Blue Growth

Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts

Maritime Sub-Function Profile Report
Maritime Security & Surveillance (6.1)

Call for tenders No. MARE/2010/01

Client: European Commission, DG MARE

Rotterdam/Brussels, 13th August 2012

Contents

Summary description

Maritime surveillance relates to situational awareness of all activities at sea impacting on maritime safety and security border control, the marine environment, fisheries control, trade and economic interests of the European Union as well as general law enforcement and defence so as to facilitate sound decision making.[1] The report shows that the market of security and surveillance products is particularly fragmented because of sectoral, institutional and legal differences within and between EU Member States. However, there is growing demand for security products because of an increase in threats over the last decade, including piracy, illicit drug trafficking and terrorism. The role of public policy is therefore key to unleashing the potential of the market to contribute to blue growth. In the area of maritime surveillance it is particularly important to encourage the sharing of information between sectors and institutions. The benefits of integrated maritime surveillance reach beyond the direct economic gains for EU industry involved in these activities. Efficient maritime surveillance will enhance the effectiveness and efficiency of public tasks and controlling the oceans and seas will facilitate greater and more sustainable exploitation by other functions, such as trade.

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[1] European Commission, Communication "Towards the integration of maritime surveillance", COM (2009) 538Final, 15 October 2009.

1 State of Play

1.1 Description and value chain

The complexity of this sector stems from the overlapping uses of security and surveillance products by different user communities. These communities can be distinguished by the particular function they perform in maritime surveillance, which are:[2]

1. **maritime safety** –including Search and Rescue-; **maritime security**[3] –understood as the combination of preventive measures intended to protect shipping and port facilities against threats of intentional unlawful attacks- and prevention of pollution caused by ships.
2. **fisheries control**;
3. **marine pollution** preparedness and response; Marine environment
4. **customs** –protecting trade and the economic interests of the European Union-;
5. **border control** –with a focus in the prevention of illegal immigration and cross-border crime at EU external borders-;
6. **general law enforcement** –with a focus on the prevention of any criminal/illegal activity and on police administrative activities-;
7. **defence**.

Thus, these products have been developed in a variety of different sectors, both security and non-security related. Furthermore, these sectors are present in three different vertical levels: national, EU and international. Each of these levels includes a specific legal framework that is not necessarily compatible or complementary to the others. Even within the EU, maritime surveillance cuts across fields where EU institutions holds differing degrees of competence -formerly distributed in three pillars-, such as in trade and customs, freedom, security and justice, and common foreign and security policy. Hence, as many previous studies of the security market in general have concluded, it is extremely difficult to define and is highly fragmented (Ecorys 2009, 2011). Maritime security and surveillance is particularly complex due to the large number of maritime actors, compared for example to aviation security. One of the main problems in defining the market is the fundamental question of what constitutes 'security', making the structures highly amorphous (see section 1.2). Security is about controlling and countering threats; these can be both endogenous including traditional criminal activity and natural disasters, but increasingly they are exogenous such as organised crime and drug trafficking.

Its importance stems from the fact that safety and security is a basis for other maritime functions. Without a secure environment on the seas, oceans and coasts, activities such as shipping, fisheries, oil extraction, deep sea mining, off shore renewable energy and even coastal tourism are compromised. The real economic value therefore is not only based on how Europe's economy may gain from the development of new security products, but in fact the revenue secured in other economic activities. Finally, Europe's internal maritime borders are much less defined and easier to cross than its land based borders. Consequently, maritime security and surveillance has to gain from improved cooperation and pooling of resources at European level. Wider intrinsic benefits of security are of course evident, given the costs to society of terrorism, drug trafficking and uncontrolled immigration.

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[2] European Commission, Communication "on a Draft Roadmap towards establishing the Common Information Sharing Environment for the surveillance of the EU maritime domain" COM (2010) 584, 20 October 2010 and Communication "Towards the integration of maritime surveillance", COM (2009) 538Final, 15 October 2009
[3] Art.2 Regulation 725/2004

Given the complexity of the maritime surveillance and security market, establishing a clear value chain is difficult. Figure 1.1 attempts to illustrate a generic value chain that can be applied to the different products and services within this subfunction. The structure of the value chain is comparable to the value chain within environmental monitoring subfunction.

Figure 1.1: The value chain of maritime surveillance and security
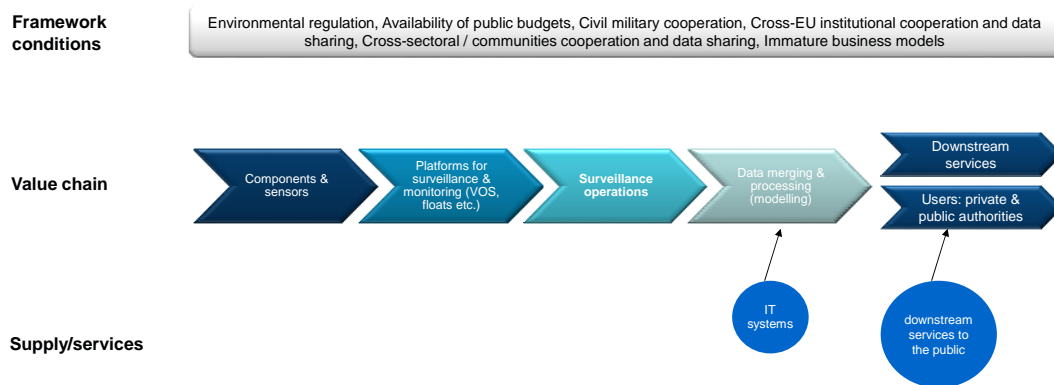
Source: Ecorys

Core components and sensors are manufactured separately and than mounted on different monitoring and surveillance platforms. The platforms are used under the surveillance operations and the data produced is subsequently collected, fused, shared analysed or fed into specific models or integrated monitoring systems. The last step in the value chain is that the information that is derived from these data is used in the downstream services and by different private and public actors. Many of the technologies higher up in the value chain, including platforms for sensors and data fusion, are still in development (see chapter two). As a result market structures still have to mature.

The value chain is strongly integrated with other economic activities and sectors. For example products that are currently used or being developed in the area of maritime security and surveillance have been adapted from defence and maritime safety equipment and they are now used for different purposes. Examples can be found in satellite observation and navigation systems which are originally derived from defence applications but also radar technologies which where first applied for military purposes.

The following text boxes present a number of examples of the main industry actors for different types of equipment that are relevant in this surveillance subfunction.

Example: the *Satellite manufacturers /integrators and operators*

The global position of EU space manufacturing exports depends extensively on the satellite manufacturing industry, mainly due to the importance of its telecommunication systems. The market available for EU industry is composed by operators and governments of countries that procure commercially and publicly satellites. Both the European and the global market are dominated by a few large players listed below. EADS Atrium ranks third after Lockheed Martin and Boeing and Thales Alenia Space sixth. As regards Earth Observation Systems the EU industry enjoys a strong global position.

Major satellite manufacturers/integrators	Satellite operators
• EADS Astrium , Europe • Thales Alenia Space, France • OHB, Germany • Lockheed Martin, USA • Boeing, USA • Northrop Grumman, USA • ORBITAL, USA • Space Systems Loral, USA • Mitsubishi Electric, Japan • Reshetnev Company, Russia • Great Wall Industry Corporation, China	• DMC international imaging (DMCii), United Kingdom • Astrium (incorporating Infoterra and Spotimage • Qinetic. United Kingdom • Rapideye, Germany • E-GEOS, Italy • EAS, Europe • CNES, France • DLR, Germany • ASI, Italy • EUMETSAT • MDA Geospatial, Canada • GeoEye, US • Digital Globe, US • ImageSat (Israel) • KARI, Korea • ISRO, India

Example: the *Vessel tracking systems*

The main market of vessel tracking systems is dominated by European and North American manufacturers although China and Japan have started to enter the market, especially in the more recent field of LRIT. There is no clear market leader among producers of AIS technologies, but for LRIT the Danish firm Thrane & Thrane has been one of the leading players.

Major manufacturers of Automated Identification Systems (AIS)	Major manufacturers of Long Range Identification and Tracking Systems (LRIT)
• Northgroup Grumman Space & Mission Systems Corp, USA • Kongsberg Maritime, Norway • Sam Electronics, Germany • Thrane & Thrane, Denmark • CNS Systems, Sweden • Maris, Norway • Samyung, USA • Savic, China • Transas, Ireland • Comar Sysytems, UK	• Thrane & Thrane, Denmark • Faruno, Japan • JRC, Japan • Bluetracker, Slovenia • Marinetrack, UK • Bureau Veritas, France • Skywave Mobile Communications Inc, Canada • Satamatics, UK

As mentioned earlier the economic performance of this specific function is wider than the economic activity of the surveillance activity and the supply of security and surveillance equipment alone. Especially the last segment of the value chain generates benefits.

The complexity and fragmentation of the security and surveillance market makes an overall estimation difficult. The Homeland Security Research Corporation valued the European maritime security market at €1.5bn in 2008, predicting that it would rise to €2.5bn by 2018. This represents about 22% of global market share, which is expected to remain the same over the next decade since demand will also rise worldwide (HSRC 2008). However, as noted above, the indirect benefits of maritime security are even more important. In fact, the European Organisation for Security estimated that the annual indirect savings of Integrated Maritime Surveillance in Europe alone would be €3.2bn (Interview with EOS, Brussels, 12th July 2011). This estimation bound to be circumvented with difficulties, not only because of the absence of a clear delineation of this sub-function, but also given the illegal and consequently unreported character of many of the activities maritime surveillance acts against. However, we can assume improvements in the reduction of operational costs of surveillance functions. With an improved efficiency and effectiveness of these functions, one would expect a decrease of these activities.

The economic value of maritime security and surveillance

Direct benefits: As in other functions, the need for better maritime security and surveillance generates a series of demands on products and personnel which lead in turn to industrial activity and subsequently more employment. Thus, direct benefits are the classic drivers for economic growth in terms of the added value and employment created through the development and operational implementation of new products and technologies and fusion of surveillance information.

Indirect benefits: The benefits to the European economy are not limited to increased demand and activity in the specialized industry. Other sectors of the European economy also benefit indirectly from better and more integrated security and surveillance, due for instance to the facilitation of trade, the prevention of environmental disasters, and the ability to reduce threats such as smuggling, piracy and illegal immigration.

Efficiency gains: A more structured and integrated market benefits industry because of clarity, less bureaucracy and reduction of investment risk, and European tax payers because of marginal efficiency in public spending.

Some examples of issues where indirect benefits could be reaped through a more integrated EU maritime security and surveillance are:

- In the function of **maritime security**, it is estimated that the average cost of security for seaports and port facilities in the EU is €464,000 for investment costs and €234,000 for yearly running costs. As for the security of the vessels, operators bear on average investment costs of around €100,000 and €25,000 of running costs per vessel. These investments are mainly in security equipment and compliance certification, while more than 50% of the costs are in specialised personnel. [4] Most of these costs stem from the security requirements of the International Ship and Port Facility Security (ISPS) Code. This code was adopted in 2004 in response to the security concerns raised by the 9/11 attacks. For instance, the largest container ship operator in the world: Maersk charges 6 dollars per container in concept of

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[4] European Commission, "Report on transport security and its financing", 1 August 2006 and Rotterdam Maritime Group, based on Swedish Maritime Administration and CETEMAR, "Study on Maritime Security Financing"

"Carrier Security Charge" to comply with the ISPS Code. Other "terminal security" charges are passed on in a separate manner.[5] Costs can therefore be further reduced through a more integrated maritime security and surveillance in the EU leading to common certifications, standards, interoperability of security equipment, less needs of personnel, etc.

- In the **fisheries control** function, it is estimated that by 2020 illegal, unregulated and unreported (IUU) fishing in selected fish groups and in five large marine ecosystems will cost to the EU €10 billion of lost catches, €8 billion of lost stock value and 27,000 lost jobs in the fishing and processing industries.[6] In reaction to this prediction the EU Fisheries Control System was overhauled, through, inter alia, more harmonisation in information and inspection procedures of Member States, the use of modern data-processing and more communications technologies, and the introduction of new more effective systems for sharing of control data. The impact assessment conducted in 2008 for this new system estimated that through its implementation, enforcement costs at land would be reduced from €146.1 million to €63.7 million from 2010 to 2019 and marine enforcement costs from €88.2 million to €52 million from 2008 to 2017.[7] This example shows that a more integrated surveillance system entailing, as in the new fisheries control system, more harmonisation, sharing of information, and the use of new technologies can reduce the administrative costs of enforcement of this and other functions, while decreasing the losses resulting from illegal activities such as IUU fishing.

  In the **customs** function, a further integration of maritime surveillance and security has potential to tackle more effectively with illegal activities and avert thereby economic losses to the EU and its Member States. For instance, through customs fraud and smuggling, counterfeit products are introduced into the European economy evading therefore import duties. According to UNODC estimates, in 2008, the European seizures from all counterfeit sources were worth roughly €606 million, taking as a reference the 7% rate of interception of counterfeit goods this study proposes, this leaves counterfeit goods for a value of €8.7 billion going unaccounted.[8] Other illegal activities (partly) undertaken through maritime trade such as cigarette smuggling entail as well great losses for the EU Member States, Europol estimates that the losses to national and EU budgets resulting from the smuggling of this type of products amount to €10 billion per year.

- The **border control** and **general law enforcement** tasks also benefit from improved maritime surveillance and security. According to UNODC estimates, in 2008, some 55,000 migrants were smuggled from Africa into Europe for a sum of about €73.4 million.[9].Europol reported two years later, in 2010, a sharp reduction in the use of sea routes for this activity, thanks to the celebration of international agreements and European coordination of law enforcement activities along the maritime border.[10] This shows the potential and benefits of stronger cooperation and coordination initiatives in this surveillance and security function. Illegal immigration leads also to direct costs to the EU budget, such as the €676 million of the return fund, which was established with the 2008 Return Directive to support and assist the return of immigrants. Such costs could be further reduced through an improved cooperation and coordination in the maritime surveillance system.

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[5] Maersk Line, "International Ship and Port Facility Security (ISPS) Code, 1 July 2004.
"http://www.maerskline.com/link/?page=brochure&path=/our_services/security/isps"
[6] Pew Environment group and EFTEC, "the costs of IUU fishing to the EU", November 2008.
[7] European Commission, Impact Assessment on "establishing a Community control system for ensuring compliance with the rules of the Common Fisheries Policy", 14 November 2008.
[8] UNODC, "TOCTA Report", 2010, pp.180-183.
[9] *Ibid.*
[10] Europol, "EU Organised Crime Threat Assessment –OCTA- 2011.

Drug trafficking is another criminal activity that could also be further averted and fought through a more integrated maritime surveillance system. According to the UNODC 2011 report cocaine is trafficked to Europe mainly by sea.[11] The trafficking of cocaine into the EU by maritime containers has reportedly increased in recent years. However, at the same time, the amount of seizures has also declined massively. The amount of seizures is used as an indicator of decrease drug-flows. This is according to the same report partially due to better cooperation and sharing of information with law enforcement counterparts in Latin America.[12] This demonstrates again the potential of a better sharing of information in the fight against drug trafficking by sea.

- As regards the **defence function,** improved maritime security and surveillance can also enhance the effectiveness of operations and more cost-efficient CSDP maritime missions, as in the EU NAVFOR Operation Atalanta to combat **piracy**. The problem of piracy, which has direct effects in the European economy, is estimated to have cost globally in 2010, between €7 and 12 million, taking into account ransoms, insurance premiums, re-routing of ships, security equipment, naval forces, prosecutions, anti-piracy organisations and cost to regional economies.[13] According to recent reports the rate of success of piracy attacks has decreased substantially in the last two years, as a result of deployment of wider deployment of Western Navies and a greater coordination among them.[14] This demonstrates again how better coordination leads to significant better results. An integrated maritime surveillance and security system can foster such coordination and therefore influence positively the outcome of activities under the Defence function.

Growing importance of RFID

The traceability and security of goods supply chains is being improved by implementing new technological developments such as Radio Frequency Identification - RFID. There is a growing interest in Radio Frequency Identification (RFID) applications in different sectors, especially for applications along the supply chain. After retailers began to implement the technology, a fast development of the technology can be observed in the logistics, aviation or pharmaceutical or public sector (RFID Journal, 2007). This sector has been growing at the pace of 30-40% annually over the last few years. It is expected to continue to grow in the coming years at the pace of 15-25% annually. Currently Europe represents approximated 20% of the RFID market. It is expected, however, that Europe's competitive position versus other regions of the world will increase. According to IDTechEx (IDTechEx , RFID Forecasts, Players & Opportunities 2011-2021), in 2016 Europe will have 26,1%, East Asia 37,1%, North America 34,2%, RoW 2,5% of the total RFID Market.

1.2   Regulatory environment

The function of maritime surveillance and security is wide, covering a wide range of public sector activities, from defence to fisheries. Below is included a list of the most relevant regulations at the EU level covering the different user communities outlined by the European Commission in its Communication concerning the establishment of a Common Information Sharing Environment.

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[11] UNODC, World Drugs Report 2011, p.38
[12] *Ibid,* p.38.
[13] One Earth Future Foundation, "The Economic Cost of Piracy". December 2010.
[14] The European Institute "Led by the EU and NATO International Efforts to Stem Maritime Piracy Begin to Pay Off, June 2011.

Maritime Safety –including SAR-, maritime security and prevention of pollution caused by ships

Maritime Safety

The European Union issued a substantive number of regulations concerning surveillance in the field of maritime safety in response to maritime disasters such as the Prestige and Erika which provoked massive oil spills with important economic, environmental and social impacts. It adopted three maritime packages. In the first one, among others, can be found for instance Directive 2002/59/EC establishing a Community vessel traffic monitoring and information system of 27 June 2002[15]. Its aim is mainly to prevent accidents and pollution at sea. It covers all ships with a tonnage 300 gross or superior, with the exception of warships, fishing vessels, traditional ships and recreational crafts of less than 45 meters in length. The Directive provides certain information obligations from the part of the operators, particularly concerning their transport of dangerous or polluting goods. EU countries must subsequently transmit the information to all other EU countries concerned, ensuring the revision, interconnection and interoperability of the national information systems. Directive 2009/17 of 23 April 2009[16] amends the previous Directive and seeks to ensure the interconnection of all Member States via the Community maritime information exchange system SafeSeaNet (SSN), including certain operational measures. For those cases where a Member State undertakes controls on the ships harboured in its ports, Directive 2009/16/EC of 23 April 2009 is applicable. It contains a series of rules to be transposed regarding number, frequency, powers systems and modalities of inspection.

Search and Rescue

As regards, the search and rescue component of the maritime safety function, the Decision 2010/252/EU includes specific guidelines for its performance, with the involvement of the European Agency for the Management of Operational Cooperation at the External Borders.[17] These involve the forwarding of all available information to the Rescue Coordination Centre responsible for the search and rescue in that specific region. Albeit general in its scope, as it covers natural, technological and environmental disasters, the Council Decision of 23 October 2001[18] establishes also a mechanism at the EU level to facilitate cooperation in civil protection assistance interventions. Its four key elements amount to the pre-identification of intervention resources, training programmes to improve response capability, the assessment and coordination teams, and most relevant to surveillance, the establishment of a common emergency communication system. The Commission manages this system and a monitoring and information centre for disaster response.

Maritime security

With regard to security of maritime transport, the European legal framework consists of the Regulation (EC) No 725/2004 of 31 March 2004 on ship and port facility security and the Directive 2005/65/EC of 26 October 2005 on port security, which together aim to secure the entire chain of maritime transport logistics.

The 2004 Regulation requires security assessments of port facilities by Member States and that each national maritime security authority demands from each vessel entering port information about

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[15] Directive No. 2002/59/EC establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EC, of 27 June 2002.

[16] Directive No. 2009/17/EC of 23 April 2009 amending Directive 2002/59/EC establishing a Community vessel traffic monitoring and information system.

[17] Council Decision 2010/252/EU of 26 April 2010 supplementing the Schengen Borders Code as regards the surveillance of the sea external borders in the context of operational cooperation coordinated by the European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union.

[18] Council Decision 2001/792/EC of 23 October 2001 establishing a Community mechanism to facilitate reinforced cooperation in civil protection assistance interventions.

its international ship security certificate and other security measures. This Regulation allows EU Member States to comply in a harmonized manner with their international obligations, since it transposes those parts of the Safety of Life at Sea (SOLAS) Convention containing special measures to enhance maritime security and the International Ship and Port Facility Security (ISPS) Code that is added thereto.

The 2005 Directive on port security aims to enhance the security of port infrastructure from risks such as terrorist attacks. It introduces a security system in all port areas that guarantees a high and comparable level of security in all European ports. Designated national port authorities are responsible for taking the necessary security measures and drawing up port security plans. A sequence of security levels are established depending on the perceived risk (normal, heightened or imminent threat). To monitor Member States' compliance with this Directive and the rest of the EU legislation on maritime security, the Commission carries out security inspections of port facilities and shipping companies in Member States, as provided in Regulation 324/2008.[19] These inspections are prepared and undertaken with the assistance from the European Maritime Safety Agency (EMSA).

Fisheries

Regulation 1224/2009 of 20 November 2009[20] establishing a Community control system for ensuring compliance with the rules of common fisheries policy regulates European surveillance in this specific field. It aims at ensuring an effective and integrated system of control, inspection and enforcement of the fisheries policy. The scope of the control system comprises all fishing activities in Community waters and the fishing activities of Community vessels and EU nationals in Community and non-Community waters. Among others, this Regulation broadens the Commission's powers of inspection, which can in certain circumstances undertake independent inspects without prior notice to the Member States concerned. It also creates a system of mutual assistance and systematic information exchange on controls between Member States and the Commission. The Community Fisheries Control Agency (CFCA) sees also its competences extended to ensure the uniform implementation of the new control system. However, control and enforcement of the Common Fisheries Policy remains still within the exclusive jurisdiction of the states. Regulation 404/2011 further develops the CFP control regulation with detailed rules for its implementation.[21]

Marine pollution preparedness and response; Marine environment

The actions of EU Member States on the field of marine environment are regulated partly through the Directives concerning Maritime Safety and prevention of environmental disasters and partly through the Marine Strategy Framework Directive of 17 June 2008.[22] This Directive is applicable to the waters under the jurisdiction of Member States. Its aim is to establish a framework within which Member States can undertake measures to improve the marine environment. These measures consist mainly in the elaboration of marine strategies, regional cooperation, assessment activities and a series of monitoring programmes.

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[19] Regulation (EC) No. 324/2008 of 9 April 2008 laying down revised procedures for conduction Commission inspections in the field of maritime security.
[20] Regulation No. 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy.
[21] Regulation No. 404/2011 of 8 April 2011 laying down detailed rules for the implementation of Council Regulation (EC) No 1224/2009 establishing a Community control system for ensuring compliance with the rules of the Common Fisheries Policy.
[22] Directive 2008/56/EC of 17 June 2008 establishing a framework for community action in the field of marine environmental policy.

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Directly relevant to marine pollution is Directive 2005/35/EC, as amended by Directive 2009/123/EC "on ship-source pollution and on the introduction of penalties, including criminal penalties, for pollution offences", De directive aims at the development of technical solutions in actions such as tracing discharges by satellite monitoring and surveillance by the MESA in cooperation with the Member States. This directive formed the basis for CleanSeaNet, which is a near-real-time satellite-based oil spill and vessel monitoring service and entered into operation in 2007.

Customs

The legal framework for customs in the EU is based on the Community Customs Code that was first established in 1992. In 2005 amendments were made through Regulation 648/2005 to tighten security for the movement of goods across international borders.[23] They entered into force on December 2006.This followed a growing concern about security threats in international trade, reflected in the Commission Communication on the role of customs in the integrated management of external borders[24]. The 2005 Regulation requires economic operators to provide customs authorities with details of goods before they are imported into the EU or exported from it, through 'one stop shops'. In addition, the 2005 Regulation introduces common methods for risk-assessment analysis entailing uniform selection criteria for controls, based on computerised systems. Through the Export Control System, Custom authorities are required to exchange information on exports electronically with other custom offices participating in the procedure.

To compensate new clearance requirements, the 2005 Regulation also foresees the creation of the concept of Authorised Economic Operator (AEO). Its aim is to ensure a safer and secure end-to-end supply chain, while rewarding reliable traders. For those that achieve this status can thereby obtain an official recognition and benefit from more simple customs procedures and facilitations on new security-related customs controls. An AEO must therefore meet a series of criteria, such as customs compliance, appropriate record-keeping, financial solvency, and where relevant, security and safety standards. This was further developed in Regulation 1875/2006, which amended the implementing provisions of the Community Customs Code in accordance to the new provisions of the 2005 Regulation. Regulation 1192/2008 aligned the rules with those established to obtain the single authorisation for simplified procedures (SASP).[25] Securing an AEO status facilitates the process of obtaining a single authorisation for simplified procedures, for the relevant criteria are considered to have been fulfilled. The AEO is one of the four constitutive parts of the World Customs Organization SAFE Framework of Standards (SAFE).[26]

In 2008, a modernised customs code was agreed and introduced through Regulation 450/2008[27], to follow recent technological developments in the field of customs control. However, the new code can only be implemented once the implementing rules become applicable and it has taken a long time to develop computer systems in line with the rules. The main changes foreseen in the new code are: Rationalisation of the legal framework and the definition of custom rules and procedures; Greater standardisation of customs rules and their implementation through IT systems to manage decisions; simplifications and guarantees related to the rights and obligations of economic operators; simplification of customs procedures and the creation of a centralised customs clearance

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[23] Regulation (EC), No 648/2005 of 13 April 2005 amending Council Regulation (EEC) No 2913/92 establishing the Community Customs Code.
[24] COM(2003) 452 final - Official Journal C 96 of 21.4.2004
[25] The Centralised Clearance or Single Authorisation for simplified procedures is a trade facilitation measure which allows economic operators to use the local clearance procedure or the simplified declaration procedure to perform the customs formalities in the Member State where it is established for his imports/exports from/to any other Member State. The authorisation of centralised clearance depends on agreements between customs authorities.
[26] World Customs Organisation, "WCO safe framework of standards to secure and facilitate global trade", June 2007.
[27] Regulation (EC) No 450/2008 of 23 April 2008

system; IT system for declaration and data exchange; and the Interoperability of national customs systems.

Border Control

The EU regulatory framework of this function is constituted mainly by the Community Code on the rules governing the movements of persons across borders[28] and the Decision adopted to supplement it furthering operational cooperation in the surveillance of the sea external borders.[29]

The Community Code includes in the notion of external borders of the EU sea borders and sea ports, insofar as they are not internal borders. Thus, the rules it establishes for the control of the external borders are also applicable to the field of maritime security and surveillance. *Inter alia,* it contains rules on general and specific checking procedures on maritime traffic and the obligation for the Member States to collect statistics on the border control and transmit them to the Commission, so that it compiles and publishes them every two years.

The Decision provides a set of rules that govern the surveillance of the EU's external borders with operational cooperation between Member States, insofar as the competent European Agency plays a coordinating role. It prescribes *inter alia* the respect of fundamental rights, particular care for vulnerable people, and a series of measures to be taken and respected when a ship or sea craft is intercepted both within the territorial waters and contiguous zone, and beyond in the high seas.

General law enforcement

At the EU level, the European body Europol contributes to the function of general law enforcement in the sea. After its creation by the EU Treaty of 1992, its mandate was expanded progressively until the last Council decision of January 2010. In general, it serves as a support centre for law enforcement operations, criminal information hub, and centre for law enforcement expertise. Its role as a facilitator in the exchange of information among Member States is particularly relevant for surveillance activities in this function Among others, Europol supports certain law enforcement activities of Member States part of their maritime surveillance and security, such as the fight against illicit drug trafficking, illicit immigration networks, terrorism, trafficking of human beings and illicit vehicle trafficking. As an evidence of Europol's progressive involvement in this field, the ongoing project 'Maritime Piracy' focuses on criminal activities related to piracy taking place both in the horn of Africa and in Europe. It also supported regional initiatives in this function such as the Maritime Analysis and Operations Centre -Narcotics (MAOC-N) based in Lisbon.

Defence

The defence function of this component falls mainly under the purview of the Member States, due to its foreign policy and security dimension. It is framed by the Common Foreign and Security Policy (CFSP) and the European Security and Defence Policy (ESDP), which are reflected in Title V of the Lisbon Treaty. It provides a series of obligations of Member States to make civilian and military capabilities available to the Union for its implementation and in certain cases, the establishment of permanent structured cooperation. The Council, and particularly its Political and Security Committee, is the EU institution in charge of taking decisions in this field.

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[28] Regulation (EC) No 562/2006 of 15 March 2006 establishing a Community Code on the rules governing the movement of persons across borders.
[29] Council Decision 2010/252/EU of 26 April 2010 supplementing the Schengen Borders Code as regards the surveillance of the sea external borders in the context of operational cooperation coordinated by the European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union.

Scenarios and Drivers for Sustainable Growth from the Oceans and seas

The EU's current most important action in the field of maritime surveillance and defence is the EUNAVFOR military operation Atalanta. Its goals consist in protecting vessels from the World Food Programme and vulnerable shipping, deterring, preventing and repressing acts of piracy and armed robbery, and monitoring fishing activities off the coast of Somalia. The Council Joint Action 2008/851/CFSP of 10 November 2008 constitutes the legal basis of this operation, in accordance with UNSC Resolutions 1814 (2008), 1816 (2008) and 1838 (2008).

1.3   Strengths and weaknesses for the sub-function

Strengths
- This sub-function is strongly related to public duties and other sub-functions, thus creating a basic demand or political drive;
- Products for security at sea and for surveillance are more in demand than ever with stemming from external pressures such as cross-border threats (e.g. threats to the supply chain, immigration flows, increases in seaborne trade and cross-border crime). .
- Established position of European industry in detection systems and cross fertilization with the defence industry: Many of the products that have been developed in the field of maritime security and surveillance have their origins in strong European producers of military equipment. Because of declining direct maritime military threats to the EU, many of these companies are now moving into the civil security market and can have a first mover advantage over global competitors[30].

Weaknesses
- Fragmented nature of the market: This fragmentation has negative consequences for EU security but also potentially damages competitiveness. Industry lacks clarity about demand which restricts investment.
- Heterogeneous institutional and legal frameworks: this undermines the linkages between different communities of users. Each State has its own institutions and regulations deciding on the confidentiality level, sharing, processing, and protection… of information obtained through the performance of maritime surveillance and security functions. For the higher value activities (platforms and data fusion), varying governance and legal structures across the EU restrict investment. For example, Aerial unmanned vehicles cannot fly in certain restricted areas and institutional structures and privacy laws prevent the efficient sharing of data. Even at the EU level, the functions cut across several areas where the EU has differing degrees of competence, e.g. trade, customs, home and justice affairs, security and foreign policy.
- Limited standards and certification to facilitate the global market: Currently the market is in a state of flux without any recognised leaders. The lack of adequate standards, interconnections and non-technical processes also hinder interoperability of the systems.
- Some Member States are not entirely convinced of the value of pooling data obtained from all these functions. In their opinion, the sensitive character of some of this data may hinder this exercise. There would also be a problem of incentives for the top-hierarchy to agree on sharing data with some of their European counterparts. Furthermore, they considered that much of the data would not be useful for geographical reasons.
- Limited national budgets: The costs of innovative security products are prohibitively high for many small countries and this is particularly the case in the current economic climate.

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[30] For example, French firm DCNS undertook a strategic review in 2009 and started to adapt its military products to the civil domain. One such product is the radar technology used on war ships (e.g. Charles de Gaulle) which has been adapted to maritime surveillance.
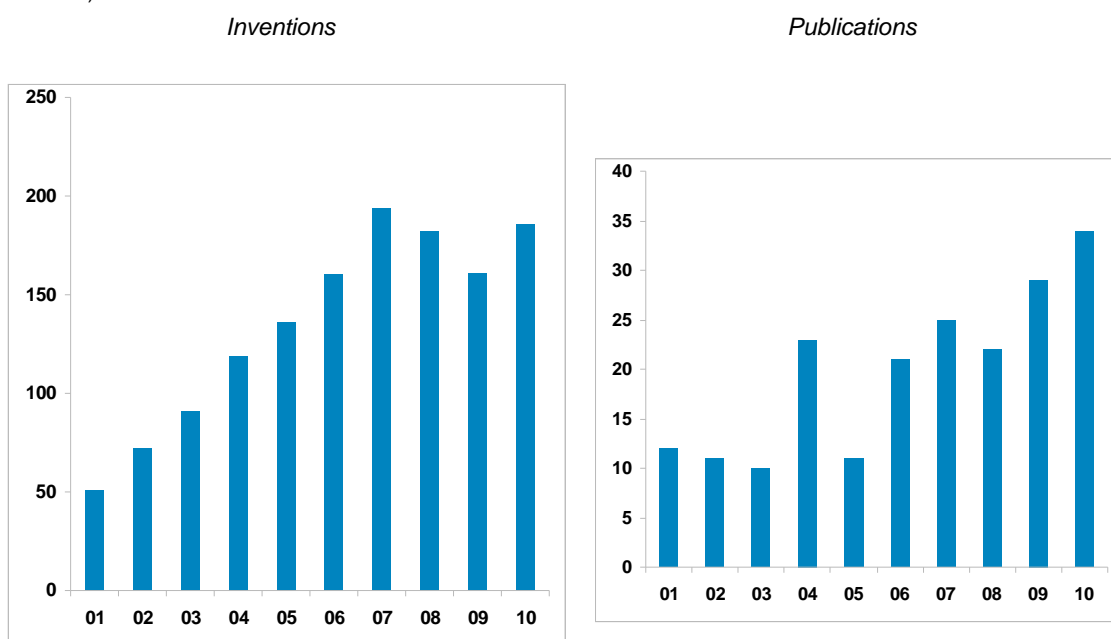
2 Research and technology

2.1 Research & technology patterns

It is difficult to estimate the amount of Research & Technology carried out in the field of Maritime Surveillance and Security, given the wide arrange of different activities it comprises and actors involved. Nevertheless, certain indicators such as the number of inventions, publications, inventions, citations, and patents can provide fair estimates of global trends in research and technology and EU's position.

Table 2.1. Total number of global inventions and publications related to Maritime Security & Surveillance (2001 – 2010)

Inventions   *Publications*

Source: Thomson Reuters

The rising number of global inventions from 2001 to 2007 gives a clear outlook of the increasing importance of Research and Technology in this function. Slight downward trend after 2007 might be related to economic crisis and consequently a decrease in private sector activities. In terms of global publications, the picture is less stable over the last decade.

The table below compares EU-27 countries in terms of patents filed on their grounds, with competing countries (2001–2010). Priority country means the place where the invention was invented and filed.[31]

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[31] Priority country is used in the absence of an inventor country within the patent statistics. The particular field is not present across a good amount of authorities

Table 2.2 Country score in inventions related to Maritime Security & Surveillance

Priority countries	Total inventions (2001 - 2011)	% of global
US	800	35%
EU-27	404	18%
Japan	325	14%
China	153	7%
South Korea	80	3%
Global	2301	

Source: Thomson Reuters

Figures above indicate that the US is leading in terms of inventions, with 35 % of global inventions in this subfunction, compared to the EU-27 countries with 18% of global inventions in Ocean Renewable Energy.

Table 2.3. Country score in scientific citations related to Maritime Security & Surveillance

Priority countries	Total citations (2001 - 2011)	% of global
EU-27	2012	37%
US	1769	33%
Japan	379	7%
China	38	1%
South Korea	0	0%
Global	5422	

Source: Thomson Reuters

Table 2.4. Country score in published papers related to Maritime Security & Surveillance

Priority countries	Total published papers (2001 - 2011	% of global
EU-27	3395	34%
US	2725	27%
China	499	5%
Japan	460	5%
South Korea	126	1%
Global	9934	

Source: Thomson Reuters

Despite the US favourable position in terms of inventions compared to its main competitors, the EU-27 is still leading in terms of published papers from scientists working in the EU and scientific citations related to those papers. Since published papers and scientific citations can be considered a certain indicator for future inventions, the table above can be also interpreted as a positive basis for future EU growth within Maritime Security & Surveillance.

Table 2.5. Top 20 global patent assignees - organizations or individual owners of the patent's invention - are presented in the table below in Maritime Security & Surveillance:

Top assignees	Total number of patents filed (2001- 2011)
MITSUBISHI GROUP OF COMPANIES	50
BOEING CO	18
TERAHOP NETWORKS INC	18
FURUNO DENKI KK	16
IBM	13
SAVI TECHNOLOGY INC	11
MITSUI ENG & SHIPBUILDING CO	10
FUJITSU LTD	9
HITACHI	9
JAPAN RADIO CO LTD	9
NEC CORP	8
INNOVATIVE AMERICAN TECHNOLOGY INC	7
INTELLIGENT DEVICES INC	7
GENERAL ELECTRIC CO	6
HONEYWELL INC	6
QUALCOMM INC	6
SIEMENS	6
SYSTEM PLANNING CORP	6
UNIV SHANGHAI MARITIME	6
DEUT ZENT LUFT & RAUMFAHRT EV	5

Source: Thomson Reuters

The tables above demonstrate that the EU is well represented in number of publications on this issue. The EU scores good results in academic research, whereas its filing of patents for inventions is well below other global competitors. Inventions are largely dominated by technology firms from the USA and Asia.

2.2 Overview of the main European research projects[32]

R&D in maritime security and surveillance is mostly funded by public authorities, given the strategic and sensitive importance of the sector and the public character of many of the tasks that are supported by surveillance information. This R&D funding is strongly rooted in military and security spending. As mentioned above, in point 1.4, often maritime surveillance and security technologies designed for the military sector are transferred and adapted to the civilian one. The civilian market is foreseen to expand, as the needs for maritime security and surveillance increase and the role of the military performing these functions is constrained by budgetary and legal considerations. Among the research domains touched upon are sensor technology (monitoring technology); unmanned observation techniques, satellite imaging and data integration/fusion, system integration… as outlined in part 2.2 –technological developments-.

 In the current research framework programme (FP7) there is a large budget for research on security (€1.4bn) of which a significant amount is spent on maritime security projects. Annex 3 lists relevant projects related to maritime security and surveillance. Two current projects that concentrate on the integration of different technologies to allow the sharing of information for improved border control are particularly interesting: the I2C and the Perseus project –see box below-.
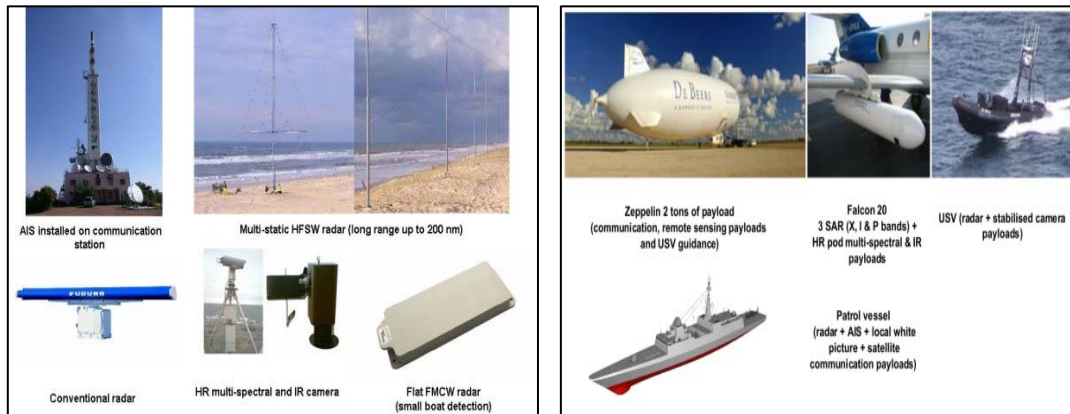
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[32] Including among others FP6 and FP7 projects

I2C

The I2C research project (*Integrated System for Interoperable sensors & Information sources for Common abnormal vessel behaviour detection & Collaborative identification of threat*) integrates key technologies in maritime surveillance to early identify and report on threats to border security.

Data collection is ensured through various shore and mobile based platforms. Shore platforms include conventional coastal radars, optical cameras, long range radars, frequency modulation radars and AIS networks on coastal stations. Mobile platforms include Zeppelin aircraft, instrumented aircraft and vessels, Unmanned Surface Vessels, processed satellite imagery and space based AIS. The type of system depends on the geographical scale: Conventional radars and AIS are used for coastal waters whereas mobile platforms and satellites are employed for the high seas. Several shore and mobile based platforms are illustrated in the figures below. The data is then fused through new IT systems that allow a complete picture of maritime activity. All vessels above 10 metres can be tracked and when there is any abnormal behaviour an alert is registered, after which the relevant authorities can take action.

**Figure 2.1: Shore and mobile based senor platforms used in the I2C Community funded research project**

Source: Morel and Claisse (2009)

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PERSEUS

Even more ambitious than I2C is the Perseus project that was launched at the beginning of the year (January 2011). With a total budget of €42 million to be spent over four years, the project addresses all aspects of maritime surveillance including technological, regulatory, economic and international cooperation factors. The overall objective is to demonstrate and validate recommendations for the European wide integrated maritime border control system, which will be developed according to the principles of subsidiarity (see Chapter four) Its aim is to integrate existing maritime surveillance systems into a 'system of systems' that provides consistent surveillance from the high seas to the coasts. It has three types of partners; technological partners that build on existing systems, service partners that provide information, training exercises, and analysis of the legal and policy context; and the potential users of the new system of systems, including coastguards, military and police authorities. There are two demonstrations of the system planned in the Western Mediterranean in 2013 and the Eastern Mediterranean and Aegean Sea in 2014. One of the important results of the project will be to inform the proposed Common Information Sharing Environment (CISE) that DG Mare of the Europe Commission is currently testing with two pilot projects called BLUEMASSMED in the Mediterranean and MARSUNO in the Northern Seas (see Chapter four).

Figure 2.2: The architecture of the PERSEUS FP7 funded research project
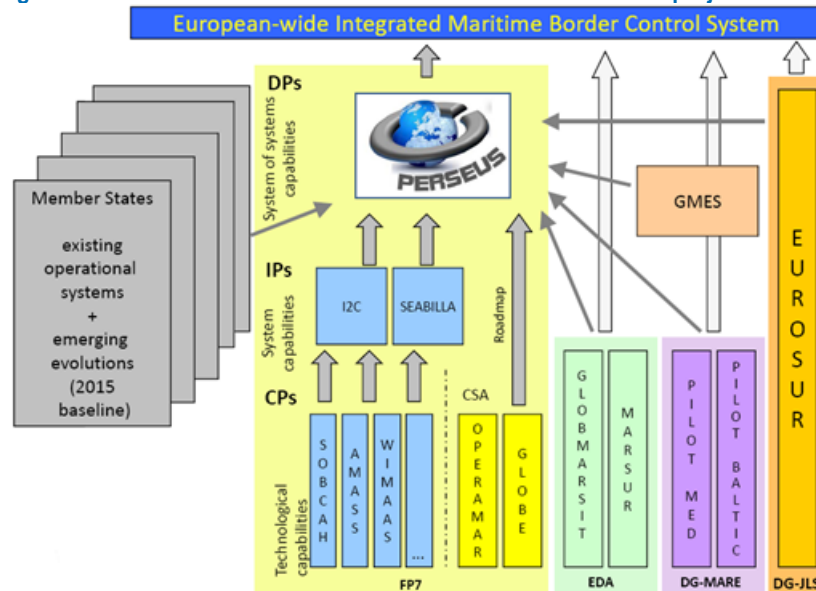
Source: http://www.perseus-fp7.eu/, accessed 28th July, 2011

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The table below present an overview of the main security related projects that are funded on the EC's Framework Programmes.

Table 2.6. List of security related research projects

acronym	budget	funding programme	Website	research area / short description
PERSEUS	€47,300,000	FP7 Security	http://www.perseus-fp7.eu/	Integrated Maritime Surveillance
I2C	€15,962,707	FP7 Security	http://www.i2c.eu/	Interoperable sensors and information sources
SEABILLA	€9,840,000	FP7 Security	http://www.seabilla.eu/cms/	Control of Maritime Borders
AMASS	€4,970,709	FP7 Security		Autonomous Maritime Surveillance System
SOBACH	€3,007,109	FP6		Surveillance of Border

acronym	budget	funding programme	Website	research area / short description
		(PASR)		Coastlines and Harbours
WIMASS	€4,000,000	FP7 Security		Wide Maritime Area Airborne Surveillance
OPERAMAR	€669,132	FP7 Security		Interoperable Approach to Improve the supply chain for Container transport and integrated security simultaneously
SECCONDD	€533,628	FP6 (PASR)		Secure Container Data Service Standardisation
SECTRONIC	€7,080,433	FP7 Security	http://www.sectronic.eu/	Secure System for Maritime Infrastructure, Ports and Coastal Zones
UNCOSS	€4,260,000	FP7 Security		Underwater Coastal Sea Surveillance
EFFISEC	€16,360,000	FP7 Security		Efficient Integrated Security Checkpoints
IMCOSEC	€1,140,000	FP7 Security	http://www.imcosec.eu/	Integrated approach to Improve the supply chain for Container transport and integrated security simultaneously

Recent technological developments revolve around two considerations:

- The platforms where sensors can be housed in order to collect the best data picture. In particular, mobile platforms such as vessels or aircraft (e.g. Zeppelins) provide much more complete information than static platforms based on shore. The most advanced type of mobile platform is a form of Unmanned Aerial Vehicle (UAV) that is currently being considered by FRONTEX as part of the EUROSUR border surveillance initiative (see Chapter 4). UAVs are already used for military purposes and there are two types under consideration: Drones and Remotely Piloted Vehicles (RPVs). Both types of aircraft are pilotless but drones are programmed in advance for autonomous flight whereas RPVs are remotely flown on the ground.
- IT systems to integrate different data sources and provide threat alerts when vessels act abnormally. These systems have been developed notably by the FP7 Security programme (I2C and PERSEUS). However, they still need to be tested and the security of the systems needs to be watertight if they are to be used to exchange information between authorities in different countries.

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3   Future developments

3.1   External drivers and key factors affecting the performance of the cluster

### 3.1.1   External drivers

Security threats

The global rise in maritime security threats drives demand in this sub-function. Security concerns have in general risen since the 9/11 terrorist attacks in the United States. Although this mainly affected the aviation security market it raised awareness for all aspects of security. Several experts who were interviewed for this sub-function said that following crisis theory, it may be that a large terrorist attack launched from sea could be necessary to focus minds on the need for increased maritime security.

Security is highly conditioned by external events, which is illustrated by the consequences of the current 'Arab Spring'. The revolutions that have occurred in North African states have led to a significant increase in the movement of people, and many have attempted to enter the EU illegally, landing in Malta and the Italian island of Lampedusa.

Regarding maritime transport the greatest security risks have resulted from the increase in container transport, which is vulnerable to terrorist activities and illegal movement of goods. The ability of ports to scan all containers while remaining efficient and cost-effective has led to demand for new scanning technologies (EC 2010).

International shipping has also been highly affected by piracy in recent years. Modern pirates operating in places like the Somali coast has increasingly affected vessels at crucial locations in international shipping routes (see figure 3.1, below).

Figure 3.1: Total number of global piracy attacks 2006-2009
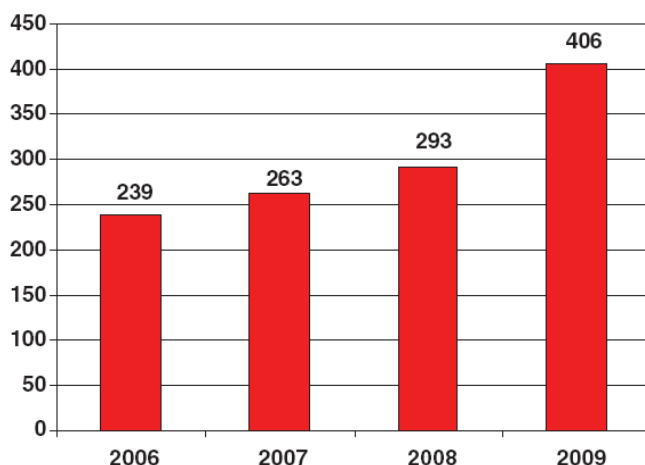
Source: Marlow 2010

Crucially, many of the new security threats have origins that go beyond EU borders and therefore maritime security and surveillance is also linked to the domains of foreign policy and intelligence. Failure to prevent the threats arising in the first place increases the need to security and surveillance products.

Monitoring of regulation/enforcement of environmental policies: oil spills, fishing…

Problems such as illegal, unregulated and unreported fishing (IUU) and oil spills have important cross-border effects in Europe. Disasters such as the Erika and the Prestige prompted the Commission to issue a substantive number of regulatory proposals and initiatives, covering among others surveillance. The progressive depletion of the fish stocks has also driven the Commission to reinforce its fisheries control system, emphasizing on the cooperation and coordination among Member States and the use of communication technologies. Both needs will thereby drive demand for more integrated surveillance and communication systems in this sector.

Population growth, regional economic disparity at world level, and subsequent migratory movements

Between the years 2000-2050 population is projected to grow from 6.1 billion to 8.9 billion people, increasing thereby by 47 per cent.[33] As the UN report notes, this demographic change will take place largely in less developed regions, the latter will account for 99 percent of the expected increase in the world population during this period[34], inevitably, and this will produce and increased pressure on the existing resources and provoke further migratory movements towards more developed regions. Member States and the EU as a whole will struggle to cope with increased migratory pressures on their borders, particularly in those bordering the least developed regions such as Africa. Thus, they will see improvements in the area of maritime surveillance and security through new developments such as the integration of their surveillance system and their development and demand of new products.

Armed conflicts

The above-mentioned increase in population, and the resulting disputes for resources such as land, water, and other commodities, may lead in some instances to armed conflicts. EU Member States will probably be affected by their consequences, in the form of strong movements of refugees, rise in cross-border organised crime originating from lawless states, humanitarian concerns, and higher prices of commodities such as oil… The EU will then have two options to tackle with these problems. It can either attempt to stop them at its own borders, through effective surveillance and security systems, or decide to intervene directly in the conflicts through its European Security and Defence Policy missions. Both options will demand further coordination and integration of maritime surveillance and security systems. Armed conflicts can therefore be seen as an important external driver affecting this cluster.

Further EU political integration

In the course of the last years, the EU has achieved a stronger political integration in the domains covered by the former second and third pillars: common foreign and security policy and police and judicial cooperation in criminal matters. This integration materialized in the Lisbon Treaty, which includes new provisions strengthening EU's competences and Member States' cooperation in these areas. To further this integration and strengthened cooperation, the Member States have created and reinforced EU agencies with competences in maritime surveillance and security, such as FRONTEX, EMSA, and CFCA. Other systems and initiatives in this field, such as EUROSUR, are being currently developed. Hence, it can be foreseen that the ongoing and future progresses on political integration also drive the maritime and security function.

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[33] United Nations, "World Population to 2300", 2004. p.4.

[34] *Ibid.*

Public procurement

In the area of maritime surveillance the crucial driver for demand is the ability of governments to procure the new technologies that are developed. With the economic recession, the European military budgets and thereby, the naval assets and capabilities have shrunk. Many countries cannot afford the increasingly sophisticated and costly products. There has been some procurement at EU level by FRONTEX following legislation allowing for this but industry is still unsure about its future extent. For SMEs developing smaller scale products the national markets can stimulate demand. However, the financial crisis and increased public debt has led to a decrease in orders.

Entry to the market of emerging countries

The security market is currently dominated by European, North American and Japanese companies. These markets can be easily monitored but it is the competitive entry of emerging economies which pose the greatest risk to EU industry. This risk is increased because there are no current international standards and certifications to structure the market.

3.1.2 Key factors

In addition to external drivers key factors are distinguished which play an important role in shaping the future of the function. These key factors are established on the basis of a review of relevant literature and the interviews that have been conducted.

Research and innovation

The development of the security and surveillance market depends heavily on new research because technologies are still not mature enough to meet the needs of government and private companies. In particular, given the heterogeneous data collection technologies and platforms there is a need for powerful systems that can integrate the different data sources.

Bringing research to the operative domain

For some segments of the security market the technology already exists but issues of regulation and substitution prevent it from being operationalised. In other words there needs to be development as well as research.

Development of a business model

For some of the emerging areas in the security market the business model is not yet clear. For example, in maritime surveillance it could be the sensors to collect data or it could be the data itself, hindering its commercialisation potential.

Role of the state and political will

The role of the state is vital in providing industry with clarity and confidence to make the required investments. In particular, the fragmentation of the market along sectoral lines and between government authorities means that the critical mass and political will does not yet exist to stimulate more activity. However, this is changing because of the efforts of the European Commission to integrate national activities and markets (see Chapter four)

Intelligence versus security

In some parts of Europe intelligence is more advanced and reduces the need for more surveillance equipment. The relationship between intelligence from the source of the threat versus the 'hard' security approach is both complementary and conflicting. This is another factor that fragments the market within Europe along national lines.

3.2 Assessment of the European industry's response capacity to new challenges and commercialisation potential

European industry has the potential to develop and implement world leading technological solutions to the challenge of maritime security and surveillance. This market has a strong R&D basis rooted in military and security spending. The technologies and the technological capacity are in place and were often built up through defence spending.

However, it is hampered by a number of significant constraints, most notably the heterogeneous nature of the market across different sectors and countries. The maritime surveillance and security sector is largely dominated by the public sector, e.g. military, coast-guards, safety and rescue services... As a result, the development of a business model for this market is difficult. The lack of mature business models limits therefore the response capacity of the European Industry. The sectoral problem means that technologies that are developed do not necessarily lead to substitution.

The international constraint that is characterizing much of the surveillance activities is potentially more limiting because more efficient surveillance requires the exchange of sensitive information between national authorities, which touches on sensitive issues of sovereignty and differences in legal systems surrounding privacy of data.

A further constraint is the above-mentioned government-based character of maritime security and surveillance activities. Thus, it is political rather than market driven and subsequently prone to public budget cuts. The involvement of different types of bureaucracies: civil and military, can also entail a slow response.

There is however an important potential for efficiency gains and further commercialisation of technological solutions in this market insofar as progress is achieved concerning interoperability and integration of different systems. The realization of this potential will also rely on the effective involvement of many maritime sectors and players making implementation complicated[35].

3.3 Most likely future developments

The demand for maritime security and surveillance products is likely to increase in the coming years and thus this will be an important area of growth for the European economy. However, the development of integrated maritime surveillance will depend heavily on whether a European system of data sharing can be adopted (see Chapter 4). It is likely that this will first start at the level of sea basins, following the success of several pilot projects. There will be many years of institutional learning and political negotiation before a fully functioning European integrated maritime surveillance area can be implemented.

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[35] Although in a different domain a study on an ocean observing system that follows an integrated versus a fragmented approach would save several hundreds of millions of dollars in the US. In addition, commercialization potential of public information might also be significant. (see IA EMODNET, EC 2010).

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3.4   Impacts, synergies and tensions

The impact of increased maritime security and surveillance will generally be positive for most other functions of the maritime economy. These impacts will be particularly high in sea basins with greater security threats, notably the Mediterranean and Atlantic areas. The main tensions foreseen are:

- The location of sensors on shore can face similar problems to wind turbines in terms of their negative impact on the landscape.
- Increase surveillance raises issues of privacy because there is a danger that the information is misused. IT systems could be hacked by criminal organisations which would paradoxically increase the security threat.

4 Role of policy

4.1 Policy and political relevance

Maritime security has enormous policy and political relevance because as explained in Chapter 1, the benefits extend far beyond new products and employment. There are significant marginal efficiency gains to be made through a better organisation of maritime security and surveillance between government agencies and across Member States in the EU. Moreover, controlling the seas and oceans is vital for all other maritime activities as well as for foreign policy. According Michel Morel from French firm DCNS, "There will be two types of countries in the future; those that control the seas and those that do not. Those that do control them will be dependent on those that do. That is the challenge for Europe, not to become dependent on other superpowers such as the US and China". However, security and surveillance are very politically sensitive subjects that affect national sovereignty and privacy laws, making it as much a legal and political issue as a matter of technical capabilities.

4.2 Domains for EU policy

The main issue for an EU policy agenda in the area of maritime security and surveillance is the fragmentation across sectors and between countries. Heterogeneous institutional and legal structures undermine the linkages between different communities of users.

The lack of adequate standards, interconnections, non-technical processes and procedures limit interoperability. One are of EU policy intervention could hence be to unleash more private investment by reducing some of the burdens mentioned above. Notably, by providing a more standardised institutional and legal framework for the data transfer of sensitive surveillance and security data in that sub function. Besides, by facilitating the standard setting process and introducing EU-wide certification, EU companies could increase their competitive advantage and their interoperability. A further aspect identified may be an increasing awareness raising of the potential benefits of sharing data between Member States and EU level by overcoming some of the concerns related to the transfer of sensitive data. Further to that, overall limited national budgets, also impacting on security surveillance may be put further on the European agenda.

These issues were noted already by the Commission's Communication on the integration of maritime surveillance Green Paper on a future EU Maritime Policy, which identified the need to rationalise the off shore activities and create an Integrated Maritime Information and Surveillance Network. Since then the Blue Paper on an Integrated Maritime Policy (IMP) identified the objectives of cross border cooperation of offshore activities and the integration of surveillance systems as crucial for the IMP overall.

There have been several initiatives at EU level for the different sectors, including:

- Vessel Monitoring and Vessel Detection Systems (VMS and VDS) monitors and controls fishing.
- In customs all modes of transport including maritime are required to submit pre-arrival and pre-departure declarations, supported by the Import Control System (ICS) and Export Control System (ECS).
- With regard to safety at sea, there exists the SafeSeaNet initiative –see case-studies-.

- Anti-drug trafficking has been addressed by two intelligence driven platforms: The Maritime Analysis and Operations Centre-Narcotics (MAOC-N) is an intergovernmental intelligence exchange initiative to counter drug-smuggling in the Atlantic from Latin America. CeCLAD-M is a French government sponsored anti-drug platform that integrates intelligence from different authorities in the Western Mediterranean.

These initiatives and pilot projects have been useful in generating cooperation between countries. However, the real added value of European policy is to integrate different sectors. An example is EUROSUR, which is the EU's developing border surveillance system –see case-studies-.

Another issue shaping the EU policy agenda in this area, as in the area of security as a whole, could be how to facilitate the development and commercialisation of products through the use of pre-commercial procurement. In areas as technologically advanced as surveillance and security, companies –particularly small ones- find it difficult to transition from technology development to full commercial development of products.[36] The public sector, by means of pre-commercial procurement, can support this transition. It can adopt forward-looking procurement strategies, whereby R&D procurement is undertaken regarding challenges for which there still exists no commercially stable solution in the market. This could be done in part through revised public procurement rules and its inclusion in the European Handbook for Security Procurement. The Commission is increasingly emphasizing this area, as show in the Commission Communication on Pre-Commercial procurement,[37] where it defines the latter as "the Research and Development (R&D) phase before commercialisation".

4.3 The process for future developments in this area

It becomes clear that there is a potential benefit from a further expansion and integration of surveillance information, in a number of areas:
In performing the surveillance process:
- Improved interoperability and reduced fragmentation
- Reduced overlap in data collection
- Enhanced economy of scale
- More comprehensive data integrated improving situational awareness;

Impacts of improved surveillance information on operational tasks:
- Per domain/community
- Improved information along the chain. More effective border control
- More effective (and efficient S&R): less accidents/fatalities at sea, decreased material damage
- Improved oil spill control: less environmental damage
- Enhanced threat of counter response to privacy (more effective interventions): reduced privacy occurrences.
- Etc, etc.

An example of the possible longer term future of an integrated of Maritime Surveillance and Security system can be found in the process of progressive integration of Air Traffic Management in Europe.

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[36] Ecorys, "Study on the Competitiveness of the EU security industry", 15 November 2009, p.77.
[37] European Commission, "Communication on Pre-commercial procurement: Driving innovation to ensure sustainable high quality public services in Europe", SEC (2007) 1668, 14 December 2007.

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Air traffic Management in Europe

In response to increased air traffic and subsequent problems and delays air traffic control in Europe became progressively integrated. This was facilitated by Eurocontrol, an organisation which was created specifically for such purpose. The first steps taken to integrate air traffic control in Europe consisted in the launching a European Air Traffic Control Harmonisation and Integration Programme (EATCHIP) in 1990 –which became in 1999 the European Air Traffic Management Programme- and the creation of a Central Flow Management Unit . Through more centralisation, harmonisation and integration of air traffic, the European air space capacity was increased, delays reduced and costs cut down. To further such progresses and in reaction to the September 11 terrorist attacks, the EU adopted the ATM 2000+ Strategy, which sought to create a seamless European air traffic management system. This strategy prompted new operational improvements and important research programmes such as SESAR in 2007, which aims at developing a new generation of European Air Traffic Management System. The successes achieved drove further European efforts in this area and ended in the adoption of the Single European Skies Legislative Packages I and II. Through these initiatives, the European Airspace came closer to the overall goal of achieving its centralised organisation and management, responding to environment and cost-efficiency concerns, and promoting common ATM regulations across Europe.

The integration in the field of control of civil aviation spilled over others such as surveillance, The Eurocontrol Provisional Council approved the ATM Security Policy Guidance, promoting thereby a number of technical improvements leading inter alia to better data exchange between military and civil facilities. A Surveillance Strategy for the European Civil Aviation Conference was also adopted to advance on a seamless and cost-effective surveillance across the European Civil Aviation Conference Member States. This would be achieved through an interoperable surveillance equipment, which would allow for the exchange of surveillance information from ground-to-air, air-to-ground, air-to-air and gate-to-gate.

The integration of Maritime Surveillance and Security can draw from this process certain lessons. First, the integration in the field of maritime surveillance will come in a piecemeal manner, initially limited to certain functions and geographical areas, as was the case for Air Traffic. Recent initiatives such as Eurosur, which takes Mediterranean basin as a standpoint, demonstrate the current use of this approach. Second, a strategy on this field needs to be agreed among EU Member States from the beginning to provide a basis and guidance for future operational developments and legislative proposals. Third, the important results achieved thanks to further integration and interoperability of systems in air traffic management forecast the potential gains that can be achieved through the promotion of integration and interoperability in the field of maritime surveillance. Fourth, the existence and role of the European Agency Eurocontrol encouraging, facilitating, managing and pushing forward further integration of air traffic management in Europe proved instrumental in making progress in this area. In the field of maritime surveillance there exist currently several different types of agencies. Thus, the establishment of a single agency, or a stronger cooperation and coordination amongst them may lead to better results.

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Annex 2 Stakeholder catalogue

Interviewee	Organisation	City/country	Specific theme	Face to face, or telephone
Nicola Iarossi	EOS	Brussels, Belgium	Overview of industry	Face to face
Jacques Mouysset / Michel Morel	DCNS	Brussels, Belgium / Toulon, France	Economic and technical aspects of industry	Face to face
Prof. René Leray	University St Louis	Brussels, Belgium	Development of CISE	Face to face
Prof. Georges Estievenart	Sciences Po, Paris	Paris, France	Maritime surveillance and narcotics	Face to face
Lennart Dreier	Swedish Coast Guard	Brussels, Belgium	MARSUNO pilot project	Face to face
Robert Light	DG TAXUD, European Commission	Brussels, Belgium	Customs aspects of surveillance	Telephone
Jean-Francois Mirigay	CE-CLAD	Toulon, France	Governance of surveillance	Face to face

Annex 3: Table of cross-links and synergies

Function affected	General	Baltic	North Sea	Medite-rranean	Black Sea	Atlantic	Arctic	Outer most
1. Maritime transport and shipbuilding	++	+	+	++	+	++	+	+
2. Food, nutrition, health and eco-system services	+	+	+	+	+	+	+	+
3. Energy and raw materials	++	+	+	++	+	++	+	+
4. Leisure, working and living	+	+	+	+	+	+	+	+
5. Coastal protection	+	+	+	+	+	+	+	+

Key to table:

++ = Strong positive impact on other subfunctions/sea basins expected

+ = Considerable positive impact on other subfunctions expected

0 = Negligible impact on other subfunctions/sea basins expected

- = Considerable negative impact on other subfunctions expected

-- = Strong negative impact on other subfunctions expected

This study considers that the maritime surveillance and security function would have a particularly strong positive impact on the Maritime transport and shipbuilding function taking place in the Mediterranean and the Atlantic. For, most of the dangers and security threats the latter function faces, such as terrorism, crime, and sea accidents happen in these two sea-basins.

The energy and raw materials function would also be very positively affected by improvements in the Maritime surveillance and security function, as regards the Mediterranean and Atlantic basins. The majority of the energy and raw materials supply routes to Europe pass through these two basins. Hence, better surveillance and security in these areas can only result in more secure energy and raw materials routes.

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