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Blue Growth and Smart Specialisation

How to catch maritime growth through 'Value Nets'

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Blue Growth and Smart Specialisation:

How to catch maritime growth through "Value Nets"

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Abstract

The principles of Smart Specialisation are valuable when implementing Blue Growth – an integrated approach towards stimulating the maritime economy. Both concepts pay considerable attention to innovation, young firm formation, bottom-up approaches and value chains. This policy brief builds on presentations and discussions from an S3 Platform Implementation workshop held on 8/9 October 2015 in Las Palmas de Gran Canaria, Canary Islands (Spain). The paper sets out several pathways to building so-called 'Blue Value Nets', notably through: 1) Expanding nets through suppliers and enablers; 2) Sharing infrastructure; and 3) Boosting Blue clusters and networks. All this requires actions from the private sector, by expanding and transforming existing value chains. However, the public sector can support this process also by: a) Enabling competency development and knowledge sharing; b) Use of maritime clusters as a tool to promote Smart Specialisation; c) Stimulating trans-boundary cooperation and; 4) Promoting 'Collaborative Labs'.

Keywords: Smart specialisation; Blue Growth; value chains; value nets, maritime clusters.

Acknowledgements: Thanks to the Government of Canarias for having hosted the implementation workshop and to Jonathan Williams of Marine Southeast (UK) for reviewing an earlier version of this paper.

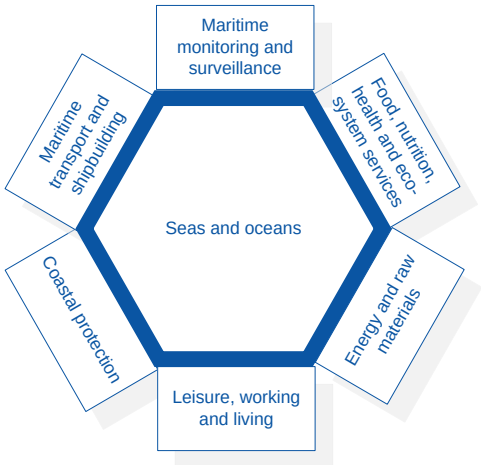
1. Why is Blue Growth important for Smart Specialisation?

1.1 Introduction of the Blue Growth concept

Blue Growth is a concept which is used by the European Commission (DG MARE) to harness the untapped potential of Europe's oceans seas and costs for jobs and growth. Blue Growth is seen as an innovative way to develop a range of maritime activities that are often dependent on each other, e.g. by relying on common skills and shared infrastructure[1]. In the subsequent implementation of the Blue Growth concept, the importance of innovation across all sectors of the blue economy has been highlighted[2].

The Blue Growth thinking has started from the notion that maritime economic activities cannot be sufficiently captured through a sectoral approach. After all, the maritime (as well as non-maritime) nature of an activity is not necessarily determined by an industrial classification or NACE code. For example, hotel accommodation has a similar code (5510) in both Berlin and Benidorm – however nobody would consider the first one as maritime. By the same token, a scientific natural research institute (code 7219) in Bologna is less likely to be focusing on the maritime world than the one in Boulogne-sur-Mer. The Blue Growth approach has circumvented this problem by taking the perspective of maritime functions. A total of six broad functions have been distinguished: Maritime transport and shipbuilding, Food, nutrition, health and eco-system services, Energy and raw materials, Leisure, working and living, Coastal protection, and Maritime monitoring and surveillance.[3]

Figure 1 Maritime functions



[1] EC (2012) Blue Growth – opportunities for marine and maritime sustainable growth. COM(2012) 494 final
[2] EC (2014) Innovation in the Blue Economy: realising the potential of our seas and ocean for jobs and growth. COM(2014) 242 final/2
[3] Ecorys/Deltares/Océanic Développement (2012) –Blue Growth Study - Scenarios and drivers for Sustainable Growth. Study report on traditional and emerging activities in the blue economy.

These maritime functions were divided into a set of 27 maritime economic activities or sub-functions. The division was necessary to allow for a more detailed analysis than was allowed by the six broad functions. An overview of these activities will be provided in the next Chapter.

Shortly after its launch, the Blue Growth concept obtained substantial momentum after its recognition through the Limassol Declaration – which was signed under the Cypriot Presidency on 8th October 2012 – and which would set the Marine and Maritime Agenda for the years to come. The declaration proposes a marine and maritime agenda to support the Europe 2020 strategy. This agenda would focus on opportunities for marine and maritime sustainable growth, including promising maritime sectors where there is a great potential for new jobs and growth. Ministers also called on Member States and European Institutions to put in place the right conditions for the Blue Economy to deliver, including support for research and marine knowledge.[4]

1.2 Blue Growth as EU Priority (RIS3)

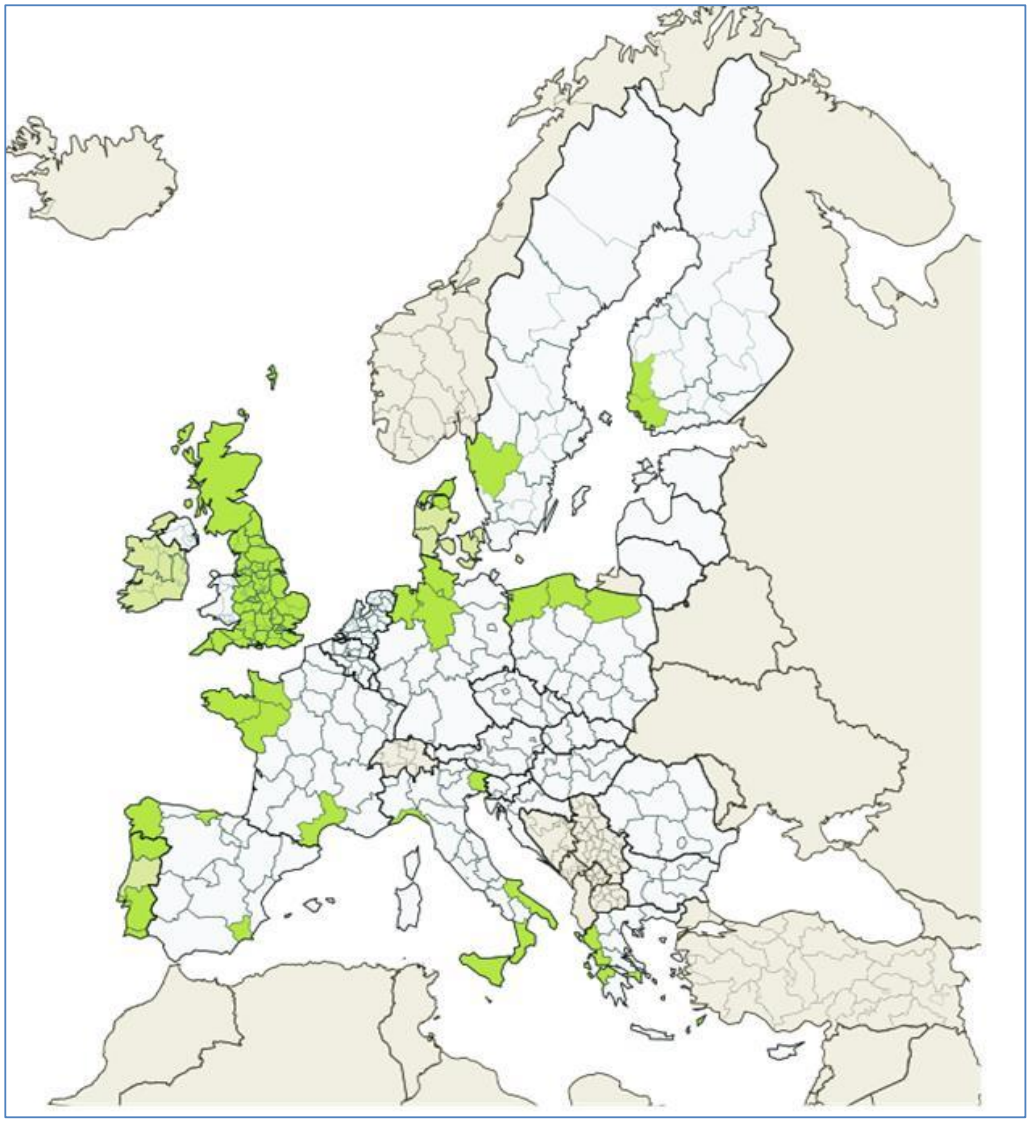
Broadly at the same time, Smart Specialisation had become a crucial concept in EU regional development. The Smart Specialisation agenda responds to the need for transformation and modernisation of the economy. It does so by exploring and exploiting (cross-cutting) niches of excellence, which requires integrated policy approaches. The Smart Specialisation framework has been introduced in the context of the current round of ERDF programmes, where the application of the concept has been introduced as an 'ex ante conditionality' within the context of Thematic Objective 1 – Research and Innovation axes. By now, most countries and regions involved have completed the process of designing a Research and Innovation Strategy for Smart Specialisation (RIS3).

S3 is about developing new specialties to "maximise diversified specialisation to gain competitive advantage" through a dynamic approach, by focusing on modernisation and innovation of local value chains. RIS3 will be supported through ESIF Programming, with an overall budget of €450 bn (70% targeted to SMEs), of which €160 bn supports R&I and the competitive economy at regional level. It is nonetheless important for regional systems to ensure a stronger planning and impact orientation, and a greater role of trans-national and inter-regional cooperation through macro-regional strategies (e.g. INTERREG, Vanguard initiatives). Also greater synergies are now possible between shared programming and EU-led funds (e.g. Horizon2020, COSME) and can be fully exploited by local initiatives by allowing experimentation.

After the first phase of RIS3 negotiations different patterns and priorities have emerged across regions, with the role and potential of region in innovation policy becoming clear across the EU. Some common interest areas have emerged (i.e. energy, health and ICT, followed by agro-food, advanced materials, services/tourism, eco-innovation) and implementation will be mainly focused on R&I processes in SMEs, technology transfer and cluster support.

[4] https://webgate.ec.europa.eu/maritimeforum/en/node/3060

Figure 1.2 EU Regions which have earmarked Blue Growth as a priority



Source: Smart Specialisation Platform http://s3platform.jrc.ec.europa.eu

As part of the smart specialisation process, Blue Growth has been recognised as an EU priority, and embraced by over 50 regions (see Figure 1.2). These findings were broadly confirmed by a CPMR study involving 40 different regions in 16 Member States on the new provisions on partnership for 2014 – 2020 Cohesion Policy programmes. It was found however that the involvement of regions varied significantly from one Member State to another.[5] Noticeable is also that Blue Growth is not necessarily referred to as a Priority Axis, but that it is also an important underlying theme within a wide variety of Priority Axes, including those in the areas of Energy, Manufacturing, Tourism, Infrastructure, etc.

[5] See http://news.crpm.org/cpmr-news/cohesion/cpmr-study-reveals-real-extent-of-involvement-of-regions-in-cohesion-policy-programmes/

RIS3 and Blue Growth in the Atlantic

When it comes to RIS3 and Blue Growth in the Atlantic, some thematic areas emerged as priorities for investments, such as renewable energy, biotechnology, tourism innovation, marine science, aquaculture and fisheries, environment sustainability, shipbuilding and smart grids. It is essential for local actors to map complementarities amongst local value chains and sectors and link those with potentials in neighbouring regions, work towards JPI Oceans and best use of Atlantic Area Interreg Programme (a possible model is the Vanguard initiative on piloting innovation). The challenge is now to make RIS3 work by ensuring continuity of support on the identified priorities, with advancements to be consistently monitored and shared with relevant stakeholders; implementing appropriate tools and support local capacity; promoting international cooperation and achieve critical mass by "combining forces", linking capacity across regions and make most of funding synergies. Key is the support of a local "entrepreneurial discovery processes" in the form of on-going knowledge sharing and dialogue/interaction between business, research, government and civil society.

1.3 Aims of this policy brief

Despite the fact that Smart Specialisation and Blue Growth have many commonalities (e.g. the focus on economic activities rather than sectors, the integrated approach), there is much scope for reviewing these two concepts together, and notably by identifying how the principles of Smart Specialisation can be used to stimulate the maritime economy, creating more critical mass in distinctive domains of R&I.

Such understanding is crucial now that it is time to implement such strategies[6] which requires an integrated and pro-active approach, away from an administrative to a more strategic approach – as part of the 'entrepreneurial discovery' of regions[7].

Against this background, the Knowledge for Growth (KfG) Unit of the Institute for Prospective Technological Studies (IPTS) hosts the S3 Platform (S3P) which was established by the EC to provide assistance to Member States and regions to design their RIS3 strategies. As part of its role to monitor the implementation of RIS3 strategies, the JRC-IPTS has taken the initiative to analyse how the implementation of RIS3 is being tackled by national and regional authorities in the area of the maritime economy by applying the Blue Growth concept in particular.

Within this context, an implementation workshop was organised by the JRC together with the Government of Canary Islands on the "Implementation of RIS3 Priorities in Blue Growth", held on 8-9 October 2015 in Las Palmas. The workshop was attended by a broad range of experts, practitioners, EU officials,

[6] See for example OECD (2013) "Innovation Driven Growth in Regions: The Role of Smart Specialisation", OECD Publishing: Paris (mentioned in the ToR p. 2)

[7] D. Foray (2015) "Smart specialisation – Opportunities and challenges for regional innovation policy". London/New York: Routledge Taylor & Francis Group.

national and regional policy makers as well as business representatives and academics from across Europe.

This JRC Policy Brief builds on the rich discussions and exchanges during the workshop, and identifies and analyses approaches towards applying smart specialisation in the area of Blue Growth. The paper provides a review of opportunities and challenges policy makers face when applying smart specialisation to the maritime economy and provides suggestions for seeking cooperation between countries and regions – based on so-called "value nets".

It does so first by elaborating on Blue Growth and innovation (Chapter two). It then draws a number of pathways towards applying Smart Specialisation in the area of Blue Growth (Chapter three) – making use of the notion of 'value nets'. The policy brief concludes with a number of strategic reflections (Chapter four).

2. Blue Growth and innovation

The potential of the European seas, coasts and oceans is manifold and complex[8]. Economic sectors active on or near the seas are interacting with other sectors in complex value chains. The list of sectors relevant from a maritime perspective is very wide. For these reasons the Blue Growth study has adopted an approach that starts from maritime functions. Economic activities in different sectors contribute to these functions in mutual interaction. As such a more complete picture of Blue Growth can be presented taking due account of the interdependencies of individual economic activities. Clearly, some of these activities are more mature and traditional, while others are growing, emerging and/or more innovative.

2.1 Overview of maritime economic activities

Each of the following six maritime functions can be divided into a range of more detailed maritime economic activities.

2.1.1 Maritime transport and shipbuilding

This function concerns the transport of goods by sea and the associated services. Traditionally, the prime function of seas and oceans is sea trade and sea transport. More than 75% of the EU external freight trade is seaborne – and on-going globalisation has made this flow ever more important. Furthermore, short-sea shipping represents 37% of intra-EU exchange in terms of ton-kilometers[9]. This figure will be higher for countries with long coastlines. Sea transport is seen as a relatively sustainable mode of transport although the sector will face significant challenge to improve its environmental performance. The long tradition of sea navigation in many European countries has led to a relatively strong development of maritime services that support the sea trade and sea transport function (ranging from brokerage and insurance to classification and inspection, education and R&D). Sea ports are also part of the function as nodes of freight handling and concentrations of services as well as employment. Finally, the shipbuilding industry contributes to this function by providing the necessary equipment, which not only covers ships but also the marine equipment in which European industries play an important role (Ecorys, 2009).

2.1.2 Food, nutrition, health and eco-system services

This function concerns the capacity of the maritime system to supply resources for direct consumption or for processing into food products or other consumer products. Historically, the fishing industry has been at the forefront of this function, providing the market with valuable proteins. Production and employment in this industry have declined over the last 15 years (Anderson and

[8] This section draws on the original Blue Growth study available at: https://webgate.ec.europa.eu/maritimeforum/en/node/2946

[9] Eurostat International Trade Statistics; EC, COM(2006)275, GREEN PAPER Towards a future Maritime Policy for the Union: A European vision for the oceans and seas, p8.

Guillen, 2009). Marine aquatic products have evolved from a traditional shellfish base (mussel, oyster) to modern fish operations (salmon, sea bass, sea bream, turbot, cod) which are more resource-intensive (animal feeding, medication, protection, sometimes heat). Blue biotechnology (exploitation and aquaculture) is still at a small scale in Europe although some algae products are widely used in the industry (e.g. agar, carrageenan and alginates). Start-up companies are working on the industrialisation of micro-algae growing facilities for producing oils destined to animal feeding, human nutrition (e.g. omega-3 and omega-6) and biofuel production. Other uses for marine resources are the high value marine resources for the cosmetics and pharmaceutical industries, which are already using algae components in several products but are also engaged in more R&D to exploit the potential of the marine biodiversity (e.g. research on some marine worms to produce artificial blood).

2.1.3 Energy and raw materials

This function covers the exploration and production of energy and of raw materials on and from the seas. The seas and oceans are expected to play an increasingly vital role in meeting future energy demand. Substantial amounts of oil and gas are still to be explored and exploited from the sea, although drilling needs to take place at ever greater depths. Offshore wind power offers unprecedented potential, as it allows an up-scaling of the industry and the outputs, as it bypasses the opposition from residents and leaves landscapes untouched. Other offshore renewable energy sources include wave and tidal as well as Ocean Thermal Energy Conversion (OTEC) and blue (osmotic) energy.

Besides energy sources, the seas and oceans also contain huge stocks of other raw materials and minerals, including iron ore, tin, copper, manganese, gold, sulphides, phosphorites, diamonds, lime and aggregates including siliceous sand and gravel. These raw materials are vital for a wide range of manufacturing sectors, including high-tech manufacturing.

Last but not least, the oceans can be an abundant source of drinking water once desalination techniques have been put in place.

2.1.4 Leisure, working and living

Coastal regions are important residential locations for EU citizens and coastal zones play an important role as a place for human settlement. In 2008, 205 million people or 41% of the inhabitants of the 22 EU Member States lived in EU coastal regions. Associated to that, coastal regions offer many employment opportunities, particularly in the service sector. The component of working relates to an active population of approx. 89 million people in the coastal regions of EU Member States[10].

The leisure component is of particular importance and covers economic activities related to coastal tourism. Because of the presence of the oceans and seas and the attractive natural environment the coastal zone also has an important tourist function. Over the last decade the EU tourism industry has become a sector of major importance in the European economy. According to the European

[10] Eurostat (2011), Regional yearbook 2011, p.180. Data of 2009, excluding data of Belgium, Bulgaria, Portugal and Finland.

Commission, the EU tourism industry generated in 2006 in its most narrow definition more than 4% of EU GDP representing almost eight million jobs (EC 2006a, p.2). Marine tourism is estimated to represent three million jobs (EC 2008c, p4). A special segment is cruise tourism, which has been growing rapidly in several sea-basins, particularly in the Mediterranean and Baltic Sea regions.

2.1.5 Coastal protection

Coastal protection is different from other sectors as it is not an economic function in itself, but rather a condition *sine qua non* for the use of coastal areas and for other functions to flourish. Still its economic relevance is substantial, and massive efforts in research and technological development are made to improve sustainable and safe coastal regions, which also contribute to coastal protection works and services as an EU export product. Because of its specific nature coastal protection has been defined as a separate maritime function.

2.1.6 Maritime monitoring and surveillance

This function concerns the monitoring and surveillance of activities taking place at seas, as well as the monitoring of the environmental state and development of the seas and coastal areas in which these activities take place. Particularly since the 9/11 terrorist attacks, international political attention for maritime surveillance has increased extensively. With regard to international relations this mainly falls within the maritime transport function (think of ISPS code, port state control requirements, and container scans etc.). Furthermore, international awareness for security on the high seas has risen, for example through coordinated actions against piracy. The Integrated Maritime Surveillance initiative was launched by the European Commission (EC 2009f), following the adoption of the IMP.

Whereas maritime surveillance is mostly focused on human related activities, environmental monitoring addresses the physical, biological, chemical etc. state of the seas and oceans. This is an increasingly important area in relation to marine observation, management of marine resources marine research and climate change issues.

2.2 Which maritime economic activities can be considered innovative?

The notion of Smart Specialisation describes the capacity of an economic system to generate new specialisms through the use of existing resources[11]. In the Blue Growth context, sub-functions that are currently relatively mature are expected to score lower on innovation, since they are more advanced in their life cycle. Analysis of these sub-functions indicates that technology development is mainly process oriented or covers improvements of existing technologies. Sub-functions that are still in their development phase are however expected to strongly impact on innovation, as this will define the feasibility of meeting their potential. In many sub-functions the success of technological breakthrough is the basis for commercialisation. Table 2.1 presents an overview of maritime economic

[11] D. Foray (2015) "Smart Specialisation – Opportunities and challenge for regional innovation policy", p. 1

functions considered innovative as well as aspects such as competitiveness, employment creation potential, spill-over potential and sustainability.

Table 2.1 Innovativeness of maritime economic activities studied

Function	Sub-function	Indicator						
		Innovativeness	Competitiveness	Employment creation	Policy relevance	Spill-over effects	Sustainability	Overall score
1. Maritime transport and shipbuilding	1.1 Deepsea shipping	0	+	-	0	0	-/+	0
	1.1 Deep sea shipping	0	+	-	0	0	-/+	0
	1.2 Shortsea shipping (incl. RoRo)	0	0	0	+	0	+	++
	1.3 Passenger ferry services	0	0	0	+	0	+	++
	1.4 Inland waterway transport	-	+	0	+	0	+	++
2. Food, nutrition, health and eco-system services	2.1 Catching fish for human consumption	0	-	0	+	-	-/+	0
	2.2 Catching fish for animal feeding	0	-	0	+	-	-/+	0
	2.3 Growing aquatic products	+	+	+	+	?	?	++++
	2.4 High value use of marine resources (health, cosmetics, well-being, etc.)	+	+	+	+	+	+	++++++
	2.5 Agriculture on saline soils	0	?	+	+	?	+	++++
3. Energy and raw materials	**3.1 Oil, gas and methane hydrates**	**+**	0	-	+	+	0	+
	3.2 Offshore wind energy	**+**	+	+	+	+	+	++++++
	3.3 Ocean renewable energy resources (wave, tidal, OTEC, thermal, biofuels, etc.)	**+**	+	?	+	+	+	+++++
	3.4 Carbon capture and storage	**+**	+	-	+	+	0	+++
	3.5 Aggregates mining (sand, gravel, etc.)	0	0	+	0	0	-	0
	3.6 Marine mineral resources	**+**	+	?	+	+	?	++++
	3.7 Securing fresh water supply (desalination)	?	0	?	+	?	+	++
4. Leisure, working and living	4.1 Coastline tourism	0	0	+	0	+	0	++
	4.2 Yachting and marinas	**+**	+	+	0	+	0	++++
	4.3 Cruise including port cities	**+**	+	+	0	+	0	+++++
	4.4 Working	0	0	0	0	0	0	0
	4.5 Living	0	0	0	0	0	0	0
5. Coastal protection	**5.1 Protection against flooding and erosion**	**+**	+	+	+	+	+	++++++
	5.2 Preventing salt water intrusion	?	0	?	+	?	+	++
	5.3 Protection of habitats	?	0	?	+	?	+	++
6. Maritime monitoring and surveillance	**6.1 Traceability and security of goods supply chains**	**+**	+	+	+	+	0	+++++
	6.2 Protect against illegal movement of people and goods	**+**	?	0	+	+	0	+++

	6.3 Environmental monitoring	**+**	+	0	+	+	+	+++++

Source: Blue Growth Study – First Interim Report

From Table 2.1, it is clear that innovative activities can be identified across virtually all maritime economic activities. A dilemma exists however, if this consideration is taken together with the need to create economic growth and jobs. After all, many innovative activities (e.g. marine mineral resources, blue biotechnology or ocean energy) are likely to become economically viable only in the medium- to longer term. Hence, now that Blue Growth concepts are being implemented across Europe, an increasing need is felt to combine such innovative activities with existing activities – take advantage of critical mass and the knowledge basis. There is a need however to agree on concrete concepts and tools that allow this to happen.

2.3 From value chains to value nets

2.3.1 Smart Specialisation and Blue Growth – many commonalities

Even though Smart Specialisation and Blue Growth surfaced at the same time, the two concepts have been developed separately. Now that both concepts have become more elaborated and are in the stage of implementation, it is important to compare them and to see how they can support each other. And indeed, they share many similarities.

First of all, both concepts embrace an integrated approach – they move beyond sectors and silos. Blue Growth looks particularly at the links between a broad range of maritime economic activities, and promotes synergies between them. Smart specialisation takes an even wider perspective, as it allows for new initiatives and applications that can be injected into all existing economic activities. Both Smart specialisation and Blue Growth promote synergies between different economic activities.

In doing so, both concepts embrace innovation and young firm formation. New and young enterprises, including spin-offs from academia, are seen as the prime vehicles for economic transformation. They can disrupt existing economic activities, but also reinforce them, e.g. by strengthening existing production processes.

Another similarity is that both approaches embrace bottom-up approaches. The smart specialisation approach takes entrepreneurial discovery as a starting point, thus innovation at the level of firms and tangible economic activities. Although Blue Growth has initially been developed at an EU-wide and conceptual level, this approach could only be successful after having been adopted and embraced by a broad variety of regions across the EU. This has led to an extra-ordinary variety of approaches, as witnessed by the priorities and structures of the Operational Programmes for the period 2014-2020.

2.3.2 A consistent focus on value chains

As demonstrated above, maritime activities are not just economic sectors; they cover the relevant maritime value chains – including backward and forward

linkages. This is important since large parts of the economic activities take place not in core sectors themselves, but in adjacent economic activities. Think of maritime transport where large parts of the added value is created in seaports and the hinterland services associated to this, as well as in the shipyards and other supply industry activities require for shipping. The same applies for each of the other functions.

The Smart Specialisation literature emphasizes the importance of the appropriate level of analysis, neither sectors nor individual companies but that of activities or the "mid grained granularity" that includes[12]:

- New activities/projects involving groups of firms and other (research) partners;
- To explore a new domain of opportunities;
- With a potentially certain weight and significance for the regional economies involved.

Perhaps most striking is therefore that both Smart Specialisation and Blue Growth pay considerable attention to value chains; they allow for an assessment of functions across sectors and world-wide, and point out where synergies and supply chain risks can occur. The core activities for each maritime economic activity are surrounded by both upstream and downstream activities. Upstream of the value chain are suppliers of equipment and resources, who may also have their suppliers. Downstream are processing sectors and subsequently distribution and sales.

For the analysis of the maritime functions and maritime economic activities, it is important to acknowledge that such value chains are increasingly fragmented and internationalized. Hence, it is difficult for any regional or even national jurisdiction to control them – as they can stretch out to other regions, countries and continents. In the study work on Blue Growth to date, a value chain has been limited to the point where a direct and substantial link to sea-based activities is no longer easily possible. Yet, as discussed during the implementation workshop in the Canarias, it is equally important to consider explicitly the land-based activities as well.

2.3.3 From value chains to value nets

Despite the merits and frequent use of value chains as an analytical concept in business economics, discussions in the maritime economy have also showed it has limitations. When studied more carefully, value chains appear to be rarely static or linear, as a wide range of unexpected spillovers can emerge throughout the process of innovation and diversification of local (and global) economic activities and sectors.

Instead, such effects can be understood and represented more effectively by introducing the concept of multi-nodal "value nets". Value nets can be understood as "a business analysis perspective that describes social and technical resources within and between businesses. The nodes in a value network represent people (or roles). The nodes are connected by interactions that represent tangible and intangible deliverables. These deliverables take the

[12] D. Foray (2015) "Smart specialisation – Opportunities and challenges for regional innovation policy", p. 42.

form of knowledge or other intangibles and/or financial value. Value networks exhibit interdependence. They account for the overall worth of products and services"[13].

The term value net has several advantages compared to value chains, such as:

1. Non-linear nature of business and innovation: the process of innovation and entrepreneurial discovery is by nature iterative and interactive, and cannot really be captured through a linear downstream analysis;

2. The importance of supporting services and enablers; a crucial aspect of smart specialisation is the introduction of enablers, new technologies (e.g. digital technology, biotechnology, nanotechnology) and support services that are adopted by existing value chains;

3. Synergies and spill-overs: both concepts pay much attention to synergies and spill-overs, economies of scale and scope that lead to cost reduction and/or new opportunities and markets;

4. Acknowledgement of the framework conditions that provide the required conditions for maritime economic activities to develop, and that can to be larger or smaller extent be influenced by policy. This includes the need for ports, infrastructure but also new infrastructures such a smart grids and multi-purpose offshore platforms;

5. Need to not only create but also capture value; crucial in the maritime economy is that actors in the maritime economy (especially the more vulnerable ones in peripheral locations) can benefit from their own activities. Indeed, the meaning of value nets is to catch this value.

The purpose of value nets is to create the most benefit for the people involved in the network. The intangible value of knowledge within these networks is just as important as a monetary value. In order to succeed, knowledge must be shared to create the best situations or opportunities. Value networks are how ideas flow into the market and to the people that need to hear them.

Because value networks are instrumental in advancing business and institutional practices a value network analysis can be useful in a wide variety of business situations[14]. In the next chapter, we will concretely point out a number of pathways to create growth and jobs in the maritime economy through such value nets.

[13] Value Network Basics, for more information see: www.openvaluenetworks.com
[14] For examples see Allee, V (2003) The Future of Knowledge: Increasing Prosperity through Value Networks, Butterworth-Heinemann

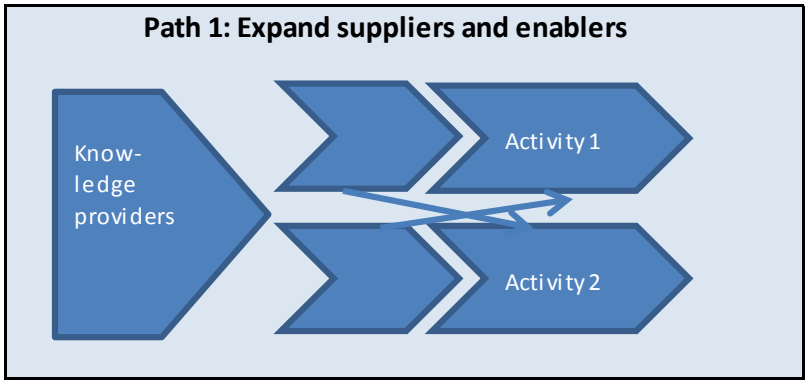
3. Pathways for building Blue Value Nets

3.1 Introduction

In this chapter, and building on the rich discussions held during the Canarias implementation workshop, three pathways will be distinguished for building "Blue Value Nets":

- Path 1: Expanding nets through suppliers and enablers;
- Path 2: Sharing infrastructure;
- Path 3: Boosting Blue Clusters and Networks.

3.2 Path 1: Expanding nets through suppliers and enablers



This is the path to bring new suppliers into existing value nets. Value nets include both upstream and downstream relations necessary for producing products or services, as well as the final and intermediate customers. Value nets can be created by linking several value chains from different (maritime or non-maritime) business lines.

Another approach is to use enabling activities from another field (e.g. from IT, biotechnology or nanotechnology) into an existing maritime activity. For example, blue biotechnology provides a range of synergies with and spill-over to other maritime activities; biofouling is a well-known phenomenon, which implies that the fouling of the ships hulls reduces hydrodynamic performance of the ship, reduced economic performance and increased fuel consumption. Blue biotechnology offers biological and non-toxic anti-fouling and coating solutions that prevent or address this phenomenon. But biofouling is also a problem in oil pipelines, and this is only one of the many examples that biotechnology can offer in the oil and gas industry.

But also other enabling aspects of bio-tech in oil and gas are relevant. Currently, a series of experiments are being conducted to test the potential of various biotechnologies in this sector, and this potential is considered huge. For instance enhanced oil recovery allows micro-organisms to potentially be used for enhancing and improving oil recovery from (depleted) formations. Another example is bioremediation in case of oil spills.

A conclusion from this example is that the maritime sector as a whole has strong interest in promoting new (bio-) technologies, cross-cutting services and suppliers that can benefit more than one sector – and bring about advantages that cannot always be foreseen.

Marine SouthEast (UK): The case of Rampion Offshore Wind-farm – Local synergies to trigger international investments

Marine SouthEast is a highly successful maritime business cluster in the South of England. It has been active in building a Local Supply Chain particularly for the fast growing offshore wind market (notably the Rampian Offshore Windfarm).

The Rampion Offshore Wind-farm is a platform with 116 turbines and main contracts with large "tier 1" contractors. Through time it needed further interest of new investors. The approach in promoting the farm to potential investors started with "awareness-type events" where small suppliers were introduced to potential customers coming from across the sea-basin. It was immediately clear that SMEs involved in energy technologies could play a role in cost-reduction strategies of larger companies. Such variety of companies would have allowed investors to "de-risk" their actual returns on investment by diversification amongst different types of ventures (e.g. tide, solar, wind, etc.) and maximise the market opportunity. But local SMEs needed to act in coordination, as hundreds of micro-innovations are required in the renewable market to allow energy-efficiency and cuts for larger companies, therefore requiring strong cooperation amongst a variety of micro providers. There was therefore an essential role for clusters, to act as key enablers for identification and promotion of possible synergies amongst different businesses, and attract investments from interested larger businesses acting both locally and internationally.

The initiative has mapped marine companies onto future procurement needs, through six awareness events & workshops in 2012. It has developed and grown a database of registered suppliers, a

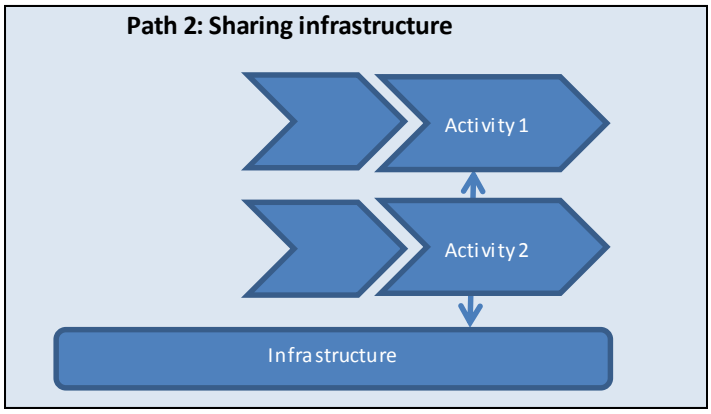
"Meet the Buyer event" in Feb 2014, where priorities were defined and 3 focused Meet the Buyer events in 2015.

See: http://www.marinesoutheast.co.uk

Typical for the above examples is that the enabling activity comes from a different (emerging) sector than the established activity. Through its inclusion, it is able to bring transformation, modernisation and diversification at the same time.

3.3 Path 2: Sharing infrastructure

Many of the maritime economic activities require the use of infrastructure: ports, platforms, research facilities including exploration vessels. These infrastructures are expensive and therefore it is crucial to share their use.



Indeed, infrastructure can be used by different economic activities. Ports are a classic example of this type of synergy. It goes without saying that ports are important crystallisation points for maritime economic activities: whether cruise shipping, short-sea shipping, deep sea shipping, passenger ferries, fishing, marine mineral mining, oil drilling, offshore or maritime monitoring; they all require ports infrastructure. It is however important to rethink the role of ports, and to develop views on how these can be transformed into crystallisation points for accommodating and promoting the maritime economic activities of tomorrow.

"Ocean Energy": Investments potentials and need for coordinated actions

Ocean Energy is the technology in renewable maritime energy with great potentials for the EU as a whole. Europe leads in the research on this field, with public sector and research institutions being essential sources of funding, and a limited private investment so far (i.e. currently limited to the UK but with potential for broader investments across the EU). Benefits for greater EU investments are clear: greater access to a global energy market of more than € 500 billion between 2010 and 2050, up to 40k high-quality jobs potentially generated by 2040 and substantial environmental reductions commitments, and more stable electricity outputs over time. Regions with greater focus are Hamburg, Basse Normadie, Pays de la Loire, Reunion, Ireland, Portugal, Cornwall and Scotland. Nonetheless, devices are still at an early stage of development and greater support to technical knowledge sharing, development and testing is required. Costs are so far too high and not commercially viable. Human skills are limited, research and demonstration is mainly promoted by academic spin-offs, and overall R&D investment in the technologies remains stable and limited. Technology needs to be very reliable and requires long-term testing and greater standardisation (synergies with off-shore wind can be achieved). Greater access to demonstration facilities,

cross-industry cooperation and better logistics are required. All these aspects might justify greater top-down investments from the EU.

Source: JRC (2015) JRC Ocean Energy Status Report

Future maritime economic activities are not only expected to be centred on ports. New maritime spatial concepts may be required to allow the full exploitation of synergies with a minimum of spatial tensions. An example are offshore islands, which can host wind turbines, ocean renewable energy sources as well as algae growing, while simultaneously providing coastal protection. Experience in such new maritime spatial concepts is still in its infancy and not well diffused. However, **multi-purpose platforms** are now being built – and it is important to adapt and elaborate such visions to the practices gained.

PLOCAN (Spain) – Multi-purpose Offshore Platform

The main objective in the PLOCAN's project is the design and construction of an offshore platform with the main aim to further marine science and develop new technologies. The PLOCAN Platform will be a fixed structure located four kilometres off the east coast of the Canary Islands, at depths of around 30 meters.

See:http://www.windplatform.eu/fileadmin/ewetp_docs/Events/2nd_Energy_Event/Hernandez-Brito.pdf

The same applies to **research infrastructure** in general and to **exploration ships** in particular. Although ocean exploration is a respected stand-alone research activity funded by oceanographic institutes around the world, there is increasing commercial interest from a range of maritime economic activities. Indeed, private organisations have contributed strongly to recent advances in our ability to explore the deep sea. However the costs of ocean exploration are high. An earlier attempt to undertake a truly large-scale ocean exploration programme that would incorporate a dedicated flagship and a modest fleet of underwater vehicles pointed to a requested funding of $ 270 million in the first year and $ 110 million in subsequent years[15]. Our own research pointed to the fact that the cost of a dedicated ship for marine mineral mining, currently being built in Germany, already amounts to over € 100 million. The case is therefore strong to share the use of exploration ships for multiple purposes, including oceanographic research, the search for active substances from marine creatures (blue biotechnology), oil and gas, as well as marine minerals including manganese nodules, cobalt crusts and massive sulphides. Furthermore, the exploration for oil and gas as well as marine minerals requires involvement of marine biologists and related experts to allow the early measurement of environmental impacts. Conclusion from this example is that any systematic

[15] Committee on Exploration of the Seas (2003) "Exploration of the Seas: Voyage into the Unknown. National Research Council, National Academy of Sciences (USA).

exploration of the oceans requires high investments that may need to be shared by multiple stakeholders, whether maritime economic activities or even nations.

Nordland (Norway) - Strategies regarding aquaculture

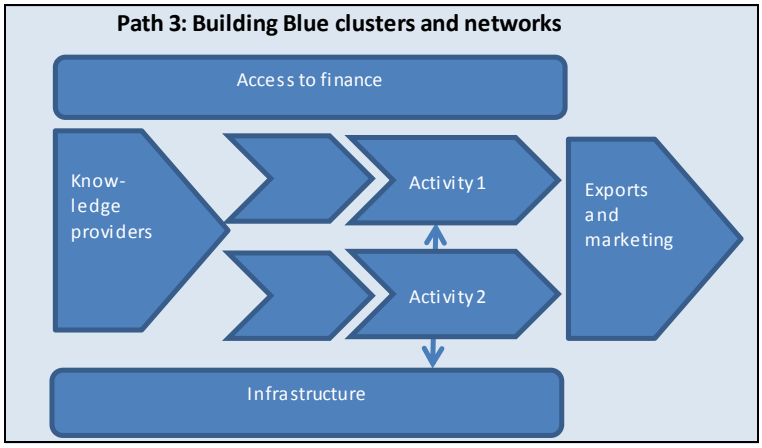
The province of Nordland is an extensive region in the North of Norway, which is amongst the world's prime salmon producers and exporters. In its continuous efforts to upgrade aquaculture activities, it has:

- Evaluated alternative and more sustainable management systems
- Contributed to the establishment of coastal zone plans (aerial planning)
- Prevented the spread of salmon lice and escape of farmed salmon (R&D-support)
- Identified bottlenecks for value creation based on marine resources
- Established a Marine Innovation Programme
- Contributed to the development of closed sea cages for environmental friendly production (R&D-support)
- Established a venture capital fund for the marine industry (under work)

Source: Presentation of Nordland county during the Canarias implementation workshop

http://www3.gobiernodecanarias.org/aciisi/ris3/files/Ponencias_Workshop/16%20Story%20Telling%20Nordland%20RIS3.pdf

3.4 Path 3: Building Blue Clusters and Networks



A more comprehensive approach to creating synergies and capturing value is that of maritime (blue) clusters.

Policies to support clusters are generally understood to focus on geographic concentrations of inter-connected firms and related actors (e.g. specialised service providers, universities).

The concept of (maritime) clusters revolves around mechanisms to increase productivity, growth and jobs. This is achieved by producing externalities or synergies that can be grouped as follows:

- **Business-to-business and research cooperation**. Enabling new forms of cooperation across sectors, and building new value chains of products and services. Proximity helps to boost such cooperation, but cluster activities can further enhance this process. The quadruple helix approach involving business, research, government and civil society is a powerful concept in this respect;
- **Competency development and knowledge sharing**. Clusters provide a locus for the labour market, retention and development of skills which are essential for building competitive advantage, and which extend beyond the borders of individual firms. Those able to attract the best skills have a decisive advantage over others. Cooperation with specialised educational institutes in the area of training are of mutual advantage;
- **Marketing and visibility**. Joint promotion of the cluster, its members and their products and services internationally is an important synergy and an important reason for companies to collaborate;
- **Maritime spatial planning**. Maritime clusters require the sharing of infrastructure, including ports, inland infrastructure as well as zoning of activities. Not all maritime economic activities go well together, and intelligent and integrated maritime spatial planning is required to prevent tensions; and
- **Trans-boundary cooperation**. In its form of cross-border, transnational and international cooperation, it enables access to markets, allows clusters to jointly address future challenges, and supports benchmarking and learning[16].

PLOCAN – Multi-purpose Offshore Platfom

The main objective in the PLOCAN's project is the design and construction of an offshore platform which aim is the investigation in the marine science and technologies. The PLOCAN Platform will be a fixed structured located off the East coast of the Canary Island, in a distance from the coast of 4km, in depths around 30m.

See:http://www.windplatform.eu/fileadmin/ewetp_docs/Events/2nd_Energy_Event/Hernandez-Brito.pdf

Cluster policies in Nordland (Norway)

Cluster policy is vital for Nordland (National programmes and regional support). Approved programmes:

- *NCE Aquaculture*
- *Arena Innovation Codfish*
- *Arena Mineral Cluster North*

[16] Ecorys/MRAG/S.PRO (2014) "Support activities for the development of maritime clusters in the Mediterranean and Black Sea areas"

- *Arena Oil&Gas Cluster Helgeland*

In progress:

- *NCE Innovative Experiences (tourism)*
- *Arena Marine Algaes*

Source: Presentation of Nordland county during the Canarias workshop

http://www3.gobiernodecanarias.org/aciisi/ris3/files/Ponencias_Workshop/16%20Story%20Telling%20Nordland%20RIS3.pdf

Important actors in supporting the RIS3 of the Canary Islands

The Maritime Cluster is an essential actor in bringing together local maritime activities (currently accounting for about 6% of regional GDP and 60,000 jobs), with the aim of doubling their relevance in terms of GDP generated by 2020. The main actions proposed to achieve such objectives are: promotion of self-recognition of maritime activities as a cross-cutting macro sector for the region; construction of sectorial knowledge base; fostering of sectorial integration; focus on innovation to develop competitive areas regionally.

The Universities, such as Universidad de La Laguna (ULL) composed of six campuses diversified by focus of research (e.g. Central: education/technologies; Anchieta: sciences/technologies; South: tourism; Guijara: humanitarian sciences; Ofra: health) and the Universidad Las Palmas de Gran Canarias (ULPGC) with its campus, and the important facilities (e.g. scientific marine technological park, laboratories for a range of areas and integration with businesses locally).

The Campus International de Excelencia is a platform for cooperation between ULL and ULPGC for development of tri-continental research and to promote growth and wealth through scientific innovation, that integrates funding tools (EU, National, etc.) and local partners (businesses, research and governments).

Source: Presentaions during the Implementation workshop

http://www3.gobiernodecanarias.org/aciisi/ris3/

4. Strategic areas for policy support

How to catch maritime growth through "Blue Value Nets"? First of all, that requires actions from the private sector, by expanding and transforming existing value chains. However, the public sector can support this process by 1) Enabling competency development and knowledge sharing; 2) Use maritime clusters as a tool to promote Smart Specialisation; 3) Stimulate trans-boundary cooperation and; 4) Promote 'Collaborative Labs'.

4.1 Enable knowledge and competency development and sharing

A low-cost / low-wage strategy is not promising in the medium- and long-term, because large enterprises attracted by low costs may delocalise sooner or later to other low-cost countries. Maritime clusters are an effective and powerful tool to prevent such delocalisation. But maritime clusters may tend to focus on more traditional maritime economic activities – and not necessarily smart specialisation. The identification of competency and knowledge gaps is therefore a first action – as such capacities are a prerequisite for future innovation.

Public actors can look for specific calls addressing the competency and knowledge gaps in the region – and several programmes exist to bring such opportunities under the attention of stakeholders – such as those in Atlantic Area.

Support to the Atlantic Action Plan and synergies in order to maximise EU funding potentials

In 2011 the Atlantic Strategy was developed, in 2012/13 a Forum was established and in 2013 an Atlantic Action Plan was agreed. Priorities in the plan are as follows: entrepreneurship and innovation, inclusive society, protect and develop costal environment, improve accessibility and connectivity. The main challenge is how to build from existing funding mechanisms (H2020, COSME, ESI, Erasmus+, COST, Life+, Territorial cooperation funds), in the absence of a dedicated fund. A Support Team for the Action Plan has been established, in order to support local applicants and match the most promising project ideas with the most appropriate funding mechanism available. A team in Brussels has been set up, supported by five focal points in FR, IE, PT, ES and UK. Aims of the Support Team are: identify projects ideas, suggest funding opportunities (match-making) and provide guidance in implementation. About 80 ideas have been collected in the project database, scored from "level 1" (i.e. basic vague idea) to "level 6" (i.e. funded project). Funds are mainly ETC (cross-border/POCREA/POCREC, trans-national/SUDOEC/ATLANTIC-AREA/MAC, interregional/INTERREG), but also IPA and ENPI.

An essential element to ensure sustainability of RIS3 funding is the maximisation of synergies potentials across available funding mechanisms. The aim is to get the best possible value out of available funding, with more funds brought together in one project (i.e. ESI and Horizon2020) or successive projects (expanding follow-ups through time by use of different funds), as well as parallel projects (synergetic one with another). Cross-funding mechanisms can be used both "upstream" (ESI to H2020) and/or "downstream" (H2020 to

ESI). Some key message is emerging in this respect: think strategic, act in collaboration (i.e. avoid "silos"), identify and exploit opportunities across the entire programming cycle. With respect to policy makers, monitoring RIS3 is becoming important to support actions for RIS3 implementation and assess funding. It is important to provide a breakdown of output indicators across priorities, so to make clear links to those and see how to finance consistently key actions through time by promoting synergies across funding mechanisms available.

See http://www.atlanticstrategy.eu/

Exchange programmes for mobility of researchers are also valuable. For this the renamed Marie Skłodowska-Curie actions (MSCA) provide a good platform. These programmes can also be used to strengthen cooperation with non-EU countries, as the MSCA programme is open for participation to all countries of the region (ENPI/MEDA). The COSME scheme "clusters go international" is relevant as well. Furthermore, policy makers can encourage maritime clusters to carry out a gap analysis on competences as well as available training / education facilities – as part of 'horizon scanning'.

4.2 Use maritime clusters as a tool to promote Smart Specialisation

Maritime clusters appear the logical focal point for building and expanding value nets, because they consist of both businesses as well as members from the research community. It is therefore important to build on Maritime clusters when rolling out Smart Specialisation Strategies.

A range of national and regional approaches in implementing RIS3

Portugal has "mapped" the existing networks of knowledge creation and exchange in the country, through an assessment of themes covered by local "nodes" and degrees of integration across the nodes. This approach has allowed for an initial understanding of the current status of knowledge exchange. As a second step, the extent to which such "networks" interact with the key sectors identified by the RIS3 will be provided, so to measure advancements and improvements of such exchanges through time due to regional investments. This could be done, for example, by comparing local nodes in the networks and existing companies across the value chains of strategic sectors. By using the initial mapping as a baseline, the effects of the implementation of the national strategy can be constantly monitored through the assessment of changes in the networks.

Ireland has promoted a reorganisation of administrative structures at regional level, as a means to respond more effectively to the needs of local economies in the innovative sectors identified as priorities. A "marine coordination group" has been established with senior officials from a range of relevant Departments from the Central Governments and the agency dealing with the policy. Regional Assemblies are functioning as a "bridge" between national policies and regional needs, so to assure that local priorities and specifications are respected in the implementation of the central government actions. Importantly, a network of

"brokers" has been set up so to engage with local entrepreneurs and other economic actors, to assure their understanding of the administrative functioning and to identify potential interesting project ideas to be funded.

Canary Islands identified a range of strategic sectors to be supported, in line with the complexity of the local economy, with a strong focus on promising innovations that could provide an added-value for the territory. A relevant role for supporting the innovation of regional economy is attributed to the local network of universities and research centers, each covering a specialization across a wide range of innovation areas. Applied research and technical platforms to test specific solutions are essential in the region to promote innovation in mature sectors (e.g. tourism and shipbuilding) and to position the region within innovative niches with high potentials (e.g. ocean energy) through international strategic partnerships with research centers and industries. A strategic role is also played by the local cluster, acting as a bridge between enterprises and research.

Nordland (Norway) is challenged by a regional economy highly dependent on global companies investing locally, but with limited value captured locally due to a lack of specialisation and qualified skills. As a result, the regional system is perceived as "incomplete" and not sufficiently competitive. The local strategy has therefore been designed to promote greater diversification in local economic activities, by making the region more attractive for global value chains acting in strategic priority sectors (e.g. aquaculture, algae). Potentials in strengthening linkages between R&D, expanding professional services across local value chains and promoting strategic global partnerships. An essential role is assigned to local clusters in attracting private investments and skilled professionals, dedicated networks to promote dialogue between enterprises and research centres, as well as the mapping of the actual value-chain in the priority sector to assess areas where value can be captured.

Source: Presentations during the Implementation workshop

http://www3.gobiernodecanarias.org/aciisi/ris3/

4.3 Stimulate trans-boundary cooperation

Maritime economic activities are for a large part concentrated in peripheral and/or sparsely populated regions. This implies that they often do not have the necessary critical mass and limited control over the value net. Therefore, it is important to take a broader perspective and take into account functional and existing relations across international territories, for example when developing sea-basin strategies. Policy support can be provided to ensure internationalisation is part of cluster business plans. Competency, skills and research are prominent areas for international collaboration that should not be overlooked.

4.4 Promote Collaborative Labs: promoting "unexpected spillovers" across value nets

Innovation across value nets is characterised by a certain degree of unpredictability and is triggered by dialogue and exchanges (i.e. the "quadruple helix" approach) amongst activities which are not necessarily expected to have strong commonalities. Creativity and "out of the box" thinking is key and it can be prompted only through specific tools and techniques. Amongst those, that of "Collaborative Labs" is a growing model, which is being experimented in some EU projects, as a means to force strategic and visionary dialogue amongst a range of diverse interests, so to assess whether practical business ideas can emerge through the interaction of different industries across specific clusters or broader value webs.

Collaborative Labs could be promoted to trigger effective discussions on possible pathways of innovations amongst industries and economic activities acting across the Blue Economy "value nets". Through such "labs", new alliances can be triggered amongst private actors in synergetic sectors, as opportunities can be investigated in bridging research and innovation activities with "investments opportunities" available from interested businesses in synergetic sectors. In the next section we will provide an overview of possible "pathways for innovative synergies" (i.e. linear and non-linear) to be promoted across value webs in the Blue Economy. We hope such an overview can provide a basis for further policy action and support for diversification across the Blue Economy in EU coastal regions and their RIS3 strategies.

JRC Mission

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new methods, tools and standards, and sharing its know-how with the Member States, the scientific community and international partners.

Serving society
Stimulating innovation
Supporting legislation