

# Baseline study: Wales

Innovation policy mix for Advance Manufacturing  
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for Advance Manufacturing

Orkestra – Basque Institute of Competitiveness  
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# Innovation policy mix for Advanced Manufacturing

## Baseline study: Wales

### 1. Introduction

This report has been elaborated as part of Manumix Interreg, a project that aims at strengthening and improving the effectiveness and efficiency of innovation policy-mixes for Advance Manufacturing (AM) at regional level through evaluation. The project is developed in partnership by governments and institutions in the Basque Country, Lithuania, Piedmont and Wales. Specifically, the consortium of the project is composed by the Basque Government, MOSTA – Lithuanian Higher Education Monitoring and Analysis Centre, FinPiemonte and Welsh Government.

The first phase of the project includes the development of a baseline study to analyse the innovation policy mix of partner regions, its governance and evaluation practices. One report has been developed for each region, as well a general comparative study. These documents have been elaborated by Orkestra with active collaboration and involvement of partner regions, by providing the core information that is analysed and summarised in the baseline studies. The studies have been elaborated based on secondary sources, interviews with partner regions representatives and/or other stakeholders, a survey filled by policymakers and a survey filled by beneficiaries of programs (in Piedmont and Basque Country). In the case of Basque Country, an additional workshop with beneficiaries has been carried out.

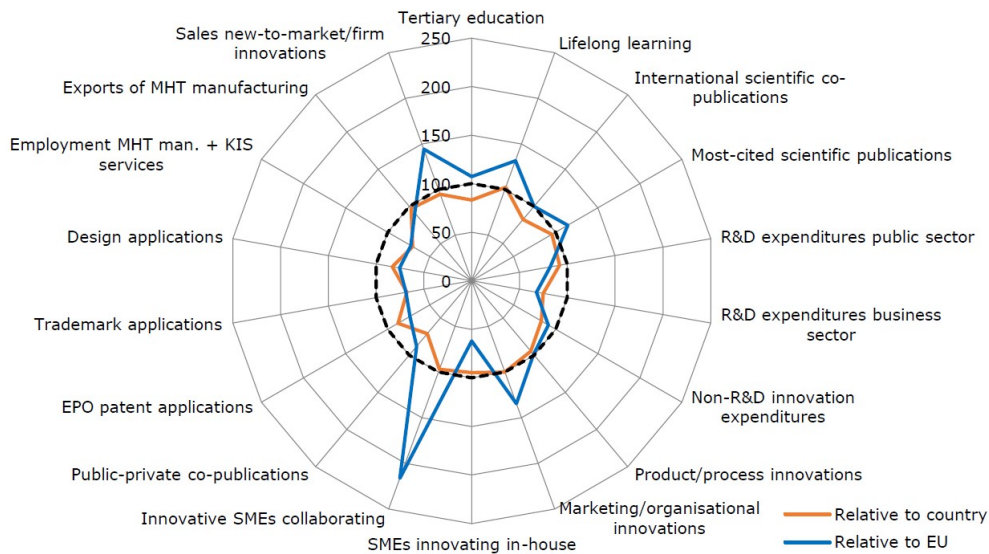
This report presents the main features of the innovation policy mix for AM in Wales. The report is structured as follows. Section 2 presents a general overview of the regional innovation and institutional context. Section 3 defines the scope and challenges of Welsh AM strategy and Section 4 provides an overview of its governance. Section 5 delves into the innovation policy mix for AM and the selected policy-mix for Manumix. Section 6 draws on the evaluation practices for AM strategy and the policy-mix. Finally, Section 7 includes the conclusions of the baseline study.

### 2. Regional context

Wales is a region/country located in the West of United Kingdom. With a population of about 3 million inhabitants and a population density of 150 inhabitants per km<sup>2</sup> is not a very populated area of the United Kingdom. It has always been considered a lagged region with respect UK average and European average but its performance in terms of innovation has been stable over time.

The last version of the Regional Innovation Scoreboard (2017) classifies Wales as a strong innovator and indicates that innovation performance has remained stable over time. The graph shows the comparative Welsh strengths with respect to the United Kingdom and European Union, also showing the regional weaknesses. Therefore, the Welsh strengths are mainly concentrating on lifelong learning, innovative SMEs collaborating and citations in

scientific publications (only with respect to the European Union) and weaknesses on the R&D expenditure, both at the public sector and business sector but with a higher incidence on the last one.



Source: Regional Innovation Monitor (2017)

The main socioeconomic indicators are shown in Table 1, in which we can observe the relative higher weight of employment in agriculture, manufacturing and public administration sector with respect to the UK, which is a sign of the Welsh specialisation. GDP per capita data also indicates a lagging situation with respect UK and EU 28 but growth rates shows a convergence tendency for that issue.

Table 1: Main socioeconomic indicators of Wales

	Wales	UK	EU28
Share of employment in			
Agriculture & mining	2.2	1.5	5.1
Manufacturing	10.8	9.8	15.5
Utilities & Construction	9.6	8.6	8.5
Services	68.8	73.0	63.2
Public Administration	7.4	6.3	7.1
GDP per capita (pps) 2014	20800	29900	27600
GDP per capita growth (2010-2014)	2.42	2.30	2.00
Population density, 2015	150	269	117
Population size 2016 (000)	3110	65380	510280

Source: Regional Innovation Monitor (2017)

- Innovation policy context: Regional competencies (centralisation/decentralisation), institutional quality index (Charron et al.2015). Competencies with regards innovation policy. Brief summary of the regional innovation policy history until RIS3.

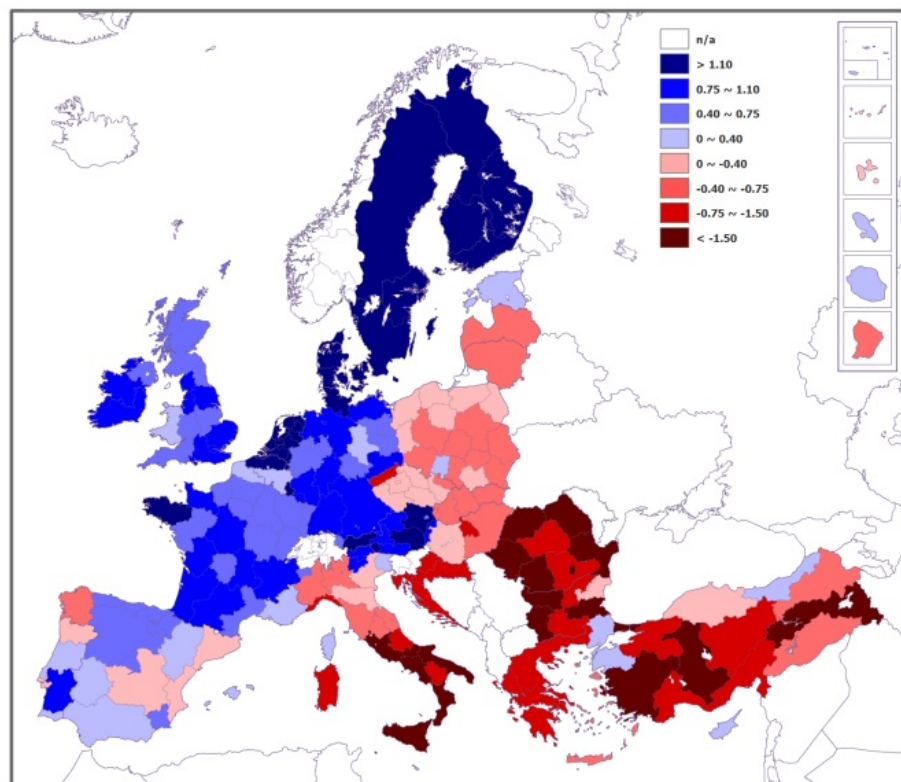
## Devolved Competencies

Wales is a self-governing and constituent country of the United Kingdom and has a directly elected legislature, the National Assembly for Wales, and a government, the Welsh Government that acts as an executive arm. This devolution of competences makes Wales an autonomous country to design and implement certain policies and instruments but they also have to be coordinated and embedded in the national governance structure.

In addition to the national coordination mechanisms and governance structure that Wales has put in place and affect to innovation policy, as we will see afterwards, it is important to highlight that its lagging characteristic makes Welsh innovation policy very dependent of European Regional Development Funds and a large share of regional funds dedicated to innovation comes from this funds. Therefore, Brexit agreements and consequences will highly impact innovation policy in Wales. Wales is working closely with UK Central Government to identify regional opportunities within innovation as part of developing the Industrial Strategy post Brexit.

## Institutional Quality Index

The European Quality of Government Index (EQI) is the result of a novel survey data on corruption and governance at the regional level within the EU, conducted first in 2010 and then again in 2013. The data focus on both perceptions and experiences with public sector corruption, along with the extent to which citizens believe various public sector services are impartially allocated and of good quality.



- The EQI 2013 contains 206 regions based on a survey that was answered by 85,000 citizen respondents. The data is standardised with a mean of zero, and higher scores implying higher quality of government; Wales has a score of  $-0,389$  and is ranked as the 107 region (UK is ranked 67). It is also worth mentioning that in 2010, Wales ranked in this index the 76 region so its position has been deteriorated in the last years.

## Regional innovation policy Strategies

Wales was one of the first regions in Europe to produce a Regional Technology Plan in 1996. This was superseded by Wales for Innovation in 2003. Both the Regional Technology Plan and Wales for Innovation gave a commitment to supporting innovation in Wales.

In 2012, the European Commission invited each region across Europe to develop a Research and Innovation Strategy for Smart Specialisation to identify a region's particular strengths. A Smart Specialisation Strategy (S3) seeks to identify and prioritise fields or areas where a cluster of activities could be developed. It is not a planning doctrine that forces a region to specialise in a particular set of industries, but an approach to policy which considers those activities that are already strong or showing promise within a region which can benefit from more research and innovation.

In 2013, the Welsh Government adopted the Smart Specialisation methodology to develop "Innovation Wales" which aims to recognise Wales' strengths and define future research and innovation priorities.

The main priority areas identified in Innovation Wales are based on the strengths in four challenge areas:

1. Life sciences and health
2. Low carbon energy and environment
3. Advanced engineering and materials
4. ICT and the digital economy

In terms of innovation policy and its application to Advanced Manufacturing Strategies the main challenges for Wales could be stated as follows (Thomas and Henderson, 2016; among others):

- Leveraging R&D level in the region: Business performance on R&D is limited as compared to UK and EU average and this is one of the main weaknesses of Wales.
- Size of the companies: mainly SMEs although there are leading companies with base in the region (need to anchor their investments in the region). There is also a need of anchoring Regional Important Companies (RIC).

- Key challenge in leveraging the supply chains from these anchor companies & RICs, and upgrading their activities
- Position in the global value chain: Companies in the region are mainly SMEs and mainly TIER 2, 3, and therefore dependent on TIER 1 needs. Upgrading companies' position in the global value chain is one of the challenges to this respect.
  - Reinforce the participation in Horizon2020. Advanced Manufacturing companies and research organisations performed really well in FP7 and European funds are really an additional push to the development of Advanced Manufacturing area. Indeed, Cardiff University is a clear leader in H2020 projects, but for firms the first port-of-call for innovation support is the Welsh government. Consequences of Brexit are still an area to discuss and effects will be seen in the following years.

Therefore, size of the companies, their low investment in R&D, their position in global value chains and dependence of European funds are the main challenges for regional innovation policy in general and advanced manufacturing in particular.

To conclude, main features of regional context are summarized in Table 2.

Table 2. Features of regional context

<b>Degree of general regional autonomy and innovation policy</b>	Devolved competences: Strong dependence on EU funds.
<b>Set-up of regional governance system</b>	Strong focus on Welsh Government but with additional governance mechanisms for certain policy domains and areas, such as innovation policy.
<b>Nature of the process of RIS3 development</b>	Consultation and participatory process developed through wide stakeholder involvement.

Source: own elaboration

### 3. What is Advanced Manufacturing in regional context?

Advanced Manufacturing is defined in Innovation Wales, Wales' S3, as advanced engineering and materials. Welsh weight on manufacturing (almost 5% of UK's manufacturing exports) is reflected in this priority. The specific sectors that compose this specialisation are Aerospace, Automotive, Electronics, Medical, Defence, Food, Rail, Technology and Materials. Despite manufacturing employment in Wales and across the UK has been in decline, the sector employs in Wales approximately 150,000 people with over 5,000 companies, 97% of which are SME's.

Some special interest has the aerospace and automotive sectors in Wales, not only for the weight of these sectors in the region but also for the presence of key anchor firms such as Ford, Toyota and Airbus and also a wide range of tier suppliers.

Some challenges have been identified for growing the manufacturing sector, which includes being competitive against the relatively lower labour rate economies such as BRIICS (Brazil, Russia, India, Indonesia, China and South Africa) and the ability to develop technology- based solutions through supply chains and innovation.

The Advanced Manufacturing Strategy identifies 5 priorities (Welsh Government):

- globalisation – increasing trade, export and inward investment opportunities from existing and emerging markets
- innovation and technology – encouraging and supporting Research and Development in innovative products and processes to increase and embed 'intellectual capital' in Wales
- employment – 'future proofing' education, skills, training and leadership to meet the demands of the 21st century manufacturing workplace
- finance for growth – syndicating risk-sharing financial packages through a combination of public and private sector funding mechanisms
- building capacity - targeting investment in strategic infrastructure and broad-access initiatives that together create a sustainable business environment.

In terms of innovation and technological development for the sector Welsh strengths relies on composite and semiconductor areas. In this last one, a great achievement that shows Welsh strengths is the setting up of a UK Catapult Centre in Wales for compound semiconductors, which will be highly publicly funded but will expect to have operational revenues from a thirds model of a third public/private/competitively won funding.



## 4. Governance of Advance Manufacturing Strategy

### General context: innovation policy governance

The Welsh Government relies on UK government for its funding, including funding for innovation policy.

Innovation policy is managed by the Welsh Government department for the Economy, Science and Natural Resources. Business Wales is the main Government portal of business support. With regards to the Smart Specialisation Strategy, innovation specialists and sectoral business development managers from the Economy Science and Natural Resources (ESNR) department are involved in the delivery of the strategy and objectives, which are included within Innovation Wales. A specific role it is worthy to mention here is the one developed by the sector panels, which advise the government in sectoral issues. Industry Wales as a development of the AM&M sector panel has a role in this respect.

WEFO, the Welsh European Funding Office, also has a role with respect to research and innovation via its management and delivery of EU Structural Funds in Wales, and support for Horizon 2020 in Wales.

In addition there have been an increasing number of external Advisory Groups comprising industries, government and higher education stakeholders set up in the governance scene. Among them, is the Innovation Advisory Council for Wales (IACW).

This body provides updates to Ministers and advice and guidance to Welsh Government officials on a broad range of innovation matters, including monitoring progress on delivering the objectives of Innovation Wales, and strategic advice to other organisations, such as WEFO, on potential European projects. IACW was launched in 2014 and has established a work programme based on four priority topics, as shown below:

- Public service-led innovation;
- Wellbeing of Future Generations
- National Innovation Body;
- Collaboration.

In each of the priority topics the IACW is currently examining the future state of innovation, the specific barriers and issues facing Wales, and the opportunities to respond using the 'smart specialisation' approach identified by the European Commission. One of the findings of the Group's early work has been the decision to review the need for a National Innovation Body for Wales. In addition, there is a group working on evaluation issues, among which is the Arloesiadur project (see the evaluation section).

The role of IACW is crucial for the governance of the smart specialisation strategy in Wales and also for the governance of the innovation policy mixes which impact on Advanced Materials and Manufacturing.

## Governance and management of Advanced Manufacturing

Welsh Government through the Economy science and natural resources (ESNR) Department is the main actor of the innovation policy governance in Wales, both in general and in relationship with Advanced Materials and Manufacturing strategy.

1. There are two additional governance mechanisms that together with the Innovation Advisory Council for Wales and the Welsh Government formal structures constitute important bodies to inform Advanced Manufacturing strategy: Advanced Materials & Manufacturing sector panel and Industry Wales. It is important to point out that the role of AM&M sector panel was assumed by Industry for Wales. Advanced Manufacturing sector panel: A sector panel has been constituted for each of the priorities sector in Wales. Therefore a sector panel for Advanced Materials & Manufacturing (AM&M) was constituted. Members of the Advanced Materials and Manufacturing (AM&M) sector panel were instrumental in the conjunction of the Aerospace Wales Forum, the Welsh Automotive Forum and the Electronics, Software & Technology Network to form the Sector Development Wales Partnership (SDWP).
2. Industry Wales ([industrywales.com](http://industrywales.com)) is a forum that incorporates the membership of 400 leading Welsh companies. It is a governance mechanism led by the private sector but it works much closed to the Welsh Government. It is composed by different forms, sector specific as such: aerospace, automotive and electronics, software and technology. Industry Wales is focused on the following key areas:
  - Innovation
  - Investment
  - Skills
  - Supply Chain capability and reach
  - Integration with UK and European wide programmes.

Therefore, we can conclude that Advanced Manufacturing strategy in Welsh has an own governance model as it combines formal structures such as Welsh Government with more informal ones such as Industry Wales. However, these different governance modes are integrated in a systemic governance model in which more general structures such as Innovation Advisory Council of Wales has a strong role.

## 5. Innovation policy-mix for Advanced Manufacturing

Wales does not have a specific policy mix for Advance Manufacturing. All the innovation policies and instruments of the government are horizontal and therefore impact on all the RIS3 priorities However, most instruments incorporate the contribution to RIS3 priorities among the evaluation criteria (non-restrictive). Indeed, this has been demonstrated as the most common

way to materialize the RIS3 in the European regions (Gianelle et al.,2016). Although instruments from other administrative levels impact on the advanced manufacturing area, especially those of the National level (i.e. Innovate UK) and European level (i.e. H2020), the main instruments that impact on the regional innovation system are the ones designed and implemented by the Welsh Government and are oriented towards all priorities and not only to advanced manufacturing.

In Table 3 more detail about the regional implemented instruments is provided, which constitutes the main policy-mix for Advanced Manufacturing in the region. Although we could identify more instruments that impact in the regional firms, such as the ones in the European Framework Programme, the Manumix project will focus on these regional ones.

Table 3. Instruments for Advance Manufacturing

Instruments	Objective	Beneficiaries	Type of instrument	Year of Launch/ budget	Other comments
<i>Smart Innovation</i>	<i>To increase the innovation awareness and capability of Welsh businesses and assist them to access financial support to grow their investment in R,D&amp;I</i>	<i>SMEs, Big companies</i>	<i>Economic instrument Grants TRLs from 3 to 8</i>	2015/ £2m	<i>Welsh Government is responsible of the design Innovation Advisory Council for Wales - advise WEFO on strategic fit structural funds with the smart specialisation</i>
Smart Cymru	To provide financial support to Welsh businesses to grow their investment in R&D&I	SMES, Big Companies, Group of Firms	Economic Instrument; Voucher. Horizontal instrument, TRLs from 3 to 7	2014/ £10.5 million	<i>Welsh Government is responsible of the design and WEFO (Welsh European funded Body) funded Intermediate Body set up by Welsh Government responsible for implementation and evaluation</i>
<i>Smart Expertise</i>	<i>To increase commercialisation of Research, Development and Innovation (R,D&amp;I) within research organisations in collaboration with industry</i>	<i>Universities, Groups of companies</i>	<i>Economic instrument Grants TRLs from 3 to 7</i>	2016/ £4 million	<i>Welsh Government is responsible of the designing. Innovation Advisory Council for Wales - advise WEFO on strategic fit structural funds with the smart specialisation</i>
<i>Smart Partnerships</i>	<i>To support collaborative projects, with a clear focus to increase the capacity and capabilities of Welsh businesses to develop R&amp;D activities by linking them with Research Organisations and an associate, to work on a specific project to develop new products, processes and services in key areas of Smart Specialisation.</i>	<i>SMEs &amp; Universities</i>	<i>Economic instrument Grants TRLs from 3 to 7</i>	2016/ part of Smart Partnership	<i>Similar to Smart Wales but only requires 1 SME not 2 to collaborate with the Academic or research organization. Associate based within the business; developing &amp; implementing the project. Will meet with their academic/research supervisor on a regular basis New R&amp;D knowledge and skills will be developed and transferred to existing company staff members; embedding the new capabilities company-wide.</i>
SBRI	<i>Driving innovation through public sector procurement</i>	<i>All possible beneficiaries</i>	<i>Regulation National/regional instrument TRLs from 6 to 8</i>	2013/ £5m to date	<i>Revision in 2013 of a national approach in place since 90's Innovate UK, UK Central Gov, Devolved Administrations, Central Gov departments in charge of design , Welsh Government in charge of implementation &amp; UK bodies in charge of evaluation</i>

Some general features can be highlighted about the Welsh innovation policy mix, which impacts on Advance Manufacturing:

- (1) Business-oriented policy-mix
- (2) Predominance of direct instruments (e.g. grants for collaborative R&D projects) and economic instruments (except SBRI where public sector bodies lead and which could be considered a regulatory )
- (3) High dependence of EU funds, especially ERDF, and some links with national instruments (SBRI)
- (4) Combination of horizontal instruments although AM is a priority area that is prioritised
- (5) Strong focus on direct measures (grants and loans) targeting firms (mainly SMEs, but also big companies)
- (6) Instruments have different and complementary objectives and cover from R&D to commercialisation activities, with a broad coverage of the highest TRLs levels.

### Interactions

The instruments of the policy mix have different and complementary objectives. Among the instruments combination that are intentional designed in Wales we could mention the synergy among there different types of instruments (Smart Cymru, Smart Innovation and Smart Expertise) (see Taeihag et al, 2013 in the Appendix) that aim to target the same group of actors and it has been designed to improve cooperation.

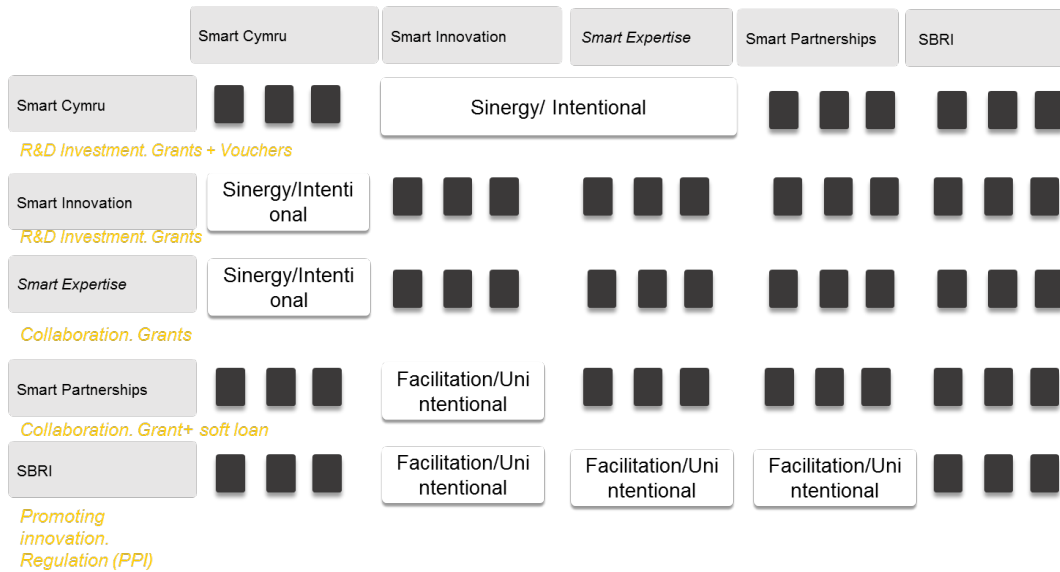
In addition, there are several facilitation effects that are perceived but are not intentional by nature, such as the facilitation that Smart Partnerships leads to Smart Innovation or how leverage the innovation level through SBRI could be an open door to afterwards participate in one of the Smart programmes.

Hence, the policy mix selected addresses quite broadly some of the main challenges of AM, such as leveraging the R&D level of companies, specially SMEs by promoting investments in R&D and its commercialization, boosting partnerships with academic organisations to innovate or promoting innovation through demand instruments, such as public procurement.

The policy mix has been designed intentionally in order to foster interactions between the instruments, specifically a synergy/facilitation type of relationship, although unintentional effects are also perceived as mentioned before. As we can find in appendix 1, facilitation refers to the relationship of two instruments in which the results of one instruments enable the other instrument to function better and synergy happens when this 'work better' relationship is bidirectional for the two instruments (Taeihag et al., 2013).

The interactions between the instruments of the selected policy mix for Manumix are illustrated in Figure 3.

Figure 1. Interactions between the instruments of the policy mix



Source: Own elaboration

Nevertheless, it has to be mentioned that these interactions respond to the understanding that policy-makers have of their interactions. This learning comes from observation, experience and also for evaluation exercises. It would be interesting to also understand the beneficiaries' perception of these interactions in order to have a complete view of this.

### Governance of the policy mix

There is not any specific governance arrangement established for each of the priorities within the S3 or specific instruments. Hence, the general governance of the policy mix is embedded in governance of S3 explained in Section 4.

The implementation of the innovation policy-mix for Advanced Manufacturing, as for the rest of priorities is led by the Welsh Government and, concretely by the department of ESNR. However, this department interacts with other governance structures, such as the Welsh European Funding Office (WEFO), which is a funded intermediate body set up by Welsh Government. The Innovation Advisory Council for Wales, advises WEFO on the strategic fit of structural funds with the smart specialization strategy.

The instruments that have been described as part of the policy mix of Manumix project, present the same governance model, except the SBRI instrument as it shares the governance with UK government. All the specificities for the policy-mix governance are described in 4.

Table 4. Overview of governance of instruments of the Manumix policy mix

Stages	Responsible	Other stakeholders involved
Design of individual instruments	Welsh Government/Business Wales or Innovate UK/ Central Government	
Implementation	Welsh Government/Business Wales/WEFO as	

	instrumental body of Welsh Government	
Evaluation of individual instruments	Internal and external evaluations (welsh Government for monitoring and others for external evaluations)	Innovation Advisory Council for Wales - advise WEFO on strategic fit structural funds with the smart specialization/ UK government
Coordination/management of the innovation policy-mix	Intermediate bodies and communities of best practices	

Source: own elaboration

## 6. Evaluation practices and management

The monitoring and evaluation of innovation instruments and innovation policy-mix is a very interesting issue in Wales. First of all, if we focus on the individual instruments that compose the innovation policy-mix analysed for Advanced Manufacturing we can extract some very insightful conclusions:

1. First of all, all the instruments include an ex-ante evaluation, monitoring and ex-post evaluation, which inform decision-making.
2. Monitoring seems to be a very important issue and indicators and dashboards have been established in order to measure the instruments performance.
3. Evaluation combines internal and external expertise
4. Evaluation method combines quantitative methods with qualitative ones, such as showcases.
5. Policy-mixes are also evaluated but time scales remain a main issue to resolve

It is also worthy to mention the Arloesiadur project (<http://www.nesta.org.uk/blog/arloesiadur-innovation-analytics-experiment>), in which the Welsh Government has been participated together with Nesta as a policy experimentation project that focus on gathering open data in order to inform policy-makers. This project has been highlighted as a good practice example in the new RIS3 guide (Gianelle et al., 2016). It is a pilot project that uses open data to inform innovation policy. Networks and connections between the different research groups from Wales and the rest of UK and between the different research areas are shown in Nesta webpage as an open data source. The challenge here is to incorporate all this evidence in decision-making processes.

Table 5. Overview of evaluation activities covered for innovation policy mix

Instruments	Exante evaluation	Monitoring	Expost	Responsible & Comments
Smart Innovation	YES	Number of enterprises receiving non-financial support, number of enterprises receiving specialist advice that begin a new product or process, number of patents registered	YES	External contract for inception, mid term and final evaluation. Report published  Measuring long term impact of Innovation and R&D support as it can take a number of years and not deliver jobs in the short-term.
Smart Cymru	YES	Enterprises financially assisted, Enterprises assisted to develop new to the market or new to the firm products, IP registered, increase in employment, profit benefit, jobs secured	YES	Monitoring and Evaluation Steering Group set up by the ES&T SET team and RME within WEFO  The operation will procure Independent baseline, interim and final external evaluations.  Tends to be more focused on requirements of the funding body (WEFO) rather than broader benefits to Welsh Economy.
Smart Expertise	YES	Enterprise cooperating with research organization.  New products, processes and services developed.  Increase in employment in enterprises. Patents registered	YES	Monitoring responsible is the Government  Innovation Advisory Council for Wales - advise WEFO on strategic fit structural funds with the smart specialisation  Measuring the long term impacts of R&D as these do not materialise until some time after the support provided.
Smart Partnerships	YES	Enterprise cooperating with research organization.  New products, processes and services developed.  Increase in employment in enterprises. Patents registered	YES	Monitoring and evaluation responsible is the Government  Innovation Advisory Council for Wales - advise WEFO on strategic fit structural funds with the smart specialisation
SBRI	NO	Does it lead to a commercial contract/opportunity	YES	Innovate UK, Central Gov, Third party consultant.  Welsh Gov approach has been copied by other Devolved Administrations and maybe used by Uk Gov.  Community of best practice, showcase events



## 7. Conclusions

Wales is a region that faces some challenges as a consequence of its economic lagging situation as compared to United Kingdom. In R&D and innovation related issues this lagging situation is more reflected on the business R&D investment, mainly linked to a business environment with predominance of SMEs but also with presence of multinationals.

The Smart Specialisation Strategy for Wales includes different priorities and among them Advanced Manufacturing Strategy, which is focused on Advanced Materials and Engineering. Innovation Wales, Wales' Smart Specialisation Strategy, sheds light in the implementation of instruments and the policy-mix, which is mainly oriented towards enhancing the innovative level of the Welsh firms.

The innovation policy mix in Wales does not refer from one priority to another and in fact is composed of instruments that aim to promote all the priority areas within the Smart Specialisation Strategy, not only the Advanced Manufacturing one. Although the general policy mix with impact in Welsh is composed of instruments from different levels, the focus in the Manumix project is put on the instruments managed by the Welsh Government or partly managed.

Precisely, the instrument mix selected for Manumix has a strong focus on leveraging the innovation level of Welsh firms, especially SMEs, and tries to cover the whole innovation journey that a firm could do from applied research to commercializing innovation. This journey could be done in isolation but also in cooperation, with research organizations but also with the facilitation of the public sector through the public procurement instrument.

This baseline focuses on the strengths of the innovation policy-mix and highlights the synergies among the different instruments. In addition, the baseline highlights some good practices that Wales has been putting into practice with regards evaluation. Thus, Wales has established a systematic evaluation of its instruments, including coordination mechanisms and the advice of the Innovation Advisory Council for Wales. In addition, Welsh Government is conducting together with NESTA a pilot project that aims to improve the way data for evaluation is gathering and visualized, and it constitutes a good practice in this area.

Finally, together with the regional challenges, Brexit is one of the main challenges Wales will face in the following years, due the dependence of European funds for innovation. Nevertheless, the Welsh Government has already established a path towards innovation policy-mixes in which evaluation plays a key role.

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## Appendix 1. Types of relations among policy measures.

Table 1. Five types of relations among policy measures.

Relation	Description
Precondition (P)	Defined as a relation that is strictly required for the successful implementation of another policy measure. For instance, if policy measure B is a precondition to policy measure A, the successful implementation of policy measure A can only be achieved if policy measure B is successfully implemented beforehand. The precondition relation is a direct relation.
Facilitation (F)	In a case where a policy measure ‘will work better’ if the outcome of another policy measure has been achieved, the relation is considered as a facilitation relation. For instance, policy measure B facilitates policy measure A when policy measure A works better after policy measure B has been implemented; however, policy measure A could still be implemented independently of policy measure B. The facilitation relation is also a direct relation.
Synergy (S)	A special case of facilitation relation in which the ‘will work better’ relation is bidirectional (undirected relation). It can be argued that such a relation can be treated as a two-way facilitation; however, we believe that treating this relation as a separate type is advantageous, as it suggests a higher effectiveness of both of the policy measures having the synergetic relation vis-à-vis the overall policy.
Potential contradiction (PC)	A potential contradiction exists between policy measures if the policy measures produce conflicting outcomes or incentives with respect to the policy target under certain circumstances, hence the contradiction is ‘potential’. This relation is undirected.
Contradiction (C)	In contrast to the conditional nature of potential contradiction, the contradiction relation is defined when there are ‘strictly’ conflicting outcomes of incentives between policy measures. Similar to the potential contradiction relation, this relation is undirected.

Source : Taeihagh, et al. (2013)