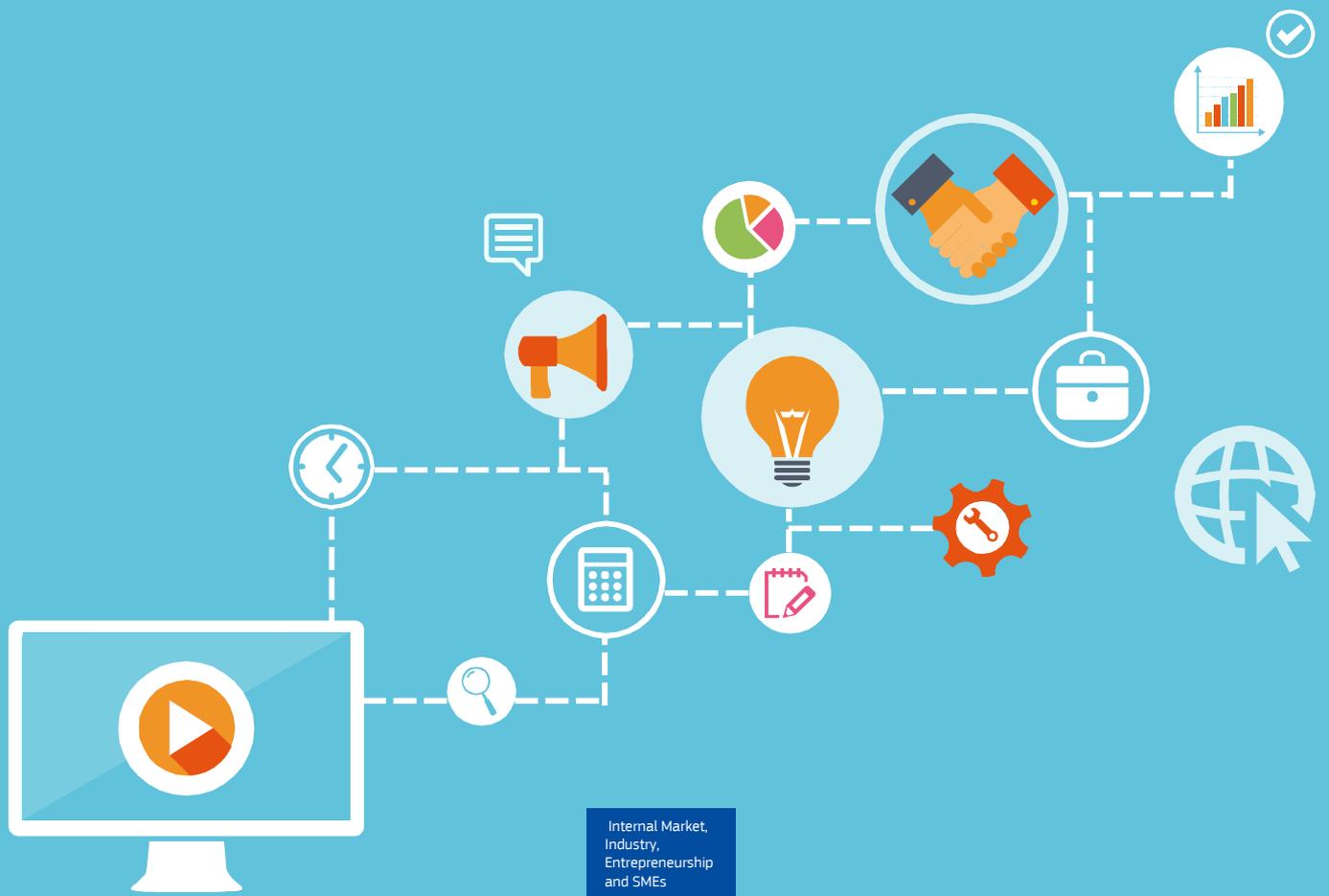




Digital Transformation Monitor

Key lessons from national industry 4.0 policy initiatives in Europe

May 2017





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Introduction

Boosting Industry 4.0 for the EU economy

Advanced technologies are currently fueling the so-called "fourth industrial revolution", 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.¹

The low adoption rate of digital technologies in enterprises – over 41% of EU companies have yet to adopt any of the new advanced digital technologies² – 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.³

National I4.0 policies 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 high-tech skills of their workforce. The present report explores the essential components of the national flagship I4.0 policies of Spain, UK, France, Italy, Germany, the Czech Republic, Sweden and the Netherlands.

Figure 1: Key facts of the national I4.0 policies

	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

While often united in their goals, the I4.0 policies differ in their policy design, funding approaches and implementation strategies. Although national authorities are aware of the I4.0 policies of their peers, a more systematic cooperation and exchange of good practices is missing.

Next to conducting a comparative analysis, the present report seeks to point out key lessons learned from industry 4.0 policies with a view to facilitate the exchange of good practice between EU Member States.

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Key characteristics of national Industry 4.0 policies

Overarching policy frameworks

Industry 4.0 policies are all part of an overarching framework or strategy, reflecting the priority status I4.0 enjoys in Europe. In particular, these wider frameworks or strategies lay out the overall vision and approach of the research, innovation and industrial policies.

For example, the French *Industrie du Future (IdF)* is linked to New Industrial France (NFI), while the Italian *Intelligent Factory Cluster (CFI)* was drawn up against the Italian Innovation Roadmap, a much broader strategy relating to the mega socio-economic challenges Italy is facing, e.g. climate change, scarcity of resources, demographic developments, etc.

The French and the Dutch cases identify very tangible reasons to launch the initiatives. In France, significant underinvestment and problems in developing competitive digital industries were the driving forces behind the policy. In the Netherlands, on the contrary, it was the relatively low share of employment linked to the manufacturing sector that led to the creation of *Smart Industry*.

In some of the countries, the policy initiative is a direct result of an overarching national framework, strategy and/or agenda.

The German *Industrie 4.0* started as one of the 10 future projects under the *Action Plan High-Tech Strategy 2020*.

In the case of Spain, it was the digital part under the Agenda for Strengthening the Industrial Sector which gradually transformed into *Industria Conectada 4.0*.

Meanwhile, HVMC in the UK shows how the government acted on the recommendation of the policy strategy to set up a series of technology centres in different industries.



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Objectives of analysed policies

Member States' I4.0 policies show great overlaps in the objectives and targets they follow. The majority of policies aim at strengthening the respective country's industrial competitiveness and modernisation and better ensuring the sustainable growth of the manufacturing sector. Regularly, economic objectives are combined with social and environmental objectives.

Notwithstanding the common goals, the policies show some variation in how these economic objectives are to be achieved. Most countries, above all Germany, focus on gaining higher productivity and greater efficiency.

Delivering next-generation technologies (Italy, UK), developing new products and improving industrial processes (Germany, Italy) providing support to SMES for innovation and commercialisation (UK, France and Spain) also feature amongst the more prominent goals.

Although Industry 4.0 policies often have common goals, they all possess elements giving each policy a unique touch. The French and Spanish initiatives both take a market-based approach providing loans to companies participating in the programme.

In the case of Spain, the cost covered by the loan depends on the action line and type of company ranging between a cost coverage of 25% to 70%. The French IdF combines a broad range of funding instruments, e.g. loans and tax incentives with private investments in R&D.

Sweden's P2030 is driven and financed heavily by industry ensuring industrial impact and long-term sustainability. Meanwhile, the unique element in the UK concerns the provision of industrial scale technology and expertise to companies to de-risk innovation through seven technology centres.

Facilitating the cooperation between industry, research and public authorities and/or between the regional and national actors is a major theme.

In France, IdFA's platform facilitates the collaboration between public and private industry and technology stakeholders, whereas the German Industrie 4.0 allows policy-makers to push forward leadership in I4.0 issues at all governance levels. The Italian CFI, on the other hand, integrates regional and national I4.0 policies in line with EU guidelines.

Figure 2: Strategic and technology focus

	Strategic focus	Technology / sector focus
	Deployment	Transport, IoT, artificial intelligence, Big data, HPC, Digital trust, healthcare, smart cities
	Deployment	Cyber-Physical Systems, IoT
	R&D	Generic
	Deployment	Generic
	Mixed	Digital platforms, Big data, Collaborative applications
	Deployment	Generic
	Deployment	Aerospace, Automotive, Chemicals, Nuclear, Pharma, Electronics
	Deployment	Generic

Focus and impact areas

Although all the examined policies involve conducting research on Industry 4.0 topics, priority is given to accelerating the deployment and application of I4.0 technologies. Only the Italian CFI has a stronger focus on research, notably on the development of new technologies to meet the challenges of manufacturing innovation.

Furthermore, there is no clear technology or sectoral focus of the examined national policies. While Internet of Things (IoT) / Cyber-physical Systems (CPS) are the most common technology focus areas, they are only specifically targeted by the German and French policies. At sectoral level, clear patterns are non-existent. What this shows is that the national flagship initiatives in I4.0 tend to be relatively open with regard to the application of specific technology or sectoral areas.

Increased sustainability of production is a common impact area targeted by the Swedish and Italian initiatives. Meanwhile, Spain seeks to provide information and implementation support to companies to better exploit the opportunities provided by Industry 4.0. In the Netherlands, more flexibility in production volume, efficiency, costs and meeting customer needs are the main expected impacts.

Sources of funding

While the major national I4.0 policies significantly rely on public funding, complementary private investments are also important with the leverage effect being considerable.

However, the volume of the multiplying leverage effect on investment among the examined initiatives is subject to large differences. Similarly, the measures adopted by the initiatives to ensure private investments vary in terms of type of action and comprehensiveness.

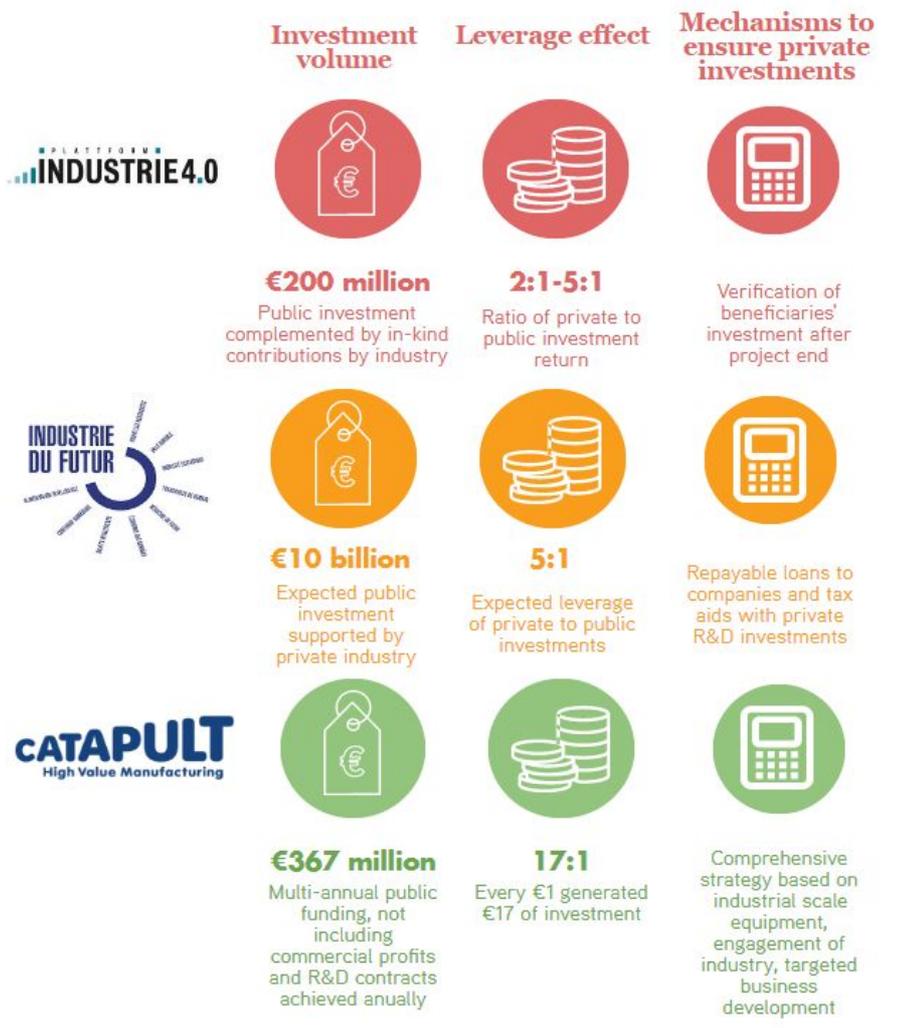
What is more, information on the expected private leverage is not equally available for all the initiatives, hampering meaningful comparison between the policies.

The HVMC in the United Kingdom underwent a comprehensive assessment of the leverage effect on public investment. With a leverage of 17:1, the HVMC exceeds the leverage of any other initiative by more than threefold. To a great extent, this success can be attributed to the significant amounts of commercial income the HVMC has been able to secure through competitive R&D contracts.

Despite the difficulties to assess the success of the initiatives in boosting private industry investments, it is evident that the scope of the measures taken vary. *L'Industrie du Futur (IdF)* and the *High-Value Manufacturing Catapult (HVMC)* have put in place the most encompassing measures. IdF provides tax incentives for private R&D investments. Moreover, HVMC provides strategic engagement with key industrial partners and dedicated support schemes for SME engagement.

While mechanisms are indeed put in place to better ensure private investments – i.e. the encouragement or requirement of private investments – the national initiatives would benefit from a more rigorous integration of private investment considerations into the policy design.

Figure 3: Public and private investments



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Results and outcomes

The national I4.0 policies in Europe have produced tangible qualitative and quantitative outputs. Tangible quantitative results and outcomes are – at this point in time – provided by half of the examined policies, notably in the case of France, the Netherlands, Sweden and the United Kingdom.

Within IdF in France, more than 800 company loans and 3400 diagnoses have been realised, whereas the Swedish P2030 funded 30 projects with participation of over 150 businesses. Meanwhile, for the German I4.0 initiative, qualitative results stand-out, such as reduced industry segregation, the transformation of research into practical applications and the creation of the platform's reference architecture with 150 members.

Regardless of the significant results achieved, the lack of established clear

targets – annually or multi-annually – often means that it is unclear whether the policy objectives have been met.

The British HVMC is once again an exception, since the initiative has set up clear targets and monitoring and evaluation cycles. The results from the comprehensive evaluation study show that the value of innovation work represented 123% of the original target in 2013-2015.⁴ This indicates that the demand for services and support exceeds initial expectations by far.

Implementation and governance approach

Next to overarching strategies or roadmaps defining the objectives and main action steps, the use of call for proposals, working groups, in-depth stakeholder consultations and steering committees is wide spread. In some initiatives, supplementary initiatives were deployed for coordinated implementation.

In order to finalise the policy design and start the roll out, stakeholder consultations and call for proposals are heavily relied on. In Spain, stakeholder consultations were particularly comprehensive. During a process of almost 5 months, CI 4.0 held a series of workshops and meetings involving all types of stakeholders. In addition, three large industry partners – Santander, Indra and Telefonica – helped to set up the strategy and governance model.

In Sweden, the use of expert groups contributed to developing new content and input for open calls, as well as drawing up visions and propose new initiatives. For strategic reasons, these expert groups are led by one or two young academic researchers. This supports long-term collaboration, since it provides the young academic leaders, who are likely to become institute or department directors, with links to industry.

Figure 4: Results/outcomes vs. budget

Country	Title	Budget	Results achieved
France	Alliance pour l'Industrie du Futur	Approx. 10 billion of public funding and industry contributions	> 800 loans to companies; 3400 company assessments for modernising production, >300 experts identified; involvement of 18 regions
Germany	Plattform Industrie 4.0	€200 million complemented by financial and in-kind contributions from industry	Reducing industry segregation; transforming research agenda into practice, developing reference architecture & launch of platform with 150 members
Netherlands	Smart Industry	Around €25 million for 2014-2017 period complemented by co-financing by industry	Setting up 14 field labs by the end of 2016: each field lab has a turnover of €250.000 to €4 million annually.
Sweden	Produktion 2030	€25 million offered by VINNOVA for 2013-2018 period and approx. €25 million from industry	Funded 30 projects, involved over 150 businesses, set up a PhD school and obtained 50% industry co-financing for every activity and instrument
Italy	Intelligent Factory Cluster (CFI)	€45 million based on €34 million in public funding and €11 million in private funding	Creating a platform and manufacturing community and implementing four priority research projects
Spain	Connected Industry 4.0	€97.5 million for project calls for 2016; €78 million from additional related programmes	Set-up of innovation and research programme in June 2016 and pilot of enterprise support programme
United Kingdom	HVM Catapult (HVMC)	€164 million in public funds for 2012-2018; for 2015/16: €79.7 million commercial income; €61.3 million public; collaborative R&D €62 million	Value of innovation work represented 123% of the target; Every €1 of public funding generated €17
Czech Republic	Průmysl 4.0	NA	NA

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Learning from national I4.0 policies

Policy dimensions

In terms of the first policy dimension, financing, the majority of the national I4.0 initiatives examined are primarily financed through public means. However, private sector co-financing has played a part.

Secondly, national Industry 4.0 initiatives tend to focus on technology and infrastructure, with skills development as a secondary goal. A notable exception is Sweden's Produktion 2030 programme – which includes a National Graduate School in Production.

Apart from Sweden, Průmysl 4.0 in the Czech Republic equally shows a greater orientation on skills for manufacturing, in particular in terms of digital skills.

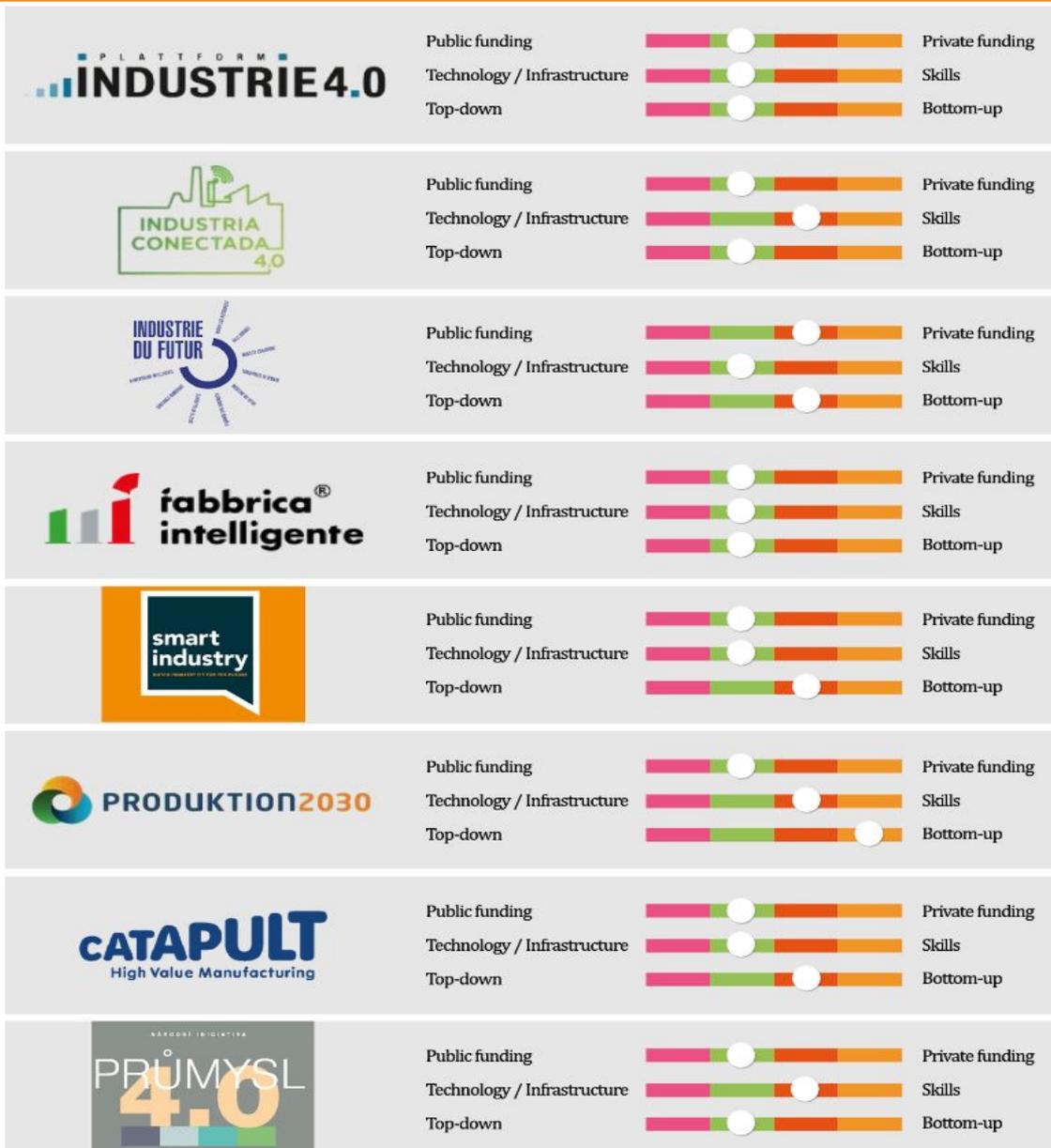
In terms of the third policy dimension, governance and implementation, most of the national I4.0 policies examined essentially adopted a top-down approach to designing, initiating and implementing the initiatives.

What this means is that while other stakeholders have been consulted and played a part in the implementation of the policies, the relevant national governments are in the driver seat.

A notable exception is Sweden's Produktion 2030 programme – where industry, academia and research groups have responsibility for the design and operation of the initiative, on top of significant industrial co-financing.

The Dutch Smart Industry (SI) is another exception. SI is grounded on the Triple Helix principle and bottom-up approaches, with involvement of industry, universities and research partners and the public sector in the agenda setting and the execution of core activities.

Figure 5: Policy dimensions



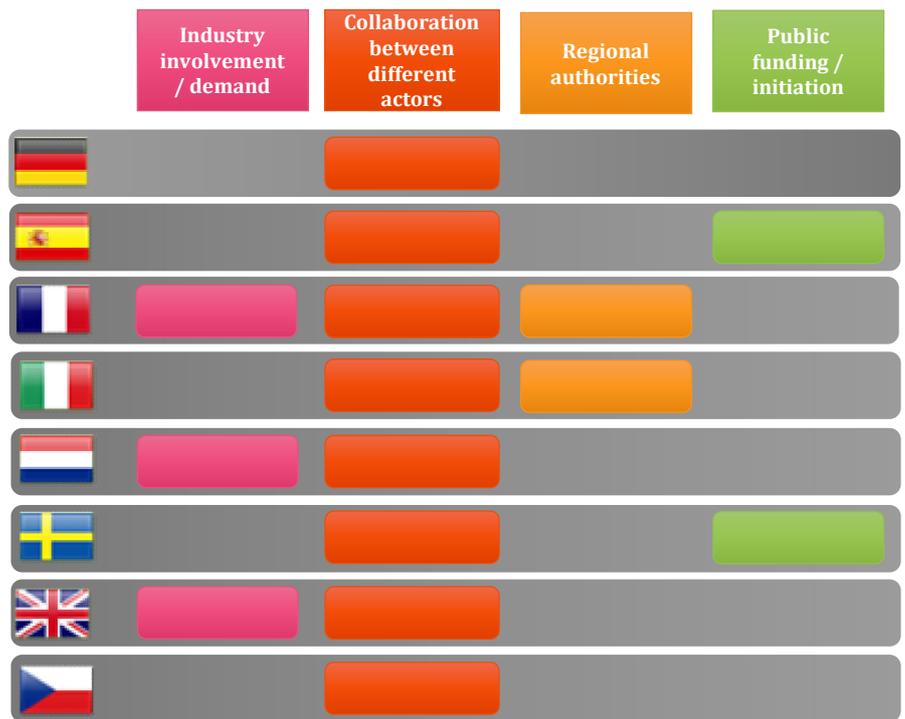
Driving factors of I4.0 policies

Collaboration between different actors is a common driving force among the national I4.0 policies examined. While the majority of this collaborations is between different actors and across various governance levels, the HVMC has set up an effective mechanism to facilitate cross-centre collaboration: Catapult's cross-centre forums. In these forums, representatives from all the centres collaborate to identify technology challenges and opportunities that can be addressed by leveraging the combined capability of the HVMC centres. In addition, there is a dedicated budget to support cross-centre technology projects.

In general, the participation of diverse actors is a defining strength of the national I4.0 policies. The collaboration with industry actors/stakeholders is most frequently cited as a driving force by the implementing authorities. In some cases, industry proactively encouraged the creation of the initiatives – for example, in the Netherlands and in France – giving the initiatives additional impetus.

The involvement of regional authorities which are engaged in adopting I4.0 strategies at regional level – often in the framework of smart specialisation strategies – regularly allowed for greater policy alignment between the national and regional level.

Figure 6: Driving factors behind I4.0 policies



Last but not least, the initiative of public authorities in pushing forward the I4.0 policies is also among the key drivers. The public impetus can be particularly useful when industries are too segregated or fragmented to reach consensus among industry actors. The example of *Industrie 4.0* in Germany shows how a large I4.0 platform can reduce industry segregation and improve networking.



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Barriers facing I4.0 policies

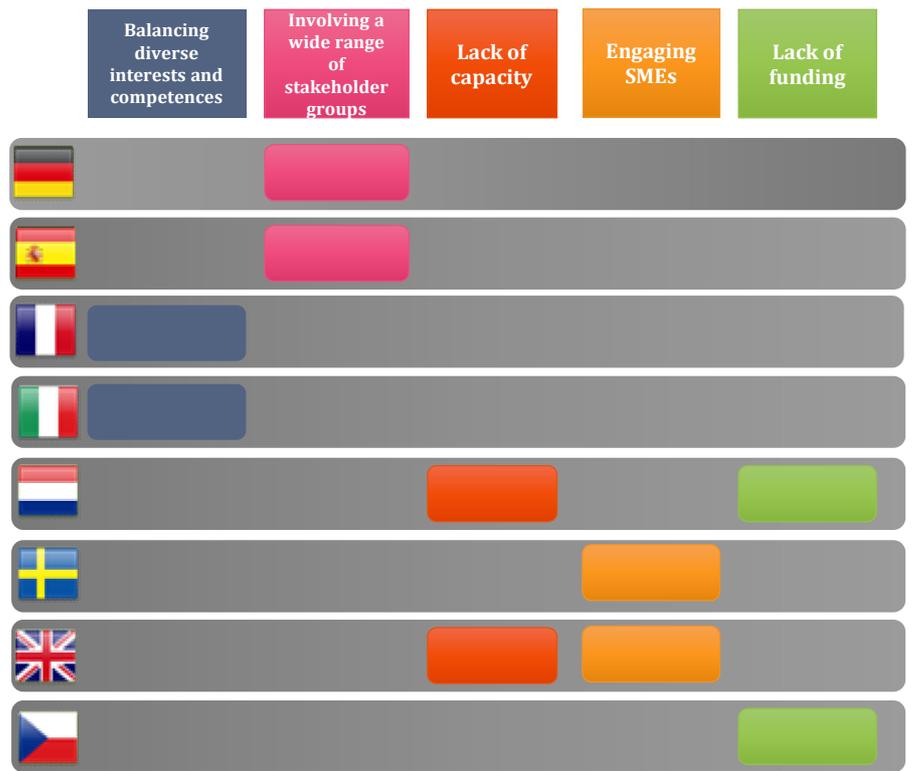
No particular barrier stands out as a common denominator for the national I4.0 policies examined. Instead, a range of different aspects arise. Resource deficiencies and effective engagement of SMEs have challenged the implementation of the initiatives. Like any other large-scale policy project, initial public funding is crucial for I4.0 policies to pick up speed and build up the capacities needed for effective programme operations.

In the Netherlands, a reduction in allocated resources calls into question whether a programme office of seven part-time workers can create enough impact to live up to the ambitious objectives of the initiative. In the Czech Republic negotiations over the budget allocation are still ongoing.

The capacity bottlenecks of HVMC, on the other hand, were overcome thanks to the responsiveness of the UK government to increase funding. Furthermore, effective SME engagement has been challenging for both HVMC and P2030 in Sweden. One well-known issue concerns the limited capacities of SMEs to fully participate in the often resource intensive engagement.

In response to this challenge, a dedicated SME engagement programme – HVM REACH - was established within HVMC. In Sweden, experience has shown that while large companies are often familiar with the process of obtaining financing, SMEs need more support on applying for funding.

Figure 7: Barriers facing I4.0 policies



I4.0 policies from a SWOT perspective

The results of the SWOT analysis of the examined national I4.0 initiatives show low degrees of convergence. With regard to the main strengths identified, the applied support to companies, the alignment of different policy governance levels as well as industry co-financing emerge as core aspects.

On the contrary, the main weaknesses identified are closely related to the barriers. Limited funding, lacking capacities, weak planning and monitor mechanisms and challenges to engage SMEs in the programmes define the key weaknesses of the examined I4.0 policies. In France, there are doubts over the ability to measure in a robust way the policy’s achievements. The Spanish initiative, at present, lacks the definition of clear targets and milestones.

Meanwhile, I4.0 policy opportunities mainly reflect on the potential for scalability and transferability, and the new market and international cooperation opportunities. In Sweden, the potential for upscaling the production school at Nordic level provides new opportunities. Meanwhile, in Italy, the announcement of a brand new Industry 4.0 funding instrument will open up new opportunities for companies.

On the threats side, the insufficient scale-up and imbalances between governance levels and different industrial and sectoral interests stand out. Unusually, the HVMC is struggling to maintain its balanced funding model, as profits have by far exceeded expectations. The balanced funding model is important to ensure the right balance between encouraging risk-taking and stimulating innovation in areas that benefit industry.



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Policy-relevant conclusions

Key policy lessons learned

The policy lessons learned from the national Industry 4.0 initiatives examined show minor commonalities. The French *IdF* integrated lessons learned from the precedent NFI into its policy design. Above all, this concerns the network structure of the *IdFA* platform – involving industry, technology and research stakeholders as well as trade unions – which is considered critical for the policy's success. In addition, a perceived gap to cover digital solutions was closed by involving digital stakeholders in the project implementation.

In Sweden, the focus areas of EFFRA – as well as ideas and concepts from the Finnish SHOK programme – inspired the programme's set-up. However, the Swedish authorities developed a more bottom-up model driven essentially by industry and research stakeholders.

In Germany, lessons learned from the policy includes experience to extend the network and common norms and standards of network members, with a view to reduce competition. A second lesson included the need to provide targeted funding instruments as well as testbeds to engage SMEs more effectively. Targeted approaches for SMEs also included specialised support in integrating SMEs into I4.0 and global value chains, since SMEs are often less prepared for technological adjustment, due to a lack of specialist staff or unfamiliarity with new technologies.

The regional focus and field lab approach provided interesting perspectives in the Netherlands. The close proximity between companies and field labs and the operation of field labs in different regions underlined the emphasis on facilitating access to knowledge.

The lesson learned from the Italian CFI concerns the strategic role of clusters to define industrial policy. Since industrial policy is highly fragmented in Europe – compared to the U.S. and China – a specialised cluster can serve to inform policy-makers on more technical policy needs.

A primary lesson learned from HVMC emphasises the value of “late-phase” innovation for economic growth. This is where industrial scale technology can serve as a success factor. Moreover, the employment of around 2000 workers by the centres composed of engineers and scientists gives the initiative a real critical mass to develop a community of experts in the UK. Finally, the balanced funding model decreased the risk of the operation to realise a long term commitment to improve innovation.

Cross-cutting issues for effective I4.0 policies

In the course of the comparative policy analysis, the following cross-cutting issues are recurrent:

- I4.0 policies greatly benefit from setting up clear objectives with measurable targets / milestones supported by qualitative and quantitative indicators, as well as rigorous monitoring and evaluation mechanisms.
- While public funding is essential, private co-financing of I4.0 policies is also very important. Therefore, policy-makers should foresee measures to ensure private financing – in voluntary or mandatory form. Similarly, the leverage effect of public investments that can elevate the impact of policies should be considered to overcome the challenges to monetise R&D outcomes in viable EU commercial applications. A higher degree of co-financing from industry actors is desirable to increase the sustainability of the initiatives.
- Industry driven approaches (or bottom-up participation) – instead of applying a top-down governance approach – giving a greater say to involved stakeholders – can better ensure the more active involvement of industry stakeholders.
- More innovative and close-to-market funding instruments, e.g. business loans and tax incentives should also be considered.
- Effective engagement of SMEs often requires a more customised approach, i.e. the provision of specific funding instruments.
- Slow implementation speed of projects can reduce the chances to achieve critical mass,
- The trend is to create large, multi-stakeholder platforms, but most of the initiatives examined are more oriented towards increasing technological deployment or uptake, i.e. support programmes closely aligned to the digital transformation needs of companies.

A need for coordination at EU-level

Given the enormous potential of Industry 4.0 policies, it is essential that Europe leverages its combined know-how to fully exploit the benefits of advanced technologies. While EU funding on topics of I4.0 is provided through several research programmes, better coordination at EU level of national policy efforts allowing for effective knowledge and best practice sharing seems indispensable.

A first step in this direction would be to create a forum to ensure that valuable policy lessons are identified, collected and disseminated across Member States and industries. In a second step, an online inventory of available Industry 4.0 and digital transformation policies could help ensure that targeted beneficiaries are aware of the entire set of measures and funding instruments available in Europe – beyond the national flagship initiatives.

References

¹ Strategic Policy Forum on Digital Entrepreneurship (2016). Accelerating the digital transformation of European industry and enterprises. Available at: <http://ec.europa.eu/DocsRoom/documents/15856/attachments/1/translations/en/renditions/native>

² *ibid.*

³ Digital Transformation Scoreboard 2017: Evidence of positive outcomes and current opportunities for EU businesses. Available at: <http://ec.europa.eu/DocsRoom/documents/21501/attachments/1/translations/en/renditions/pdf>

⁴ Warwick Economics & Development (2015) High Value Manufacturing Catapult - Pathways to Impact.

5 Annexes

Annex I - Overview of examined I4.0 policies

Country	Title	Focus	Objectives	Target audience	Funding model / private financing	Budget	Results achieved
France	Alliance pour l'Industrie du Futur	SME diagnostics and modernisation incentives; Development of the national offering; Showcase pilot projects; Development of advanced manufacturing techniques	To modernise the French production base and production tools and support the use and integration of digital technologies to transform companies and business models; to create new sources of growth and jobs	French industry and production base and in particular SMEs and mid-caps	Mixing public funding instruments as loans and tax incentives with private investments in R&D and production lines; a private leverage effect of five times is expected	Approx. 10 billion from public sources, including IftF funding from 2017 onwards, supported by private funding	Provided loans to over 800 companies, supported 3400 companies with a diagnosis for modernising production, identified over 300 experts and involved 18 regions in the process
Germany	Plattform Industrie 4.0	Technological innovation based on the main pillars such as horizontal integration along value networks, end-to-end engineering, vertical integration including security aspects and considering new ways of working and education.	To drive digital manufacturing forward by increasing digitisation and the interconnection of products, value chains and business models; to support research, the networking of industry partners and standardisation.	Producers, SMEs and policy-makers	Mixing public funding with private financial and in-kind contributions; offering between a 2:1 or 5:1 ratio between private to public investment	€200 million from BMBF and BMWI, complemented by financial and in-kind contributions from industry	Reducing industry segregation, transforming research agenda into practice, developing reference architecture and launch of platform with 150 members
Netherlands	Smart Industry	Acceleration of the introduction of ICT in manufacturing and adaption of business value chains; Capitalising on existing knowledge	To ensure the Dutch industry is prepared for the technological changes ahead.	Business community in general, specific focus on high-tech industry, chemical, agro-food and logistic sectors	Combining public funding from state and European regional development budgets with financial support and in-kind contributions from industry	Around €25 million for 2014-2017 period complemented by co-financing from industry	Setting up 10 fields that will be extended by 14 field labs by the end of 2016: each field lab has a turnover between €250.00 to €4 million on a yearly basis
Sweden	Produktion 2030	Develop leadership and skills in sustainable production	To ensure that by 2030 Sweden is the primary choice for sustainable production	Research institutes, universities and companies / SMEs from industry and service fields	Public funding and co-financing from industry - typically required to finance around 50% of project costs in research projects	€25 million offered by VINNOVA for 2013-2018 period, complemented by approx. €25 million from industry	Funded 30 projects, involved over 150 businesses, set up a PhD school and obtained 50% industry co-financing for every activity and instrument

Annex I- Overview of examined I4.0 policies (cont.)

Country	Title	Focus	Objectives	Target audience	Funding model / private financing	Budget	Results achieved
Italy	Intelligent Factory Cluster (CFI)	Focus on the research topics for new sector and products development (sustainable manufacturing, adaptive manufacturing, smart manufacturing and high performance manufacturing); Support technology transfer, knowledge and infrastructure sharing.	To propose, develop and implement a strategy based on research and innovation, able to direct the transformation of the Italian manufacturing sector towards new products, services, processes and technologies.	Organisations of the intelligent factory ecosystem incl. large companies, SMEs, universities, research centres, etc.	Mainly publicly funded, yet envisaged process towards equal funding model	€45 million based on €34 million in public funding and €11 million in private funding	Created a platform and manufacturing community, and implemented four priority research projects
Spain	Connected Industry 4.0	Increase industrial added value and skilled employment in the sector; develop the local supply of digital solutions; develop differential competitive levers to favour the Spanish industry and boost exports.	Industry upgrading for economic sustainability; Manufacturing efficiency for environmental sustainability; Quality employment for social sustainability	Enterprises with industrial activity, in particular SMEs and micro-enterprises	Public-private partnerships, Loan and direct aid based system to ensure participation of the private sector with expected leverage effect of 1:2	€97.5 million in connected industry project calls for 2016; related programmes provide additional €68 million (loans and direct aid) for ICT companies and €10 million for innovative clusters	Set-up of innovation and research programme in June 2016 and pilot an enterprise support programme
United Kingdom	HVM Catapult (HVMC)	Support businesses in the field of high value manufacturing. i.e. a high level of R&D intensity, leading to significant growth	Drive growth of manufacturing within UK	Business, industry and research organisations	Funded to equal terms by public, business and joint public-private funding; share of commercial income 40% in 2015/2016 financial year	€164 million invested by UK Government over 2012 – 2018 period; for 2015/16: €79.7 million commercial income was obtained against €61.3 million public funding; collaborative R&D est. at €62 million	Value of innovation work represented 123% of the target; Every €1 of public funding generated €17
Czech Republic	Průmysl 4.0 (Industry 4.0)	Skills and technology focus	To adapt the education system and labour market to the needs of Industry 4.0 and manufacturing specific digital skills	Business associations, businesses; trade unions	Mainly driven by the public; funding allocation still unclear	N/A	N/A

About the Digital Transformation Monitor

The Digital Transformation Monitor aims to foster the knowledge base on the state of play and evolution of digital transformation in Europe. The site provides a monitoring mechanism to examine key trends in digital transformation. It offers a unique insight into statistics and initiatives to support digital transformation, as well as reports on key industrial and technological opportunities, challenges and policy initiatives related to digital transformation.

Web page: <https://ec.europa.eu/growth/tools-databases/dem/>

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