Alpine Space)

Transregional initiatives foster the implementation of solutions upon areas covered by each programme. Most of these programmes integrate components that are partly in line with the uptake of Industry 4.0. For example, the open calls opened yearly can lead SMEs to collaborate across borders with regional authorities for implementing a solution of relevance for stakeholders (e.g. common data format). IoT4Industry demonstration voucher could thus enable business stakeholders to illustrate the solutions provided towards regional authorities and thus have a better chance to get access to these schemes and related benefits.

### **Building upon regional vouchers' outcomes**

As a follow-up investment linked to consultancy voucher outcomes, the IoT4Industry voucher could constitute an opportunity to further build upon the recommendations provided for the first through a feasibility study and / or a prototype project (thus enabling a 'digital by design' solution) and keep the momentum around the recommendations issued. A case by case cooperation scheme would need to be developed with the regional stakeholders (regional authority, agency or cluster in charge of the consultancy voucher) for identifying / supporting the relevant stakeholders.

This approach could induce an interesting leverage effect to regional policies fostering these consultancy services.

### **An 'even faster track' to innovation at EU level**

IoT4Industry project support for prototyping could constitute an important asset for SMEs for accessing targeted H2020 schemes.

- Fast track to innovation

The Fast Track to Innovation<sup>41</sup> (FTI) provides funding for bottom-up proposals for close-to-market innovation activities in any area of technology or application, under the helm of the new European Innovation Council (EIC) pilot. The project supported by this programme need to be relatively close to the market (TRL >6) and involve industrials from at least 3 countries.

IoT4Industry voucher for Feasibility Studies could notably constitute a stepping stone for innovators eligible / willing to apply for this programme by raising the readiness level of their solution and providing an adapted framework for the required building of trust between potential partners.

- SME Instrument

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<sup>41</sup> Horizon 2020, Fast Track to Innovation



Similarly to the ‘Fast Track to Innovation’ programme, the SME Instrument is to be implemented on solutions relatively close to the market (TRL >6). IoT4Industry could help potential participants reaching this TRL threshold.

#### Recommendation for regional funding bodies and clusters

The information included in this section is presenting potential combinations / sequencing of funding schemes for fostering the implementation and maximise the impacts of IoT4Industry voucher schemes upon the territories they ‘cover’.

These combinations are notably presented for ‘inspiring’ clusters and regional stakeholders but need to be adapted to their contexts. Indeed, each cluster / regional stakeholder has by definition a refined overview of the funding schemes that are (and will be) made available on the territory.

## 7.2. Considerations on IoT4Industry leverage effects

IoT4Industry leverage effects are also to be considered on a wider scale. Indeed, the synergies described in the previous section are embedded in the overall picture.

National initiatives and regional programmes fostering innovation in the field of Industry 4.0 manage to define leverage effects (revenue growth, costs reduction for industries) and impacts on socio-economic parameters (job creation, investments, time-to-market, etc.). Given its format and scope the IoT4Industry project cannot rely on similar inputs and has to define its own indicators. An overview of such potential indicators (to be further refined in the next steps of the project) are provided in Table 5

**Table 5: other leverage effect indicators**

Target	Mean	Indicator
<b>EU Region ‘uncovered’ by IoT4Industry stakeholders (partners or ambassador) with <u>no</u> RIS3 priority on Industry 4.0</b>	Project dissemination (newsletter, website, events)	Number of IoT4Industry recipients of the newsletter beyond the areas ‘covered’ by a partner or an ambassador
<b>EU Region ‘uncovered’ by IoT4Industry stakeholders (partners or ambassador) with RIS3 priority on Industry 4.0</b>	<i>Same as above, plus:</i>	Number of IoT4Industry recipients of the newsletter beyond the areas ‘covered’ by a partner or an ambassador  Number of interactions with relevant initiatives and projects
<b>Ambassador cluster</b>	<i>Same as above, plus:</i>  Train the trainer sessions	Number of regions / entities having attended or watched train the trainer sessions



## 8. Conclusions and next steps

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This document provides an overview of the European, national and regional schemes fostering the implementation of Industry 4.0 solutions upon European member states and regions.

European policies fostering Industry 4.0 such as ESIF, H2020 funding or smart specialization strategies do complete (and influence on) national initiatives supporting the uptake of processes and technologies within industries. PPPs are also key initiatives in this environment.

Regional authorities, agencies, clusters and partnerships play an essential role in the implementation of all these initiatives along their own priorities. As such, these will have to be targeted by Industry project dissemination and more importantly associated to its developments.

IoT4Industry potential leverage effects identified could be important should such co-creation process be implemented within and beyond the partnership.

These outcomes are of high relevance for the project's next steps:

- Provide regional stakeholders (clusters, regional authorities, agencies, etc.) with a set of tools for further improving their approach towards Industry 4.0 stakeholders
- Designing a voucher scheme that inscribe itself in national / regional environments
- Implementing a tailored dissemination strategy fostering the wide outreach of the calls for projects
- Implement collaborative schemes that enable the maximization of successes / impacts of the projects implemented
- Provide IoT4Industry consortium with useful tools for measuring these impacts and assessing the leveraging effects implied by the implementation of the project





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## Annex A – Interview Guidelines

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### 1. Preliminary note to the interviewer

#### a. Frame of the interview

This interview is scheduled in the scope of the H2020 IoT4Industry project.

The overarching aim of IoT4Industry is to provide SMEs with vouchers for developing (feasibility study / prototype / demonstration) innovative solutions for fostering Industry 4.0 evolution.

*To be completed*

The interview should run according to the following logic:

- Greeting, thanks and recap of the context;
- Content oriented discussion;
- Wrap-up and preparation of next steps (invitation to the interviewee to remain informed about IoT4Industry)

#### b. Targets

Targets of the interviews are regional authority representatives / employees in charge of implementing industry 4.0 policies AND / OR ICT AND / OR advanced manufacturing policies at regional level.

#### c. Preparation of the Interview

In anticipation of the interview, appropriate desk research should be conducted to ensure the interview relies on an informed interviewer and that all interviews performed contribute to the development of consistent information.

The “organisation profile” (Annex 1) should be prepared in advance of the interview to identify any additional elements that may need to be addressed during the interview.

#### d. Timeline

Deadline	Action
17/05/18	Agreement on the distribution per partner / format of the interviews
18/05/18	Agreement on the content of the interview guide
21/05/18	Agreement on the list of interviewees
23/05/18 – 06/06/18	Interviews (possibly with intermediary review)
06 - 08/06/18	Completion of the interview guide with the info gathered
07/06/18	Discussion on the main info gathered



11 - 14/06/18	Integration to D1.3
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### e. Legend

In the scope of this document, all questions to be answered are indicated in tables.

- Questions with **brown** headers are to be answered by the interviewer;
- Questions with following background colours are to be answered by the interviewee
  - In **blue**, regardless of interviewee role
  - In **green**, should the interviewee be an ICT related interviewee
  - In **orange**, should the interviewee be an Advanced Material interviewee

### 2. Greeting, thanks and recap of the context (2 min)

Greeting, thank you, and recap on what IoT4Industry/the interview is about and why it is valuable. Reminder that the call / meeting will last approximately 20 minutes and that no confidential data will be shared. Confirm some basic organisation and mission information.

### 3. Interview protocol

Regional policy schemes for fostering Industry 4.0

<b>#1</b>	<b>What are the policy initiatives fostering Industry 4.0 in your region</b>
Answer	

<b>#2</b>	<b>What are the main Industry 4.0 business and innovation stakeholders in your region</b>
Answer	

<b>#3</b>	<b>According to you, what are the sectors to be prioritised in IoT4Industry-related policies in your region?</b>
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Answer	<input type="checkbox"/> Aeronautics	<input type="checkbox"/> Medical
	<input type="checkbox"/> Metalworking	<input type="checkbox"/> Consumer Electronics
	<input type="checkbox"/> Energies	<input type="checkbox"/> Mechanic/Mechatronics
	<input type="checkbox"/> Railways	<input type="checkbox"/> Marine
	<input type="checkbox"/> Textile	<input type="checkbox"/> Construction
	<input type="checkbox"/> Food & Beverage	<input type="checkbox"/> Additive manufacturing
	<input type="checkbox"/> Defense	<input type="checkbox"/> Other:

#### Funding and finance

<b>#4</b>	<b>What funding mechanisms do you know that support SME innovations related to Industry 4.0?</b>
Answer	

<b>#5</b>	<b>What are the regional initiatives for fostering the developments of IoT SMEs in your region?</b>
Answer	

<b>#6</b>	<b>What are the regional initiatives for fostering the developments of Advanced Manufacturing SMEs in your region?</b>
Answer	

<b>#7</b>	<b>Do you consider that the funding available is enough for successfully supporting Industry 4.0 market / innovation ?</b>
Answer	

<b>#8</b>	<b>What specific areas/activities do you think funding is still lacking for supporting Industry 4.0 market uptake ?</b>
Answer	



## Technologies / Advanced manufacturing

<b>#9</b>	<b>What are key advanced manufacturing technologies to be fostered for successfully engaging in Industry 4.0 process?</b>
Answer	
<b>#10</b>	<b>What are the ones you foresee?</b>
Answer	
<b>#10-bis</b>	<b>What are the ones you made?</b>
Answer	

## Technologies / ICT

<b>#11</b>	<b>What are key ICT / IoT technologies to be fostered for successfully engaging in Industry 4.0 process?</b>
Answer	
<b>#12</b>	<b>What are the ones you foresee?</b>
Answer	
<b>#12-bis</b>	<b>What are the ones you made?</b>
Answer	

<b>#13</b>	<b>Can you identify any regulatory, legal and administrative barriers to innovation diffusion and commercialisation of Industry 4.0 innovations ?</b>
Answer	
<b>#14</b>	<b>What services could be provided to overcome these barriers?</b>
Answer	

## Key takeaways (10 min)

Summary of the most significant drivers and obstacles for the business innovation under focus within its regional socio-economic, legal, sectoral and policy context. **It is important to outline the nature of the drivers and obstacles.**





#15	How could <b>business intermediaries</b> (e.g. clusters) support growth and innovation in your regions beyond existing / upcoming IoT4Industry services?
Answer	

#16	What, if anything, could national or European policy-makers do to support innovative organisations in their efforts to support SMEs developing Industry 4.0 solutions in your region? Is a European approach to be favoured over a national approach or vice versa?
Answer	

#17	<i>Among the following key services of the IoT4Industry project, which one(s) would you potentially be interested in?</i>
Answer	

#### 4. Wrap-up and preparation of next steps (3 min)

Thank the interviewee and close with the questions below.

Bear in mind to create a business bond that could be of benefit for both interviewee and interviewer in future initiatives.

#18	<b>Closing checklist</b>
Answer	<p>Can we contact you for <b>follow-up questions</b>? <input type="checkbox"/>Yes <input type="checkbox"/>No</p> <p>Can we use a picture of your organisation and <b>quote the interview</b> in the scope of IoT4Industry? <input type="checkbox"/>Yes <input type="checkbox"/>No</p> <p>Are you interested in a <b>training event</b> in the scope of IoT4Industry? <input type="checkbox"/>Yes <input type="checkbox"/>No</p> <p>Are you interested in <b>receiving more info</b> on IoT4Industry and would you be interested in being put on the mailing list? <input type="checkbox"/>Yes <input type="checkbox"/>No</p>

#### Organisation profile

<b>ID information</b>	
Name of the organisation	Name



	<a href="http://www.website.com">www.website.com</a>
Country / region	

Themes / areas	
Field of activity	Scope of the activities from the department (1-2 lines)
Geographical reach	Explanation of the geographical scope of activities
Stakeholders	
Main achievements	

Interviewee ID	
Name of interviewee	
Position	
e-mail / phone	

