



CSA
OCEANS
JPI Oceans support action


SEVENTH FRAMEWORK
PROGRAMME

Technological and legal barriers - Intellectual Property Rights



Project full title: **CSA Healthy and Productive Seas and Oceans**

Website: **www.jpi-oceans.eu**

Grant agreement no.: SCS2-GA-2012-314194-CSA Oceans

Project start date: 1st September 2012

Duration: 36 months

Funding scheme: SP1 –Cooperation; Coordination and support action; Support actions FP7-SST-2012-RTD-1

Deliverable number: D4.3

Deliverable name: Technological and legal barriers - Intellectual Property Rights

WP no: 4

Contractual date: 31 August 2014

Delivery date: November 2014

Lead Beneficiary: Ministerio de Economía y Competitividad (MINECO)

Authors: Lourdes Armesto (MINECO), Teodoro Ramírez (MINECO), Amelia Rubio (MINECO) and Susana Hernández (FECYT-MINECO)

Nature: R

Dissemination Level: PU

DISCLAIMER:

The information contained in this document is for informational purposes only and it does not constitute legal, professional or commercial advice. While every care has been taken to ensure accuracy of the information provided in this document, no representation or warranty, expressed or implied, is given by CSA Oceans and the authors of the document as to the accuracy or completeness of the contents and information contained in this document.

Under no circumstances shall the CSA Oceans consortium, or any of its members, their staff or agents, including the authors of the document, be liable or responsible for any loss or damage whatsoever arising out from any inaccuracy, omission or error in the information contained in this document or from any other cause, direct or indirect, in connection with reliance on the use of such information. We do not accept any liability or responsibility for any loss, damage, expenses, claims or infringement of third party rights. The user thereof uses the information as its sole risk and liability

The recommendations and views expressed in the document are purely those of CSA Oceans and they do not necessarily reflect the official opinion of the European Commission or JPI Oceans.

Cover images:

Beach Combouzas en Arteixo © Flickr - jl.cernades

Jellyfish macro © Flickr - Mr. Physics

At play.. dolphins and bow wave © Flickr- OneEighteen

Tourism Boracay © Flickr- Daniel Y Go

LED light on photobioreactor for algae cultivation ©Ifremer - Michel Guillaou

CONTENT

1. Introduction	4
1.1 Current situation in Europe	4
1.2 Objective of this report	4
2. Report methodology.....	5
2.1 Research funding agencies consultation	5
2.2 Stakeholders consultation	6
2.3 Desk based research	7
3. Outcomes of the consultation: barriers and recommendations	7
3.1 Outcomes of the consultation at National level	8
3.2 Outcomes of the consultation at EU level	14
3.3 Summary of outcomes and recommendations	23
3.4 Barriers from literature review and desktop research	26
4. Intellectual property rights (IPR)	46
4.1 Background information on intellectual property rights (IPR)	46
4.2 General questions and recommendations on patents, utility models and trade secrets	50
4.3 Recommendations on IPR in the maritime sector: The shipbuilding sector	60
5. Public-private partnerships (PPP)	62
5.1 Introduction	62
5.2 Joint Technology Initiatives	64
5.3 Research and contractual PPPs	66
5.4 Potential role of PPPs within the framework of JPI oceans	69
5.5 Recommendations for identifying and managing PPPs	70
5.6 Additional recommendations	74

ANNEX I. Overview of intellectual property rights at national level

1. INTRODUCTION

1.1. CURRENT SITUATION IN EUROPE

While the EU is considered as having very good research and development capacities in many fields, it is considered not as successful in commercializing research results through manufactured goods and services. In particular, licensing and creating spin-off companies are often considered as major opportunities to capitalize on research findings and to strengthen the economic base in Europe, but Europe does not sufficiently make use of these opportunities. Major competing regions in the world such as East Asia and the US are deemed more successful in this respect. Thus there is a strong need to improve knowledge transfer and to boost innovation in the EU.

The so-called “blue economy” contributes immensely to create jobs and sustainable growth in Europe. “The sea and the coasts are drivers of the economy. Because of their outward-looking geography, ports and coastal communities have traditionally been centres for new ideas and innovation.”¹ But especially in the marine related fields like blue biotechnology or ocean renewable energies it is a big challenge to realize the step from the developmental stage to the commercialization of innovative products.

Europe needs to improve intellectual property management between researchers and the private sector, reduce discrepancies between different national regulatory frameworks, policies and practices; and enhance the dissemination of knowledge throughout Europe. An effort should be made to better convert knowledge into socio-economic benefits.

In 2010 the “Innovation Union” was defined as one of the flagship initiatives within Europe’s 2020 strategy. Amongst others, the EU 2020 Strategy aims “to improve framework conditions for business to innovate (i.e. **create the single EU Patent and a specialised Patent Court, modernise the framework of copyright and trademarks, improve access of SMEs to Intellectual Property Protection, speed up setting of interoperable standards; improve access to capital and make full use of demand side policies, e.g. through public procurement and smart regulation**)”². Herewith, the European Commission has **identified knowledge transfer from universities and other public research organizations to private companies as crucial** for sustaining and improving growth, employment and social wellbeing in the EU.

1.2. OBJECTIVE OF THIS REPORT

The work package 4 “Identification of barriers to science based innovation” aims at **identifying and analyzing the generic technological gaps and the key barriers to develop knowledge-based innovations**, which also impede the sustainable development of marine and maritime economic activities and the generation of benefits and wealth from our seas and oceans. This information will

¹ Source: (‘© European Union, <http://eur-lex.europa.eu/>, 1998-2014’), Blue Growth opportunities for marine and maritime sustainable growth (COM(2012) 494 final), ,

² Source: (‘© European Union, <http://eur-lex.europa.eu/>, 1998-2014’), Europe 2020 - A strategy for smart, sustainable and inclusive growth (COM(2010) 2020 final),

allow an ex-ante evaluation for actions to be implemented within the JPI Oceans and contribute to the Strategic Research & Innovation Agenda (SRIA). It will also provide critical inputs for JPI Oceans to build long-term, large-scale public-private partnerships.

Therefore **the objective of this report is to gather and analyse existing information on general barriers that hinder innovation, the growth and competitiveness of European industry in marine and maritime activities for a better success on the world market. The report also addresses more in depth the main administrative, legal and technological barriers for some key sectors of the blue economy.**

The document also provides an **overview of IPR at European and national level³**, focussing on industrial property rights, particularly on patents due the importance of patents for the maritime industry and it provides some examples of IPR barriers in the maritime sector. The report also provides guidance **with practical questions and recommendations on how to protect IPR based on the information gathered through desk research and provide an overview of IPR at national level.**

Finally the report provides an **overview of public-private partnerships and recommendations for the identification and management of PPPs**, with a view to the possible implementation of this type of instrument to support some of the actions of JPI Oceans, particularly those that requires a strong industry involvement in close cooperation with public research institutions to build long-term, large-scale public-private partnerships.

2. REPORT METHODOLOGY

The information used in this report is **based on the analysis of the inputs provided by** research funding agencies and stakeholders (including technology platforms and industry associations relevant for JPI Oceans) on barriers for technology, development and innovation, including administrative, IPR and other legal issues **as well as consultation workshops**. In addition, an extensive **desktop study to search for existing information and studies** on barriers for technology development and innovation has been conducted. This has allowed to identify the main barriers that hamper the growth of the maritime economy, including technological and legal barriers. The identification of barriers will help to set up the basis for future ex-ante evaluation for actions to be implemented within the JPI Oceans and contribute to the Strategic Research & Innovation Agenda (SRIA).

In addition, an extensive **desktop study has been conducted** on IPR related issues and the management of Public Private Partnerships (PPPs).

2.1. RESEARCH FUNDING AGENCIES CONSULTATION

A questionnaire was sent to the research funding agencies (RFA) and ministries to identify the key challenges and opportunities for the future and to gather information on functioning and mapping of national RTD and innovation systems, science to policy mechanisms, and national research strategies and programmes. The questions included aspects related to barriers at national and European level. The **survey** included following questions with regard to the topic “barriers”:

³ An overview of IPR at national level is provided in Annex 1.

1. *In your opinion, what are the major barriers that hamper innovation in the marine and maritime sectors in a) your **country** and b) at **European** level? Explain if these barriers are related to intellectual property rights, legal, administrative, financial issues, technological gaps or lack of knowledge/ knowledge transfer. Please indicate if there are any actions (solutions) you would recommend to overcome those barriers. Do you see a potential role for JPI Oceans?*
2. *In your opinion what are the major barriers (e.g. administrative, legal, funding obstacles, etc.) at a) **national** level and b) **European** level to promote trans-national cooperation and implement joint programming activities in marine and maritime RTD and innovation. How could these barriers be overcome? Can JPI Oceans play any role?*
3. ***How can JPI Oceans contribute** to boost research, technology and innovation in order to promote the competitiveness of the marine and maritime sectors?*

2.2. STAKEHOLDERS CONSULTATION

One of the aims of the CSA Oceans mapping exercise was to get information on: i) what issues could potentially be addressed by JPI Oceans to respond to its goals, ii) how those issues could be tackled and iii) how to do it efficiently. In order to collect views of stakeholders, CSA Oceans hosted a series of **workshops in May-June of 2013**. Over **60** European and international stakeholder groups, organizations, networks, platforms and projects took part in **6 workshops**. The participants were asked to fill in a **short pre-workshop questionnaire** to prepare their input on potential needs/actions/tools to achieve the JPI Ocean goals to stimulate the discussion. These inputs were debated during the workshops which allowed to highlight a number of commonalities between the stakeholders. After the workshops, stakeholders were encouraged to elaborate on their responses through **an online open consultation**.

The online open consultation aimed to give the opportunity to the whole marine and maritime community to express their views and provide their inputs on the potential role on JPI Oceans and how JPI Oceans can add value. Similar questions to the ones asked to research funding agencies, **on barriers for RTD and innovation and factors that may hamper the growth of the maritime industry at EU level, were also addressed to stakeholders, except for that they** were not asked by barriers at national level, given the pan-European or international scope of many of the stakeholders.

The output of this open consultation has been used to feed into the mapping and preliminary analysis of marine and maritime to identify barriers to innovation. In total **49 responses** were received from the open stakeholder consultation. The profiles of the respondents by marine or maritime area showed that most of the respondents were involved in applied research, followed by fundamental research and monitoring; whilst industry participation remained low. Given the broad nature of stakeholders consulted, including international organizations, European organizations, national organizations and individuals it was decided to focus the questionnaire on barriers at EU level since many of them were international organizations and European organizations which may not be aware of barriers at national level.

2.3. DESK BASED RESEARCH

To fulfill the objectives of this deliverable, this report has implied substantial desk based research. While the consultation procedure has provided valuable information, it was also necessary to complement the findings with a certain level of desk-based research and experience based input information on marine and maritime needs, gaps, technological and legal barriers is already available. To compile this report, has been collected information on technical and legal barriers, knowlegde transfer and IPR **from the state of the art**.

An intensive desk based research has been also necessary to compile information on IPR issues at national level for those countries involved as participants and observers in JPI Oceans as well as to map existing recommendations for the management of IPR and Public Private Partnerships.

3. OUTCOMES OF THE CONSULTATION: BARRIERS AND RECOMMENDATIONS

This section addresses the main barriers identified at national and EU level that hamper maritime research, technology development and innovation. The information provided **from the research funding agencies and stakeholders consultations has allowed to identify and analyze the main barriers for technology development and innovation, and in general for boosting the competitiveness of marine and maritime industries at national and EU level**. It also provides recommendations to overcome the identified barriers, based on the inputs from the consultations.

TYPES BARRIERS: According to their nature, barriers **have been classified** in different categories related to.

- KNOWLEDGE TRANSFER. TECHNOLOGY TRANSFER
- LEGAL AND IPR, INTELLECTUAL PROPERTY RIGHTS
- ADMINISTRATIVE AND MANAGEMENT
- FUNDING
- COOPERATION AND COORDINATION
- CULTURAL BARRIERS AND RISING AWARENESS
- DATA ACCESS
- OTHER BARRIERS

Some of the identified barriers are **mixed** and can be linked to more than one of the different categories of barriers listed above (e.g. barriers on administrative and financial issues). These have been tackled under different categories concerned.

Because the nature of the barriers at national and EU level is different, below we have addressed these barriers in different sections. Thus we present first the outcomes from the consultation with research funding agencies, targeting barriers at national level (section 3.1). In section 3.2 we present the outcomes the consultation on barriers at European level, based on the inputs on both research funding agencies and stakeholders (section 3.2). In each of these sections solutions are also proposed to overcome the identified barriers.

3.1. OUTCOMES OF THE CONSULTATION AT NATIONAL LEVEL

The barriers **identified** at national level and **categorized** under these categories and the solutions/**recommendations to overcome** these barriers are given below:

KNOWLEDGE TRANSFER. TECHNOLOGY TRANSFER

BARRIERS

One of the main barriers at national level identified by research funding agencies is the **lack of knowledge transfer**. It was pointed out that this barrier is also the **result of other barriers interlinked that have** an influence on knowledge transfer. Those barriers are exposed below. In relation to knowledge transfer, particularly it was highlighted that results of research **projects do not have an impact on innovation**.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

It is necessary to develop **mechanisms to promote** knowledge transfer, enhance cooperation and dialogue between industry and science. **Share experiences and best practices** between research institutions and maritime industry sectors as well as knowledge transfer across-sectors to address common challenges. **Create a space for sharing and exchanging knowledge and resources: R&D centres, infrastructures, equipment, data bases, programs, know how, skilled personal, specialized teams, etc.**

Develop suitable management frameworks and **mechanisms to fully integrate and embed innovation in research projects**. **Internalize standard process to integrate innovation** in every project. **Prioritize the investment in projects focused on innovation** which can have an impact on the economy and the society.

LEGAL AND IPR, INTELLECTUAL PROPERTY RIGHTS

BARRIERS

In relation to legal issues and IPR one of the main barriers identified at national level by research funding agencies was the **lack of understanding of the importance** of intellectual property rights and other legislative barriers. Some participants like industry and SMEs feel that patents **are not very functional** in marine and maritime sectors because there is too much disloyal competence, **piracy** and the high bureaucracy makes claiming process too long.

At national level, research funding agencies raised the lack of coordination/fragmentation within the research system so objectives and resources dispersion and **lack of harmonization of the regulations** hamper the alignment of means with ends.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

It is necessary to develop activities to support **awareness** among industry and in particular SMEs of the benefits of the IPR and boost the implementation IPR across all sectors.

Create a practical and effective way to **protect** intellectual property and simplify and **reduce time of procedures to claim** intellectual property rights, such as patenting technology.

The regulatory framework on IPR needs to be **flexible to be updated to rapid changes** in the society and at the same pace that advances in research, technology and innovation are produced. It also needs to be **adapted** to the new societal challenges and discoveries. It is important **create legal norms in gaps and needs** to protect or boost innovation and **update** obsolete legal regulations.

It is necessary to review and make an effort to **harmonize regulations at national and local** level that may have an impact on technology development and innovation, and update or abolish obsolete legal regulations. In addition, **common regulations** to protect and boost innovation on the marine and maritime sectors should be developed.

The modification of national laws on public aid across Europe would **allow companies to benefit of more public funding; strictly for knowledge implementation / technology transfer** (despite innovation is considered “close to the market” the public funding support is low).

ADMINISTRATIVE AND MANAGEMENT

BARRIERS

In many countries there is no a specific marine and maritime research **strategy** and frequently the national strategies for research do not include specific **priorities** focused on marine and maritime research and innovation. Consequently, in many countries there is no specific **budget** line in the national RTD programmes and plans allocated to this domain.

A major barrier identified by research funding agencies is the **fragmentation in the governance and management** of marine and maritime issues at national level, including the management of research and innovation programmes. In most Member States marine and maritime issues fall under the remit of different ministries (e.g. energy, mining, transport, fisheries, research) however not all of them have funding allocated to research and innovation.

The lack of proper planning may be a limiting factor for industry; hence it takes a bit longer time to act in a desirable time period when it becomes necessary.

Traditional **sectorial governance** structures are inadequate for the management of multiple human activities at sea, promote their growth and prevent their impacts on the environment and also the cross-sectorial impacts between the different activities. Narrowly focused, sectorial governance is a barrier that hampers growth and innovation in maritime industries since it does not provide a suitable framework to develop innovation that cut across different sectors to tackle needs and challenges that are common to different sectors.

The **implementation** of innovation, including agreeing on a standard definition for innovation, in national and EU projects has been also identified as a major challenge for all EU Member States and a barrier that hampers new innovations in marine and maritime research.

IDENTIFIED SOLUTIONS/RECOMMENDATIONS

In order to ensure the development of research and innovation needed to support the growth of the maritime industry it is necessary to develop national marine and maritime research and innovation strategies and implement these strategies through **targeted programmes** with specific budgetary lines to fund marine and maritime issues. The programmes should identify the marine and maritime priorities to allocate resources to support advances in this field. The time frame of national programming could be **aligned** to those of EU funding programs to maximize synergies.

On the other hand, policies and management measures should set **realistic targets** to provide certainty to the industry for the development of innovation to achieve those targets. This is key to maintain and grow profitability of the industry while keeping compliance with environmental policies and regulations

It is necessary to develop **mechanisms and measures at national level to ensure the development and implementation** of innovation across all activities and all maritime sectors (e.g. measures to reward the integration of innovation in process and projects). Policies should also set of **realistic targets** to promote innovation and sustainability of the maritime industry in the short-intermediate and long term to ensure profitability of maritime industrial activities, taking into account possible impacts on the environment and society.

It is necessary to **harmonize and integrate national policies and strategies and develop common management and funding practices at national level across different sectors**. This will avoid duplication of efforts in research and innovation and help make more efficient use of resources. Also a common understanding on innovation is needed between MS across Europe.

The use of the marine space by human activities, their effects on the marine environment and the impacts of specific activities on other uses of the sea need to be addressed through new and integrated management/governance structures to respond to the needs of different sectors. These should also promote and facilitate the development of new innovations to promote the growth of maritime industries, avoid conflict of interest between sectors for the use of the marine space and also to prevent and mitigate impacts of human activities on the marine environment, thus serving the interests of stakeholders from different sectors. It would be necessary to develop plans and reduce time of implementation measures with a view to reduce uncertainty for industry. New management model needs to be able to adapt to environmental pressures (e.g. climate change) and to rapid changes in the uses of the sea. Plans for particular situations, like emergencies or disasters, so as to reduce the time of response, should also be developed.

FUNDING

BARRIERS

Research funding agencies have pointed out in the consultation that **financial constraints**, due to the economic crisis, are a major barrier for research and innovation at national level. In addition to the budgetary restrictions, marine and maritime research do not have a **specific budgetary** line in most of the national RTD programmes, since marine and maritime research is not include as a specific priority in many national RTD programmes.

Marine and maritime research and innovation is costly, in particular demonstration and pilot-projects, and a strong commitment of policy makers is needed to ensure the future **sustainability** of projects and actions in this field. In some countries there are no plans or solutions to secure long term funding needs for marine and maritime research and innovation. Moreover sectorial governance can lead to **duplication** and **fragmentation** of efforts which affect the efficiency of funding.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

It is necessary to **increase financial** resources for marine and maritime research and in particular for demonstration and pilot-projects, though this is difficult at this moment for many countries due to budgetary restrictions.

The economic climate and budgetary constraints call for **optimizing** the available funding by identifying the main **priorities, aligning of funding** and allocating resources to support **common, collaborative and cross-sectorial activities** for maritime research, technology development and innovation along priority lines that need to be identify to address common challenges. This can create synergies across Europe and have an impact at national level on RTD activities. A way to optimize funding and make better use of limited resources is to prioritize focused and sustainable projects that can contribute to tackle specific important societal challenges.

It is necessary to **promote a higher involvement of industry in funding RTD activities through the development of PPPs, Public Private Partnerships** and launch calls focused on demonstration projects and pilot projects to test new technology and innovation and their assess the potential benefits on the society.

It is extremely important to **ensure continuity** of funding for marine and maritime RTD activities. With this aim it is necessary to raise the awareness of policy makers and national governments on the importance support the integration of marine and maritime research in the development of RTD strategies and policies. It is also necessary to develop new frameworks to ensure availability of funding for public research organizations and also industry to leverage private investments in marine and maritime research, technology and innovation.

It would also be necessary to promote the development of actions at EU level **to exchange experiences and best practices on the management of budgets** at national level in order to optimize the funding to support marine and maritime research activities to address common priorities.

COOPERATION AND COORDINATION

BARRIERS

One of the main barriers is the difficulty **to get industries, companies and academic organizations to work together** in the innovation process, in order to meet knowledge and technology offers and demands. Also it is stress the difficulties to see the added value of international cooperation with the national efforts.

At national level, research funding agencies raised the issue of the **lack of coordination/fragmentation within the research system**. In many countries the competences in

sectorial policies are often split between different ministries and in some cases between different regions, this **fragmentation** can be a barrier for innovation in maritime sectors.

Another important barrier is the **weaknesses in strategic and operational planning**, including operational integration that prevents a good level of coordination and cooperation to achieve success.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

It is necessary to develop **mechanisms to promote and support events** where industry and scientists meet in order to improve the communication between users and producers of technology and innovation, with a view to satisfy the knowledge, technology and innovation demand of industry. In this respect JPI Oceans can **establish a general framework for cooperation and facilitate** knowledge transfer.

In order to make a **better use of existing resources** (e.g. sharing of research infrastructures vessels) major efforts are necessary at the level of countries to increase intra-national coordination. It is necessary to make an effort to synchronize and coordinate research actions to avoid duplication and fragmentation, integrate science, industry and public administration needs, **align national, regional and local policies and collaborate in the common objectives**. This could be achieved by developing suitable **mechanism** for better governance, coordination and cooperation between the different administrations at national level (including regional and local administrations), for instance through the creation of **overarching bodies** at national level (e.g. National Marine Research Agencies as a main governing bodies at national level) and develop national **overarching strategies and programmes** to define priorities, align objectives and develop more targeted research on specific challenges.

Some **examples** of cooperation in marine/maritime sector were raised in the consultation: Representatives from the marine/maritime sectors in Flanders have joined forces in a common platform '**Flanders Maritime Cluster**' to stimulate this knowledge transfer and innovation. Another example raised was **the National Ocean Strategy (NOS) of Portugal and its Action Plan** which intends to promote alignment and coherence of the efforts regarding exploitation and preservation of the Ocean in parallel with its exploration and research efforts in order to reach short to long term objectives. It seeks to enhance strategic planning at national level, bridges and promote coherence with EU level (Europe 2020), **including its European Structural and Investment Funding (ESIF) and Research and Innovation Programme (Horizon 2020)**, to cover the period 2014-2020. Moreover, it intends to prove the umbrella supporting regional and local action planning, as well as a bridge for international cooperation at global scale.

On the other hand though being part of EU, the focus of Member States is still to cater for national/local communities and industries. Thus, there is expectancy that national RTD efforts provide a local advantage.

CULTURAL BARRIERS AND RISING AWARENESS

BARRIERS

Another barrier that research funding agencies noticed is the **lack of innovation culture in industry** and in **research** organizations, including **risk tolerance**.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

It is necessary promote awareness of the benefits of innovation among stakeholders and scientists and internalize **the process of innovation** in the research system, including public organizations and enterprises across all marine and maritime sectors.

Promote the development of mechanisms at national level (e.g. **specialized agencies**) to provide financial support to innovation and to raise awareness of the innovation culture. In some countries there are quite a few agencies created in order to change the attitudes by providing not only financial support but also by raising awareness of innovation culture. A solution could be to create calls and reward proposals focused on **good practices in innovation**.

DATA ACCESS

BARRIERS

In some countries data collection and access is largely **monopolized** by one or subject-related institutions. In many cases the data policy of these institutions is not open access and can lead to prohibiting **charges** for data access, even for research projects.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

Develop mechanisms at national level to **improve the coordination in the collection and management** of marine data (**integrating local, regional and national systems**). **Sharing** knowledge and experiences in data collection and management and develop data policies in order to facilitate and simplify procedures to access to data bases. A solution would be to create open-access marine national data centres.

OTHER BARRIERS AND RELATED ISSUES

Other issues highlighted by research funding agencies in relation to barriers for technology development and innovation and in general to boost the maritime economy are:

- The fact that barriers in marine and maritime research are complex and **depend on the sector** and the market.
- Financial, **infrastructural** and **human resources** specific scarcities prevent the development of necessary critical mass to boost innovation.
- High cost of technology, in particular the high purchasing and licensing costs of software for research units from established manufacturers of specialized software packages was pointed out as a barrier.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

To avoid high purchasing and licensing costs of software for national research units it would be necessary to grant this kind of software.

Improve the coordination and cooperation of research, technology development and innovation at national level under defined priority fields in order to create critical mass in areas that need to be promoted to boost the maritime economy.

3.2. OUTCOMES OF THE CONSULTATION AT EU LEVEL

This section addresses the main **barriers identified at EU level** that hamper maritime research, technology development and innovation. **Recommendations to overcome** the identified barriers are also provided. Some of the barriers identified fall under can be linked to different categories of barriers (e.g. barriers dealing with administrative and financial issues) and therefore these **have been considered accordingly under different categories** concerned.

KNOWLEDGE TRANSFER - TECHNOLOGY TRANSFER

BARRIERS

Knowledge transfer was pointed out as one of the main barriers. The lack of knowledge transfer **can be result of the others barriers**. For example, there is **lack of events** to support knowledge transfer where users (companies) – and producers of knowledge and technology (e.g. academic organizations, research institutes) where can meet to identify knowledge / technology demands. This is can be the result of administrative and management barriers, or/and limited funds, or/and lack of cooperation and coordination or/and cultural barriers. IPR and regulatory barriers also have a great influence on knowledge transfer.

In addition, it was highlighted that there is not enough (still limited) **communication and cooperation** between basic and applied science, technology development and industry. They often don't know what the other is doing which makes difficult the transfer of knowledge.

Performance measures for academic science, which are mainly peer-review publication orientated, hinder knowledge transfer to the applied science and policy domains.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

Industrial and research policies **should be better organized to increase the cooperation** between science and industry, allowing academics and enterprise work closer to each other. It would be necessary to develop a **mechanism** to improve the dialogue between scientists, policy makers and stakeholders and create a common language easily understandable for everybody. If **communication** is enhanced, unexpected synergies among basic and applied science, technology development and industry can be created. This will benefit of all these components and, in the end, facilitate innovation. **Building trust** within the community is also an important aspect that needs to be considered. These require appropriate funding and tools to get communities to know each-other, for instance through annual TNA **open-days to share** knowledge and practices.

More effort needs to be put into knowledge management and knowledge transfer to ensure that there is an increased cost: benefit.

The lack of knowledge transfer between research and industry can be counteracted through **clustering** industry and research, jointly working in a **pre-competitive area** of technology development. This has proven to be a successful tool towards a common understanding of the needs and opportunities within a sector. Open innovation is promoted but not yet implemented. There is a need for a balanced approach that is acceptable for companies.

Knowledge transfer can be promoted by **creating a space to share** and exchange resources: R&D centres, infrastructures, equipment, data bases, programs, know how, skilled personal, specialized teams, etc. with security and IPR protection.

Public-Private Partnerships can be an efficient tool to promote knowledge transfer between science and industry. **Boosting Public-Private Partnership, PPP** would facilitate the cooperation between different participants, stakeholders, sectors, and transnational cooperation.

In the case of the aquaculture sector, experience has shown that when there are well-defined issues that can be addressed by short to medium-term research then this interaction is active and efficient. When longer term issues have to be addressed, where impacts and benefits are not easily visible, then additional mechanisms (such as JPI-Oceans) are needed for strategic planning and relevant investments.

JPI Oceans can establish a general framework for cooperation by **promoting networking** events and workshops to facilitate the dialogue between scientist and technologists and the knowledge transfer. JPI Oceans, as a pan-European initiative involving member states, could develop **mechanisms to promote** the knowledge transfer and technology between science and industry as well as cross-sectorial cooperation. In cooperation with the European Commission it could develop a dedicated program for seas and oceans to promote the development and transfer of knowledge and technology. Innovation and growth of maritime economy can be facilitated by a **more structured interaction between knowledge producers and users**. JPI Oceans can help by **facilitating this dialogue** with a top-down approach and long-term perspective.

LEGAL & IPR, INTELLECTUAL PROPERTY RIGHTS

BARRIERS

Regulations at EU level and international level have been identified as barrier for the growth and competitiveness of the maritime industry. The **access of industry** to funding for knowledge implementation/technology transfer innovation **is limited** due to European regulations, since innovation is considered a “close to the market” activity and therefore more industry involvements is required while public support is usually granted for innovation is lower.

It is difficult for industry to develop without a **stable legal framework** over time. There is a significant **risk** that the results are jeopardized by new coming regulations or standards. An **example** is in the sector of ocean wind energy, where there is a **lack of stability and clarity of the legislative framework** that affect deep offshore designs that are rapidly developing with potential commercialisation in the next five to six years. However, deep offshore wind development depends on numerous factors and crucially on a stable and clear regulatory framework post 2020.

Other important problem is the **lack of maritime spatial planning and monitoring/surveillance**. Increased activity within Europe's marine waters has led to increased spatial demands and therefore growing competition between sea users. In the case of offshore wind energy, planning delays can increase the costs significantly and effective planning will ease permitting and licensing procedures.

Also **delay on the implementation of measures or the long time needed**, for example to ensure good environmental status of marine areas/ecosystems.

IPR issues were identified as a barrier at EU level. In the consultation According to the inputs, IPR are a difficult subject that **inhibits open discussions between science and the economic** sector. For the industry, patent is the main barrier to an industrial cooperation. Secondary barriers are other related IPR, resulting in individual barriers to disclose innovations. For instance, many scientists are **not willing to cope** with the associated legal aspects and restrictions to knowledge transfer.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

Turn the European and international legal and regulatory barriers in opportunities for the maritime industry to develop new knowledge, technologies and markets in response to **new regulations**. An **example** is the **introduction of the EEDI⁴** index by IMO, International Maritime Organization. This, in principle, is a great opportunity to rethink some of the existing marine technology for a serious reduction of the energy spent in shipping. Instead, the large financial interests connected to the new EEDI index are driving the work of the players toward commercial agreements with classification societies: instead of trying to develop technological breakthroughs to really improve the ship's performances, this is seen as an opportunity for new commercial strategies.

It is urgent to develop an **international and stable legal framework**, particularly for high seas and seabed, and develop a **maritime spatial planning and monitoring/surveillance programmes**. This would provide stability and clarity for investors as well as helping reduce project costs.

It is necessary **to accelerate** the process and procedures of regulatory actions, like management regimes for ecosystems independent of administrative borders, to **establish priorities and to standardize** processes and make them more efficient to reach objectives.

Actions like the development of sustainable mechanisms to **promote awareness** among the **scientific community on the importance of IPR**, highlighting its benefits, should be developed, including aspects on knowledge transfer for technology development and innovation and its key role in promoting the competitiveness of industries. Some possible solutions are i) the creation of a **protected zone** (like Chatham House Rules) which helps to exchange ideas freely in Think Tank meetings. Some of the barriers related to IPR can be overcome by generously **granting all contributors** their own role (e.g. authorship, shareholdership); ii) JPI Oceans could **facilitate** discussions on the level of **transparency**, and IPR **protection** acceptable for transnational RTD efforts.

In order to avoid barriers coming for IPR use in the development of projects, issues on the use of IPR should be clarify at the beginning of the project.

ADMINISTRATIVE & MANAGEMENT

⁴ EEDI: Energy Efficiency Design Index

BARRIERS

Bureaucracy is still a problem. Any top down action in Europe takes years to be consequent and while developing solutions, implementing research work or active structuring and production, roughly 30% of time and money is lost (not used) in paper work. The barriers identified in the consultation include extremely **complex mechanisms** for funding (local/national/EU rules, varying legal systems; very complicated contracts for relatively simple projects or networks), too low success rate of applications, **unclear success criteria**. **Collaborative** research programs are therefore too **complicated**; there is excessive administrative issues, excessive number of partners and lack of appropriate coordination of the resources and scientific results. Tenders are very competitive and require a heavy investment in the preparation of proposals. In general, the advertising with no enough time to build European-level consortium bids, are perceived as limitations at the moment.

Researchers are increasingly reluctant to invest themselves in these long lasting and time consuming initiatives. Sometimes the **rules of project applications and reporting** are more important than the actual results. In occasions, researchers participating in excellent proposals, that are eventually rejected or that eventually do not receive funding, get very disappointed and frustrated. As a consequence many of them decide not to get involved in other EU calls. Improve the **system for elaboration** of proposals as well as a change in the **system of evaluation and managing of calls**.

In addition to the excessive bureaucracy, the inputs from the consultation highlighted that research programmes waste too much money on meetings, travel and administration at the expense of useful research. It also was highlighted that conditions for EU funding are often based on political criteria rather than scientific value (e.g. types of partner).

The **implementation** of innovation in projects is a challenge. There is a weakness in **strategic and operational planning**, including **operational integration** that prevents higher levels of coordination and cooperation to achieve success.

Models for management of marine and maritime sectors across national regulations are **not very suitable**. The **traditional sectorial approach** to management and funding of research/innovation efforts is a huge barrier to any holistic approach to the marine and maritime field that affect all level (national, regional, EU and global): The result is that there is a **lack of integration of innovation and technology development in research projects**. On the other hand, the alignment of objectives and resources is prevented by the current **dispersion of these**. It is also difficult to select and monitor instruments and initiatives.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

It is necessary to **reduce bureaucracy** and change the traditional sectorial approach to management and funding of research/innovation by **integrating policies and management programmes** across different **sectors**, developing common integrating strategies and programmes at EU level and management frameworks for alignment of budgets.

It is necessary **to focus the programs and their projects on innovation** to have **more impacts in order to solve the problems of the society**. All the projects should contain a part dedicated to technology development and innovation. It is necessary simplify calls and improve evaluation system giving more importance to results.

All excellent proposals should have the possibility to get funding and perhaps JPI Oceans could play a role to find a solution to this barrier.

A potential **action** that could be implemented by JPI Oceans is to develop joint activities to promote a better integration of innovation and technology development in research projects and improve the calls and procedures. To facilitate the preparation of proposals and the management and coordination to fund collaborative research programs.

In order to improve transnational cooperation for research and access to funding for research institutes and industry it is necessary **optimized efforts in management and programming**.

On the other hand, **building trust** between European institutions and the different stakeholders is an important aspect that needs to be taken into account in collaborative project to overcome problems caused by lack of understanding and trust. This requires measures to **promote an enhanced dialogue** between policy makers and stakeholders as well as the dialogue between the different sectors. Time and patience is needed to create mutual trust and understanding.

An **example** of a stakeholders' engagement process and dialogue between policy makers and stakeholders is the **EU Maritime Strategy for the Atlantic Area and its Action Plan**. They both provide an Ocean basin approach involving its Coastal Member States and their regions, and motivating others, to coherently implement actions towards the blue growth in the basin.

FUNDING

BARRIERS

The funding resources allocated to marine and maritime research are very **scarce and insufficient** to cope with all challenges that need to be tackled and there is too much competition for RTD funding. The funding is also clearly insufficient to foster the cooperation at Pan-European level between research institutions, particularly in some research areas. There is also a **lack of bilateral funding schemes** and **risk-averse** lending environment from banks and investors and there is low political commitment of Member States to participate and provide resources to support initiatives at European level.

Apart from the oil & gas, the current maritime **industry is unable to self fund** the development of industrial activities at sea due to the lack of resources. Space conquest was established as a national/European **priority**, and ESA (European Space Agency) was created, with a very significant budget every year. There is not any "naval" ESA at EU level, and most of Member States do not have a National Study Centre about naval issues. If oceans are planet's future, if developing seaborne or subsea activities is a priority for the Europe maritime economy and jobs, this must be suitably reflected in the European public research efforts at a level if not equal at least not negligible compared to the space budgets.

On the other hand, like in management, **traditional sectorial approach to fund RTD** is a barrier that fragments funding efforts. In addition there are **separate funding streams** for academic and governmental institutions that hinders research collaboration. Moreover, there is **not suitable mechanism in place at EU level to fund long term** issues and the funding (calls) on an annual basis

might is not the best solution. The possibility to work in the long term without cutting the budgets is also important.

Joint financing of use of large infrastructure is not solved. Other problems associated with funding are the delay in reimbursements. According to the inputs in many cases the time between the expenses were made and reimbursement was over three years. This has a very negative impact on the initiatives.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

Reduce bureaucracy of EU projects and reduce the time, effort and funding allocated to networking, meetings and administration in favour of more funding for research activities. Calls for new proposals should be based on **scientific criteria** and scientific added value rather in political criteria.

It is necessary to increase the funding and investments for marine and maritime sectors to create new knowledge. It would be necessary to develop a **European Ocean Agency to tackle ocean challenges with suitable resources and instruments**. JPI Oceans must emphasize at EU level the fact that developing seaborne or subsea industrial activities is like entering into a **new era**, similar to the space odyssey in the 50's and that this requires a **substantial budget** that need to be secure.

It is necessary develop **common strategies and programmes**, with **common priorities**, to **better align national budgets (and across sectors and disciplines) to address common challenges at EU level**. In order to make any inter-national (regional, EU or global) alignment of efforts and to make a **better use of existing resources** (e.g. sharing of research infrastructures vessels) major efforts are needed at the level of countries to increase intra-national coordination. A change in the national approach for management of funding, including administrative and legal aspects, may be required. **JPI Oceans** can provide the framework to agree on common priorities and develop common programmes to align resources to tackle common long term challenges more efficiently and with higher effectiveness, **prioritizing** investments for collaborative projects.

Develop mechanisms to contribute to **ensure the continuity of useful** and successful networks at EU level. It is necessary to plan funds and programs in the long term and develop mechanisms to provide opportunities to ensure **continuity** of successful initiatives at EU level. JPI Oceans might look at 20-30 year programme of investments.

Experiences of past networking efforts, such as **ENCORA CSA**, resulted in creation of national networks of coastal researchers and EU-wide thematic networks related to key ICZM topics. When the funding ended the **process of integration slowed down considerably**, although some developed contacts still bring benefits, since the integrated human ICZM capital is still there.

JPI Oceans can promote the awareness at national level on the need of long term political commitment and financial support needed to increase the cooperation and coordination at EU level to address common long term challenges that cannot be tackle at national level.

COOPERATION AND COORDINATION

BARRIERS

One of the barriers identified was the difficulty of entities from one country to cooperate with entities of other countries. This relates to the **difficulties for establishing contacts and RTD cooperation agreements** mainly for small business.

The **lack of a common vision, strategy and implementation plan**, either for the whole marine RTDI or for specific flagship initiatives such as EOOS, is one of the barriers for more substantial transnational cooperation. European cooperation in general is seen as negative instead of as something to help the separate countries forward. At European level the ability to decide on common priorities and to long-term commitments becomes a barrier. There is a **lack of integration and cooperation** at UE level and **objectives and resources dispersion** hamper the alignment of the means with the ends. The major **obstacles** are: definition of common priorities/strategies; difficulties in selecting and monitoring instruments and initiatives; data/infrastructure sharing or access; administrative burden to build international cooperative R&D programme; and lack of initiatives and low capacities to promote sense of ownership from stakeholders' participation.

Fragmentation is also a barrier for cooperation at EU level. There is a complex **web** of organizations which may leads to **possible duplication**.

On the other hand, frequently the institutions involved in EU projects are in many cases the same, which is a major obstacle to further develop the European Research Area (ERA).

In relation to international cooperation at EU with other countries, it is difficulty to establish collaborative research projects with partners from countries such as USA, Japan etc. For example, the **EU-US Biotechnological force helped to organize Marine Biotech** foresight workshops that were very useful but never followed by concrete actions in terms of R & D projects. In some regions there are also some barriers for collaboration with some countries (e.g. with Russia in the Arctic seas).

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

It is important allocate **appropriate resources** to ensure trans-national cooperation. JPI Oceans can facilitate a **reinforcement of already existing cooperation bridges** and build new ones where necessary. Scientists are in general, highly open to collaborate at trans-national levels. Internationalization is considered always necessary and positive.

JPI Oceans might promote the strengthening of pan European **networks**, covering networks of marine and offshore **specialists** and themes. It is also necessary improve the coordination to build a sustainable **network** and partnership of funding agencies and ministries from different countries, creating clusters with stakeholders interested in maritime RTD. Under the JPI is possible to carry out this task. As a result the whole area of marine and maritime science and technology might receive a strong stimulus **towards sustainability**. Importantly, positive results can be expected on both national and EU-wide level. Boost **Public-Private Partnership, PPP** to facilitate the cooperation between different participants, stakeholders, sectors, and transnational cooperation.

JPI Oceans can help by **developing pan-European strategies and plans** for research, technology development and **monitoring** with broad participation, and thus ownership, from EU nations and stakeholders. Also could take the role as **mediator** between Member States and the EU and together with ERA-NETs act as **coordination** platform for Marine and Maritime Research. JPI Oceans being a

platform where relevant ministries and funding agencies are represented can try to **align national regulations and procedures** on project management.

Approaches based on smart **specialization** and **cross-sectorial cooperation** through specialized clusters may strongly increase innovation capacity.

It is necessary to enhance **long term cooperation** in order to **create mutual trust and understanding**. **JPI Oceans** could serve as the **platform** that encourages dialogue and cooperation at national level as well as inter-sector coordination, facilitating the transfer of stakeholders' inputs to higher level (regional/EU) of Member States efforts. Building inter-national (regional, EU or global) alignment of efforts **require huge intra-national coordination efforts** or even **changes in national procedures**. The barriers for cooperation caused by different national **interests** and **policies** can be overcome by leveraging sufficient (financial) support for relevant innovative projects at European level - this can be a prime role of JPI Oceans.

During the evaluation of the proposals and the negotiation phase there are additional issues that should be considered to ensure that the **geographic scope of the project is well balanced**, that the partnership is actually representative at EU level and that it involves the relevant institutions in the participating countries to conduct the work. This would avoid having projects where the partnership do not represent well the real the capacities at EU level, as it has happened in many occasions in FP7 projects. Therefore excellence should not be the only criteria used to evaluate and fund projects.

In addition, to improve transnational cooperation and access, there is an urgent need to **solve the administrative burden**.

In the area of research infrastructures there are good examples of enhanced cooperation. For instance the OFEG, Oceans Facilities Exchange Group, has created a barter system for exchange of ship time. This system may be extended to other infrastructures. One of the issues that needs to be solved is how nations without barter capacities (e.g. no own ships) can participate.

CULTURAL BARRIERS AND RISING AWARENESS

BARRIERS

At EU level cultural problems are important barriers. It is sometimes difficult for Member States, stakeholders and research funding agencies to **see added value of international cooperation with the national efforts**. **In the consultation it was highlighted that there is not sufficient awareness and mobilization around the EU Blue Book, its objectives and the implementation steps**.

On the other hand, most of the large European maritime research infrastructures are of a **commercial nature**. These institutions are deeply linked to the interests of shipyards and ship-owners, and **most of them are not interested in carrying out research advancements** in non-commercial areas.

There is no ownership of marine/maritime problems (**problems under the sea are invisible**, far from people's daily lives), and every country is busy solving its own problems.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

It is necessary **raise awareness of the benefits from international cooperation** and develops mechanisms to **promote a wide participation** of stakeholders in European initiatives. Develop further efforts at EU level to **raise the awareness** of stakeholders on the progress and achievements of the EU maritime policy and the opportunities that the implementation of these policies and its tools represents for the different sectors.

It is necessary to **promote** awareness on innovation between policy makers and researchers, so that technology development and innovation are **“naturally embedded”** in all research projects publicly funded. In addition to **information or rising awareness campaigns** on innovations, the means of finance engineering might act as a catalyst.

A possible solution is linked to **prioritization of R&D (and innovation areas)**; including technology development / knowledge sharing towards end users (not only companies but also data users like met offices, emergency related institutions, local administrations, etc.)

It is also necessary to raise awareness on IPR and their importance for innovation.

JPI Oceans could promote measures to overcome structural and cultural barriers in the RTD system at the highest level to ensure there is support for more work in this field and provide support to **build trust** within the marine and maritime community.

JPI Oceans can also improve the dialogue between science and policy to raise awareness of national managers on major ocean challenges to facilitate a decision making process based on scientific evidence.

DATA ACCESS

BARRIERS

One of the major barriers highlighted in the consultation is lack of data and the access to and exchange of data and research results, which hamper the development of new knowledge needed for industry to growth. It was raised that some data becomes politically **sensitive** in the run up to negotiations and data holders are sometimes to provide access to them. For example, data from the Arctic are hard to acquire due to national restrictions.

Also there the access to transnational to big **infrastructures** (e.g. ship time) is a barrier to collect data.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

It is necessary to develop a framework **to provide access to and share** data and **protect IPR**. It is also necessary to **increase the trust** between countries and promote awareness at national level between different authorities and institutions on the **need of access to data and data sharing, so as to reduce the cost of monitoring and make a more efficient use of the existing resources**. This requires the development of suitable mechanisms for promote the cooperation at EU level and create awareness across Europe, including dissemination of existing regulations, as well as promote the establishment of **international agreements** for data sharing and exchange.

Building on existing initiatives, **JPI Oceans** could **provide a framework to compile all the data** from public funded projects and develop integrated platform where these data are made available to different stakeholders and users.

OTHER BARRIERS

BARRIERS

In the consultation it was highlighted that lack of human capacities with the skills and competences needed is a barrier. At national level, the **lack of jobs** in Marine Sciences does not attract people to study the ocean. Also the lack of truly **transdisciplinary thinking** and approaches is a major limit to promote transdisciplinary human capacities and the optimization of marine research.

In the consultation it was also raised that many of the existing barriers are specific of each **sector** and the market and is hence difficult to generalize. It was also raised that there are differences in the societal needs between different European regions and this could act as a barrier, though examples were not provided.

Many barriers for innovation are related to the **markets**. The market usually looks for the easiest way of profit making and it will avoid risks if possible. Thus, for instance it can be **challenging to 'sell' innovation to risk-averse** regulatory bodies and profit-driven commercial organizations

The relationship cost/benefits of technology is a barrier for technology development. Where a technology has a significant global impact but only a small benefit to any individual stakeholder, its development can be difficult, especially where relatively expensive equipment is required.

IDENTIFIED SOLUTIONS /RECOMMENDATIONS

It is necessary invest in **courses of specialize training** in marine and maritime sectors in different areas, research, development, innovation, management, continuing training to update knowledge and promote interdisciplinary to have an integrated understanding and thinking.

The issue of human capacities should be addressed at the level of higher education teaching (and hence will take time). It is also necessary to promote the international transdisciplinary thinking and training of experts **to enhance their skills**.

Create a **virtual space** to inform and share knowledge, news about maritime and marine sectors. Promote conferences, meetings, courses, international news, calls, employment, networks of experts, data bases, and etcetera.

It is necessary to **adapt** generic solutions and actions to the needs of the sectors, society and regions.

3.3. SUMMARY OF OUTCOMES AND RECOMMENDATIONS

Several barriers that hamper innovation and the growth of the maritime economy have been identified both at national level and EU level by stakeholders and research funding agencies. In general the barriers identified are closely interlinked and **it is difficult to separate them and establish an order of priority**. Nevertheless, **according to the number of inputs received**, some barriers stand out. Thus the 3 main barriers identified at **national level** and **EU level** were related to:

1) Administrative and management issues, 2) Funding related issues and 3) Lack Cooperation and Coordination.

Nevertheless, legal issues and regulations were also raised by research funding agencies and stakeholders as an important barrier for the growth of the maritime economy, both at national level and at EU level. Cultural barriers were also highlighted by several as important barriers **for knowledge and technology development and innovation**.

The figure below aims to illustrate all the barriers found and their multi-interconnections, from inputs provided by research funding agencies and stakeholders in the consultation.

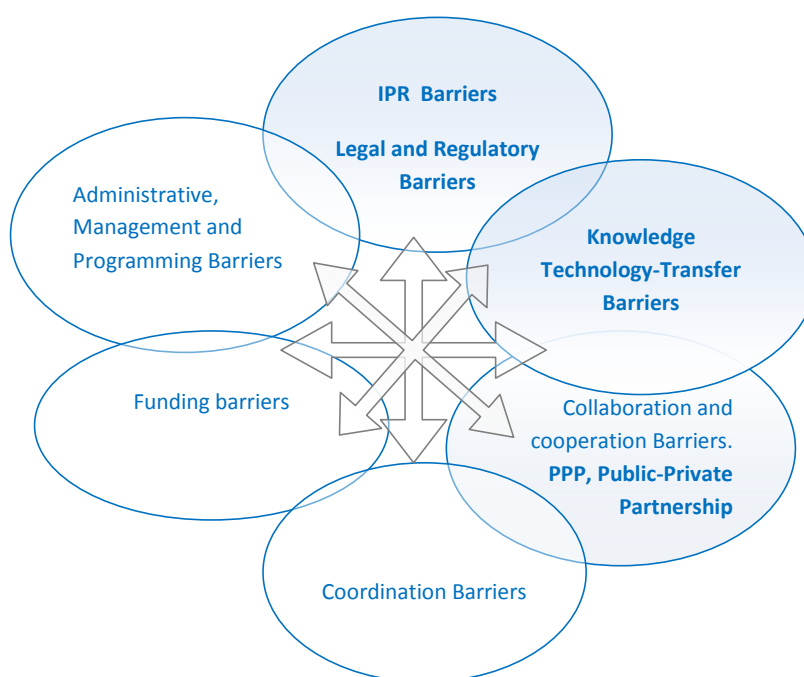


Figure 1: Found barriers and multi-interconnections between them.

Regarding barriers at national and EU level related to **technology and innovation, legal issues and IPR** the main solutions/**recommendations drawn from the consultation** are:

Technology

- Develop suitable management frameworks, mechanisms and measures to fully integrate and embed innovation in research projects and to ensure the development and implementation of innovation across all activities and all maritime sectors.
- Prioritize the investment in projects focused on innovation.

- Developing common pan-European strategies and plans for research, technology and development, definition of common priorities and better align national budgets (and across sectors and disciplines).
- Set of realistic targets to promote innovation and sustainability of the maritime industry in the short-intermediate and long term.
- Create a common language easily understandable by scientists, policy makers and stakeholders. A common understanding of innovation is needed across Europe.
- Increase financial resources for marine and maritime research and in particular for demonstration and pilot-projects to test new technology and innovation.
- Promote a higher involvement of industry in funding RTD activities and develop frameworks to leverage private investments in marine and maritime research, technology and innovation through the development of PPPs.
- Ensure continuity of funding for marine and maritime RTD activities.
- Integrate marine and maritime research in RTD strategies and policies.
- Develop mechanisms to promote and support the communication between users and producers of technology and innovation.
- Develop smart specialization strategies and cross-sectorial cooperation through specialized clusters working in a pre-competitive area of technology development may strongly increase innovation capacity.
- Develop mechanisms to strengthen networks and cooperation between science and industry the coordination of research, technology development and innovation.
- Develop mechanisms (e.g. dedicated programmes) to promote the knowledge transfer and technology between science and industry as well as cross-sectorial cooperation and dialogue between scientist and technologists.
- Develop a European Ocean Agency to tackle ocean challenges with suitable resources and instruments.

Legal issues

- Create legal norms to protect or boost innovation and update or abolish obsolete legal regulations.
- Review and make an effort to harmonize regulations that may have an impact on technology development and innovation. Common regulations to protect and boost innovation on the marine and maritime sectors should be developed.
- Turn the European and international legal and regulatory barriers in opportunities for the maritime industry.

- Develop an international and stable legal framework, maritime spatial planning and monitoring/surveillance to provide stability and clarity for investors.
- Accelerate the process and procedures of regulatory actions.
- Promote the establishment of international agreements for data sharing and exchange.

IPR

- Support awareness among industry and in particular SMEs of the benefits of the IPR and boost the implementation IPR across all sectors.
- Promote awareness among the scientific community on the importance of IPR for innovation, highlighting its benefits, should be developed.
- Create a practical and effective way to protect intellectual property and simplify procedures.
- Regulatory framework on IPR needs to be flexible to be updated to rapid changes in the society.
- Facilitate discussions on the level of transparency, and IPR protection acceptable for transnational RTD efforts.
- Develop a framework to provide access to and share data and protect data IPR.

According to the inputs received from research funding agencies and stakeholders, JPI Oceans could help catalyse many of these solutions to overcome existing barriers.

3.4. BARRIERS FROM LITERATURE REVIEW AND DESKTOP RESEARCH

In this section we analyse the outcomes of the literature review and desktop research conducted for this deliverable on the existing barriers for technology development and innovation.

GENERAL BARRIERS IN INNOVATION AND RELATIONSHIPS

Innovation may be defined as exploiting new ideas leading to the creation of a new product, process or service. It is not just the invention of a new idea that is important, but it is actually “bringing it to market”, putting into practice and exploiting it in a manner that leads to new products, services or systems that add value or improve quality. Innovation also means exploiting new technology and employing out-of-the-box thinking to generate new value and to bring about significant changes in society.⁵

According to the literature review there are external and internal barriers for technology development and innovation. These are the findings of a recent study conducted in Turkey to identify the existing barriers in the innovation process in Turkey’s conditions. That study⁶ has performed a detailed **review of literature of different nations related with innovation barriers** and also

⁵ Source: MARTEC’s IPR GUIDE, Managing the research results (www.martec-era.net)

⁶ SAATÇIOĞLU O.Y. and TİMURCANDAY ÖZMEN O.N. (2010) *Analyzing the Barriers Encountered in Innovation Process Through Interpretive Structural Modelling: Evidence, From Turkey* Journal of Management and Economics (YÖNETİM VE EKONOMİ) (17) 1, 207-225.

investigated the interrelations among barriers and developed a model that can measure the interacting effects of the barriers on the other barriers and in the innovation system.

SAATÇIOĞLU and TİMURCANDAY ÖZMEN (2010) identified 32 internal and 24 external barriers from a literature review and conducted an analysis to determine **the valid barriers** for Turkey, concluding that there are 12 valid barriers for Turkey's conditions. The study also investigates the **interrelations** between these 12 barriers. The research was conducted based on the opinions of the experts about innovation barriers. It was **found that "finance of innovation" barrier affected all of the barriers** in Turkey. Accordingly the study concludes that in order to increase innovation performance of Turkey, "finance of innovation" barrier should **be settled**.

It is noteworthy that some of the barriers identified in the report, are quite similar and closely linked to the knowledge transfer related barriers identified in the present report from the outcomes of the consultation of CSA Oceans.

We have analysed the barriers identified by research funding agencies (RFA) and stakeholders in the CSA Oceans consultation. Many of these barriers coincide with the barriers identified by SAATÇIOĞLU and TİMURCANDAY ÖZMEN (2010) in its work. However there are many other, both internal and external barriers, that we have identified from the consultation that were not included in list of external and internal barriers elaborated by SAATÇIOĞLU and TİMURCANDAY ÖZMEN (2010). Taking into account the findings from the CSA Oceans consultation and following a similar approach to that of SAATÇIOĞLU and TİMURCANDAY ÖZMEN (2010), we have try to identify the internal and external barriers for innovation from the inputs received in the consultation.

Below we provide a list of internal and external barriers based on the outcomes of the CSA Oceans consultation. Internal barriers are those that depend on the industry itself, while external barriers are the rest of barriers on which industry do not have any control. The list includes 14 internal barriers and 37 external barriers. The order of barriers in the list is arbitrary. It is important to highlight that several issues act at the same time as external and internal barriers for innovation. Some clear examples of this are issues related with financing, lack of qualified staff, bureaucracy or lack of communication between science and industry, among others.

INTERNAL BARRIERS

1. Difficulties to face costs of projects and technology. In general maritime **industry is unable to self-fund** the development of industrial activities at sea due to the lack of resources. (Financial, infrastructural and human resources) and critical mass to boost innovation
2. Difficulties for industry to access to public funding for innovation (at EU and national level)
3. Lack of qualify staff with skills needed
4. Industry is not interested in carrying out research advancements in non-commercial areas.
5. Lack of awareness and lack of innovation culture in industry and research organizations, including risk tolerance.
6. Difficulties for industry to establish cooperation agreements with third countries;
7. **Difficulties to establish contacts and RTD cooperation agreements** particularly for SMEs
8. Lack of communication between basic and applied science, technology development and industry

9. Lack of understanding of the importance of IPR;
10. Industry and SMEs feel that patents **are not very functional** in marine and maritime sectors. Patent is considered a main barrier for industrial cooperation
11. Limited **communication and cooperation** between basic and applied science, technology development and industry Difficulty to get industry and academic organizations to work together in the innovation process
12. Frustration from researchers caused by rejection of good proposals due to the lack of enough funding
13. IPR are a difficult subject that inhibits open discussions between science and the economic sector
14. Specific sectorial barriers

EXTERNAL BARRIERS

1. Funding resources for marine and maritime research are very scarce and insufficient;
2. Frequently there is no specific budget lines to fund marine and maritime research
3. **No suitable mechanism in place at EU level to fund long term issues**
4. Difficulties for industry to access to public funding for innovation (at EU and national level)
5. **Financial constraints**, due to the economic crisis, are a major barrier for research and innovation at national level
6. Lack of marine-maritime research and innovation strategies with realistic targets; The lack of a common vision, strategy and implementation plan
7. Maritime research and innovation is costly, particularly demonstration and pilot-projects
8. **Lack of integration of innovation and technology development in research projects**
9. The lack of coordination/fragmentation within the research system, Fragmentation of efforts at EU level. **Objectives and resources dispersion**
10. **Fragmentation in the governance and management** of marine and maritime issues at national level, including the management of research and innovation programmes. Competences in sectorial policies are often spread between different ministries and regions.
11. **The traditional sectorial approach to fund RTD** is a barrier that fragments funding efforts
12. Regulations and at EU level and international level; Regulations at national level;
13. Lack of a stable legal framework for industry and Lack of maritime spatial planning and monitoring/surveillance
14. Inadequate system for elaboration and evaluation and of proposal and managing of calls; difficulty in selecting and monitoring instruments and initiatives
15. **Risk** that the results are jeopardized by new coming regulations or standards
16. **Risk-averse** lending environment from banks and investor
17. Lack of qualify staff in the market with skills needed. The lack of jobs in Marine Sciences does not attract people to study the ocean
18. The lack of truly transdisciplinary thinking and approaches
19. Excessive bureaucracy at national and EU level. Management of collaborative research programs is too complicated. Delay in reimbursements of project costs is an important barrier for industry.
20. Conditions for EU funding are often based on political criteria rather than scientific value (e.g. types of partner).

21. **Lack of integration of innovation and technology development in research projects**
22. Competition with other entities for the development of projects
23. Risks linked to innovation. It is **challenging to 'sell' innovation to risk-averse** bodies and organizations
24. Lack of long-term political commitment to ensure long term support needed
25. Lack of cooperation and communication between basic and applied science, technology development and industry.
26. Lack of knowledge transfer between science and industry. Many scientists are **not willing to cope** with the associated legal aspects and restrictions to knowledge transfer
27. Difficulty to establish collaborative research projects with partners from other countries
28. **Difficulties** to establish **contacts and RTD cooperation agreements** particularly for SMEs
29. IPR are a barrier that **inhibits open discussions between science and the economic** sector.
For the industry, patent is the main barrier to an industrial cooperation
30. High bureaucracy involving IPR makes the claiming of rights a very long process
31. Weaknesses in strategic and operational planning; Delay in the implementation of measures and the lack of proper planning may be a limiting factor for industry;
32. Science priorities are not necessarily the same that industry priorities: Performance measures for science, mainly peer-review publication orientated, hinder knowledge transfer
33. Differences in the societal needs between different European regions can act as a barrier
34. Access to data and information ;
35. Infrastructure sharing or access
36. Disloyal competence and piracy
37. Specific sectorial and market barriers

According to the above lists, the number of external barriers found is lower than the number of internal barriers for innovation reported by SAATÇIOĞLU O.Y. and TİMURCANDAY ÖZMEN O.N. (2010), while the number of external barriers was higher. This would mean that the capacity for innovation of maritime industries would depend much of external drivers, at least from the point of view from research funding agencies and stakeholders consulted. Even if all internal barriers could be overcome, many of the external barriers would be still important enough to hinder very significantly the capacity of innovation of industry and in particular SMEs. Therefore in order to overcome barriers for innovation special emphasis should be put to remove external barriers. The removal of external barriers can also act as an encouraging measure for industry to undertake measures to remove many of the existing internal barriers.

BARRIERS IN MARINE KNOWLEDGE TRANSFER AND INNOVATION

Knowledge transfer, Technological transfer: can be defined as the process of sharing of or acquiring/providing/licensing skills, knowledge, technologies, intellectual property, methods of manufacturing, samples of manufacturing and facilities among governments, companies, research institutions and other organizations to enable the accessibility of scientific and technological developments to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials or services⁷

⁷ Source: MARTEC's IPR GUIDE, Managing the research results (www.martec-era.net)

Barriers for knowledge transfer and innovation have been identified by projects such as **Marine TT** (<http://www.marinett.eu/>). MarineTT was FP7 Support Action that has developed methodologies and tools to address knowledge transfer from EU projects.

In general the many of barriers found by CSA Oceans for technology development and innovation, both at national and EU level, are quite similar to some of the barriers identified by the project Marine TT, which analysed the barriers for knowledge transfer and innovation. After an open consultation process with stakeholders from different sectors and fields, which involved 2 workshops, the project Marine TT identified a large number of barriers to knowledge transfer and uptake for innovation. These were further classified and grouped in different categories. Finally barriers were classified in 4 main categories. A full description of the nature and scope of each of these categories can be found in the report available at the Marine TT website (<http://www.marinett.eu/>)

It is noteworthy that some of the barriers identified in the report developed by Marine TT, are quite similar and closely linked to the knowledge transfer related barriers identified in the present report from the outcomes of the consultation of CSA Oceans.

Knowledge transfer was considered by CSA Oceans' stakeholders as one of the main barriers for research, technology development and innovation and where need to increase technology development and innovation in projects was raised. However, there was some disagreement with the opinion expressed by research funding agencies, since in the consultation with research funding agencies barriers related to knowledge transfer were only mentioned once.

PROBLEMS TO PROTECT IPR, INTELLECTUAL PROPERTY RIGHTS

Currently in the marine and maritime experience patenting is not very common in the maritime or shipping sector. This is mainly due to long and **costly procedures to obtain a patent** while in the course of time the respective technological advantage gained e.g. in a European ship **yard is copied immediately in SE Asia, irrespectively if a patent exists or not**. This is a typical barrier for sustainable use of innovative project results. So we should have a look if this "practice" still holds true in our replies from stakeholders.

MARTEC⁵ has developed a **guide on the protection of IPR and particularly where recommendations on patents and technology transfer are given**. See section 4 "*Guide for managing IPR's and PPP*".

According to MARTEC, main barriers are **piracy, counterfeiting** and the **theft of intellectual property** assets pose a serious threat to all businesses. Exporters face unfair competition abroad, non-exporters face counterfeit imports at home and all businesses face legal, health and safety risks from the threat of counterfeit goods entering their supply chains. Most SME's are not aware that their **patent or trademark does not protect them in other countries**. If you are an exporter, or think you might want to export in the future, you will need to seriously consider securing protection for your intellectual property (IP) in those foreign markets of interest to you. It is a good idea to get the appropriate forms of IP protection before you start doing business. Technological knowledge (the technology), as a public good, raises problems to protect intellectual rights. **It is difficult to establish rights over technology**. R & D produces intensive information results that can be **easily reproduced**

with virtually no cost. Therefore, the possibility of a **rapid dissemination** of these results and, as a result, a reduction of the expected benefits, is a strong disincentive to innovative activities⁸.

In considering the **licensing of technology**, it is important to remember that licensees may attempt to use the licensed technology to manufacture products in direct competition with the licensor or its other licensees. In many instances, licensors may wish to impose **territorial restrictions** on their licensees, depending on antitrust laws as well as the licensing laws of the host country. As in all overseas transactions, it is important to investigate not only the prospective licensee but the licensee's country as well. The government of the host country often must approve the licensing agreement before it goes into effect. Some governments prohibit royalty payments that exceed a certain rate or contractual provisions barring the licensee from exporting products manufactured using the licensed technology to third countries. Given the intangible character of technology, its use by one does not detract from its use by another (The technology is subject to indivisibilities and there is no rivalry in consumption). In other words, it can be used simultaneously by many users for the same or different purposes without impacting in any way on its quality or functionality. Therefore, the owner of technology could potentially license the use of his technology to as many licensees as he wishes, maximizing the earning potential of his technology constrained only by the terms of the agreements that he enters into with the potential licensees⁹.

EXAMPLES OF TECHNOLOGICAL AND LEGAL-ADMINISTRATIVE CHALLENGES/BARRIERS IN SOME KEY MARINE AND MARITIME SECTORS

EXAMPLES OF ADMINISTRATIVE/LEGAL AND TECHNOLOGICAL CHALLENGES FOR THE AQUACULTURE SECTOR

The European aquaculture sector has been stagnated over the last decade, while the aquaculture at global level has growth around 10% per year. This has been attributed to different failures in the systems and to different barriers that hamper the growth, some of which relates to legal-administrative as well as to technological barriers.

The aquaculture sector in Europe is facing several challenges and barriers that prevent or hamper its growth: e.g. access to space, difficulties to get licences, lack of a legal stable framework, competence form imports under a lack of level playing field for the sector, industry fragmentation; difficulties to access to seed capital or loans for innovation; need to comply with environmental regulations (e.g. MSFD), spreading of diseases and lack of suitable treatments, etc. insufficiency of medicines and vaccines.¹⁰

In 2013 the European Commission adopted a Strategic Guidelines for the sustainable development of EU aquaculture¹¹ with several measures to overcome the current barriers of this sector, correct the shortcomings identified and contribute to boost the growth of the aquaculture sector. The Strategic Guidelines identify 4 priority areas that need to be tackled in order to unlock the potential of EU aquaculture. These are related to administrative procedures, spatial planning, competitiveness of the

⁸ Source: MARTEC's IPR GUIDE, Managing the research results (www.martec-era.net)

⁹ Source: MARTEC's IPR GUIDE, Managing the research results(www.martec-era.net)

¹⁰ Source: © European Union, <http://eur-lex.europa.eu/>, 1998-2014') Building a sustainable future for aquaculture A new impetus for the Strategy for the Sustainable Development of European Aquaculture (COM(2009) 162 final

¹¹ Ref: European Commission. Strategic Guidelines for the sustainable development of EU aquaculture (COM(2013) 229 final)

sector and a level playing field, which are considered in general by many stakeholder some of the most important barriers that hamper the growth of aquaculture at EU level

1. Administrative barriers and procedures

One of the main barriers found by the aquaculture sector are related to administrative constrains, in particular concerning licensing procedures¹². This includes high bureaucracy, excessive regulation and complexity of administrative procedures which makes licensing a difficult, long and cumbersome process. This usually leads to important delays in licensing. Available information on licencing in different countries suggests that in several Member States authorisation procedures are long and often take around 2-3 years to complete; but in some cases even more longer times have been reported¹³. Therefore there is a wide scope for improving administrative practices, especially in licensing¹⁴.

This high and complex bureaucracy can be attribute in many cases to the fact that competences on marine and coastal issues at national level frequently fall under the remits of different authorities or agencies, which cause overlap of competences and add difficulties due to lack of a clear administrative framework that affects the different administrations involved¹⁵. Moreover, in many countries there is a poor or lack of coordination between the competent administrations or authorities, as indicated the outcomes the CSA Oceans consultation process. Thus the dispersion of competences at national level also affects to licensing.

The high cost of licensing has also been identify as a main administrative barrier for this sector. An additional barrier in some countries are the geographical differences in taxation within the same country¹⁶. These high cost alongside with the high bureaucracy and the time needed to get the authorisations notably hamper the possibilities for blue growth in this sector and affects its overall competitiveness.

Though these barriers are general for the aquaculture sector, SMEs are particularly affected by them¹⁷. SMEs often do not have the knowledge and managerial experience to deal with all the bureaucracy and the difficulties to access to funding is also a barrier for SMES face the cost of the whole process. These barriers have been already identified in the list of general external and internal barriers above.

2. Legal barriers and Regulations

In addition to the administrative procedures, there are also several barriers that are more linked to the existing regulations and laws. In general there is a lack of harmonization and coherence between the multiple legal and regulatory procedures at national level and at the level of regions within the same country^{18 19}. In fact, legal barriers have also been identified in the CSA Oceans consultation as

¹² Source: European Commission. Blue Growth opportunities for marine and maritime sustainable growth (COM(2012) 494 final), © European Union, 1995-2014, © European Union, 1995-2014

¹³ Source: European Commission. Strategic Guidelines for the sustainable development of EU aquaculture (COM(2013) 229 final), © European Union, 1995-2014

¹⁴ Source: European Commission. Blue Growth opportunities for marine and maritime sustainable growth (COM(2012) 494 final), © European Union, 1995-2014

¹⁵ Ref: Prospective analysis of the aquaculture sector in the EU. Part 1 Synthesis report (2008). Joint Research Center, European Commission.

¹⁶ Ref: Prospective analysis of the aquaculture sector in the EU. Part 1 Synthesis report (2008). Joint Research Center, European Commission.

¹⁷ Ref: European Commission. Strategic Guidelines for the sustainable development of EU aquaculture (COM(2013) 229 final)

¹⁸ Ref: Federation of European Aquaculture Producers (FEAP). Annual Repor 2011 (<http://www.feap.info/>)

general barriers to promote the growth of maritime activities. These barriers are not only related to lack of an harmonize legal framework but also are caused by lack of a common understanding in the interpretation and application of the existing laws and regulations (e.g. on environmental issues, animal health etc.),

On the other hand the development of regulatory measures for protecting the marine environment, such as designation of MPAs, Nature 2000 sites and measures to protect predatory (e.g. birds and mammals) species, are considered as a barrier and a risk for the sector^{20, 21, 22}. The strict regulations on environmental impacts and water quality at EU level are also major barrier for the sector²³. Moreover, the compliance with the environmental requirements is costly and time consuming and this may affect the overall competitiveness of the sector, while the socio-economic costs and benefits are usually not taken into account in the environmental impact assessments²⁴. The way environmental legislation is implemented is also a barrier. In many cases diverging interpretations and applications of legislation increase are perceived as increasing uncertainty for potential investors²⁵.

Another main barrier for aquaculture related with regulations is the lack of a legal framework for a „level playing field” for the sector. The current lack of a level playing field makes extremely difficult for the sector to compete with the low prices of aquaculture products from other countries, where aquaculture production is not subjected to the same strict legislation on environmental standards, food safety, market (e.g. labelling), animal health and feeds as European aquaculture²⁶. Other additional considerations concerns un-equal playing field are related to licensing processes, taxation and working conditions of employees, among others²⁷

One of the major the challenges that aquaculture sector is facing is lack of available space in coastal areas²⁸ and the lack of a stable legal framework to regulate the use of the marine space^{29, 30}. Spatial planning is a key tool to help expand the industry, increasing the legal certainty for industry. Marine Spatial Planning can help reduce uncertainty, facilitate licensing processes, avoiding conflicts with other sectors and also contribute ensure the compliance of the sector with environmental requirements^{31, 32}. In that way MSP can help facilitate the investments and speeding up the development of aquaculture in Europe³³.

¹⁹ Ref: European Commission. Strategic Guidelines for the sustainable development of EU aquaculture (COM(2013) 229 final)

²⁰ Ref: Federation of European Aquaculture Producers (FEAP). Annual Repor 2011 (<http://www.feap.info/>)

²¹ Ref: European Commission (2013). Great Cormoran. Applying derogations under Article 9 of the Birds Directive 2009/147/EC

²² Ref: European Aquaculture Technology and Innovation Platform (EATIP), EATIP Vision Document (<http://www.eatip.eu/>)

²³ Ref: Federation of European Aquaculture Producers (FEAP). Annual Repor 2011 (<http://www.feap.info/>)

²⁴ Ref: Wilson, A., Magill, S. and Black, K.D. 2009. Review of environmental impact assessment and monitoring in salmon aquaculture. In FAO. Environmental impact assessment and monitoring in aquaculture. FAO Fisheries and Aquaculture Technical Paper. No. 527. Rome, FAO. pp. 455–535.

²⁵ Source: European Commission, Joint Research Centre (2012) An Approach Towards European Aquaculture Performance Indicators. Indicators for Sustainable Aquaculture in the European Union. JRC Technical Reports, © European Union, 1995-2014

²⁶ Source: European Commission, Strategic Guidelines for the sustainable development of EU aquaculture (COM(2013) 229 final), (http://ec.europa.eu/fisheries/cfp/aquaculture/official_documents/com_2013_229_en.pdf) © European Union, 1995-2014 European Aquaculture Technology and Innovation Platform (EATIP), EATIP Vision Document (<http://www.eatip.eu/>)

²⁷ Ref: Federation of European Aquaculture Producers (FEAP). Annual Repor 2011 (<http://www.feap.info/>)

²⁸ Ref: European Commission. Blue Growth opportunities for marine and maritime sustainable growth (COM(2012) 494 final) (http://ec.europa.eu/maritimeaffairs/documentation/publications/documents/blue-growth_en.pdf)

²⁹ Ref: European Commission. Blue Growth opportunities for marine and maritime sustainable growth (COM(2012) 494 final) (http://ec.europa.eu/maritimeaffairs/documentation/publications/documents/blue-growth_en.pdf)

³⁰ Ref: European Aquaculture Technology and Innovation Platform (EATIP), EATIP Vision Document (<http://www.eatip.eu/>)

³¹ Ref: European Commission. Strategic Guidelines for the sustainable development of EU aquaculture (COM(2013) 229 final) (http://ec.europa.eu/fisheries/cfp/aquaculture/official_documents/com_2013_229_en.pdf)

Due to the lack of space for aquaculture in coastal areas, the conflicts with other sectors and the environmental concerns, offshore aquaculture has emerged as a solution to overcome the problems that the sector face in coastal areas, satisfying the demand of space that the sector needs to growth³⁴.

Sustainable aquaculture must also consider potential impacts on the environment, including impact on wild fish stocks³⁵. Thus aquaculture in the EU has to comply with high environmental sustainability standards. The compliance of the sector with the regulations has an impact on the overall costs for producers, but it also can be turned into business opportunity if the attention of the consumers is drawn on quality and environmental sustainability, contributing to the public acceptance³⁶. Several options (e.g. integrating offshore aquaculture with offshore wind farms or implementing integrated multi-trophic aquaculture) can help increase the sustainable production and meet the environmental and users concerns³⁷.

3. Technological barriers for aquaculture

In addition to the administrative and legal barriers the sector also has to face several technology barriers and challenges that needs to be tackled to boost the growth and competitiveness of the sector. Due to the diversity of this sector is a large number of technological barriers most of which are dependent on the particular species farmed (e.g. different species of molluscs and finfish)³⁸.

The objective of this study is not to provide a comprehensive an in depth analysis of the all technology barriers for each aquaculture activity, but rather to provide a general overview of the main technology barriers that hamper the sustainable growth of the sector at EU level. In that regard, COM (2009) 162 final, identified several areas where efforts need to be focussed to ensure a sustainable growth of aquaculture in Europe. Among them are the following³⁹:

- An environmentally-friendly aquaculture
- An aquaculture-friendly environment
- Securing animal health
- Ensuring animal welfare
- Addressing the need for veterinary medicines
- Ensuring high quality and sustainable feed-stuff for fish

³² Ref: European Commission (2011). Study on the economic effects of Maritime Spatial Planning. Final Report.

http://ec.europa.eu/maritimeaffairs/documentation/studies/documents/economic_effects_maritime_spatial_planning_en.pdf

³³ Ref: European Commission. Strategic Guidelines for the sustainable development of EU aquaculture (COM(2013) 229 final) (http://ec.europa.eu/fisheries/cfp/aquaculture/official_documents/com_2013_229_en.pdf)

³⁴ Ref: European Commission, JRC. (2008). Prospective analysis of the Aquaculture Sector in EU. Part 2 Characterization of emerging aquaculture systems (<http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=1740>)

³⁵ Ref: European Commission, Joint Research Centre (2012) An Approach Towards European Aquaculture Performance Indicators. Indicators for Sustainable Aquaculture in the European Union. (<http://publications.jrc.ec.europa.eu/>) JRC Technical Reports

³⁶ Source: European Commission, JRC. (2008). Prospective analysis of the Aquaculture Sector in EU. Part 2 Characterization of emerging aquaculture systems, © European Union, 1995-2014 (<http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=1740>)

³⁷ Ref: European Commission, Joint Research Centre (2012) An Approach Towards European Aquaculture Performance Indicators. Indicators for Sustainable Aquaculture in the European Union. . (<http://publications.jrc.ec.europa.eu/>) JRC Technical Reports

³⁸ Ref: Browdy, C.L. and J.A. Hargreaves (editors). 2009. Overcoming Technical Barriers to the Sustainable Development of Competitive Marine Aquaculture in the United States. U.S. Department of Commerce, Silver Spring, MD USA. NOAA Technical Memo NMFS F/SPO-100. 114pp.

³⁹ Source: © European Union, <http://eur-lex.europa.eu/>, 1998-2014') Building a sustainable future for aquaculture A new impetus for the Strategy for the Sustainable Development of European Aquaculture (COM(2009) 162 final

- Ensuring consumer health protection

We will focus on the technology barriers/challenges closely linked these areas that are critical for the growth of the aquaculture sector:

Sustainable production of aquaculture feeds

Aquaculture at world level is still very much depended on feed fisheries. According to previous studies, by 2003 the consumption of fishmeal and fish oil by aquaculture at world level showed an increase of nearly 3 million and 1 million tonnes, respectively, which represents around 53 and 87 % of global production of these commodities, respectively.⁴⁰ Currently the dependence of European aquaculture on fishmeal and oil is high, ranging range between 35-50% for fishmeal and 4-25% for fish oil.⁴¹ The demand for aquaculture feeds in the coming decades is expected to growth in connection with the increase of world population and the expected consumption of seafood, while the global fisheries production is expected to stagnate⁴².

Despite the growth of European aquaculture has been poor in comparison with the growth of aquaculture at world level, overall, in the last 15 years the EU aquaculture production grew by around 8% from 1.178 million tonnes in 1995 to 1.276 million tonnes in 2010 with a pike in 1999 of around 1.425 million tonnes. The strongest and most continuous growth can be seen in the marine finfish aquaculture which more than doubled the production volume since 1995 from some 152,000 tonnes to 355,000 tonnes in 2010⁴³.

However in recent years the overall EU aquaculture production is stagnating. In order to boost the growth of European aquaculture in a sustainable way it is necessary to develop research and technologies to produce alternative and sustainable sources of feed for aquaculture to overcome the current dependence of the sector, particularly for carnivorous finfish species, on fishmeal and fish oil. Moreover, the dependence of the sector on feed fisheries may raise environmental and ethical concerns between consumers and stakeholders and cause important damage to the image of the sector⁴⁴.⁴⁵ This dependence on fisheries for fishmeal and fish oil may also have a negative economic impact on the sector as it make aquaculture dependent of the prices of these products in the world market, which are currently increasing due to a growing demand⁴⁶.

⁴⁰ Ref: Huntington, T.C. and Hasan, M.R. 2009. Fish as feed inputs for aquaculture – practices, sustainability and implications: a global synthesis. In M.R. Hasan and M. Halwart (eds). Fish as feed inputs for aquaculture: practices, sustainability and implications. FAO Fisheries and Aquaculture Technical Paper. No. 518. Rome, FAO. pp. 1–61.

⁴¹ Ref: J. Hofherr, F. Natale, G. Fiore (2012) An approach Towards European Aquaculture Performace Indicators. Indicators for Sustainable Aquaculture in the European Union. JRC Technical Reports, European Commission,

⁴² Ref: Huntington, T.C. and Hasan, M.R. 2009. Fish as feed inputs for aquaculture – practices, sustainability and implications: a global synthesis. In M.R. Hasan and M. Halwart (eds). Fish as feed inputs for aquaculture: practices, sustainability and implications. FAO Fisheries and Aquaculture Technical Paper. No. 518. Rome, FAO. pp. 1–61.

⁴³ Source: J. Hofherr, F. Natale, G. Fiore (2012) An approach Towards European Aquaculture Performace Indicators. Indicators for Sustainable Aquaculture in the European Union. JRC Technical Reports

⁴⁴ Ref: Olsen Y. (2011) Resources for fish feed in future mariculture. Mar. Ecol. Progr.Ser. Vol. 1: 187–200,

⁴⁵ Ref: Building a sustainable future for aquaculture A new impetus for the Strategy for the Sustainable Development of European Aquaculture (COM(2009) 162 final)

⁴⁶ Ref: Building a sustainable future for aquaculture A new impetus for the Strategy for the Sustainable Development of European Aquaculture (COM(2009) 162 final)

Adequate feed suited to the physiological needs animals are essential for optimal growth, health, welfare and production⁴⁷. Therefore, developing of technologies to provide suitable feeds for aquaculture is a fundamental to ensure the sustainable future of this sector.

Moreover, formulation of new feeds and development of feeding protocols based on the physiological needs of farmed species may increase feed conversion rates and thus contribute to reduce generation of wastes ⁴⁸

Securing animal health and fighting against diseases

The fight against fish diseases is a major problem for the industry which also impacts the animal welfare, quality and the safety seafood products with consequences for the markets. According to the paper published by Stentifor *et al* (2012) disease will limit future food supply from the global crustacean fishery and aquaculture sectors⁴⁹. The lack of control measures for existing diseases and the lack of technology to fight against the appearance of new diseases are important barriers that can have important economic impact on the aquaculture sector. For instance, current estimations indicate that up to 40% of tropical shrimp production may be lost annually, mainly due to viral infections for which standard preventative measures (e.g. such as vaccination) are not feasible⁵⁰

In order to ensure the sustainability of the sector it is necessary to increase the resilience of farmed species to diseases and pathogens, especially with regard to new and emerging diseases⁵¹ However, the limited availability of authorised veterinary medicinal products to address health risks remains however one of the major problems for the aquaculture industry ⁵².

It is necessary to develop new technologies that allow the production and use of new vaccines and treatments for diseases and parasites⁵³. Also the current tools and technologies need to be improved for rapid diagnosis of diseases and pathogens and become more effective in the treatment of diseases⁵⁴.

Optimising production and ensuring animal welfare

This is an area that is gaining more and more importance as issue of concern to consumers, policy makers and producers due to ethical implications⁵⁵. This increasing concern is also reflected in research priorities⁵⁶, and also the markets as welfare is becoming an important criterion for the choice of consumers.

⁴⁷ Ref: Olsen Y. (2011) Resources for fish feed in future mariculture. Mar. Ecol. Progr.Ser. Vol. 1: 187–200,

⁴⁸ Ref: Browdy, C.L. and J.A. Hargreaves (editors). 2009. Overcoming Technical Barriers to the Sustainable Development of Competitive Marine Aquaculture in the United States. U.S. Department of Commerce, Silver Spring, MD USA. NOAA Technical Memo NMFS F/SPO-100. 114pp

⁴⁹ Ref: Stentiford GD, Neil DM, Peeler EJ, Shields JD, Small HJ, Flegel TW, Vlcek JM, Jones B, Morado F, Moss S, Lotz J, Bartholomay L, Behringer DC, Hauton C, Lightner DV (2012). *Journal of Invertebrate Pathology*, 110: 141–157

⁵⁰ Ref: Stentiford GD, Neil DM, Peeler EJ, Shields JD, Small HJ, Flegel TW, Vlcek JM, Jones B, Morado F, Moss S, Lotz J, Bartholomay L, Behringer DC, Hauton C, Lightner DV (2012). *Journal of Invertebrate Pathology*, 110: 141–157

⁵¹ Ref: Federation of European Aquaculture Producers (FEAP). Annual Report 2011 (<http://www.feap.info/>)

⁵² Source: ('© European Union, <http://eur-lex.europa.eu/>, 1998-2014') Building a sustainable future for aquaculture A new impetus for the Strategy for the Sustainable Development of European Aquaculture (COM(2009) 162 final)

⁵³ Ref: European Aquaculture Technology and Innovation Platform (EATIP), EATIP Vision Document (<http://www.eatip.eu/>)

⁵⁴ Ref: Chen J (2012) Detection of bacterial pathogens in aquaculture samples by DNA microarray analysis. *Aquaculture*, 338-341:29-35.

⁵⁵ Ref: Maina DCJ, Mullana S, Atkinson C, Cooper M, Wrathall JHM, Blokhuysen JH (2014) Best practice framework for animal welfare certification schemes. *Trends in Food Science & Technology*, 37, Issue 2: 127–136

⁵⁶ Ref: EFARO (2013) KEY TOPICS FOR SCIENTIFIC SUPPORT TO THE EUROPEAN AQUACULTURE STRATEGY. An outline of RTDI topics identified by the Aquaculture Strategic Working Group (www.efaro.eu)

Optimal husbandry conditions, good health and adequate feed well suited to the physiological needs of the farmed aquatic animals are essential for optimal growth and production. Guaranteeing the welfare of farmed fish also contributes to a better image for the aquaculture industry⁵⁷

In this field in addition to conduct further research it is necessary to develop suitable technologies to ensure the welfare of farmed animals by ensuring health conditions (see below), water quality (see below), estimate biomass in cages (see below) to keep right densities, optimise husbandry conditions and using suitable feeds and feeding regimes (see below), among others. For instance recent advances in recirculation systems show that they can provide a more stable environment and improve fish welfare, enhancing also the energy efficiency.⁵⁸ It is also necessary to develop protocols and systems to improve fish welfare, focussing on reducing mortality, stress during transport and relocation⁵⁹. Procedures and Technologies for developing harmonized welfare certification schemes are needed to enhance the acceptance of products by consumers⁶⁰.

Ensuring consumer health protection/Ensuring the quality of the environment

The risks of seafood consumption on human health is becoming an issue of growing concern due to the potential harmful effects caused by pollutants, toxins and biological pathogens. Ensuring the quality and safety of aquaculture products to consumers is a key factor for the competitiveness of the sector.

Pollution of aquaculture products by contaminants, the bioaccumulation of algal blooms toxins by filter feeders or the presence of certain toxins in finfish, the biological contamination with pathogens or the presence of certain parasites in farmed species pose a serious risk to human health, damage the image of the sector and have an important negative effects on the aquaculture sector.

HABs and the toxins they produce are a major concern and threat for the sector, particularly for mollusc farms. In this field it is necessary to improve the technologies to better predict the occurrence of this event, to monitor the extension of the blooms and assess the risks for aquaculture and humans. In particular technologies are needed for developing early warning systems and in situ sensors to monitor in real time the presence of toxic species and toxins in the environment and also for the rapid detection of toxins in seafood^{61, 62}.

With regard to pollutants there is also a need to develop technologies to in situ monitor pollutants in the environment with a view to develop early warning systems that allow to anticipate measures to minimise impacts of pollution on aquaculture and on human health,. It is also necessary to develop technologies for a rapid and direct detection of toxic substances in seafood, including heavy metals and frequent organic pollutants^{63, 64}. The limitations of current methods, as reviewed by

⁵⁷ Source: ('© European Union, <http://eur-lex.europa.eu/>, 1998-2014') Building a sustainable future for aquaculture A new impetus for the Strategy for the Sustainable Development of European Aquaculture (COM(2009) 162 final

⁵⁸ Ref: <http://www.forskningsradet.no/en/Newsarticle/>

⁵⁹ Ref: EFARO (2013) KEY TOPICS FOR SCIENTIFIC SUPPORT TO THE EUROPEAN AQUACULTURE STRATEGY. An outline of RTDI topics identified by the Aquaculture Strategic Working Group (www.efaro.eu)

⁶⁰ Ref: Maina DCJ, Mullana S, Atkinsonb C, Cooperc M, Wrathallc JHM, Blokhuisd JH (2014) Best practice framework for animal welfare certification schemes. Trends in Food Science & Technology, 37, Issue 2: 127–136

⁶¹ Ref: Analysis of Research Needs and Gaps. Report. CSA Oceans

⁶² Ref: Arvanitoyannis IS, Kotsanopoulos KV, Papadopoulou A. (2014) Rapid detection of chemical hazards (toxins, dioxins, and PCBs) in seafood. Crit Rev Food Sci Nutr. 2014;54(11):1473-528.

⁶³ Ref: Analysis of Research Needs and Gaps. Report 3.2. CSA Oceans

⁶⁴ Ref: Arvanitoyannis IS, Kotsanopoulos KV, Papadopoulou A (2014) Rapid detection of chemical hazards (toxins, dioxins, and PCBs) in seafood. Crit Rev Food Sci Nutr. 2014;54(11):1473-528.

Arvanitoyannis et al. (2014)⁶⁵, call for the development of new and more effective ways to detect pollutants in seafood.

Also rapid methods for detection and removal of harmful pathogens in seafood are needed to ensure high quality and safety of seafood to consumers and avoid risks on human health^{66, 67}.

Impact of aquaculture on the environment

As already mentioned in this report, the environmental requirements for aquaculture are high. The compliance of industry with environmental regulation implies high cost of monitoring, time and resources which is a barrier for the sector, particularly for small producers.

The development of affordable, reliable and sensitive automated systems to in situ monitor the quality of the environment and the impacts of aquaculture (e.g. oxygen, nutrients, organic matter, pollutants, etc.) is needed to help industry comply with the environmental sustainability criteria of EU regulations and reduce costs⁶⁸. In addition current technologies and systems to remove wastes and contaminants from aquaculture effluents systems could be improved to increase their efficiency and reduce the impact of waste waters on the environment in a more effective way, thus helping keep compliance with EU environmental regulations, which is also fundamental to ensure the quality and safety of aquaculture products⁶⁹.

New feeding technologies, feed compositions and management of feeding protocols, based on improve knowledge on the physiological needs of farmed species, could increase feed conversion, increase production and contribute to reduce the environmental impact of aquaculture, including impacts on wild stocks and emissions^{70, 71}. Also new automatic devices are needed to improve the estimation of fish biomass in cages⁷², these systems could be coupled with feeding systems to increase the efficiency of feeding regimes and minimise the inputs of uneaten feed into the environment⁷³.

Aquaculture, as other maritime industries, uses coatings to protect cages from biofouling. These coatings usually contain toxic substances (e.g. TBT) that can be release to the marine environment and also can be taken up by farmed animals with the consequent risks for human health⁷⁴. In order

⁶⁵ Ref: Arvanitoyannis IS, Kotsanopoulos KV, Papadopoulou A. (2014) Rapid detection of chemical hazards (toxins, dioxins, and PCBs) in seafood. Crit Rev Food Sci Nutr. 2014;54(11):1473-528.

⁶⁶ Ref: EFARO (2013) KEY TOPICS FOR SCIENTIFIC SUPPORT TO THE EUROPEAN AQUACULTURE STRATEGY. An outline of RTDI topics identified by the Aquaculture Strategic Working Group (www.efaro.eu)

⁶⁷ Ref: Mandal PK, Biswas AK, Choi K, Pal UK, (2011). Methods for Rapid Detection of Foodborne Pathogens: An Overview. American Journal of Food Technology, 6: 87-102.

⁶⁸ Ref: Browdy CL, Hargreaves JA (editors) (2009). Overcoming Technical Barriers to the Sustainable Development of Competitive Marine Aquaculture in the United States. U.S. Department of Commerce, Silver Spring, MD USA. NOAA Technical Memo NMFS F/SPO-100. 114pp

⁶⁹ Ref: New developments in recirculating aquaculture systems in Europe: A perspective on environmental sustainability. Aquacultural Engineering, November 2010, Volume 43, Issue 3, Pages 83-93

⁷⁰ Ref: Browdy CL, Hargreaves JA (editors) (2009). Overcoming Technical Barriers to the Sustainable Development of Competitive Marine Aquaculture in the United States. U.S. Department of Commerce, Silver Spring, MD USA. NOAA Technical Memo NMFS F/SPO-100. 114pp EATIP Vision Document (<http://www.eatip.eu/>)

⁷¹ Ref: EFARO (2013) KEY TOPICS FOR SCIENTIFIC SUPPORT TO THE EUROPEAN AQUACULTURE STRATEGY. An outline of RTDI topics identified by the Aquaculture Strategic Working Group (www.efaro.eu)

⁷² Ref: Puig V, Espinosa V, Soliveres E, Ortega A, Belmonte A, de la Gandara F (2012). Biomass estimation of bluefin tuna in sea cages by the combined use of acoustic and optical techniques. Collect. Vol. Sci. Pap. ICCAT, 68(1): 284-290 (2012)

⁷³ Ref: Browdy CL, Hargreaves JA (editors) (2009). Overcoming Technical Barriers to the Sustainable Development of Competitive Marine Aquaculture in the United States. U.S. Department of Commerce, Silver Spring, MD USA. NOAA Technical Memo NMFS F/SPO-100. 114pp

⁷⁴ Ref: Guardiola FA, Cuesta A, Meseguer J, Esteban MA (2012). Risks of Using Antifouling Biocides in Aquaculture Int J Mol Sci. 2012; 13(2): 1541-1560.

to prevent impact from these toxic substances it is necessary to develop non-toxic antibiofouling materials or coatings⁷⁵ . .

On the other hand, the impact of escapes on the genetic biodiversity of wild fish populations and the spreading of diseases is a concern that has increase notably over the last decade... However, this is an area where there is no much knowledge available, particularly for some cultures, and where there is need for development of new knowledge, technologies and innovation⁷⁶ to avoid or minimise the number of escapes from aquaculture cages. The development of new materials, designs of cages and technologies to reduce risks from operations, and technologies to detect and to recover escapes can help minimise the impacts of aquaculture on the marine environment and contribute to it sustainability^{77, 78, 79} .

Technologies for rapid, easily identifiable, low cost and low stress methods of marking farmed fish would allow for identification of the source of potential escapee. It is also necessary to develop measures and technologies for the reproductive isolation between farmed and wild stocks⁸⁰

Technology barriers for offshore aquaculture

The increase demand for the use of the marine space in coastal areas and the lack of space to satisfy all the claims from stakeholders, the administrative burden to get licenses in coastal areas and the strong environmental requirements has led to the aquaculture sector to look to the offshore areas as a solution to all these problems. However, before to achieve a full development of the offshore aquaculture at commercial scale a series of technological problems and barriers need to be overcome⁸¹ .

This include among others the development of technologies to adapt to scale at which offshore systems must be operated on⁸² and also the technologies needed for the design of structures, anchoring systems, cages and feeding systems which can withstand harsher environmental conditions (e.g. extreme weather, longer and higher waves, stronger currents, etc.)^{83, 84} .

The development of offshore aquaculture will also require to overcome technology barriers and logistic challenges for installing and operating farms, including stocking, feeding, monitoring and

⁷⁵ Ref: Browdy CL, Hargreaves JA (editors) (2009). Overcoming Technical Barriers to the Sustainable Development of Competitive Marine Aquaculture in the United States. U.S. Department of Commerce, Silver Spring, MD USA. NOAA Technical Memo NMFS F/SPO-100. 114pp

⁷⁶ Ref: European Aquaculture Technology and Innovation Platform (EATIP), EATIP Vision Document (<http://www.eatip.eu/>)

⁷⁷ Ref: European Aquaculture Technology and Innovation Platform (EATIP), EATIP Vision Document (<http://www.eatip.eu/>)

⁷⁸ Ref: Triantafyllidis A, Karaïskou N, Bonhomme F, Colombo L, Crosetti D, Danancher D, García-Vázquez E, Gilbey J, Svåsand T, Verspoor E, Triantafyllidis C. Management options to reduce genetic impacts of aquaculture activities. Genimpact final scientific report (<http://www.imr.no/genimpact/>)

⁷⁹ Ref: Browdy CL, Hargreaves JA (editors) (2009). Overcoming Technical Barriers to the Sustainable Development of Competitive Marine Aquaculture in the United States. U.S. Department of Commerce, Silver Spring, MD USA. NOAA Technical Memo NMFS F/SPO-100. 114pp

⁸⁰ Ref: Triantafyllidis A, Karaïskou N, Bonhomme F, Colombo L, Crosetti D, Danancher D, García-Vázquez E, Gilbey J, Svåsand T, Verspoor E, Triantafyllidis C. Management options to reduce genetic impacts of aquaculture activities Genimpact final scientific report (<http://www.imr.no/genimpact/>)

⁸¹ Ref: Knapp G (2013) The development of offshore aquaculture: an economic perspective. In A. Lovatelli, J. Aguilar-Manjarrez & D. Soto, eds. Expanding mariculture farther offshore: technical, environmental, spatial and governance challenges. FAO Technical Workshop, 22–25 March 2010, Orbetello, Italy. FAO Fisheries and aquaculture Proceedings No. 24. Rome, FAO. pp. 201–244

⁸² Ref: European Commission, JRC. (2008). Prospective analysis of the Aquaculture Sector in EU. Part 2 Characterization of emerging aquaculture systems

⁸³ Ref: European Commission, JRC. (2008). Prospective analysis of the Aquaculture Sector in EU. Part 2 Characterization of emerging aquaculture systems

⁸⁴ Ref: Knapp G (2013) The development of offshore aquaculture: an economic perspective. In A. Lovatelli, J. Aguilar-Manjarrez & D. Soto, eds. Expanding mariculture farther offshore: technical, environmental, spatial and governance challenges. FAO Technical Workshop, 22–25 March 2010, Orbetello, Italy. FAO Fisheries and aquaculture Proceedings No. 24. Rome, FAO. pp. 201–244

harvesting⁸⁵, ⁸⁶. These technology advances require big amount of investments in RTD. This fact alongside with the high risk of operations hampers the investments of industry in RTD for offshore aquaculture⁸⁷.

EXAMPLES OF LEGAL AND TECHNOLOGICAL BARRIERS/CHALLENGES FOR THE OFFSHORE WIND ENERGY SECTOR

In 2008 the European Commission conducted a public consultation on EU action to promote Offshore Wind Energy with the aim to identify the key barriers for the further development of offshore wind energy in Europe and how to overcome them. After the analysis of the responses of stakeholders the Commission published a report with the outcomes of the consultation (the full document is available at

http://ec.europa.eu/energy/strategies/2008/doc/2008_11_ser2/offshore_wind_consultation_report.pdf).

From this report it is possible to identify and drawn the main administrative, legal and technologies barriers that the sector of offshore wind energy needs to address. These are the following⁸⁸:

Related administrative-legal barriers/challenges

- Identification of suitable locations for offshore wind farms

The first group of barriers identified by the report relates to the difficulties for the identification of suitable locations for offshore wind farms. According to the report, over 85% of the stakeholders considered the lack of integrated approaches (e.g. spatial planning involving site identification, consenting procedures and grid planning not carried out in parallel) to the identification of suitable locations for offshore wind farms as one of the most important barriers for the development of offshore wind energy. The lack of strategic level planning across Member States is particularly problematic for the perspective of realising synergies that could come from such cross-border cooperation.

The report highlights that most of the stakeholders considered the availability of information on designation of nature conservation areas or other environmental constraints, (e.g. Wildlife habitats or migration routes), to be a significant or very significant barrier. The uncertainty on the designation of MPAs in some countries increases uncertainty and risks from a developer's perspective.

- Consenting procedures: generally too complex, unclear and long

The second group of barriers concerned difficulties relating to the consenting procedures. Among the more important barriers within this group were: The fact that permissions are required from different authorities within a country, the lack of unique entry point for project applicants and clear

⁸⁵ Ref: Knapp G (2013) The development of offshore aquaculture: an economic perspective. In A. Lovatelli, J. Aguilar-Manjarrez & D. Soto, eds. Expanding mariculture farther offshore: technical, environmental, spatial and governance challenges. FAO Technical Workshop, 22–25 March 2010, Orbetello, Italy. FAO Fisheries and aquaculture Proceedings No. 24. Rome, FAO. pp. 201–244

⁸⁶ Ref: European Commission, JRC. (2008). Prospective analysis of the Aquaculture Sector in EU. Part 2 Characterization of emerging aquaculture systems (<http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=1740>)

⁸⁷ Ref: European Commission, JRC. (2008). Prospective analysis of the Aquaculture Sector in EU. Part 2 Characterization of emerging aquaculture systems (<http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=1740>)

⁸⁸ Source: European Commission, http://ec.europa.eu/energy/strategies/2008/doc/2008_11_ser2/offshore_wind_consultation_report.pdf, © European Union, 1995-2014

procedures for coordination between the authorities tends to prolong and complicate the procedures, the absence of certainty as regards the legal framework and the dispersion of the responsibility increase the risks and thus costs for developers.

Most of stakeholders generally consider it as a significant barrier that laws or regulations on the process and/or criteria for obtaining development consents and similar permits, licences or concessions are not clear or do not exist

Related technology barriers

- Grid infrastructure and system integration

The third group of barriers identified by the reported concerned difficulties relating to the integration in the electricity grid and system...

One of the major problems is that offshore wind resources are not equally distributed across the continent and to date most offshore wind developments have been in Northern Europe. In a scenario with large-scale development of offshore wind power, the production from such installations will therefore mainly need to be fed into the grid via entry points on the coasts in Northern Europe.

The need for and/or construction time of onshore grid reinforcements to assure connection and enable integration of offshore wind into the European grid was considered by stakeholders a very significant or significant barrier. Many respondents also considered the construction of necessary offshore grid connectors to the wind farms as very significant or significant and the general need for improved interconnections as important as very significant or significant.

- Technology constraints

The availability of reliable, tested offshore wind turbine technologies was the barrier that most of the respondents identified as significant or very significant. Today only a very limited number of turbine manufacturers offer serial production models for offshore applications– this reduces the level of competition in the offshore market and thus increases the cost differential to onshore wind. Similar bottlenecks exist elsewhere in the supply chain – the limited availability of suitable cranes, jack-up rigs, installation vessels and similar equipment as well as of skilled personnel with the necessary mix of qualifications is highlighted by many stakeholders as a key barrier.

Insufficient R&D efforts to improve reliability of technology and to improve/reduce cost of technology were considered a significant or very significant barrier by the organisations responding to the consultation. In particular, stakeholders emphasised the need for more RTD for instance with respect to foundation technologies including floating foundations.

EXAMPLES OF LEGAL AND TECHNOLOGICAL BARRIERS/CHALLENGES FOR THE OCEAN ENERGY SECTOR

In 2012 the European Commission conducted a public consultation on ocean energy in order to identify major barriers, bottlenecks and needs to promote the growth of this sector and contribute to secure energy supply and meet the targets of different EU policies, including the Maritime Policy.

So, the consultation aimed at gathering opinions and ideas from individuals and stakeholders on whether and how to help the sector make its contribution to security of energy supply in Europe and meeting targets for a 'green' future. The consultation did not concern off-shore wind energy which is considered to be at a different stage of development.

Following the consultation the European Commission produce the report “Ocean Energy: Feedback Statement of the Online Public Consultation held from 14 June to 14 September 2012” with the key findings of the consultation. The full report is available at:

http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/ocean_energy/ocean-energy-consultation-feedback-statement_en.pdf.

Among other issues, the report identified barriers and constrains that affect to the development of ocean energy. Among these there are several technical barriers, administrative constrains and barriers related to maritime spatial planning (MSP). The administrative constrains and barriers related to MSP are address below, while technological barriers will be addressed

ADMINISTRATIVE CONSTRAINS AND SPATIAL PLANNING⁸⁹

Administrative constraints

The length and complexity of authorisation/certification/licensing procedures at the level of Members States, regions or areas was one of the most often quoted administrative constrain by stakeholders in the consultation conducted by the European Commission. This was followed by the lack of qualified staff and the length and complexity of licensing across borders. Also the length and complexity of licensing across borders was a barrier highlighted by stakeholders...

In many cases the problems lies in the fact that in many Member States there are several authorities involved in the consenting procedures. This slows down and complicates the process and, as a consequence, increases project costs.

Stakeholders drawn attention to the fact that there are issues with interpretation of existing EU legislation. Local authorities can sometimes be cautious in awarding authorisation over possible infringements of environment-related directives. The Environmental Impact Assessment requirements also appear to present a significant challenge for developers.

The lack of trained qualified personnel is a limitation at both the administrative and technical levels. Insufficient administrative capacity was particularly highlighted as a problem, as it contributes to the delays in the licensing process

Spatial Planning

Most of the stakeholders that responded to the consultation of European Commission considered that conflicts could occur between the ocean energy sector and other maritime activities, especially with fishing, military uses, shipping and nature conservation. In particular, the potential for conflict with fishermen featured as the most prominent but it was also pointed out that ocean energy developments could offer a career change opportunity for fishermen, whose livelihoods could be in

⁸⁹ Source: European Commission, “Ocean Energy: Feedback Statement of the Online Public Consultation held from 14 June to 14 September 2012” http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/ocean_energy/ocean-energy-consultation-feedback-statement_en.pdf, © European Union, 1995-2014

danger as a result of overfishing. Stakeholders also highlighted that ocean energy deployments can create a “sanctuary effect” which could help the recovery of fish stocks. Most of stakeholders considered very important the inclusion of ocean energy development in national maritime spatial planning.

The suggestions made by stakeholders to EC for mitigation of these conflicts were mostly focussed on the effective Maritime Spatial Planning but also on other measures such as long-term planning and transparency in the permitting process, early consultation, awareness and information campaigns, multiplatform solutions, designation of large zones for ocean energy to offer flexibility in array locations and compensation schemes.

TECHNOLOGICAL BARRIERS

Grid connection were the most frequently quoted barrier to the development of ocean energy. It is noteworthy that grid connection issues was the most frequently mentioned barrier in all stakeholders groups, except the private sector. The lack of agreed standards and technical specifications and lack of construction and installation vessels followed as the most frequently mentioned barriers. The lack of certainty and excessive costs of grid connection were seen to be a risk, eroding stakeholders' confidence and therefore slowing down the development of the sector. Other technical barriers identified by stakeholders were related to the devices themselves: the lack of proven designs, proving reliability and survivability of devices and materials, lack of availability of marine space, technology-related obstacles, and variety of designs - lack of convergence, subsea converters and transformers⁹⁰.

In January this year the European Commission launched the Communication “Blue Energy. Action needed to deliver on the potential of ocean energy in European seas and oceans by 2020 and beyond (COM (2014) 8 final)”. Based on the impact assessment and a stakeholder consultation, the Communication identifies several issues that require attention over the short to medium term to help the sector to scale up and become cost-competitive with other forms of electricity generation. Among these issues it addresses and develops further some of technical barriers identified in the report of the European Commission on the results of the consultation on Ocean Energy conducted in 2012. This includes the following⁹¹:

- **Technology costs** are currently high and access to finance is difficult. Most of the existing technologies still need to demonstrate their reliability and survivability in the marine environment. The cost of generated electricity is therefore currently high but is set to decrease as the technologies advance along the learning curve. Demonstration of devices at sea is costly and risky and SMEs are often short of the necessary resources to deploy their prototypes. The diversity of the technologies currently being tested means that progress toward capital cost reduction is taking time.
- **Expanding and strengthening the EU's transmission grid infrastructure**, offshore but also on land and across borders, is necessary to accommodate future volumes of ocean energy and

⁹⁰ Source: European Commission, “Ocean Energy: Feedback Statement of the Online Public Consultation held from 14 June to 14 September 2012” http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/ocean_energy/ocean-energy-consultation-feedback-statement_en.pdf, © European Union, 1995-2014

⁹¹ Source: (© European Union, <http://eur-lex.europa.eu/>, 1998-2014) Blue Energy. Action needed to deliver on the potential of ocean energy in European seas and oceans (COM(2014) 8 final)

transport it to centres of demand. Whilst the recent TEN-E guidelines may yield improvements in the future, concerns about timely grid connection remain. Other infrastructural issues including inadequate access to suitable port facilities and the lack of specialised vessels for installation and maintenance also need to be addressed.

In addition, the European Wind Energy Association has also identified legal barriers in the sector of Ocean Wind Energy focussed on the deployment of deep ocean structures. The barriers identified by EWEA have been already mentioned above and are related to the certainty of the legal framework, standardization and maritime spatial planning⁹². These barriers are described in detailed in the report “Deep Water. The next step for offshore wind energy” developed by EWEA, and available at the EWEA website: <http://www.ewea.org/>

It is noteworthy to mention that in general many of the administrative, legal and technological barriers found for the ocean energy sector are in general also shared by the offshore wind sector, though each sector has obviously its own specificities. Nevertheless, the lack of integrated spatial planning, grid connections, lack of ships for installations and maintenance, lack of skilled labour force, fragmentation at national level and dispersion of competences between different authorities, time needed to get permissions, complexity of administrative procedures, were some of the common barriers.

It is also interesting to note that several of the general barriers identified in the CSA Ocean consultation coincided with the barriers that are common to the ocean energy and offshore wind energy sectors.

EXAMPLES OF LEGAL BARRIERS/CHALLENGES FOR THE BIOTECHNOLOGY SECTOR (Marine Genetic Resources, MGR)

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity is an international agreement which aims at sharing the benefits arising from the utilization of genetic resources in a fair and equitable way, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding, thereby contributing to the conservation of biological diversity and the sustainable use of its components. It was adopted by the Conference of the Parties to the Convention on Biological Diversity at its tenth meeting on 29 October 2010 in Nagoya, Japan⁹³.

The convention includes a provision establishing a general principle calling for users to obtain the prior informed consent (PIC) of, and to share benefits with provider countries when their genetic resources are used for research and development. However, until recently (in the absence of the Nagoya Protocol) there was no sufficient legal framework to ensure that the genetic resources were obtained in compliance with domestic law of the provider country. Companies and scientists often developed commercial products based on genetic resources and, in many cases, filed patents using that material. In some situations this led to conflicts and accusations of "bio-piracy"⁹⁴.

⁹² Ref: Deep Water. The next step for offshore wind energy. 2013. EWEA (<http://www.ewea.org/>)

⁹³ Source: Convention of Biological Diversity CBD (<http://www.cbd.int/abs/>)

⁹⁴ Source: European Commission, http://ec.europa.eu/environment/nature/biodiversity/international/abs/pdf/Q_As_on_ABS.pdf, © European Union, 1995-2014

The Nagoya Protocol provides specific framework conditions for procedures that govern how users of genetic resources and traditional knowledge associated with genetic resources may obtain access to such resources and traditional knowledge. In particular, it details information that needs to be included in the prior informed consent (PIC) given by the provider country. It also contains a general obligation on the establishment of a benefit sharing agreement to be established through mutually agreed terms between the provider and the user. The Protocol obliges states to ensure that users operating under their jurisdiction respect the legislative or regulatory requirements of states that provide genetic resources and traditional knowledge. The Protocol encourages Parties to direct benefits arising from the access to and utilization of genetic resources towards the conservation of biological diversity and the sustainable use of its components. It is also hoped that these benefits may help vulnerable populations that depend on genetic resources to use them sustainably. It could also help to enhance the management and establishment of protected areas that are important to conserve biodiversity. As regards the obligation of states adhering to the Nagoya Protocol, the Protocol foresees the adoption of specific compliance procedures and mechanisms, including dispute settlement procedures, that will help Parties to comply and that will address cases of non-compliance. These will be agreed at a later date⁹⁵.

It has been recognized that with the entering into force of the Nagoya Protocol on Access and Benefits Sharing (ABS) in 2014 the legal framework to access to and use of genetic resources, including marine genetic resources, will change⁹⁶. However changes will only occurred within the EEZ, since the CBD does not cover marine biodiversity beyond the EEZ, and therefore Nagoya only applied to the genetic resources within the EEZ. Consequently marine genetic resources beyond areas of national jurisdiction are excluded from the scope of the Protocol.

In fact, none of the existing international laws, regulations, agreements and treaties that apply to areas beyond the national jurisdiction (i.e. UNCLOS, SIA, CBD, etc.) provide legal certainty for the use and management of IPR of marine genetic resources beyond the EEZ. This is an issue that has been the focus of discussions in several international forums, including UNCLOS. Ethical concerns have been raised on the use of marine genetic resources from areas beyond the EEZ, since those should be regulated following the principle of “Fair and Equitable Sharing of Benefits” in order to share the benefits of these genetic resources with the whole humankind, instead the benefits being retained by those that make the discovery.

Much of the unknown marine biodiversity (estimated to be around 90% of the total biodiversity of the ocean) is believed to be found in areas beyond the EEZ, in the deep ocean and therefore this gap in the legal framework is currently a major barrier for industry to plan and invest with certainty to make new bio discoveries in these rich biodiversity areas. The lack of legal framework does not encourage the investment of industry in this field and this prevents the development of new products (from new medicines to cosmetics and substance for industrial applications, etc.) with enormous potential applications and benefits for the humankind (from new medicines to cosmetics and substance for industrial applications, etc.).

⁹⁵ Source: European Commission, http://ec.europa.eu/environment/nature/biodiversity/international/abs/pdf/Q_As_on_ABS.pdf, © European Union, 1995-2014

⁹⁶ Ref: Lallier et al. 2014. Access to and use of marine genetic resources: understanding the legal framework. Nat. Prod. Rep., 2014, 31, 612

4. INTELLECTUAL PROPERTY RIGHTS (IPR)

This section provides an overview of intellectual property rights at its management at EU level the document also provides a set of recommendations based on previous studies and other existing information for the management on intellectual property by industry.

Given that the focus of WP4 is innovation and that patents are probably the most relevant intellectual property for the maritime industry⁹⁷, this section is mainly focused on this industrial property and specially in patents, though general issues relevant to other industrial property are also addressed. IPR issues are generic and cross-cutting to all sectors, not only to maritime sectors; therefore there are not specific regulations on IPR for sectors. Therefore the information and recommendations provided on IPR are general in almost all cases. The document does not deal with the management of intellectual property in EU projects. In addition to the content of this section Annex 1 provides a short overview of IPR issues at national level in the countries participating in CSA Oceans.

4.1 BACKGROUND INFORMATION ON INTELLECTUAL PROPERTY RIGHTS (IPR)

Intellectual property is usually classified in: i) Industrial property and ii) Copyright (and related rights)

Industrial property

Industrial property usually encompasses patents and utility models, industrial design, trademarks, geographical indications, and other rights such as plant variety rights and semiconductor products.

All these rights enable holders to prevent unauthorised use of an intangible asset of potential commercial value, whether this is an idea behind an innovative product or process, or an indication to the consumer of origin⁹⁸.

PATENTS

Patents are perhaps the most widely known industrial property and perhaps one of the most important for the maritime industry⁹⁹, including SMEs, to ensure the protections of their inventions and therefore to promote and ensure their competitiveness. Those SME that are now aware of the importance of patents are in risk of increasing their vulnerability in the market due to unauthorised copies of their inventions by competitors

A **patent** is a legal title that can be granted for any invention having a technical character provided that it is new, involves an inventive step and is susceptible of industrial application. Patents encourage companies to make the necessary investment for innovation, and provide the incentive for individuals and companies to devote resources to research and development. Today, (technical) inventions can be protected in Europe either by **national patents**, granted by the competent national

⁹⁷ MARTEC's IPR Guide (<http://www.martec-era.net/>)

⁹⁸ Source: European Commission. An Industrial Property Rights Strategy for Europe (COM(2008) 465 final) (http://ec.europa.eu/internal_market/indprop/docs/rights/2008_0465_en.pdf), © 1995-2014

⁹⁹ Ref: MARTEC's IPR Guide (<http://www.martec-era.net/>)

authorities or by **European patents** granted centrally by the **European Patent Office (EPO)**. Aesthetic creations, mathematical methods, computer games etc. are not regarded as inventions as they lack a technical character. To qualify as new, it is important that the invention has not been in the public domain (state of the art) before the date on which the patent application is filed. A patent can cover how things work, what they do, what they are made of, and how they are made. Anybody - an individual or a company or an institution - can apply for a patent. A patent gives the owner the right to prevent others from making, using or selling the invention without permission. However, it is not automatically implied that the patent owner may make use of it. Quite often, permits from national authorities governed by laws other than patent law, have to be obtained before commercialising a product covered by a patent¹⁰⁰.

Patents are a limited term exclusive right granted to an inventor in return for the disclosure of technical information from the invention¹⁰¹. In general, the exclusive rights of a patent owner to exploit the invention commercially last for a maximum of 20 years from the filing date, subject to the payment of regular renewal fees. Anyone else wishing to use the invention while it is still patented must request authorisation from the patent holder and may have to pay a licence fee. In return for this exclusive right, the details of how it works are published 18 months after filing the patent application. In this way, the scientific or technical know-how - the technical teaching of the invention - is made public allowing others to further their own research. As a general rule the patent renewal fees increase over time. This means that only the most commercially viable patents are maintained for the full period. At the end of the 20-year term, the patent lapses¹⁰².

UTILITY MODELS

Utility models, which exist in some EU Member States, are similar to patents in giving the holder an exclusive right to a technical invention, but they have a shorter lifespan than patents. The invention protected by a utility model must be new, but generally the level of inventiveness required is less than for patents. Utility models and national patents granted in Member States which do not conduct a thorough assessment of inventive step are a faster route of protection. However, they can be seen as lower quality rights than examined patents, and can therefore increase legal uncertainty¹⁰³.

According to WIPO, the main differences between utility models and patents are the following¹⁰⁴:

- The requirements for acquiring a utility model are less stringent than for patents. While the requirement of "novelty" is always to be met, that of "inventive step" or "non-obviousness" may be much lower or absent altogether. In practice, protection for utility models is often sought for innovations of a rather incremental character which may not meet the patentability criteria.

¹⁰⁰ Source: European Commission, http://ec.europa.eu/internal_market/indprop/patent/faqs/index_en.htm, © European Union, 1995-2014

¹⁰¹ European Commission. An Industrial Property Rights Strategy for Europe (COM(2008) 465 final) (http://ec.europa.eu/internal_market/indprop/docs/rights/2008_0465_en.pdf), © 1995-2014

¹⁰² Source: European Commission, http://ec.europa.eu/internal_market/indprop/patent/faqs/index_en.htm, © European Union, 1995-2014

¹⁰³ Source: European Commission. An Industrial Property Rights Strategy for Europe (COM(2008) 465 final) (http://ec.europa.eu/internal_market/indprop/docs/rights/2008_0465_en.pdf), © 1995-2014

¹⁰⁴ Source: WIPO World Intellectual Property Organization (http://www.wipo.int/sme/en/ip_business/utility_models/utility_models.htm)

- The term of protection for utility models is shorter than for patents and varies from country to country (usually between 7 and 10 years without the possibility of extension or renewal).
- In most countries where utility model protection is available, patent offices do not examine applications as to substance prior to registration. This means that the registration process is often significantly simpler and faster, taking, on average, six months.
- Utility models are much cheaper to obtain and to maintain
- In some countries, utility model protection can only be obtained for certain fields of technology and only for products but not for processes.
- Utility models are considered particularly suited for SMEs that make "minor" improvements to, and adaptations of, existing products. Utility models are primarily used for mechanical innovations.

TRADE MARKS

A **trade mark** is a sign which serves to distinguish the goods and services of one organisation from those of another. Trademarks are words, logos, devices or other distinctive features which can be represented graphically. They can consist of, for example, the shape of goods, their packaging, sounds and smells. In Europe, trademarks can be registered at national level at the industrial property (IP) offices of Member States, or at EU level as a Community trade mark (CTM) at the Office for Harmonisation in the Internal Market (OHIM) in Alicante. Under the overall system, national and Community trademarks coexist and the same sign may be registered as a Community and/or as a national trade mark. The CTM system consists of one single registration procedure which grants to its owner an exclusive right in the 27 Member States of the EU¹⁰⁵.

DESIGNS

A **Design** is the appearance of the whole or a part of a product (i.e. any industrial or handicraft item, including inter alia parts intended to be assembled into a complex product, packaging, get-up, graphic symbols and typographic typefaces, but excluding computer programs), resulting from the features of, in particular, the lines, contours, colours, shape, texture and/or materials of the product itself and/or its ornamentation.¹⁰⁶

GEOGRAPHICAL INDICATIONS AND TRADITIONAL SPECIALITIES¹⁰⁷

A **Geographical Indication (GI)** is a sign, usually a name, used on goods that have a specific geographical origin and possess qualities, characteristics or a reputation essentially attributable to that place of origin. Typically, a geographical indication includes or consists of the name of the place of origin of the goods. This name can be collectively used by all enterprises from the given area which manufacture a given product in a prescribed way¹⁰⁸.

Three EU schemes known as PDO (protected designation of origin), PGI (protected geographical indication) and TSG (traditional speciality guaranteed) promote and protect names of quality

¹⁰⁵ Source: ©European Union, 1995-2014, http://europa.eu/rapid/press-release_MEMO-13-291_en.htm?locale=en,

¹⁰⁶ Source: ("© European Union, <http://eur-lex.europa.eu/>, 1998-2014"), Directive 98/71/EC of the European Parliament and of the Council of 13 October 1998 on the legal protection of designs

¹⁰⁷ Source: European Commission, http://ec.europa.eu/agriculture/quality/schemes/index_en.htm, ©European Union, 1995-2014

¹⁰⁸ Source: European Commission, http://europa.eu/rapid/press-release_MEMO-14-486_en.htm?locale=en, ©European Union, 1995-2014

agricultural products and foodstuffs. These schemes encourage diverse agricultural production, protect product names from misuse and imitation and help consumers by giving them information concerning the specific character of the products¹⁰⁹:

- Protected Designation of Origin - PDO: covers agricultural products and foodstuffs which are produced, processed and prepared in a given geographical area using recognised know-how.
- Protected Geographical Indication - PGI: covers agricultural products and foodstuffs closely linked to the geographical area. At least one of the stages of production, processing or preparation takes place in the area.
- Traditional Speciality Guaranteed - TSG: highlights traditional character, either in the composition or means of production

Although PDOs and PGIs are usually geographical names (Parmigiano-Reggiano, Queso Manchego, Champagne), they can also be "traditional names" like Feta or Reblochon. PDOs or PGIs are not mere origin labelling names, but names for agricultural products or foodstuffs that present a specific given quality, defined by the producers themselves, which is the result of the factors of the area: climate, soils conditions, know-how, local breeds, endogenous varieties, etc.¹¹⁰.

The agricultural products and foodstuffs that have been awarded with Protected Geographical Indication, Protected Designation of Origin or Traditional Speciality Guaranteed can be consulted at the DOOR database (Database of Origin and Registration) (<http://ec.europa.eu/agriculture/quality/door/list.html>)

In this database seafood products and derivatives are found under Class 1.7 "Fresh fish, molluscs, crustaceans and products derived therefrom". **Currently there are only 37 seafood products from fisheries and aquaculture that have been registered with Protected Designation of Origin or Protected Geographical Indication.** 12 of them have POD and the rest of them, 25 have been register under PGI. A total 8 new seafood products have been recently applied for PGI (6) or PDO (2)¹¹¹. The seafood products that have been awarded with Protected Geographical Indication and Protected Designation of Origin can be consulted at the DOOR database (Database of Origin and Registration) (<http://ec.europa.eu/agriculture/quality/door/list.html>)

More information on Geographical indications can be found at:
http://ec.europa.eu/agriculture/quality/schemes/index_en.htm

COPYRIGHT AND NEIGHBOURING RIGHTS

On the other hand, **copyright and related rights** provide an incentive for the creation of an investment in new works and other protected matter (music, films, print media, software, performances, broadcasts, etc.) and their exploitation, thereby contributing to improved competitiveness, employment and innovation. The field of copyright is associated with important

¹⁰⁹ Source: European Commission, http://ec.europa.eu/agriculture/quality/schemes/index_en.htm, ©European Union, 1995-2014

¹¹⁰ Source: European Commission, http://ec.europa.eu/agriculture/quality/policy/quality-package-2010/ia-gi_en.pdf, ©European Union, 1995-2014

¹¹¹ Source: Based on data from DOOR (European Commission, <http://ec.europa.eu/agriculture/quality/door/list.html>, ©European Union, 1995-2014)

cultural, social and technological aspects, all of which have to be taken into account in formulating policy in this field¹¹².

4.2 GENERAL QUESTIONS AND RECOMMENDATIONS ON PATENTS, UTILITY MODELS AND TRADE SECRETS

This section provides responses to several practical questions and gives recommendations on industrial property. The section is mostly focussed on patents, though general questions and recommendations on utility models and trade secrets are also given. It is based on compilation of questions and recommendations from different sources.

PRACTICAL QUESTIONS AND RECOMMENDATIONS TO PROTECT PATENTS THROUGH THE EUROPEAN PATENTS

Below we provide number of responses to practical questions as well as useful recommendations concerning the application of patents in Europe under the framework of the European Patent Convention (EPC), compiled from different sources¹¹³.

How do you currently apply for a patent in Europe?

Today, inventions can be protected in Europe either by national patents or European patents granted centrally by the European Patent Office (EPO).

Member States have their own patent offices which deal with applications for national patents, but the protection conferred by a national patent is limited to the territory of the State concerned.

If the applicant chooses to apply for a European patent, the application will be dealt with by the EPO, based in Munich and a branch in The Hague. The EPO provides a single procedure for granting patents in Europe. It is an intergovernmental organisation comprising 38 members (27 EU Member States + 11 other European countries). On the basis of one single patent application processed in one of the three official languages of the EPO (English, French and German), inventors and businesses can obtain a European patent.

If the EPO grants a European patent, the full text of the patent, known as the specification, is published in the official language of the EPO chosen by the applicant as the language of the proceedings. At this stage, the applicant must also provide a translation of the part of the patent that defines the scope of protection - the claims – into the other two official EPO languages.

The patent proprietor must choose the countries in which he/she wishes to have protection and validate the European patent in these states. A number of different validation requirements may apply. For example, the patent proprietor may have to pay a fee to the national patent office, comply

¹¹² Source: European Commission, http://ec.europa.eu/internal_market/copyright/index_en.htm , © European Union 1995-2014

¹¹³ Sources:

- European Union, http://europa.eu/rapid/press-release_MEMO-10-291_en.htm, © European Union 1995-2014
- European Union, http://europa.eu/rapid/press-release_MEMO-11-240_en.htm, © European Union 1995-2014
- European Commission, http://ec.europa.eu/internal_market/indprop/patent/faqs/index_en.htm, © European Union 1995-2014
- MARTEC's IPR Guide, Managing the research results (<http://www.martec-era.net/>)
- European Commission, http://ec.europa.eu/internal_market/indprop/patent/index_en.htm © European Union 1995-2014
- European Commission, http://ec.europa.eu/internal_market/indprop/patent/faqs/index_en.htm, © European Union 1995-2014

with various formal requirements and provide a translation of the patent to the official language of the State.

What are the current validation costs of a European patent?

At present for a European patent to be effective in a Member State, it needs to be validated in that Member State (cf. above). These validations are expensive. The translation of patents is particularly costly, on average amounting to €75 to €85 per page. With a typical length of a patent being 20 pages, the costs for a single translation of a patent may be more than €1500. Further costs are incurred by hiring local representatives acting as intermediaries between the patent proprietor and the national patent office in order to comply with all the requirements in a specific Member State and/or to certify the translation. Various other fees must also be paid to the national patent offices. The validation costs for a European patent in 13 Member States are approximately €12 500 and reach approximately €32 000 in 27 Member States.

These costs particularly affect SMEs, young innovative companies, start-up companies and public research organisations, and they hinder access to the patent system.

Furthermore, in order to maintain the patent protection, the patent holder has to pay renewal fees each year in each country where the patent has been validated. Also, if he/she wishes to transfer the patent or to allow someone to use the patented invention through a licensing agreement, these transactions need to be registered by the national patent offices country by country. This makes the management of patents complex and costly in Europe.

Do patent applications and patent specifications have to be translated?

Applications for European patents can be filed in any language. Yet applicants have to provide a translation of the application into English, French or German which are the official languages of the EPO (if the application was not filed in one of the official languages). The European patent is granted in one of the three EPO languages. Before the grant, the applicant is required to provide a translation of the claims (which define the scope of the subject-matter for which patent protection is sought) into the other two official EPO languages.

Under the new translation regime applicable to the creation of the unitary patent protection (see below), SMEs, natural persons, non-profit organisations, universities and public research organisations having their residence or principal place of business within any of the 27 EU Member States will get a compensation of all translation costs up to a ceiling if the application was filed in one of the official languages of the European Union that is not an official language of the EPO (for more information see below questions on the unitary patent).

Moreover, for a transitional period of maximum 12 years, European patents with unitary effect that were granted in French or German will need to be translated into English and the ones granted in English will need to be translated into another official language of the EU. These translations will be required until high-quality machine translations into all the official languages of the Union are made available to ensure the availability of patent information.

What is the London Agreement?

The London Agreement, the Agreement on the application of Article 65 European Patent Convention (EPC), is an intergovernmental and optional agreement aimed at reducing the translation costs of European patents granted under the framework of the European Patent Convention (EPC). It entered into force on 1 May 2008.

There are two situations for Member States having signed up to the London Agreement: for countries which use one of the EPO languages as their own official language have completely dispensed with translation requirements. Once the EPO publishes the patent, no further validation or translation is necessary. For other countries, they either designate one of the EPO languages or require that the whole patent is translated to that language or they only use the option to require the translation of the claims to their own official language(s).

However, the London Agreement does not apply in 16 EU Member States. These countries continue to require a translation of the entire patent into their official language(s). Although the London Agreement has reduced costs, it does not always or fully address the issue of validation requirements.

The European law says in Europe cannot be patented computer programs. Is that true?

Article 52-2c EPC explicitly excludes computer programs from the possibility of being patented at the same time that a council directive states that these can be protected through copyright.

However, only the programs as such are excluded from patentability. When they are incorporated in a machine or process that meets the requirements of patentability, the resulting system can be protected by a patent.

Is it possible to patent a DNA sequence in Europe?

In Europe, the patent is allowed provided that the three classical criteria of novelty, inventiveness and applicability. Although the EPC does not provide for exclusion of patents on biological material, there were problems when the patenting of genes and DNA sequences. But the argument of opponents to the patenting of DNA on the basis that it is mere discoveries has not been successful, as it has imposed the doctrine of that DNA and other biological material in its isolated form can be patented, since isolation may involve an inventive step and meet other requirements.

Where can I apply for the European patent?

In general, the European patent application may be submitted, in the European Patent Office in Munich, in his Department in The Hague, or Berlin. Also at the National Patent offices of countries which belong to the European Patent Convention.

Can I get a European patent in a non-European country (UE member) with the European patent procedure?

Yes, if it is a member of the European Patent Convention. At present the number of member countries stands at 38. However, it is not necessary to request protection for each and every one of the Member States. Protection can be obtained for only some of them, which will provide for reduced fees.

A European patent is the same as a Community patent?

No, The European Patent Convention does not create a uniform law for protection, but leads to protection in many member countries of the Convention as the applicant wishes. Also, do not provide for the existence of a competent court at the European level to settle patent litigation, which presents the risk those courts in the Member States to dictate different resolutions. The Munich Agreement (for Community patent) provides benefits, including a centralized procedure for the issue based on a uniform law, which takes place in a single language of procedure, a reduction of security costs if it is to get the patent for several Member States and a high-protection law.

In order to access to more detailed information on practical issues and FAQs on patents under the European Patent Convention we recommended to visit the website of the European Patent Office (EPO) (<http://www.epo.org>), where comprehensive information is provided. In particular there is a very useful section on FAQs on patents

What is a 'unitary patent'?

In 2012 the Council and the European Parliament approved a legislative package aimed to unify the European patent systems. The package consisted in 2 Regulations and one International Agreement, to establish a legal framework for a unitary patent protection in the EU.

The unitary patent will be a third option for companies or inventors seeking patent protection in Europe. It will be a further tool in the inventor's toolbox in addition to national patents and 'classical' European patents (i.e. without unitary effect). For more details on the latter see point 6.

A unitary patent is a European patent with unitary effect. The procedure up to the grant of the patent will be the same as for ('classical') European patents without unitary effect. After grant, European patents will fall into one of the two categories.

A 'classical' European patent needs to be validated in each State for which it has been granted. It has the same effect as a national patent granted in the respective territory and its fate in these States may be different, depending e.g. on any court proceedings which take place in these States. The 'classical' patent is therefore often compared with a bundle of national patents which is centrally granted.

In contrast, the unitary patent will ensure uniform protection for an invention in 25 Member States (all Member States except Italy and Spain) on a one-stop shop basis.

What is the “unitary patent package”?

The “unitary patent package” consists of three elements:

- a Regulation creating a European patent with unitary effect (or “unitary patent”);
- a Regulation establishing a language regime applicable to the unitary patent;
- an international agreement among Member States setting up a single and specialised patent jurisdiction (the “Unified Patent Court”).

The two Regulations implement enhanced cooperation in the area of the creation of unitary patent protection. 25 Member States participate in this enhanced cooperation. All these Member States and

Italy which signalled in December 2011 its intention to join will conclude the international agreement on the Unified Patent Court.

Why does Europe need unitary patent protection?

Unitary patent protection would make it possible for inventors (individuals, companies or institutions) to protect their invention in 25 Member States by submitting a single application. After the patent is granted, there would be no need to validate it one by one in each country.

Unitary patent protection would make the existing European system much simpler, much less burdensome and expensive for inventors. It would end the complex validation requirements, and in particular limit the very expensive translation requirements in the participating Member States. Consequently, it would stimulate research, development and investment in innovation helping to boost growth in the EU.

Unitary patent protection would also protect inventions better than the current system. Due to the prohibitive costs involved in the national validation of European patents, today many inventors only patent their inventions in a handful of countries. This makes inventions less valuable as the lack of protection in other countries allows them to be copied more easily.

What are the advantages of the unitary patent package?

The unitary patent package will have four major advantages:

- It will create a unitary patent with uniform protection within the territory of the participating 25 Member States;
- The unitary patent will be available on a one-stop shop basis at affordable costs, as it will be centrally granted by the European Patent Office and no further validation requirements need to be fulfilled and applications can be filed in any language;
- It will create a unified and specialised jurisdiction in patent matters for the participating Member States, and thus avoid an unnecessary duplication of litigation cases before the various courts of the various Member States concerned, and enhance legal certainty; and
- It will ensure the dissemination of patent information in all languages of the European Union through high-quality machine translation services which will be available online and free of charge.

The single unitary patent option will offer those who wish to protect their invention in Europe huge cost advantages and reduce the administrative burden.

The single jurisdiction for patent matters will have the major advantage compared to today's situation that, in the future, legal certainty will be enhanced. The risk of multiple parallel court proceedings leading possibly to divergent outcomes will disappear.

What is the difference between the European patent and the unitary patent?

The EPC provides a single procedure for granting European patents. On the basis of one single patent application processed in one of the three official languages of the EPO (English, French and German), inventors and businesses can obtain a European patent. When the EPO grants a European patent, the

full text of the patent, known as the specification, is published in the official language of the EPO chosen by the applicant as the language of the proceedings. At the grant stage, the applicant must also provide a translation of the part of the patent that defines the scope of protection - the claims – into the other two official EPO languages.

However, the grant of the European patent is not enough for it to take effect in most Contracting States to the EPC. The patent proprietor must choose the countries in which he/she wishes to have protection and validate the European patent in these states within a short time limit after grant. A number of different validation requirements may apply. For example, the patent proprietor may have to pay a fee to the national patent office, comply with various formal requirements and provide a translation of the patent to the official language of the State. In order to obtain unitary effect, patent holders need to request the unitary effect at the European Patent Office (EPO) no later than one month after the grant of their European patent has become effective. The unitary effect which is entered by the EPO into its Register transforms the European patent into one single patent for the 25 Member States. Anybody, regardless of the country of origin, can opt for a unitary patent. The unitary patent will be centrally administered by the EPO throughout its whole life, i.e. until the end of the patent term (20 years from the filing date of the patent application at the latest). For the two Member States which, up until now, do not participate in this project, inventors will of course be able to obtain patent protection via their 'classical' European patents. The European patent will need to be separately validated in these two countries. As the unitary patent is a further option, it is at the moment not clear how frequently the new alternative will be used.

How can an applicant apply for a 'unitary patent'?

Applicants will have to file an application for a European patent with the EPO the same way as they do today. The new element is that, no later than one month from the date on which the grant of the European patent has become effective, the patentee can request the EPO to register the unitary effect in the European Patent Register. In the case of such a request made after the grant, the patent will take effect retroactively (from the mention of the grant) in the 25 participating Member States without any additional validation requirement. It will provide equal protection through the territories of these countries. The patent owner will have the choice of whether or not to request unitary effect for their European patents.

Inventors may therefore choose between unitary patents, the 'classical' European patents (to be validated in the Member States) or national patents (to be filed in all the Member States). The new reform package just provides an additional tool in the toolbox.

Will the European patent with unitary effect be valid in all Member States?

No. The European patent with unitary effect will be based on two regulations which will be adopted in the framework of enhanced cooperation of 25 Member States (all Member States but Italy and Spain). This was necessary because an agreement between all 27 Member States could not be found. Eventually, 25 Member States have decided to proceed with enhanced cooperation in order to create a system of unitary patent protection in Europe. Member States not participating now can join later.

Enhanced cooperation is a possibility ensured by the Treaties that can only be adopted by the Council as a last resort, when it has established that the objectives of such cooperation cannot be attained within a reasonable period by the Union as a whole, and that at least nine Member States participate in it.

How much will it cost to obtain a 'unitary patent' and how much does a similar protection cost today?

After the transitional period (in which certain additional translations will be required), the cost to obtain a European Patent with unitary effect will be around 5 000 euro. This covers the procedural fees of the EPO as well as the cost of the translation of the claims to the two other procedural languages of the EPO.

During the transitional period of maximum 12 years, the cost will be slightly higher, about 6 500 euro. This includes the cost of the additional translation required during the transitional period: in order to facilitate the access to patent information until high-quality machine translations become available, European patents with unitary effect that were granted in French or German will need to be translated to English and the ones granted in English will need to be translated to another official language of the EU.

Obtaining patent protection in the territory of the 27 Member States by means of a European patent costs today about 36 000 euro (the majority of which goes on translation and other costs linked to validation, such as fees of local patent offices and costs for local patent agents).

By comparison, in the US, a patent costs about 2 000 euros, in China about 600 euros.

What will be the role of the Unified Patent Court?

The Unified Patent Court (UPC) will be the future centralised patent jurisdiction of the participating Member States. It will be a court common to the participating Member States and thus subject to the same obligations under Union law as any national court of the participating Member States, in particular refer, where necessary, questions on the interpretation of European Union law to the Court of Justice of the European Union.

The UPC will have exclusive jurisdiction especially in respect of civil litigation related to infringement and validity for both the "classical" European patents and the European patents with unitary effect. It will also have competence in respect of supplementary protection certificates issued for a product protected by a European patent with or without unitary effect.¹

During a transitional period of 7 years, actions concerning "classical" European patents without unitary effect can still be brought before the national court if those patents have been opted-out before an action has been brought before the UPC. This period may be prolonged up to a further 7 years by the Administrative Committee (decision making body within the court system composed of one representative per Contracting Member State). In addition, persons who have filed applications for European patents within this transitional period can decide to opt out of the jurisdiction of the Unified Patent Court.

Where can I find more information on the Unitary Patent?

More information on the unitary patent can be found at:

- http://ec.europa.eu/internal_market/indprop/patent/index_en.htm
- <http://www.epo.org/>
- http://europa.eu/rapid/press-release_MEMO-12-970_en.htm
- http://europa.eu/rapid/press-release_MEMO-11-240_en.htm

PRACTICAL QUESTIONS AND RECOMMENDATIONS ON UTILITY MODELS AND TRADE SECRETS

As stated above utility models protect technical innovations which might not fulfil the requirements of a patent. Utility models can be protected in some countries. Below we provide some FAQs and recommendation related to utility models collected from IPR Helpdesk¹¹⁴.

Is a patent the only way to protect an invention?

No. Inventions can also be protected by trade secrets if you keep them in secrecy. In some EU Member States, you may also file an application for utility models.

Can I have a patent and a utility model for the same invention?

This possibility exists in some countries. For example, in Germany it is possible to obtain and keep both a patent and a utility model for the same invention. If a utility model is branched off from a patent application, the patent application can continue to be pursued to the grant stage as well. However, in other countries, such as Japan and China, only a single right for the same invention is allowed to remain in force.

Can I convert a European Patent into a national utility model?

Yes, when a European patent is revoked, or when a European patent application is rejected or withdrawn.

Can I convert a patent application to a utility model?

If a patent application is refused, many countries allow the conversion of a patent application into a utility model application. However, in some countries there is a time limit for doing so.

What are the advantages of the utility model?

One of the main advantages is that filing a utility model is much cheaper than obtaining and maintaining a patent. The lower costs associated with utility models mean that they could be particularly useful for SMEs. Another advantage is that the utility model is normally granted faster than a patent. The utility model will be easily granted since there is usually no substantive examination (e.g. on novelty.) The inventive step requirements are lower than for patents.

Is it possible to file a European or international utility model application?

There is no European or international utility model protection. The rules for utility model registrations vary from country to country. Consequently, the requirements for utility model protection will vary depending on the particular national regulations.

What can be protected by a utility model?

Utility models can be registered in some countries to protect technical innovations which might not qualify for a patent. The requirements of protection vary from country to country. However, most

¹¹⁴ © European Union (2011 - 2014), Source: <http://www.iprhelpdesk.eu> (documents and information provided free of charge by the European IPR Helpdesk).

countries will only grant utility models for products, not for methods or processes. Because the novelty and inventive step requirements are less stringent than those required for patents, utility models can be useful for incremental inventions where only a small change has been made and which might not meet the inventive step requirements for a patent. Utility models are a more flexible and less costly way of protection of technical inventions than patents. The degree of inventive step is required but in a lower grade than for a patent and the maximum duration of protection is shorter.

PRACTICAL QUESTIONS AND RECOMMENDATIONS ON TRADE SECRETS

Trade secrets are also a way of protecting IPR. Below we give some questions and recommendations on trade secrets collected from IPR Helpdesk¹¹⁵

What is a trade secret?

A trade secret refers to information which meets the following requirements:

- it is secret, meaning that it is not, as a body or in the precise configuration and assembly of its components, generally known among or readily accessible to persons within the circles that normally deal with the kind of information in question;
- it has commercial value because it is secret; and
- it has been subject to reasonable steps under the circumstances, by the person in control of the information, to keep it secret.

The type of information that can be considered as a trade secret is therefore highly diversified, including know-how, technological knowledge, business and commercial data such as lists of customers, business plans, recipes or manufacturing processes. Even though most business information could potentially be regarded as a trade secret, in practice most of it does not need to be treated as such since it has no commercial value. It is therefore important that companies are aware of the information that they consider secret, allowing their effective protection and management.

How can trade secrets be protected?

Trade secrets are not protected by a specific intellectual property right. Therefore trade secrets do not confer “proprietary rights”, meaning that the holder of a trade secret does not have exclusive rights over the information. Thus, to protect trade secrets, organisations are advised to take measures and implement a range of best practices to make sure that the trade secret is kept confidential.

These measures and best practices include:

- assessing the company’s valuable confidential information;
- developing an internal trade secret policy;
- storing confidential information safely;
- creating employee awareness of the importance of keeping trade secrets safe;

¹¹⁵ © European Union (2011 - 2014), Source: <http://www.iprhelpdesk.eu> (documents and information provided free of charge by the European IPR Helpdesk).

- concluding non-disclosure agreements in the case where trade secrets must be discussed with business partners;
- including non-disclosure clauses within agreements such as licence agreements, consortium agreements or partnership agreements, where the exchange of confidential information is very likely and/or necessary.

These measures are highly important since once the information is leaked, others can use it freely since no proprietary right to the trade secret exists.

However, if the information was leaked by someone under the obligation to keep confidentiality, such a disclosure would constitute a breach of contract allowing remedies for the trade secret holder. Moreover, if a person obtains the trade secret by dishonest means (such as in the case of espionage), all countries in the European Union offer some form protection under unfair competition law.

What are non-disclosure agreements?

Non-disclosure agreements, also called confidentiality agreements, are legally binding contracts establishing the conditions under which one party (the disclosing party) discloses information in confidence to another party (the receiving party).

Depending on the number of parties disclosing information, non-disclosure agreements may be “one-way” (also known as unilateral) with one party disclosing information and one party receiving information, or “two-way” (also known as bilateral or mutual) when there is a bilateral disclosure. Whenever the two parties wish to disclose information instead of relying on a “two-way” agreement, it is also possible to sign two unilateral non-disclosure agreements, which may sometimes facilitate negotiations on the drafting of such an agreement. Sometimes you may also see multilateral agreements, with more than two parties involved.

What are the advantages and disadvantages of holding a trade secret?

	Patent	Utility Model	Trade Secrets
Advantage	<ul style="list-style-type: none"> • exclusive right • effective tool against imitators • protection up to 20 years, which is generally considerably longer when compared to utility models 	<ul style="list-style-type: none"> • exclusive right • effective tool against imitators • lower registration costs when compared to patents 	<ul style="list-style-type: none"> • no registration costs • protection not limited in time • no disclosure required
Disadvantage	<ul style="list-style-type: none"> • costs for registration can be high • the invention must be disclosed in the application 	<ul style="list-style-type: none"> • not available in all countries • costs for registration • shorter protection than patents • not available for all kinds of inventions 	<ul style="list-style-type: none"> • often not an effective tool for product inventions • limited remedies available • not easily enforceable • can be patented by others

© European Union (2011 - 2014), Source: <http://www.iprhelpdesk.eu> (documents and information provided free of charge by the European IPR Helpdesk).

In addition to the pros and cons given in the above table there are other addition issues that should be taken into account before deciding which of both (patents or secrets) suits better to our needs¹¹⁶. We are not considering utility models, since they only can be registered in some countries.

Patenting an invention implies to disclosure information on the invention through the process of filing the patent, this means that competitors could take advantage from the disclosure of this information. Nevertheless, until a patent is issued, the patent office retains the information of a patent, since there is a possibility that it will not be granted. If this happens we can always resort to trade secrets.

Trade secrets do not make much sense if the ultimate goal is marketing, and innovation that although hidden from the eyes of competitors, when it is placed on the market the product or process, ceases to be secret, and is available to anyone, including those able to unravel how to repeat their achievement.

It is also advisable to take into account the probability that the invention is developed independently by a competitor as well as the probably that other companies may copy the invention that is being kept under secret (e.g. through reverse engineering). Though as indicated above, many products of new technologies, including bio-based, are easily reproduced by any moderately equipped laboratory, making it almost impossible to keep secret...

Another important aspect that should be considered is the capacity of our company to protect a trade secret, since keeping a secret well protected is sometimes very difficult, especially for SMEs.

Other additional considerations related to the cost for registering a patent, which not only involved registering but also the payment of annual renewals fees. Particularly this could be an important aspect for some small SMEs with funding difficulties.

In order to protect trade secrets the following recommendations could be considered:

- Restrict the access of staff to all information on the trade secret and its use
- Conduct confidentiality agreements with the staff that have access to that information.
- Establish protocols to avoid unintended disclosure of information (e.g. the communications tools used by company, website, newsletters, press communications, etc.).
- Sign confidentiality agreements with suppliers, customers and subcontractors who have access to information.

4.3 RECOMMENDATIONS ON IPR IN THE MARITIME SECTOR: THE SHIPBUILDING SECTOR

IPR is a cross-cutting and generic issue and specific recommendations for the management of IPR in specific maritime sectors are very scarce. Here we use the shipbuilding sector as an example of maritime sector where some specific recommendations have been provided by expert groups.

The “LeaderSHIP 2015 initiative” was launched in 2003 with the aim of giving a coordinated response to the challenges faced by the European shipbuilding sector. The main focus was on knowledge

¹¹⁶ The considerations given below have been drafted taking into account the recommendations of MARTEC on IPR (www.martec-era.net)

based activities and the need for better return on the substantial investments made by yards in research, development and innovation¹¹⁷.

The Communication “LeaderSHIP 2015 Defining the Future of the European Shipbuilding and Repair Industry –Competitiveness through Excellence (COM(2003) 717 final)” addresses the key issues that were highlighted by the LeaderSHIP 2015 Advisory Group in its recommendations. It also identifies policy actions, among them on IPR protection. In the Communication the European Commission supported the recommendations made by the Advisory Group and called upon industry to exploit existing IPR rules and developed data bases¹¹⁸.

The recommendations made by the Leadership 2015 High Level Advisory Group on the protection and management of IPR in the shipbuilding sector were the following¹¹⁹

- *The existing instruments for IPR protection (copyrights, registered designs, trademarks, patents, non-disclosure and specific collaboration agreements) need to be exploited to the full.*
- *Knowledge data bases for shipbuilding, containing information about the state of the art, existing patents, the specific competitive situation for certain products and solutions, and key knowledge holders, should be built and run by dedicated PR entities.*
- *International patent rules applicable to shipbuilding need to be examined and possibly strengthened.*

According to the analysis of the report of the LeaderSHIP Advisory Group, in addition to copyrights, designs, trademarks and patents, the industries in the shipbuilding sector could take additional measures such as non-disclosure agreements and specific collaboration agreements. However, it highlighted that the “one-off” features often found in shipbuilding projects can make such agreements costly and appear less rewarding. It was also stressed that to exploit these existing instruments to the full, yards and suppliers need to become more aware of the threats to their know how and the resulting competitive disadvantages. The Communication stressed that the creation of databases could become a central activity for European shipyards to reach this objective. Moreover, such database could provide access to ship builders and suppliers with information on the internationally available knowledge (documented and non-documented) on specific vessel components, the requirements of an IPR protection of specific technical solutions, the existing patents in the relevant technical fields, the technological position of competitors, and the potential exposure of yards and suppliers to product piracy and other threats. The Communication also highlighted patents are still an essential instrument which European shipbuilders need to exploit to the largest possible extent, including in the countries of their main competitors.. The report stressed that ship owners should be prevented from operating ships carrying devices on board built in violation of existing patents. A re-examination of the current framework which does not allow national authorities to take measures against a ship, carrying a device built in violation of a patent, calling at a port where such patent is registered and protected, could give yards the right tool to

¹¹⁷ Source: European Commission, http://ec.europa.eu/enterprise/sectors/maritime/shipbuilding/leadership2015/index_en.htm, © European Union, 1995-2014

¹¹⁸ Ref: European Commission, LeaderSHIP 2015. Defining the Future of the European Shipbuilding and Repair Industry –Competitiveness through Excellence COM(2003) 717 final

¹¹⁹ Source: (© European Union, <http://eur-lex.europa.eu/>, 1998-2014'), LeaderSHIP 2015. Defining the Future of the European Shipbuilding and Repair Industry –Competitiveness through Excellence COM(2003) 717 final

protect their inventions and innovations, boosting the investments in research and development and stimulating yards' interest in acquiring patents¹²⁰.

In order to provide a new impetus and identify new business opportunities for the shipbuilding sector particularly on innovation, greening, use of new technologies and diversification into new emerging markets, such as off-shore wind energy, in February 2013 a new the LeaderSHIP initiative (LeaderSHIP 2020) was launched¹²¹.

A report was published by European Commission, which provides a strategic vision for the shipbuilding industry and recommendations to be implemented in the short and medium term in order to achieve the objectives of the vision, and support and safeguard knowledge and developments and the creation of sustainable growth and high-value jobs for the maritime technologies¹²².

These recommendations focus on 4 key areas, one of them is "Improving market access and fair market conditions" which includes recommendations on IPR focussed on measures to make patents cheaper and easier to use; maximise the use of all IPR; the need of a pan-European systems to fight against counterfeit and infringement cases and strengthen the cooperation between industry and EC on IPR.¹²³

The LeaderSHIP 2020 report is available at: <http://ec.europa.eu/enterprise/sectors/maritime/>

5. PUBLIC-PRIVATE PARTNERSHIPS (PPP)

5.1 INTRODUCTION

Public-private partnerships are instruments for conducting activities in cooperation between the public sector and industry /businesses, with the aim of optimizing cost and increase the benefits and impacts of public and private investments on the society.

Public-private partnerships (PPPs) can contribute significantly to achieve the objectives the Europe 2020 strategy for growth and jobs The aim of these partnerships is to leverage private investments and pool them with public resources and spread the cost of financing, thus reducing the cost of investments for the public sector for the development of projects which have an interest for the industry and the society. PPPs can become an important instrument to promote the investments in RTD and innovation in Europe, particularly in the current economic situation, and avoid to increase the pressures on the budget of Member States to fund activities that are fundamental to increase the industrial competitiveness in Europe and to support the objectives of the EU 2020 Strategy¹²⁴.

¹²⁰ Source: ('© European Union, <http://eur-lex.europa.eu/>, 1998-2014'), LeaderSHIP 2015. Defining the Future of the European Shipbuilding and Repair Industry –Competitiveness through Excellence COM(2003) 717 final.

¹²¹ Source: European Commission, http://ec.europa.eu/enterprise/sectors/maritime/shipbuilding/leadership2015/index_en.htm, © European Union, 1995-2014

¹²² Source: European Commission, http://ec.europa.eu/enterprise/sectors/maritime/shipbuilding/leadership2015/index_en.htm, © European Union, 1995-2014

¹²³ Ref : http://ec.europa.eu/enterprise/sectors/maritime/files/shipbuilding/leadership2020-final-report_en.pdf

¹²⁴ Source: © European Union, 1995-2014, http://europa.eu/rapid/press-release_MEMO-09-509_en.htm,

PPPs has been defined in the following way:

“ 'public-private partnership' means a partnership where private sector partners, the Union and, where appropriate, other partners, such as public sector bodies, commit to jointly support the development and implementation of a research and innovation programme or activities;”¹²⁵;

PPPs are therefore intended to increase the investment in a particular field by leveraging the investments of industry in that field and creating synergies with public funding targeting the same field and objective. This allows to reduce the cost of the projects (e.g. research, infrastructures, etc.) and alleviate the pressure on public bodies to fund some initiatives that otherwise could not be undertaken (e.g. due to the lack of critical mass) or that would have been very costly for the public sector. These are some of the major advantages of PPPs. Though there are many other no less important benefits. For instance they are a suitable instrument to foster the integration and cooperation between science and industry, to concentrate efforts, exchange of knowledge, technologies and best practices. This enhanced cooperation is essential to tackle important technical and knowledge barriers that hamper the growth of the maritime economy¹²⁶.

Due to the potential benefits of PPPs, both for the public and the private sector, the number of PPPs has notably increased over the last years to address specific issues in many different areas. However it would be necessary to distinguish between PPPs for public procurement and PPP for research. Though the overall goal of PPPs has the same basis, i.e. enhanced the cooperation between public and private sector to reduce costs and increase the efficiency of funding, and the impact of the investments on the society; however the aims and scope of both types of PPP is different.

The term “public-private partnership” is not defined in the EU legislation on public contracts. In general, it refers to forms of co-operation between public authorities and the private sector which aim at ensuring the funding, construction, renovation, management and maintenance of infrastructure associated with the provision of a service¹²⁷.

The PPP modality most common in Europe is concession. According to studies, concessions account for over 60% of all PPP contracts in Europe. Concessions are public private partnerships which are establish between the public sector and mostly private companies, where the private partners exclusively operate, maintain and carry out the development of infrastructure. This may include infrastructures such as ports, water distribution, parking garages, toll roads, among others. They can also be set up to provide, services of general economic interest such as energy, water distribution and waste disposal for example¹²⁸.

The term “purely contractual PPP” means that the PPP is only based on contractual facts between the parties involved, where the private partner is designated to conduct one or more tasks of a project. In the “concessive model” the private partner provides a service to the public, “in place of”,

¹²⁵ Source: (“© Unión Europea, <http://eur-lex.europa.eu/>, 1998–2014”) REGULATION (EU) No 1291/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC

¹²⁶ Source: © European Union, 1995-2014, http://europa.eu/rapid/press-release_MEMO-09-509_en.htm

¹²⁷ Source: (“© Unión Europea, <http://eur-lex.europa.eu/>, 1998–2014”) GREEN PAPER ON PUBLIC-PRIVATE PARTNERSHIPS AND COMMUNITY LAW ON PUBLIC CONTRACTS AND CONCESSIONS COM(2004) 327 final

¹²⁸ Source: © European Union, 1995-2014, http://europa.eu/rapid/press-release_MEMO-14-19_en.htm,

under the control of the public partner. Another feature of “concessive models” is the method of remuneration for the joint contractor, which consists of charges levied on the users of the service, if necessary supplemented by subsidies from the public authorities. In other contractual PPP models (e.g. Private Finance Initiative or PFI), the remuneration for the private partner does not take the form of charges paid by the users of the works or of the service, but of regular payments by the public partner. These payments may be fixed, but may also be calculated in a variable manner¹²⁹.

On the other hand, public procurement is a key part of the Europe 2020 strategy for smart, sustainable and inclusive growth which set up that public procurement policy must ensure the most efficient use of public funds and that procurement markets must be kept open Union-wide.¹³⁰ In March 2014, the EU adopted the new rules on public procurement and concessions through a legislative package that includes¹³¹:

- The revision of Directive 2014/24/EU replacing directive 2004/18/EC
- The revision of Directive 2014/25/EU replacing directive 2004/17/EC
- A new directive 2014/23/EU on concession contracts

The policies and regulations on PPPs for public procurement are broad and it is not within the aim of this report to address PPPs for public. Detailed information on policies and regulations public procurements and contracts can be found at the following websites of the European Commission:

- http://ec.europa.eu/internal_market/publicprocurement/index_en.htm

5.2 JOINT TECHNOLOGY INITIATIVES

JTIS IN FP7¹³²

The first public-private partnerships in research were launched under the framework of FP7 under the form of Joint Technology Initiatives (JTIs). The aim was to establish PPP between the EU and the industry to address research and technology development in certain technology areas considered key through the joint funding and implementation of JTIs in specific technology areas under FP7. The first JTIs were implemented through Article 171 of the EC Treaty (now Article 187 of the Treaty on the Functioning of the European Union (TFEU)) by dedicated legal entities called Joint Undertakings.

Under the framework of FP7 5 JTIs were established (based on the specific selection criteria set up by FP7) to address research, technology and innovation in partnership with the industry in the following key areas for competitiveness:

- Innovative Medicines Initiative (IMI)

¹²⁹ Source: ("© European Union, <http://eur-lex.europa.eu/>, 1998–2014") GREEN PAPER ON PUBLIC-PRIVATE PARTNERSHIPS AND COMMUNITY LAW ON PUBLIC CONTRACTS AND CONCESSIONS COM(2004) 327 final

¹³⁰ Source: © European Union, 1995–2014, http://europa.eu/rapid/press-release_MEMO-14-20_en.htm,

¹³¹ Source: European Commission, http://ec.europa.eu/internal_market/publicprocurement/modernising_rules/reform_proposals/index_en.htm, © European Union, 1995–2014,

¹³² Source: ("© European Union, <http://eur-lex.europa.eu/>, 1998–2014"), Public-private partnerships in Horizon 2020: a powerful tool to deliver on innovation and growth in Europe, (COM(2013) 494 final)

- Aeronautics and Air Transport (Clean Sky)
- Hydrogen and Fuel Cells Initiative (FCH)
- Embedded Computing Systems (ARTEMIS)
- Nano electronics Technologies 2020 (ENIAC)

The launching of JTIs was considered well justified on the basis of identified market failures, the long term nature of the required activities and the scale of the commitment needed to achieve the necessary breakthroughs. All of these were subjected to regular monitoring, review and evaluation.

The JTIs launched in FP7 have achieved their objective by promoting a high level of industrial participation in the RTD and innovation activities conducted by the JTIs, including SMEs who represent about 28% of the participants.

However, the reports and interim evaluations conducted after the launching of JTIs indicated some weaknesses. In particular it was highlighted the need for stronger commitments from industry, in particular for better define the commitments and enhance the leverage effect. It is also necessary to better define and clarify how JTIs are established, better define the objectives, which should be clearer, and set up measurements to ensure greater openness towards new participants.

In addition a number of recommendations aiming at simplifying and streamlining the running of JTIs were made in the final report assessment on JTIs, the report of the JTI Sherpa Group. Among them the establishment of a specific financial framework that suit to the needs of JTIs. Moreover, a number of concerns related to the used of different rules and procedures for each JTI have been raised by stakeholders.

JTIS IN H2020

All the above mention weaknesses and concerns on JTIs have been addressed in the JTIs launched under Horizon 2020, building on the experience of JTIs launched under FP7.

Under the framework of H2020 five Joint Technology Initiatives (JTIs) that have been adopted by Council Regulations ¹³³:

- Innovative Medicines 2 (IMI2)
- Fuel Cells and Hydrogen 2 (FCH2)
- Clean Sky 2 (CS2)
- Bio-based Industries (BBI)
- Electronic Components and Systems (ECSEL).

Four of these five JTIs launched under H2020 represent the next stage for JTIs established under FP7 (ECSEL JTI merges ARTEMIS and ENIAC JTIs), while BBI JTI has been identified as a new initiative following the European bioeconomy strategy¹³⁴.

At difference from contractual PPPs, JTIs are implemented and evaluated through calls based on industry rules¹³⁵. Despite the success of JTIs launched in FP7, the experience demonstrates that Joint

¹³³ Source: European Commission, <http://ec.europa.eu/programmes/horizon2020/en/official-documents>, © European Union, 1995-2014,

¹³⁴ Source: European Commission. Final assessment of the research PPPs in the European Economic Recovery Plan Factories of the Future, Energy-efficient Buildings, European Green Cars initiative, , © European Union, 2013

Undertakings demand much time and effort and therefore the establishment of JTIs should only be pursued to tackle research and innovation objectives of strategic importance that cannot be achieved through other instruments, including the implementation through normal Horizon 2020 calls.¹³⁶

The establishment of JTIs (and contractual PPPs) in H2020 is regulated by Art .25 of the Regulation (EU) No 1291/2013 PARLIAMENT AND OF THE COUNCIL of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC. In relation to JTIs Art. 25 established, among other provisions, that *this form of partnerships shall only be implemented where the scope of the objectives pursued and the scale of the resources required justify it taking full account of the relevant impact assessments, and where other forms of partnerships would not fulfil the objectives or would not generate the necessary leverage.*

5.3 RESEARCH AND CONTRACTUAL PPPS

RESEARCH PPPS IN FP7

The aim of research PPPs is to support research, development and innovation in specific sectors of strategic interest for the industry. The first research PPPs calls were launched in 2009 under the framework of FP7, as part of the Economic Recovery Plan, in order to support research and innovation in strategically important industries and thus avoid negative impacts of the economic crisis on the RTD activities within these key sectors. Three key industrial sectors were identified to be supported through research PPPs and three major PPPs were launched: the European Green Cars Initiative, Energy-efficient Buildings, and Factories of the Future.¹³⁷

The priorities for research PPPs launched in 2009 were identified and defined by industry while the implementation and management of the projects was conducted through calls launched by EC through FP7 calls. One of the advantages of research PPPs is that they do not require special rules for the management of projects, as these were implemented following the FP7 rules¹³⁸

The three PPPs were set up with a fairly informal structure that allowed the initiatives to get underway quickly. Ad hoc industrial advisory groups (AIAGs) were created, one for each PPP, to facilitate the strategic dialogue between the Commission and industry. The AIAGs were established through specific agreements between the industry and the European Commission. The different groups consisted of a broad representation of stakeholders including members industrial research associations and experts representing other key stakeholders. These groups were appointed by the Commission and industry, and had a balanced composition of members coming from public RTD institutions, academia and from the industry all with a high RTD expertise in the field of the PPP. One of the tasks of the AIAGs was the development of road maps for in consultation with all stakeholders, relevant ETPs and the European Commission. The roadmaps were implemented through FP7 calls.

¹³⁵ Source: European Commission. Final assessment of the research PPPs in the European Economic Recovery Plan Factories of the Future, Energy-efficient Buildings, European Green Cars initiative, © European Union, 2013

¹³⁶ Source: ('© European Union, <http://eur-lex.europa.eu/>, 1998-2014'), Public-private partnerships in Horizon 2020: a powerful tool to deliver on innovation and growth in Europe, (COM(2013) 494 final)

¹³⁷ Source: European Commission. Final assessment of the research PPPs in the European Economic Recovery Plan Factories of the Future, Energy-efficient Buildings, European Green Cars initiative, © European Union, 2013

¹³⁸ Source: ('© European Union, <http://eur-lex.europa.eu/>, 1998-2014'), Public-private partnerships in Horizon 2020: a powerful tool to deliver on innovation and growth in Europe, (COM(2013) 494 final)

The final assessment of the 3 PPP was conducted by an independent expert group appointed by the Commission. In its report the expert group concluded that there evidences that the activities of the PPPs resulted in more close-to-market relevant projects and activities than is usually achieved within standard FP7 cooperative projects. They also found that the efficiency of the calls was significantly improved, particularly with respect to success rates and shorter time to grant in comparison to usual FP7 calls. Nevertheless, the actions conducted by the PPPs, however, were considered by the expert group insufficient to address adequately the ‘valley of death’. The expert group provided 5 recommendations to be undertaken under the framework of H2020 and a set of actions to implement the recommendations¹³⁹. Building on the experience of the research PPPs, according to the expert group, the contractual PPPs would ideally¹⁴⁰:

- *provide a leading role for industry in defining research priorities;*
- *have the private side advising on implementation;*
- *have multiannual roadmaps to allow the development of long-term investment plans;*
- *have a pre-defined budget to ensure continuity;*
- *place more emphasis on the relevance of industry and on achieving industrial impact;*
- *focus on enabling industrial technologies;*
- *have increased use of SME-friendly instruments and demonstrations;*
- *have a high share of industrial experts in the evaluations;*
- *implement single-stage evaluations to reduce TtG;*
- *execute coordinated and joint calls between themes;*
- *maintain openness to all, according to normal H2020 rules;*

CONTRACTUAL PPPS IN H2020

Research and innovation are critical to support the objectives of the EU 2020 Strategy and to create sustainable economic growth and jobs and to reinforce Europe's international competitiveness. They can also help to address major societal challenges. However, progress is slow towards the Europe 2020 objective of investing 3% of GDP in R&D, with particular weaknesses in private investments. Public-Private partnerships PPPs are key tools in H2020 to deliver on innovation and growth in Europe and to leverage private investments in research and innovation. The partnerships will deliver major benefits to society, such as lower carbon emissions, alternatives to fossil fuels, and new treatments to combat poverty related diseases and the growing threat of antimicrobial resistance¹⁴¹.

According to the REGULATION (EU) No 1291/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC, *a greater impact should also be achieved by combining Horizon 2020 and private sector funds within public-private partnerships in key areas where research and innovation could contribute to Europe's wider competitiveness goals, leverage private investment and help tackle societal challenges. Those partnerships should be based on a long-term commitment, including a balanced contribution from all partners, be accountable for the achievement of their targets and be aligned with the Union's strategic goals relating to research,*

¹³⁹ Source: European Commission. Final assessment of the research PPPs in the European Economic Recovery Plan Factories of the Future, Energy-efficient Buildings, European Green Cars initiative, © European Union, 2013

¹⁴⁰ Source: European Commission. Final assessment of the research PPPs in the European Economic Recovery Plan. Factories of the Future, Energy-efficient Buildings, European Green Cars initiative, © European Union, 2013

¹⁴¹ Source: European Commission. Final assessment of the research PPPs in the European Economic Recovery Plan Factories of the Future, Energy-efficient Buildings, European Green Cars initiative, © European Union, 2013

*development and innovation. The governance and functioning of those partnerships should be open, transparent, effective and efficient and give the opportunity to a wide range of stakeholders active in their specific areas to participate*¹⁴²

The key features of the research PPPs launched in FP7 were seen as beneficial in the final assessment of research PPPs, however the ad hoc nature of the arrangements was not seen as ideal by any of the parties or stakeholders. For this reason, PPPs of a similar nature and intent as the research PPPs in FP7 are presented as contractual PPPs within the EC proposal for Horizon 2020¹⁴³.

The establishment of JTI and contractual PPPs in H2020 is regulated by Art. 25 of the Regulation (EU) No 1291/2013 PARLIAMENT AND OF THE COUNCIL of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC, on Public-Private Partnerships. In relation to contractual PPP Art. 25 establishes that *the involvement of the Union in public-private partnerships may take the forms of contractual arrangements between parties, which specify the objectives of the partnership, respective commitments of the partners, key performance indicators, and outputs to be delivered, including the identification of research and innovation activities that require support from Horizon 2020*¹⁴⁴.

According to Art. 25 (1) of this Regulation, Horizon 2020 may be implemented through public- private partnerships where all the partners concerned commit to supporting the development and implementation of pre- competitive research and of innovation activities of strategic importance to the Union's competitiveness and industrial leadership or to addressing specific societal challenges. Public- private partnerships shall be implemented in such a way that full participation of the best European players is not impeded¹⁴⁵.

Also Art. 25 (3) establishes that *public-private partnerships shall be identified and implemented in an open, transparent and efficient way. Their identification shall be based on all of the following criteria*¹⁴⁶:

- (a) the demonstration of the added value of the action at Union level and of the choice of the instrument to be used;*
- (b) the scale of impact on industrial competitiveness, job creation, sustainable growth and socio-economic issues, including societal challenges, assessed against clearly specified and measurable objectives;*
- (c) the long-term commitment, including a balanced contribution from all partners based on a shared vision and clearly defined objectives;*

¹⁴² Source: European Commission, REGULATION (EU) No 1291/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC, (http://ec.europa.eu/research/participants/data/ref/h2020/legal_basis/fp/h2020-eu-establact_en.pdf) © European Union, 1995-2014

¹⁴³ Source: European Commission. Final assessment of the research PPPs in the European Economic Recovery Plan Factories of the Future, Energy-efficient Buildings, European Green Cars initiative, © European Union, 2013

¹⁴⁴ Source: European Commission, REGULATION (EU) No 1291/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC, (http://ec.europa.eu/research/participants/data/ref/h2020/legal_basis/fp/h2020-eu-establact_en.pdf) © European Union, 1995-2014

¹⁴⁵ Source: European Commission, REGULATION (EU) No 1291/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC, (http://ec.europa.eu/research/participants/data/ref/h2020/legal_basis/fp/h2020-eu-establact_en.pdf) © European Union, 1995-2014

¹⁴⁶ Source: European Commission, REGULATION (EU) No 1291/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC, (http://ec.europa.eu/research/participants/data/ref/h2020/legal_basis/fp/h2020-eu-establact_en.pdf) © European Union, 1995-2014

(d) the scale of the resources involved and the ability to leverage additional investments in research and innovation;

(e) a clear definition of roles for each of the partners and agreed key performance indicators over the period chosen;

(f) complementarity with other parts of Horizon 2020 and alignment with the Union research and innovation strategic priorities, in particular those of the Europe 2020 strategy.

In December 2013 eight contractual Public Private Partnerships (PPPs) focussed in research and technology areas of key importance were launched by the Commission. The research and innovation roadmaps of the these PPPs have been established after an open consultation process with the involvement of stakeholders and the assessment conducted by the European Commission supported with the advice of independent experts¹⁴⁷. The eight contractual Public-Private Partnerships are:

- Factories of the Future (FoF)
- Energy-efficient Buildings (EeB)
- European Green Vehicles Initiative (EGVI)
- Sustainable Process Industry (SPIRE),
- Photonics
- Robotics
- High Performance Computing (HPC)
- Advanced 5G networks for the Future Internet (5G)

5.4 POTENTIAL ROLE OF PPPS WITHIN THE FRAMEWORK OF JPI OCEANS

PPPs can also be instrumental to achieve the goals and objectives of JPI Oceans and to address some of the challenges that have an important industrial component, that have been identified in the Strategic Research and Innovation Agenda of JPI Oceans.

Public-private partnership in the maritime sector would facilitate the development of a true maritime research, engineering and technology community. A public-private partnership on research, innovation and technology development for the blue industries could create substantial synergy across sector and regions it should be built around relevant industries, institutes, universities and centres of excellence and should therefore be considered as a tool in the further implementation of Blue Growth in Europe. The initiative(s) could be tackle challenges in a few selected RTD and innovation areas, those more relevant for industry and MS, and with bigger potential to boost the growth and create jobs, these may include for instance Maritime technologies, Materials and nano-technology for maritime applications, Cross-cutting enabling technologies, Technology for deep sea resources and Sensors (including biosensors), among others. The most suitable areas will have to be identified

JPI Oceans can add substantial value by advancing in these fields and obtain significant synergy in creating a community of knowledge and sharing of practice around maritime technology and engineering through a comprehensive, Europe-wide, public private partnership. JPI Oceans is the perfect initiative to support such an activity as it requires a long-term approach to cooperation. Due to expenses in infrastructures, simulators and the need to couple activities with the development of

¹⁴⁷ Source: European Commission, http://ec.europa.eu/research/industrial_technologies/ppp-in-research_en.html, © European Union, 1995-2014

a new generation of scientists and engineers, the initiative should be built around relevant industries, institutes and universities and centres of excellence in Europe topping up their cooperation. Promote mutually beneficial public-private partnerships that support the involvement of marine industries and other stakeholders in emerging maritime sectors such as marine Renewable.

A key task will be to develop and implement effective joint activities and instruments such proper governance, cross-national public procurement for innovation, and coordinated research and innovation initiatives within a broadly based partnership. JPI Oceans has a wide contact network which would allow the related industries to meet other marine and maritime industries and research institutes, thereby creating synergies and multidisciplinary partnerships to benefit the Ocean Economy and blue growth. This cross-sectorial approach is essential to advance areas such development of sensors or marine biotechnology.

Since the objective of JPI Oceans is to enhanced cooperation across Europe in the field of marine and maritime research, the report is mostly focussed on research PPPs. Nevertheless PPP for public procurement could also be potential and effective instrument to increase synergies between maritime industry and the public sector in strategic areas of common interests to JPI Oceans participating countries and the industry sector, allowing to optimise the use of resources to undertake major investment in marine and maritime research (such as marine research infrastructures for ocean observation and monitoring or other maritime areas that may require big investments in infrastructures) that otherwise could not be addressed by MS due to the current economic crisis. Due to its potential usefulness the document also provides below some background information on PPPs for public procurement and contracts.

5.5 RECOMMENDATIONS FOR IDENTIFYING AND MANAGING PPPS

Despite the maritime sector is key for the EU economy, so far none of the research PPPs launched by European Commission has been targeted to the maritime industry. Contractual PPPs could be a suitable instrument to implement a PPPs in the maritime field within the framework of JPI Oceans to address key challenges that are of public interest and that need a strong industrial involvement.

The maritime economy accounts for as much as 5% of European economic activity. The EU's Marine Regions, with their strong connection to the sea, account for almost 40% of its GDP. Maritime transport, responsible for 90% of EU's external trade and 40% of its internal trade, is vital for its economy. Fisheries, aquaculture and food processing are key sectors in food and food security and account for around 0.5 million jobs with a turnover of €32 billion Euros per year. The unexploited potential of the sea is even bigger, with still largely unknown mineral resources. Moreover it is estimated that more than 90% of the marine biodiversity remains unexplored. Oceans and seas offer a huge potential for discovery of new species and applications derived from biotechnologies, a sector foreseen to grow at a 10% annual in the coming decade. The potential for marine energy still needs to be realized and there are many research and technology barriers within specific sectors that hamper the exploitation the full potential of the maritime economy.

To make the most of the whole potential of the maritime economy it is necessary substantial amount of funding to invest in research and technology development to tackle the barriers that hamper the growth of the industry in key maritime sectors. No less important is the research and technology

needed to ensure that this growth is compatible with the preservation of the marine environment. A stronger involvement of industry is needed to fund research, technology and innovation and this need to be done through enhanced cooperation with marine and maritime research and technology centres. PPPs can be suitable instruments to achieve these objectives and boost the maritime economy, contributing to the objectives of the EU 2020 Strategy.

Because none of PPPs launched so far have been or are focussed on the maritime field, and therefore there is not specific experience or information on PPPs in the maritime sector. However the experiences and lessons learnt from ongoing research and contractual PPPs launched in other strategic fields could be useful in order to set up potential PPPs to address specific fields or areas of interest for the maritime sector.

Below we present some recommendations for the management of PPPs, in the field of marine and maritime research. These recommendations are proposed by CSA Oceans for a potential maritime PPP under the framework of JPI Oceans. These recommendations are proposed keeping in mind the nature and goals of JPI Oceans and after reviewing different reports and documents on PPPs¹⁴⁸ The provided recommendations concern with the identification of the PPP, the management, funding, implementation, communication and monitoring.

Recommendations for the identification of the PPP

- The cooperation between European Commission, MS and the private sector should be strengthened with a view to identified potential future PPPs focussed on the marine and maritime sectors. This may requires setting up a working group between JPI Oceans, European Commission and industry stakeholders representatives to assess which maritime areas are the ones with higher potential and perspectives of success to be supported through PPP. The process for identification of PPPs topics should be open, inclusive and transparent
- Potential future marine or maritime PPPs should set up in those fields where there are a strong interest and commitment from public and private sector and enough critical mass, both in terms of capacities (both in the private and public sector) and funding resources, so as to ensure its long-term sustainability and success.
- PPPs should provide a clear added value to at EU level and also for the Members States interested in being involved.
- PPPs in the marine and maritime field should have a strong the long term commitment between all parties in order to guarantee the long term sustainability of initiative which is critical for its success. This must be translated in the provision of suitable funding resources

¹⁴⁸ References:

- European Commission, JTI Sherpas Report, "Designing together the 'ideal house' for public-private partnerships in European research" http://ec.europa.eu/research/jti/pdf/jti-sherpas-report-2010_en.pdf#view=fit&pagemode=none
- REGULATION (EU) No 1291/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC)
- European Commission. First interim evaluation of the ARTEMIS and ENIAC Joint Technology Initiatives (COM(2010) 752 final),
- European Commission. COMMISSION STAFF WORKING PAPER Report on the first interim evaluation of the Innovative Medicine Initiative Joint Undertaking Report on the first interim evaluation of the Clean Sky Joint Technology Initiative Joint Undertaking Report on the first interim evaluation of the Fuel Cells and Hydrogen Joint Undertaking SEC(2011) 1072 final, , European Union 1995-2014
- European Commission. Public-private partnerships in Horizon 2020: a powerful tool to deliver on innovation and growth in Europe, (COM(2013) 494 final)
- European Commission. Final assessment of the research PPPs in the European Economic Recovery Plan Factories of the Future, Energy-efficient Buildings, European Green Cars initiative
- European Commission. Public-private partnerships in Horizon 2020: a powerful tool to deliver on innovation and growth in Europe, (COM(2013) 494 final)

in the long term, from both the public sector (at EU and national level) and from the industry. The PPP should be able to boost enough RTD funding from industry to achieve the level of investment needed, alongside with the public funding, to achieve the goals of the PPP.

- They should have well defined and ambitious objectives, and address close to market activities, with a strong emphasis on innovation, to contribute to the EU 2020 Strategy.
- The PPP should tackle RTD and innovation challenges that could not be achieved through other mechanisms or instruments.
- An ex-ante impact of the PPP on the economy, including growth and jobs, should be done, it would be necessary to conduct an assessment of the socio-economic impact of the initiative at EU level.

Recommendations for the management of PPPs

- When devising governance and management structures and implementations plans it has to be kept in mind that the principle "one size fits all" may not be feasible or applicable¹⁴⁹, due to the broad spectrum of industries within the maritime sectors each of them with their specific particularities regarding their strengths, weaknesses, opportunities and threats (e.g. markets competition, industry dimension, technology challenges, stakeholders involved, etc.).
- The PPP could be based on a contractual agreement between the maritime industry and public partners (including MS and EC). They should be built on the basis of increased transparency, clear objectives, simplification of administrative issues, key performance indicators and outputs to be delivered
- The role of each party within the PPP must be agreed and clearly define.
- It is advisable to introduce multi-annual grant agreements for the members of the PPP, to make the programming compatible with the rules governing the budget of the European Union and MS.
- Administrative and financial rules should be set up from the outset. Special attention should be paid to reduce administrative burden.
- PPP should include mechanisms to allow integration of new partners it proven necessary to add value to the initiative.

Recommendations on the funding of PPPs

- It would be necessary to enhance the cooperation between Member States (through JPI Oceans), European Commission and the industry sector to analyse the different funding options and EU funding mechanisms available in order to launch a potential maritime PPP.
- The possibility of implementing maritime PPPs through H2020 should be explored in cooperation with the European Commission. The combined used of funding from H2020, with public funding from MS and private funding in key research, technology development and innovation areas where the involvement of the industry is needed would be a very powerful tool to ensure the level of investment and the critical mass needed to boost the industrial activity linked to key areas of the maritime economy. It would help to increase the private investments in RTS and innovation activities, and would contribute to address and tackle some of the grand societal challenges in line, promoting growth and create high

¹⁴⁹European Commission, http://ec.europa.eu/research/jti/index_en.cfm?pg=about, European Union 1995-2014

quality jobs in line with the objectives of the EU 2020 Strategy. This type of partnerships should be built on mutual trust and long term commitment from EU, Member States and Industry.

- In addition, it would be necessary to explore the full potential of different funding mechanisms available, including European Structural and Investment Funds, and the synergies of the PPP with regional and national smart specialisation strategies
- The funding commitment and contribution from industry should be substantial and comparable to the level of public funding.
- The funding or funding mechanisms should ensure the leverage of national and public investments and the impact on the European economy. For those PPPs requiring infrastructures it would be essential to secure financing during the construction phase of the infrastructure and the operational/exploitation phase, to ensure the long-term sustainability of the projects. Funding should also provide access to the technologies needed to implement the PPP and contribute to improve the leadership of the European maritime industry.
- The funding activities should target high risk RTD activities, including close to market activities.

Recommendations for the implementation phase of PPPs

- The development of a strategic agenda of a potential marine or maritime PPP and the establishment of priorities and roadmaps should be done in a cooperative way. The industry should lead the development of the roadmap, in consultation with stakeholders and the public partners.
- The implementation of the road map they should be driven by industry, with the support of the public sectors, which should also supervise the process and assess the performance of the PPP.
- Evaluation of projects should be agreed among the parties. The process could be built on previous experiences from other PPPs. The evaluation should be impartial, transparent, and based on excellence, but it should also take into account the potential economic impact, the suitability of partners and their capacities to conduct research and tech development to achieve the goals.
- One of the key activities should be the promotion of exchange of knowledge, human resources and shared use of infrastructures, to strengthen the links between research centres and industry, reduce fragmentation and contribute to the excellence.
- JPI Oceans is based on the principle of variable geometry, which means that any country would be allowed to participate in a PPP on a voluntary basis. However, measures should be developed in order to avoid duplications, maximise synergies and to ensure the efficiency and effectiveness of the PPP in achieving its objectives. The interests of all participating MS in the PPP should be taken into account.
- Possible synergies and links with programmes and projects at national or EU level should be analysed and exploited, when necessary by coordinating programme and calls between PPPs and those launched by European Commission or JPI Oceans. JPI Oceans could help facilitate the appropriate coordination between countries to harmonize procedures and coordinate calls.
- Administrative and financial rules, reporting and related issues should be set up and necessary measures should be taken to simplify the administrative burden.

Recommendations for PPPs on communication and stakeholder engagement

- The proper communication is a key issue. This needs to be supported by an effective communication strategy and dissemination plan. It is also necessary to involve all public and private players in communication and outreach activities.
- The PPP should enable broad engagement of stakeholders and create capacities. The development of a plan with tangible objectives should be implemented, such as stimulating the participation of SMEs, clustering activities, and education and training actions.
- The PPP should promote and facilitate the engagement of marine and maritime SMEs. SMEs are very important for the economic development of Europe and they account for a large proportion of the marine and maritime industry in Europe.

Recommendations for monitoring and assessment of PPPs

- Develop monitoring, evaluation processes and methods for impact assessment of the PPPs. A robust system for continuous project monitoring and assessment needs to be set up, with key performance indicators to assess the results, including socio-economic impacts, and evaluate the performance of the strategy and roadmaps.
- They should be built based on the experience gained from other prior and ongoing PPPs on monitoring and assessment methods and approaches.

5.6 ADDITIONAL RECOMMENDATIONS

Recommendations from the experience gained from the 3 first research PPPs¹⁵⁰

An expert group appointed by the European Commission conducted in 2013 the final assessment of the 3 research PPPs launched in 2009 and provided several conclusions and also recommendations for the management and implementation of research PPPs, based on the experience gained from the PPPs launched in 2009. These recommendations should be considered since they may be useful for the possible implementation of potential maritime PPPs in the future. These recommendations are available in the Report prepared by this expert group, available at <http://bookshop.europa.eu/>

Recommendations based on the experience gained from JTIs

In addition, further recommendations regarding the management and the establishment of PPPs can be found in the Final report of the JTI Sherpa Group on JTIs "Designing together the 'ideal house' for public-private partnerships in European research. JTI Sherpa Group. Final Report (January 2010)" where this group of experts appointed by the European Commission made an assessment of the 5 JTIs launched by the European Commission under the framework of FP7.

The information is available at http://ec.europa.eu/research/jti/pdf/jti-sherpas-report-2010_en.pdf#view=fit&pagemode=none,

The recommendations provided by the final report include an analysis of the pros and cons of the possible legal structures of the JTIs.

¹⁵⁰ European Commission. Final assessment of the research PPPs in the European Economic Recovery Plan Factories of the Future, Energy-efficient Buildings, European Green Cars initiative, © European Union, 2013

ANNEX I. OVERVIEW OF INTELLECTUAL PROPERTY RIGHTS AT NATIONAL LEVEL

Below an overview of IPR related issues at national level in those countries involved in CSA Oceans is provided.

In addition to the information provided below, a full list of laws, regulations, bilateral, multilateral and international treaties and agreements on IPR applicable in each country can be found at the World Intellectual Property Organization (WIPO) website:
(<http://www.wipo.int/wipolex/en/>)

BELGIUM

INTELLECTUAL PROPERTY RIGHTS IN BELGIUM

In Belgium, intellectual property protection takes various forms: **copyright** and **related rights**, **patents**, **trademarks**, **designs** or **models** and **plant breeders' rights**. Through these protections, titleholders are granted the exclusive right, within a given time period and a specific geographic area, to exploit their intellectual property.

Industrial property rights

Patents are regulated by the Law of 28 March 1984 on patents for inventions. Provide protection in the form of a legal right to property which allows titleholders to prohibit third parties from manufacturing, using or marketing their invention without their authorisation for a specific period of time within a specific geographic area. In order to be patentable an invention must: be new; involve an inventive step; have an industrial application. The period of protection is generally **20 years** but in some cases may be longer.

Trademarks

Trademarks in Belgium are regulated by the Benelux Convention on Intellectual Property, 25 February 2005. The term of protection of trademarks throughout the Benelux region is **ten years**.

Designs and Models

The protection of designs and Models applies to all or a part of a product's visual appearance as characterised by its: lines; contours; colours; shape; texture; or materials. Designs are two-dimensional forms and models are three-dimensional. In order to be protected, they must be novel and distinctive. In order to be protected, they must be novel and distinctive. The period of protection is 5 years and may be renewed four times.

Copyright

Copyright and related rights are granted to: authors of literary and artistic works; artists and performers; producers of sound recordings or the first transcriptions of a film; broadcasting

organisations; database developers. According to the Belgian law the work must be original and fixed in a material form that can be communicated to the public. The term of copyright protection is **70 years** after the death of the author.

BELGIAN OFFICES AND TOOLS TO SUPPORT INTELLECTUAL PROPERTY PROTECTION

The **Belgian Office for Intellectual Property** (OPRI) is the official body for the registration of trademarks, designs and models within the Benelux area.

The Benelux Office for Intellectual Property (BOIP)

The office for registration of trademarks and designs in the Benelux is the Benelux Office for Intellectual Property (BOIP), which is part of the Benelux Organisation for Intellectual Property.

ADMINISTRATIVE PROCEDURES

Patents: Patent applications are filed with the **Office for intellectual property** (OPRI) and shall be accompanied by payment of the application fee.

Trademarks, Model or Design: The registration is handled by the **Benelux Office for intellectual property** (OBPI).

Copyrights: Copyrights **arise automatically on the creation of an original work**. Therefore, administrative formalities are not required to acquire these rights. It may be useful, however, to register a work in order to prove its existence on a specific date. A date can be established in one of the following ways:

- application to the registry of the Federal Public Service Finance;
- engaging a notary to draw up a duly authenticated document establishing the existence of the work;
- using an i-DEPOT envelope to file with the BOIP (Benelux Office for Intellectual Property, BOIP).

Sources of information:

- @European Union, 1995-2014, http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#belgium_en_protecting-intellectual-property,

FRANCE

INTELLECTUAL PROPERTY RIGHTS IN FRANCE

France's **Intellectual Property Code** protects business assets in the field of innovation (industrial property) and intellectual property

Intellectual property rights

France's industrial property law (DPI) protects aspects such as: designs/models, software, know-how,

domain names, trademarks,

Innovation protection options for businesses: R&D project contracts, contracts in joint R&D projects, Patents, trademarks, Registrations, Soleau envelope (innovation tracking)

Intellectual property protection bodies

FRENCH OFFICES AND TOOLS TO SUPPORT INTELLECTUAL PROPERTY PROTECTION

The National Institute of Industrial Property (INPI) is the official body responsible for managing the intellectual property in France. . INPI also has research databases on trademarks, patents and designs/models to help answer questions on industrial property. INPI offers **expert assistance** and **support services** to answer questions on or help with industrial property procedures.

The Guide to intellectual property in competitiveness clusters aims to raise awareness among those involved in R&D projects and also offers them legal tools for anticipating and resolving difficulties. It provides factsheets, summaries of regulations, methodology and contract tools, etc.

(http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#france_en_protecting-intellectual-property)

The **technology exchange** is a central database containing offers relating to transferable patents.

(http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#france_en_protecting-intellectual-property)

ADMINISTRATIVE PROCEDURES

In France, businesses are advised to register and protect innovations with the **national industrial property institute** (INPI). Procedures can be completed online (filing patents, registering trademarks, etc.).

Source: ©European Union, 1995-2014, http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#france_en_protecting-intellectual-property

GERMANY

INTELLECTUAL PROPERTY RIGHTS IN GERMANY

Intellectual property in Germany is protected by industrial property rights, which prevent any form of copying or imitation.

Industrial property rights include:

- **Patents** (protection of new technical inventions);
- **Utility model** (protection of technical innovations, although this is purely a registration right as opposed to a patent);
- **Registered design** (protection of designs, patterns and models);
- **Trade mark** (e.g. Trade marks made up of words or images).

Copyright

The Copyright Act applies to works of literature, art and science. Copyright protection comes into force when a work is created; official registration is not necessary.

A collection of the most important legal texts about the commercial remedy can be found on the website of the **German Patent and Trade Mark Office** (DPMA).

Links to DPMA website are provided by http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#germany_en_protecting-intellectual-property

GERMAN OFFICES AND TOOLS TO SUPPORT INTELLECTUAL PROPERTY PROTECTION

The central body dealing with industrial property rights is the **German Patent and Trade Mark Office** (DPMA). The German Patent and Trade Mark Office (DPMA) is the central body for filing patents, utility patents, design patents and trademarks. Whether or not industrial property rights apply, and if so, which ones, depends on the rules governing the relevant rights and how the applicant intends to protect these. All industrial property rights can be registered online via DPMA Direct.

More than **20 Patent information centres** (PIZ) throughout Germany offer comprehensive information on industrial property rights.

More information on **Patent information centres** is available at the website of the **German Patent and Trade Mark Office**. The website http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#germany_en_protecting-intellectual-property provides links to DPMA

The following German funding programmes support entrepreneurs regarding the exploitation of research results and IPR issues¹⁵¹:

- **SIGNO**: Funding programme of the Federal Ministry of Economic Affairs and Energy which supports universities, KMU and inventors to overcome legal barriers and to promote the exploitation of innovative ideas. www.signo-deutschland.de
- **EXIST**: Funding programme of the Federal Ministry of Economic Affairs and Energy which seems to improve the entrepreneurial spirit at universities and research institutes. Additionally, the number and the success of technological and knowledge based spin-offs should be increased. www.exist.de

Sources:

- ©European Union, 1995-2014, http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#germany_en_protecting-intellectual-property,
- Information provided by Project Management Jülich (CSA Oceans partner)

ITALY

¹⁵¹ Information provided by the CSA Oceans partner Project Management Jülich

INTELLECTUAL PROPERTY RIGHTS IN ITALY

Italy adopted the European legislation on trademarks through the Industrial Property Code.

Industrial Property Code includes and harmonizes the Italian, EU and international legislation governing trademarks, invention patents, models and designs:

Legislative Decree No 131 of 13 August 2010 - Amendments to the Legislative Decree No 30 of 10 February 2005, laying down the code of industrial property, in accordance with Article 19 of Law No 99 of 23 July 2009

Industrial Property Rights

A **trade mark** is a distinctive name, symbol, motto, design or other device associated with a product or service, designed to identify the specific company and identifying the specific company which supplied it. The de facto trade mark is distinguished from the registered trade mark, which benefits from greater protection. Registration lasts ten years from the date that the request is made, unless ownership is renounced, and when expired, can be renewed for another ten years each time. The de facto trade mark (not registered) is subject to all the risks that would arise from any same registration by others.

A patent is, on the other hand, an exclusive right, granted by the government, that authorizes the business owner to make use of an invention for a specific period of time, allowing him to benefit from the commercial advantages that may derive from it. We can distinguish between the **patent for inventions**, regarding a new creation (duration: 20 years), from the **patent for utility models**, which is an improvement on an existing creation (duration 10 years). The protection guaranteed by the patent can be requested only for the national territory (national patent) or for the majority of countries around the world (international patent). With regards to the EU, on the 11 December 2012, the European Parliament approved the regulation that as from 2014 the Community Patent will be introduced.

The Industrial **models** differ between:

- Utility models: applicable to machines, tools, equipment or other existing objects;
- Designs and models: distinctive signs that contribute to the identification of a certain type of product.
- This type of patent lasts 10 years from when the application form was submitted. For design models, the duration is five years and can be extended for another five years, up to a maximum of 25 years.

The **Community trademarks** are valid throughout the territory of the EU (consisting of the current Member States and the countries that will join in future). Registration is valid for 10 years and can be renewed. Organisations and associations wishing to guarantee the origin, nature or quality of a specific product may obtain patents for **trademarks of the individual type** or the **collective type**.

Copyright. Copyright is the exclusive original right to distribute and use intellectual property.

Italian law protects all intellectual properties related to literary works, theatre, visual arts, architecture, cinema and science, acknowledging the author a number of economic and moral rights.

Protection is automatic and no formalities (filing or registration) are required from the author.

ITALIAN OFFICES AND TOOLS TO SUPPORT INTELLECTUAL PROPERTY PROTECTION

In Italy, patents, and trademarks are the responsibility of the **Italian Patent and Trademark Office** established at the Chamber of Commerce of each province.

The **local Chamber of Commerce** assists companies in administrative procedures necessary for the registration of trademarks and patents. The full list of local offices can be found on the Chamber of Commerce website.

In 2004 Italy introduced the **Helpdesk for protecting intellectual property** (IPR Desk). These are offices staffed with civil servants (located in ICE offices in 10 countries) with experience in intellectual property-related matters that have the task of monitoring the market and provide information on the industrial property system and on its operation in the country of competence.

Links to all these institutions and organizations can be found at:

http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#italy_en_protecting-intellectual-property,

ADMINISTRATIVE PROCEDURES

To register a trademark it is necessary to submit an appropriate application to the **local Chamber of Commerce** or send it to the **Italian Patent and Trademark Office** based in Rome, by registered letter with acknowledgment of receipt. If a digital signature is available, the application can be submitted online through the "Telemaco" service.

Source: ©European Union, 1995-2014, http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#italy_en_protecting-intellectual-property,

THE NETHERLANDS

INTELLECTUAL PROPERTY RIGHTS IN THE NETHERLANDS

Intellectual property rights are designed to protect inventions, trademarks and creative ideas. You can request protection at an early stage by claiming copyright and registering your idea with the Benelux Office of Intellectual Property (BOIP), the tax authority or a notary, or by protecting it through Industrial property rights

Once you have implemented your idea, you can protect it under the patent law (for inventions); this means no one may copy or use your idea or model without your permission.

Design and model law regulates external protection within the Benelux area. The models or designs covered by it must be new.

Trademark law enables you to protect the brand used for your product, service or company. No one may then use either the colour or design of your logo. See Copyright Act and Brand Protection at:

http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#netherlands_en_protecting-intellectual-property

Protection of your business name: if you sign up to the trade register, the Dutch Chamber of Commerce will conduct a search to find out whether or not another company is already using the same name.

Copyright

Copyright is the exclusive right of a copyright holder to publicise and reproduce a work. In the Netherlands copyright exists as soon as a work is produced. The author does not need to register the work or to declare that copyright is reserved. In some cases copyright is retained by a person who is not the work's actual author, Copyright is protected by the Copyright Act.

http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#netherlands_en_protecting-intellectual-property

Copyright ends 70 years after the death of the author of the work. If a work has been published anonymously (or under a pseudonym), or if the copyright is in the hands of a legal person, the term of copyright ends 70 years after the work's initial disclosure.

A complete list of laws and regulations on IPR in the Netherlands can be found at:

<http://www.wipo.int/wipolex/en/>

DUTCH OFFICES AND TOOLS TO SUPPORT INTELLECTUAL PROPERTY PROTECTION

The **Netherlands Patent Office** helps you to protect your inventions. As soon as a patent is issued, no one else may take over or apply your idea or design without your consent:

http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#netherlands_en_protecting-intellectual-property

The **Benelux Office for Intellectual Property** (BOIP) is the official body for the **registration of brands, models and designs** in the Netherlands, Belgium and Luxembourg. For protection within the Benelux area, it is possible to submit trademarks drawings or models to the **Benelux Office for Intellectual Property** (BOIP).

Information from the Dutch government can be found on the **Antwoordvoorbedrijven.nl** website, which lists all the various relevant dos and don'ts, e.g. licences and requirements, laws and regulations, taxes and subsidies.

ADMINISTRATIVE PROCEDURES

It is possible to **register an idea** at an early stage by submitting an **i-DEPOT registration** document to the Benelux Office for Intellectual Property (BOIP). This allows companies to prove the ownership of the ideas and prevent anyone else from taking it over or applying it.

Sources of information:

- ©European Union 1995-2014, http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#netherlands_en_protecting-intellectual-property,

NORWAY

INTELLECTUAL PROPERTY RIGHTS IN NORWAY

The protection of intellectual property in Norway is governed by the following **Acts**:

- Patents Act
- Trade Marks Act
- Designs Act (
- Copyright Act

Links to these Acts are provided by http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#norway_en_protecting-intellectual-property

The Norwegian Industrial Property Office (**NIPO**) is the official government body responsible for granting and managing industrial property rights (IPR) in Norway.

Industrial property rights

- A **patent** gives exclusive rights to exploit an invention commercially for a limited period (up to 20 years). During this period, others can be prevented from producing, importing or selling the invention that is patented.
- A **trade mark registration** confers exclusive rights to use the trade mark to identify goods and services. This exclusive right entitles you to stop others using similar marks for goods or services. The right covers the use of the mark on the goods themselves, in advertising, on documents, in oral statements or in any other way. Trade mark protection lasts for ten years from the date of registration. The registration can be renewed every ten years, any number of times.
- **Design** refers to the appearance and shape of a product or part of a product. Design registration gives you the exclusive right to exploit the design commercially for a limited period. During this period, others can be prevented from producing, importing or selling the design that is protected. The registration can be renewed for several periods up to a total of 25 years.
- **Enterprise name**. The right to an **enterprise name** is acquired from the date on which one starts to use the name in Norway or the date on which notification reaches the **Register of Business Enterprises**. The right means that nobody else can use or register an identical enterprise name.

Copyright

The **Copyright Act** defines a creative work as 'a literary, scientific or artistic work of any kind, irrespective of the manner or form of expression'. In order to use or copy the work, permission must

be obtained from the author and the publisher. It is not permitted to copy the work itself even if it does not carry such a prohibition. More information on copyright can be obtained from Kopinor (see: http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#norway_en_protecting-intellectual-property)

Commercial strategies

Before presenting an idea to potential partners, companies should sign a **non-disclosure agreement**. This will limit the possibility of the idea being used unlawfully by the other party.

NORWEGIAN OFFICES AND TOOLS TO SUPPORT INTELLECTUAL PROPERTY PROTECTION

The **Norwegian Industrial Property Office** is a national body that helps Norwegian businesses to enhance their activities with knowledge of industrial property rights - helping them to safeguard their investments and competitive positions and create economic growth in Norwegian society. The **Norwegian Industrial Property Office** can provide information and guidance on how to proceed if you want to apply for a patent, trade mark or registered design

The **Nordic Patent Institute** is a partnership between the patent authorities in Denmark, Norway and Iceland. Its main role is to provide various types of service in the patents field to other patent authorities and to individuals. The Nordic Patent Institute has the status of a PCT authority, i.e. an international authority for novelty analyses and preparatory assessment of patentability.

The main function of **Kopinor** is to act on behalf of copyright holders in Norway and abroad to sign and maintain agreements with all types of business in Norway on copying protected material.

Norid manages the .no domain and maintains the central database of all Norwegian domain names.

Links to the websites of these institutions can be found at:

http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#norway_en_protecting-intellectual-property

ADMINISTRATIVE PROCEDURES

The regulations for patent, design and **trade mark protection** are managed by the **Norwegian Industrial Property Office**, which also processes applications. There are various registration forms associated with patents, trademarks and designs, which can be found on the Norwegian Industrial Property Office web site. More information at:

http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#norway_en_protecting-intellectual-property

Source: ©European Union, 1995-2014, http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#norway_en_protecting-intellectual-property,

ROMANIA

INTELLECTUAL PROPERTY RIGHTS IN ROMANIA

Industrial property rights

The following **areas** are covered by national legislation on industrial property: invention patents (valid for 20 years); trademarks and geographical indicators; designs and models; topographies of semiconductor products; supplementary protection certificates (for medicines and plant protection products); utility models; new plant varieties.

The **protection of industrial property rights** is mainly governed by the following laws:

- Law on invention patents
- Law on trademarks and geographical indications :
- Law on the protection of designs and models
- Law on the protection of topographies of semiconductor products:
- Law on the protection of the new plant varieties

The links to these legislation can be found at:

http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#romania_en_protecting-intellectual-property

More information can be found at the **Oficiul de Stat pentru Invenții și Mărci, OSIM** (State Office for Inventions and Trademarks) website. More information at:

http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#romania_en_protecting-intellectual-property

ROMANIAN OFFICES AND TOOLS TO SUPPORT INTELLECTUAL PROPERTY PROTECTION

In Romania, intellectual property rights are protected mainly by two specialist institutions: the **Oficiul de Stat pentru Invenții și Mărci, OSIM** (State Office for Inventions and Trademarks) and the **Oficiul Român pentru Drepturile de Autor, ORDA** (Romanian Copyright Office). **OSIM** protects intellectual property rights in the area of industrial property, in accordance with national legislation and national treaties and conventions.

Its **responsibilities**, include: registering and examining applications in the area of industrial property; issuing protection certificates which grant their holders exclusive rights in Romania; certifying and authorising patent attorneys.

ORDA protects intellectual property rights in the area of copyrights and related rights.

In addition to OSIM, there are a number of other organisations, mostly private, working to ensure that intellectual property rights are respected.

The **Grupul de Lucru pe Probleme de Proprietate Intelectuală** (Working Group on Intellectual Property Issues) is a public-private partnership between state institutions and private organisations which all share the common objective of **combating piracy and counterfeiting**.

The **Camera Națională a Consilierilor în Proprietate Industrială din România, CNCPIR** (Romanian National Chamber of Industrial Property Attorneys) is a professional, non-governmental organisation whose mission is to **regulate the activity of patent attorneys**

The **Chamber of Commerce and Industry of Romania** provides information on how to obtain protection certificates in the area of industrial property.

ADMINISTRATIVE PROCEDURES

The administrative registration procedures that guarantee protection of intellectual property are detailed on **OSIM's** website. OSIM provides forms for invention patents, trademarks and geographical indications, models and designs, topographies of semiconductors products, forms for plant variety and forms for utility models. For registration for invention patents, trademarks and geographical indications, models and designs, topographies of semiconductors products, utility models.

OSIM provides assistance with regard to electronic submissions, consultation of public databases, as well as documentary research services relating to inventions, trademarks, geographical indications, designs and models.

Sources: ©European Union, 1995-2014, http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#romania_en_protecting-intellectual-property,

SPAIN

INTELLECTUAL PROPERTY RIGHTS IN SPAIN

Intellectual property covers intangible creations of the human mind in the broadest sense: inventions, literary, artistic and scientific works, names, trademarks, designs, etc. Intellectual property is divided into two categories: industrial property and copyright.

Industrial property governs the protection of the intellectual creations of entrepreneurs in order to compete on the marketplace, in other words technical innovations (patents and utility models), new designs (industrial drawings and models); distinctive signs (trademarks and trading names) and semiconductor topographies, in other words the three-dimensional design layout and connections of integrated circuits.

SPANISH OFFICES AND TOOLS TO SUPPORT INTELLECTUAL PROPERTY PROTECTION

In Spain Industrial Property Protection is the responsibility of the State. Those wishing to protect such rights in Spain must register them with the Industrial Property Register of the Spanish Office of Patents and Trade Marks. Full information in this regard can be found at links provided by:

http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#spain_en_protecting-intellectual-property

Copyright protection is performed automatically in Spain. With regard to copyright there are two key international conventions: the Bern Convention and the World Trade Organization convention

covering such rights. If they are protected in one signatory State to these conventions, then they are protected in all.

The Ministry of Education, Culture and Sport is responsible for intellectual property through the Office of Intellectual Property, a unit dependent on the General Department of Cultural Industries and Policy and Books which includes the Intellectual Property Register. Intellectual Property is the collection of rights corresponding to authors and other holders (artists, producers, radio broadcasting companies) on works and services created by them. The Ministry of Education, Culture and Sport is responsible for proposing measures to protect intellectual property adequately. In the Ministry of Education, Culture and Sport there is also a national collective body, the Intellectual Property Mediation and Arbitration Commission, which fulfils the duties of mediation and arbitration attributed to it by the Intellectual Property Act¹⁵².

Links to Industrial Property Regional Information Centres are provided through the website of the SPTO.

ADMINISTRATIVE PROCEDURES

In order to protect industrial property rights, the individual or enterprise concerned must apply for registration of the invention, design or trademark with the **Spanish Office of Patents and Trade Marks** (OEPM). Many of these applications can be processed via the Internet.

Protection of copyright and associated rights performed automatically in Spain; there is no obligation to register your work in order to assert your rights. Spain does however have an **Intellectual Property Register** for use on a voluntary basis. This protection covers authors in the signatory countries of international agreements to which Spain is a party.

More information is available at http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#spain_en_protecting-intellectual-property

Sources:

- @European Union, 1995-2014, http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#spain_en_protecting-intellectual-property, @European Union, 1995-2014
- Ministerio de Educación, Cultura y Deporte, (Spain)

UNITED KINGDOM

INTELLECTUAL PROPERTY RIGHTS IN UK

The main UK intellectual property (IP) rules are laid down in the **Copyright, Designs and Patents Act 1988**.

IP law aims to **automatically safeguard** certain intellectual property rights. Applications can also be made for other types of legal protection:

¹⁵² Source: Ministerio de Educación, Cultura y Deporte

- **designs**
- **patents**
- **copyright**
- **trade marks**

Links to all the above property rights can be found at http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#united-kingdom_en_protecting-intellectual-property

Industrial property rights

Patents. Taking out a **patent** gives the patent owner the right to stop people from making, using, importing or selling the patent without the permission of the patent owner. A granted patent can remain in force for up to **20 years**.

A **trademark** can provide a distinctive way of representing your goods or services that sets them apart from those of other traders. Common law may give some trade mark protection automatically but you should consider **registering your trade mark** for added protection.

Copyright. If your business creates original works, **copyright protection** could be an important part of ensuring its success. It might be essential to enforce your rights if a rival with a similar product or service copies your instruction manual for instance. As a copyright owner, it is for you to decide whether and how to license use of your work. The UK Government's Business Link website provides full guidance on copyright rules, including lists of what is automatically covered, what is not, and how to get copyright protection.

UK **copyright law** usually provides **automatic protection abroad** as the UK is a member of many international agreements. However, UK registration of a **design, patent, or trade mark** does **not protect** it elsewhere in the EU and abroad.

Commercial strategies. A **non-disclosure agreement (NDA)** is a legal contract between you and another partner not to disclose information you have shared for a specific purpose, allowing businesses to approach potential partners, suppliers, customers, etc. knowing that information cannot be legally passed on. This can be used to share intellectual property, commercial information, business plans, etc.

ADMINISTRATIVE PROCEDURES

If you want to apply for a patent, you can choose to apply either by post or electronically. Electronic filing may be particularly attractive if you apply or will in future apply for a patent on a regular basis. Applications for additional IP rights can be made through the UK's Intellectual Property Office and through a locally registered IP attorney. The IPO's forms and fees are available on its website. You can complete the forms and send them back to the IPO online, or through a UK-based IP attorney. Links to websites and more information is available at the website: http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#united-kingdom_en_protecting-intellectual-property

UK OFFICES AND TOOLS TO SUPPORT INTELLECTUAL PROPERTY PROTECTION

- The **Intellectual Property Office** (IPO) is a UK executive agency of the Department for Innovation, Universities and Skills (DIUS), and is responsible for all aspects of IP policy. The Intellectual Property Office (IPO) offers several online services.
- IPO's brochure 'Intellectual property explained', EPO's online services discussion forum and the OHIM website's Frequently Asked Questions (FAQ) are a valuable source of information.
- IP attorneys, business advisors and support schemes can also advise businesses on their IP rights and protection. Details of local attorneys can be obtained from the Chartered Institute of Patent Attorneys (CIPA) and Institute of Trade Mark Attorneys (ITMA).
- Scotland's Intellectual Assets (IA) centre can help firms located in Scotland protect and exploit their business know-how.
- Scottish Enterprise's Business Gateway and Invest Northern Ireland's Technical Advisory Unit guide businesses on protecting intellectual property in the UK.

Links to the above mention organizations and institutions as well as more information on IPR in UK is provided at http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#united-kingdom_en_protecting-intellectual-property

Source: ©European Union, 1995-2014, http://europa.eu/youreurope/business/start-grow/intellectual-property-rights/#united-kingdom_en_protecting-intellectual-property