

Policy Research Corporation

Terms of Reference
Towards a Maritime Knowledge and Innovation Community
European Institute of Technology

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I. EXECUTIVE SUMMARY

For the European Commission the stimulation of innovativeness is a primary concern to secure Europe's position in the world. By formulating the Lisbon Strategy, the Commission has worked out several action programmes on this matter. In the midterm review of the Lisbon strategy the Commission initiated the creation of the European Institute of Technology (EIT).

The EIT follows the example of well known top institutes in the world, like MIT, although the EIT will be differently organized. The EIT will be structured as a network organization built on Knowledge and Innovation Communities (KIC's). These KIC's are meant to be strategic partnerships between knowledge institutes (universities, knowledge institutes), businesses, government parties, etc. The objective of the KIC's is to deliver solutions that help the EU to face today's and tomorrow's challenges, such as climate change, sustainable mobility, energy efficiency or the next generation of information and communication technologies (ICT).

The European Network of Maritime Clusters and the Waterborne Technology Platform are of the opinion that there is a window of opportunity for the maritime industry, the marine side and Europe as a whole by proposing the establishment of a Maritime KIC. A Maritime KIC will bring better coordination and cooperation between the maritime and the marine world within Europe and an improved interaction between the 'knowledge' side of the maritime and marine fields and the 'application' side. By doing so, interaction can be arranged, so that knowledge diffusion between the maritime and marine side and into the maritime industry can be enhanced. Consequently this will lead to the acceleration of innovation, more

radical innovations (on subjects such as climate change, sustainable mobility, energy efficiency or ICT), and ultimately to new competitive advantages for the maritime cluster. In this way Europe will have double benefit, less environmental impact of the industry and a healthy maritime industry, securing jobs, capital and knowledge on the European continent.

The establishment of a Maritime KIC is fully in line with the Integrated Maritime Policy. The policy acknowledges the importance of maritime activities, but is also drawn from the environmental (marine) perspective. In order to get better insight into the impact the industry has on the environment, the Commission is in need of a solid maritime and marine knowledge base. A Maritime KIC will be *the* instrument to integrate maritime and marine research for providing a multi-disciplinary knowledge base.

For the Maritime KIC to succeed, strategic partnerships must be formed by individuals, based on excellence in maritime and/or marine research. Only the best should be eligible for participating. In this way the Maritime KIC can act as a magnet for excellent students, researchers, and lecturers and ultimately resulting in a lasting culture of excellence that will facilitate finding solutions to Europe's challenges of tomorrow.

II. INTRODUCTION

II.1. OBJECTIVE OF THIS STUDY

The objective of this document is to define the Terms of Reference (ToR) for a study on a Maritime Knowledge and Innovation Community (Maritime KIC). The assignment to draft a ToR was commissioned jointly by the *Waterborne* Technology Platform and the European Network of Maritime Clusters. This document defines the vision for a Maritime KIC, as it has been formulated jointly by the participants of the *Waterborne* Technology Platform and representatives from the marine side. This ToR is based on the latest policy statements of the European Commission on the European Institute of Technology (EIT) and the concept of KIC's. This document is a starting point of a process towards a Maritime KIC. The next step would be the presentation of this proposal to the European Commission and to find funding for an in-depth study on the establishment of a Maritime KIC.

II.2. THE EUROPEAN INSTITUTE OF TECHNOLOGY AND THE CONCEPT OF KIC'S

a/ The background of the EIT

Innovation is necessary for Europe to remain competitive in the world economy of tomorrow. Therefore innovation is a high priority, set by the European member states in the Lisbon agenda for Growth and Jobs. In order to stimulate innovation within the European Union, the Lisbon agenda was drawn by the member states. In the midterm review of this agenda in 2005 the establishment of a European

Institute of Technology (EIT) was proposed by the Commission¹. The EIT will be structured as a separate European Community body and will have the objective to enhance European competitiveness and contribute to sustainable economic growth by reinforcing the innovation capacity of Member States and the Community. It shall do this by promoting and coordinating innovation, research and higher education (the elements of the so-called knowledge triangle) at the highest levels by means of strategic partnerships among Europe's best business, research and higher education actors. These partnerships will be instrumental in strengthening as well as developing new capabilities and generating tangible solutions to major social, economic and environmental challenges within the European Union.

b/ Strategic objectives of the EIT

The EIT shall identify main priority areas² (to be determined by the strategic innovation agenda) and work on the following strategic objectives:

- Raise awareness among potential partner organisations and encourage their participation in its activities
- Select and designate KIC's in the priority fields in accordance with Article 7 and define their rights and obligations by agreement; provide them with appropriate support; apply appropriate quality control measures; continuously monitor and periodically evaluate their activities; and ensure an appropriate level of coordination between them
- Mobilise funds from public and private sources and use its resources in accordance with this Regulation. It shall in particular seek to raise a significant and increasing proportion of its budget from private sources and from income generated by its own activities;
- Encourage the recognition of qualifications awarded by universities which are partners in the KIC's and bear the EIT mark in the member states;
- Promote the dissemination of good practices for the integration of the knowledge triangle in order to develop common culture of innovation with a high level of knowledge transfer;

¹ Communication to the Spring European Council, “*Working together for growth and jobs, a new start for the Lisbon Strategy*”, Communication from president Barosso, 2-2-2005

² Legislative act: *Common position adopted by the Council...establishing the EIT, doc.no: 2006/0197, 15647/07 EIT 23, Brussels 11-01-2008*

- Seek to become a world class body of excellence in innovation, higher education and research;
- Ensure complementarity and synergy between EIT activities and other Community programmes;
- Complement existing national and regional policies, instruments and networks in the field of innovation, research and higher education in Europe.

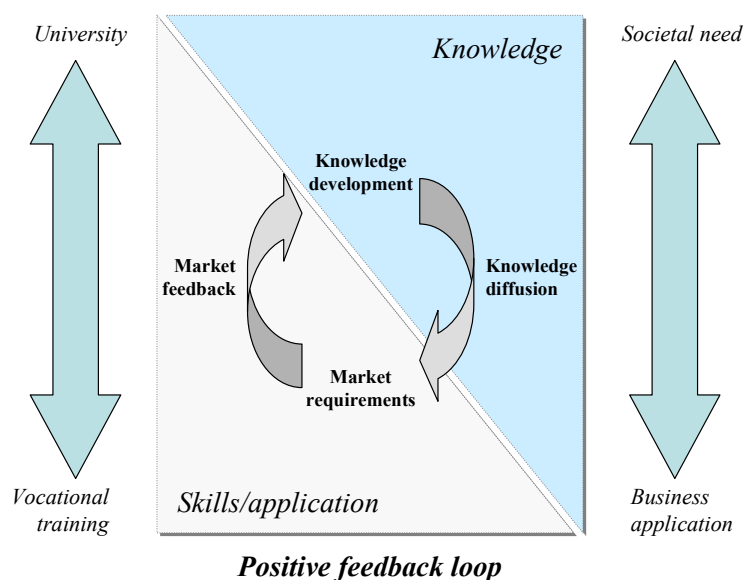
c/ Knowledge and Innovation Communities

The EIT will not be structured as an initiative for Europe's leading knowledge and innovation communities to collaborate under the EIT. A "Knowledge and Innovation Community" (KIC) is a (legal) autonomous partnership of universities, research organisations, companies and other stakeholders in the innovation process, i.e. bringing the scientific system and the business world closer together. The creation of partnerships enables the diffusion of knowledge within the maritime industry.

The partnership must be structured in a strategic network with a joint mid- to long-term innovation plan designated to achieve the EIT objectives in a specific area. In the KIC public funding will be attached to research categories and by generating synergy effects of cooperation it is meant to motivate private business to more R&D spending within the KIC. This can generate a higher leverage effect of public spending, and consequently the creation of more business applications (by applied research).

KIC's undertakings must include education and training activities at master and doctoral level. By linking research to education and training activities, further diffusion of knowledge is enabled. The combination of knowledge diffusion and business applications creates a positive feedback loop thereby creating value. Moreover, in this way long term competitive advantages for the industry can be created. The added value of a KIC will be to enhance this process in the entire value chain of an industry. Capabilities originate from knowledge transferred into skills that are not easy to copy and distinguish a certain company/industry from competitors.

Figure 1 : Knowledge diffusion and market requirements



Source : Policy Research Corporation

d/ Best practices: Massachusetts Institute of Technology and Rolls-Royce

A good example of an institute that has become a leader in developing strategic partnerships between university, businesses and the community is the Massachusetts Institute of Technology (MIT, ranked 4th best academic institute of the USA, 5th best of the world³, research to be awarded with 74 Nobel prizes). The European Commission took MIT as example when the concept of the EIT was launched. The idea behind the partnerships created under the umbrella of the MIT is that an alliance between universities, industry, government and entrepreneurs leads to the development of new knowledge and technologies, the education of a highly skilled work force to apply these new technologies (creating new capabilities) and the creation of the next generation of researchers to carry on the process of discovery and development.

³ Academic Ranking of World Universities, 2007, Institute of Higher Education, Shangha Jiao Tong University

Of course, the MIT's network is the result of a long history, a long line of successes and failures. But at least it provides a point on the horizon and sets the ambition for the EIT and a Maritime KIC. The EIT and the Maritime KIC can draw important lessons from the MIT-example and other top institutes in the world that use strategic partnerships for integrated research approaches (e.g. Stanford, Princeton, etc).

MIT examples of enhancing the knowledge triangle (source: www.mit.org)

Biomedical Enterprise Program

Offered by MIT Sloan School of Management and the Harvard-MIT Division of Health Sciences and Technology, the Biomedical Enterprise Program leads to an MBA and an SM in Health Sciences and Technology. The program prepares biomedical entrepreneurs and managers to transform scientific discovery into patient-oriented, commercially successful products and services.

The Industrial Performance Centre

The Industrial Performance Centre supports interdisciplinary research and education aimed at understanding and improving industrial productivity, innovation, and competitiveness. Faculty and students from all five MIT schools participate in its programs. Since its founding in 1992, the centre has conducted research at more than 2,000 firms in major manufacturing and service industries in advanced and emerging economies.

A good example of a strategic partnership that is already operating within the maritime cluster in Europe is the UTC, the University Technology Centre, a partnership between Rolls-Royce and the Norwegian University of Science and Technology.

Example of existing maritime partnership

Rolls-Royce and the Norwegian University of Science and Technology agreed to ensure the UTC's have adequate funding, staffing and infrastructure so that they can operate as an effective and integrated part of the Rolls-Royce Research and Technology Acquisition programme¹. The objective of the UTC-programme is to create a technological lead by stimulating research and maintaining a strong focus on the application of its research. These partnerships create a cross-cultural working environment for Rolls-Royce and University staff in areas of basic science, applied research, staff training, and technology transfer, where the universities can benefit from privileged access to Rolls-Royce capability bases and information networks. An example of current maritime research performed by the UTC is efficient and balanced ship design in order to create ship hulls that have minimum resistance so that speed can increase while fuel consumption decreases.

Of course, the example of these very effective partnerships between a single company and some universities does not prove the possibility of a Maritime KIC which inevitably involves individuals from a number of institutions and industry partners. The example proves however, that there is a case for and value added of close cooperation between the research and business areas and maritime as well as marine issues.

II.3. PROCEDURAL ASPECTS FOR THE EIT-ESTABLISHMENT

a/ The establishment of the EIT

On Friday, the 23rd of November 2007 The Competitiveness Council reached a political agreement on the establishment of the EIT, following the European Parliament's resolution adopted in September 2007⁴. On January 11th 2008⁵ EIT-legislation was adopted by Commission.

The legislation states that the EIT will be supervised by a Governing Board. This board will act as the “steering wheel” of the EIT and will define its priorities as laid down in the Strategic Innovation Agenda (SIA). The SIA is a policy document which will be drawn by the European Commission to outline the long-term priority fields for the EIT. The Commission expects to appoint the Board members in summer 2008. The governing board will be composed of 19 high-level members experienced in innovation, business, research and higher education; of which 15 will be independent professionals of the highest calibre and 4 will be representatives of staff and students. The members will be appointed by the European Commission.

A total budget of EUR 308,7 million for the period 2008-2013 will be available for the EIT.

⁴ http://ec.europa.eu/education/policies/educ/eit/index_en.html

⁵ Legislative act: *Common position adopted by the Council...establishing the EIT, doc.no: 2006/0197, 15647/07 EIT 23, Brussels 11-01-2008*

b/ Strategic Innovation Agenda

The Commission plans to draw the SIA no later than 30 June 2011. Until the adoption of the SIA, the members of the Governing Board will submit a draft for a rolling triennial work programme (article 18) within twelve months of their installation. In this triennial working programme the Governing Board selects two to three KIC's in areas that help the EU to face today's and tomorrow's challenges, such as climate change, sustainable mobility, energy efficiency or the next generation of information and communication technologies (ICT).

Article 17 of EIT-legislation: Strategic Innovation Agenda

1. By 30 June 2011 at the latest and every seven years thereafter, the EIT shall draft a seven-year Strategic Innovation Agenda (hereinafter referred to as "the SIA") and submit it to the Commission.
2. The SIA shall define long-term priority fields for the EIT and shall include an assessment of its socio-economic impact and its capacity to generate the best innovation added-value. The SIA shall take into account the results of the monitoring and evaluation of the EIT as referred to in Article 16.
3. The SIA shall include an estimate of financial needs and sources in view of the future operation, long-term development and funding of the EIT. It shall also contain an indicative financial plan covering the period of the financial framework.
4. Acting on a proposal from the Commission, the SIA shall be adopted by the European Parliament and the Council in accordance with Article 157(3) of the Treaty.

c/ Selection of KIC's

The selection criteria for KIC's are laid down in the legislative act, adopted by the Council on the establishment the EIT. Article 7 states:

Article 7 Selection of Knowledge and Innovation Communities

1. A partnership shall be selected and designated by the EIT to become a KIC on the basis of a competitive, open and transparent procedure. Detailed criteria for the selection of the KICs, based on the principles of excellence and innovation relevance, shall be adopted and published by the EIT; external and independent experts shall be involved in the selection process

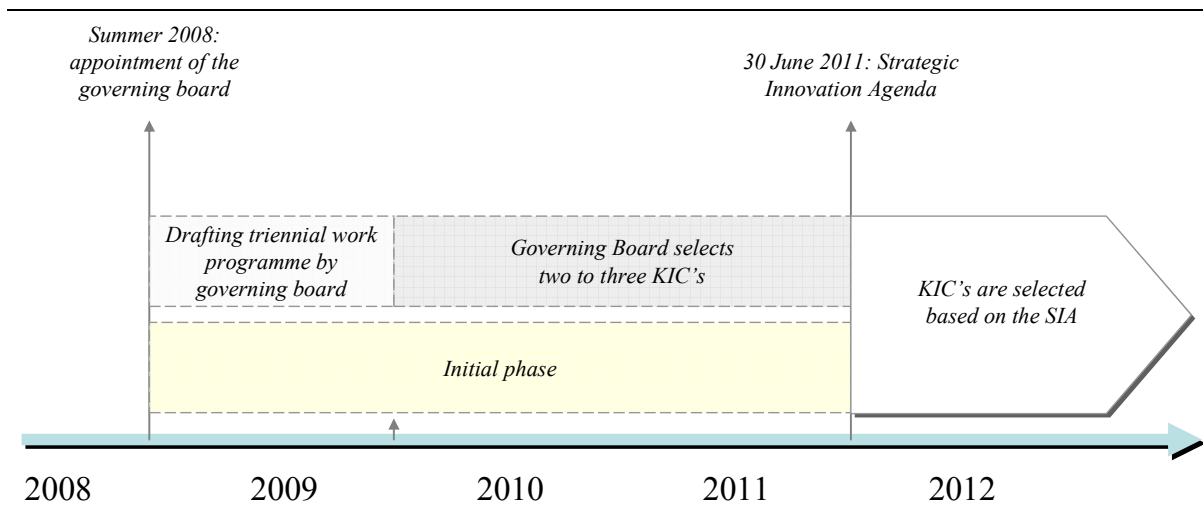
2. In accordance with the principles enshrined in paragraph 1, the selection of a KIC shall take particular account of:

- (a) the current and potential innovation capacity within the partnership as well as its excellence in higher education, research and innovation;
- (b) the partnership's capacity to achieve the goals of the SIA;
- (c) the partnership's capacity to ensure sustainable and long-term self-supporting financing including a substantial and increasing contribution from the private sector, industry and services
- (d) the participation in the partnership of organisations active in the knowledge triangle of higher education, research and innovation
- (e) the demonstration of a plan for the management of intellectual property appropriate to the sector concerned and consistent with the EIT principles and guidelines for the management of intellectual property, including the way in which contributions from the various partner organisations have been taken into account
- (f) measures to support the involvement of and cooperation with the private sector, including the financial sector and in particular SMEs, as well as the creation of start-ups, spin-offs and SMEs, in view of the commercial exploitation of the results of the activities of KICs
- (g) readiness to interact with other organisations and networks outside the KIC with the aim of sharing good practices and excellence

d/ Timeline

Figure 2 shows the timeline for the establishment of KIC's for the EIT.

Figure 2 : Timeline for the establishment of KIC's



Source : Policy Research Corporation

- In the summer of 2008, the appointment of the governing board of the EIT is planned;
- Until the summer of 2009, the governing board is drafting a triennial work programme;
- In the summer of 2009, two to three KIC's are selected by the governing board; in order to be able to be one of the first KIC's to be selected, the preparation of a proposal of a Maritime KIC should be ready at the end of spring 2009;
- By the end of June 2011, the Strategic Innovation Agenda has been drawn;
- From then on, KIC's are selected based on this Strategic Innovation Agenda.

III. TOWARDS A MARITIME KIC

III.1. INTRODUCTION

The previous chapter provided general information on the EIT, what its mission and objectives will be, and how KIC's are selected and structured. Also a timeline was drawn for the establishment of the EIT and the selection of KIC's. This chapter describes the opportunity of a Maritime KIC, which would add significant value to Europe. As was mentioned in paragraph II.3 the Governing Board will select KIC's that help the EU to face today's and tomorrow's challenges, such as climate change, sustainable mobility, energy efficiency or the next generation of information and communication technologies (ICT). As all of these challenges are related to the maritime and marine industries, a Maritime KIC can contribute to developments and solutions in these fields.

III.2. OPPORTUNITY FOR A MARITIME KIC

Innovation is a key to the future of the European Maritime sector. The questions the sector is facing require a strong cooperation and integration of the research and development to achieve the system changes needed. It requires cooperation between industry, universities and research organizations.

a/ Strong position of the European maritime industry and maritime and marine research institutes

In the last century global trade and maritime transport grew at an impressive rate. As maritime transport grew, scale increased and professionalization of the industry followed. Three important factors contributed to this professionalization: economic interests, concerns for safety, and general concern about the environment. Increasing cargo volumes induced the maritime cluster to build more innovative and safer ships and cargo handling systems. The same counts for the transport of human beings as no company can afford the loss of human life. A more recent trend is the concern for the environment. As an industry operating in a vital and fragile environment, viz. the oceans, seas and rivers, societies demand the maritime industries to have intensive concern about its environmental impact.

The professionalization of the industry is demonstrated by consolidation, concentration (ports like Rotterdam, Hamburg, Singapore), the creation of maritime clusters and technological platforms (on a European level, the *Waterborne Technology Platform*).

Not only the maritime industry is professional, this is combined with the world leadership of the European maritime and marine universities and research institutes. At the marine side, 5 top research institutes are delivering to meet the challenges of tomorrow.

b/ The Waterborne Technology Platform: a coordinated approach

Initiated in 2003, the Waterborne TP was launched in January 2005, as a forum in which all actors along the waterborne value chain in Europe participate: ship- and boat builders, suppliers of related systems and equipment, ship operators for transport and services as well as their users, those who provide the related infrastructure and ports and actors that organize the exploitation of ocean resources⁶. These actors are mostly champions in the worldwide maritime industry.

Waterborne TP is mainly building on the know-how of naval architects, marine engineers and nautical officers, who drive the

⁶ About Waterborne TP: <http://www.waterborne-tp.org/>

development in all sub-sectors included in the technology platform. The objective of Waterborne TP is: to bundle efforts of the European waterborne actors to remain champions (*in maritime transport, in the production of efficient and safe vessels as well as the related systems and equipment, in providing infrastructure and logistics for ports and waterways, in offshore technology and for leisure craft*) and to continue to create value and high qualification employment opportunities in Europe. The platform is industry-driven but also includes universities and research institutes, EU member states, European Commission (and other) stakeholders which are relevant to society as a whole.

The Waterborne TP medium and long-term vision is based on three pillars⁷:

- Safe, sustainable and efficient waterborne transport;
- A competitive European waterborne industry;
- Managing and facilitating the growth in transport volumes and the changes in trade patterns.

Waterborne TP translated these pillars into its own Strategic Research Agenda (SRA) with the objective to create better, more durable and sustainable maritime applications.

Whereas the Waterborne Technology Platform has provided some coordination between industry partners and has developed a Strategic Research Agenda and an Implementation Route Map it still falls short of a well coordinated and organised approach to innovation in the skills and application area. There remains a lot of work to do to make the vision for the maritime sector into a reality.

c/ Combined knowledge and expertise

The maritime industry operates on a highly professional level and the establishment of the Waterborne TP contributed to a well coordinated approach. In Figure 3, the basic elements of a KIC are recalled and displayed, but now applied to the maritime cluster and divided into

⁷ Vision 2020: *Waterborne Transport & Operations, A Key Asset for Europe's Development and Future*, Waterborne TP

two parts. In the bottom half, the *Waterborne* TP is shown, which has a clear role and output.

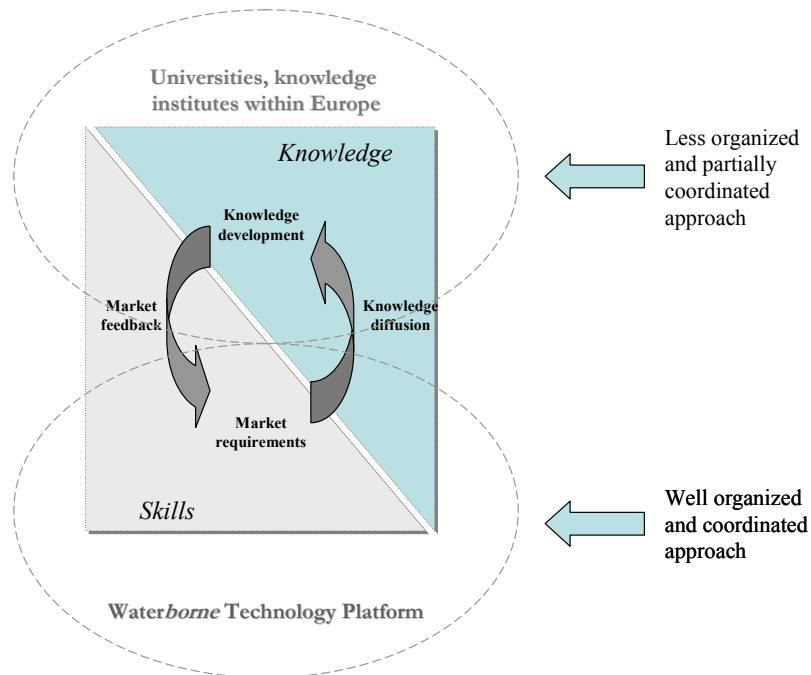
The top half however, regarding knowledge and academic research on maritime (and marine) affairs, is not as coordinated as the lower half. Evenly, the academic world is more fragmented. Although good examples exist of partnerships and institutes based on some very well coordinated approaches on the knowledge and science side, there is only little or no coordination amongst the majority of – mostly smaller – institutes. A recent study conducted by Ecorys⁸ revealed that more than 1300 research establishments are active throughout the EEA in one or more sectors that constitute the marine and maritime research sector. More coordination is needed to strengthen the flow of new knowledge from this large and unfragmented knowledge base into the more practical bottom half. The industry creates innovation on an incremental scale and providing feedback to its knowledge base; the fragmentation in the knowledge base hinders the same process top-down. The MIT-example clearly shows that a cooperation in both halves leads to increased learning, enhanced knowledge diffusion and consequently more industry innovativeness, both incrementally as well as radically.

The knowledge segment is not as coordinated as the industry side, but the academic community is working together well in the European Framework Programmes and there is a healthy exchange between the maritime interests in universities. However, there is less effective coordination with universities outside the maritime community where the basic technologies are developed which could be used to benefit in the maritime industries. These include the key disciplines of mechanical engineering, electrical engineering, electronics and ICT, structural and civil engineering and materials. An important challenge for the Maritime KIC is to form alliances with institutes that are not necessarily participating in the Maritime KIC on relevant disciplines in which cross-cutting linkages exist on certain themes.

More innovativeness is necessary for the Maritime industry to come up with solutions needed to be competitive, remain champion on a global scale and decrease its impact on climate change and

degradation of the marine environment. The European Commission acknowledges this in the recently formulated European maritime policy.

Figure 3 : Interaction between maritime knowledge base and the maritime industry



Source : Policy Research Corporation

d/ European Maritime Policy

Based on the recognition that all matters relating to Europe's oceans and seas are interlinked, and that coherence is vital in sea-related policies, the European Commission proposed on October 10th 2007 to set up an Integrated Maritime Policy⁶ for the European Union. The objective of the Integrated Maritime Policy will be to face the challenges related to waterborne operations:

- Globalisation and competitiveness;
- Climate change;
- Degradation of the marine environment
- Maritime safety and security;

⁸ Study on European Networking for Maritime Research Excellence, Ecorys, 25 October 2007

- Energy security.

The integrated policy not only integrates maritime affairs, but also includes marine affairs. With the ultimate objective to enable a sustainable use of the maritime space, for both economic and leisure purposes, the Integrated Maritime Policy contains five action areas (see textbox below). By drawing the document the Commission recognizes the importance of maritime affairs and the need to address marine aspects simultaneously. As can be seen, the second action area contains the need for building a knowledge and innovation base for the policy. This is needed to link political and research priorities, address cross-sectoral and challenges, maximise synergies between Member State and Community efforts, avoid duplication and improve the dialogue between maritime actors. Moreover, the Commission wants to explore how research can better contribute to innovation and how to transform knowledge and skills more efficiently into industrial products and services.

Five actions areas of the Integrated Maritime Policy

1. Maximising the sustainable use of the oceans and seas;
2. Building a knowledge and innovation base for the maritime policy;
3. Delivering the highest quality of life in coastal regions;
4. Promoting Europe's leadership in International Maritime Affairs;
5. Raising the visibility of Maritime Europe.

With respect to the knowledge and innovation base the Commission has worked out the following actions: Present a comprehensive European Strategy for Marine and Maritime Research in 2008;

- Launch joint cross-cutting calls under the 7th Research Framework Programme to promote an integrated approach and improve understanding of maritime affairs;
- Support research to predict, mitigate and adapt to the effects of climate change on maritime activities, the marine environment, coastal zones and islands;
- Support the creation of a European marine science partnership for a concerted dialogue between the scientific community, the industry and policymakers.

Hence, by drawing the European Maritime Policy for the European Union, the Commission acknowledges the need for an integrated approach with respect to maritime and marine affairs, decreased fragmentation in the knowledge base (critical mass) and ultimately enhanced innovativeness in the maritime industry to face tomorrow's economic and environmental challenges. The seriousness of the European Commission about its plans, is further underlined by the recent name change of Directorate General of Fisheries and Maritime Affairs into Maritime Affairs and Fisheries (DG Mare).

III.3. TOWARDS A MARITIME KIC

a/ Chapter summary

This chapter showed that a Maritime KIC is an important opportunity for Europe:

- Europe's maritime industry is leading in the world and this is combined with the world leadership of the European maritime and marine universities and research institutes;
- The maritime industry formed a well coordinated platform, the *Waterborne Technology Platform*;
- The knowledge base, needed to support and further enhance the technology platform, is relatively fragmented and only well coordinated in some areas;
- The European Commission adopted an integrated maritime policy:
 - A simultaneous approach of maritime and marine affairs is necessary;
 - The need for a solid knowledge and innovation base is underlined.
- In order to remain leading in the world the industry is in need of a well coordinated knowledge base that has critical mass. This knowledge base is the key to enhanced innovativeness and competitive advantage of the industry, which will provide the solutions for tomorrow's challenges. Moreover, the integration of the maritime and marine knowledge bases, of which the latter is even more fragmented and uncoordinated, is needed to develop an integrated knowledge base.
- This not just proves the need for a Maritime KIC, it underscores the fact that the time is right to take such an initiative. If Europe is serious about its ambitions of remaining competitive, to cope with issues like climate change and environmental degradation

and increasing its innovativeness, it should take the step of setting up the Maritime KIC.

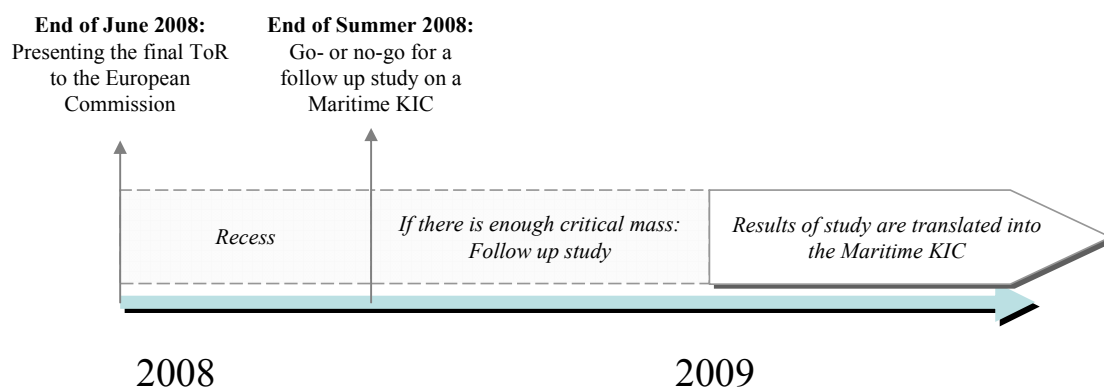
Besides the direct benefit of a Maritime KIC in focusing and attracting excellence within maritime research, development and education for innovation, it will also demonstrate the European excellence within the maritime field.

b/ Timeline for the establishment of a Maritime KIC

Figure 4 shows the timeline for the establishment of a Maritime KIC. This timeline fits well into the timeline with respect to the establishment of the EIT and the selection of KIC's. The milestones in the process towards a Maritime KIC are:

- End of June 2008: presenting the ToR to the European Commission;
- End of summer 2008: go- or no go decision for a follow up study on a Maritime KIC;
- Fall 2008 – Spring 2009: follow up study;
- Summer 2009: establishment of the Maritime KIC.

Figure 4: Timeline of process towards a Maritime KIC



Source: Policy Research Corporation

IV. VISION AND SCOPE OF A EUROPEAN MARITIME KIC

IV.1. INTRODUCTION

This chapter contains a vision of a Maritime KIC, i.e. what should be the way ahead for the Maritime KIC in order to be successful (better knowledge base, increased knowledge diffusion, creating better solutions and competitive advantage for Europe's maritime industry). The concept 'maritime' covers an extensive range of activities and can therefore be ambiguous. The drawing of a vision and consequently a scope for a KIC is therefore worked out in the following structured approach.

- A description of the European Maritime⁹ Industry and its importance for Europe;
- Future challenges for the European Maritime Industry;
- A vision that proves the added value of a Maritime KIC;
- A scope for the maritime KIC, based on this vision.

IV.2. THE EUROPEAN MARITIME AND MARINE CLUSTER

a/ A highly integrated and very divers maritime cluster

It is difficult (if not impossible) to imagine Europe without waterborne transport and its related operations. Waterborne

⁹ If the term 'maritime cluster' is used, reference to both maritime and marine activities is made

operations enable our way of living by facilitating the supply of goods, food and energy as well as personal mobility and leisure on the water.

The European maritime cluster is highly integrated and very diverse. It embraces deep sea, short sea transportation of goods and people, ship building and ship repair, port infrastructures, marine equipment, offshore structures/operations, hydraulics and recreational craft. Because of the diverse range of activities an equally diverse range of technologies, custom and series designs, vessels, support services and infrastructures exist. European companies belong to the world leaders in all fields of the maritime industry and waterborne operations.

The European maritime industry, including marine related activities, consists of thousands of companies, organisations and professional bodies including: ship-owners, shipyards and yacht builders, ports and port services, equipment manufacturers, offshore, oceanographic research, systems suppliers, dredging and coastal protection, fisheries, aqua farming, classification societies, inland navigation, research and technology institutes, engineering services and other knowledge providers. Many of these individual companies are SME's; several are international leaders in their business and sub-sectors and intend to remain so. They serve Global and European supply chains through shipping services and the operation of passenger transport, deliver energy, protection of coastal lines, fish supply for consumption, dredging works and they satisfy the demand for holidays and leisure at sea¹⁰.

Within the maritime cluster several related industries have evolved that provide valuable services for the maritime cluster. Examples of these industries are classification societies and knowledge institutes. These related industries provide services like protocols for insurance purposes and safety regulation, model testing, training, simulations, research on environmental impact, etc. which are of crucial importance for the industry.

¹⁰ Vision 2020: *Waterborne Transport & Operations, A Key Asset for Europe's Development and Future*, Waterborne TP

b/ Significant economic contribution

The maritime industry has a significant economic impact on Europe. More than 3 million people work directly in the European waterborne sector and generate a turnover of about € 300 billion, which represents more than 1% of the EU's GDP. Between 80 to 90% of all goods imported and exported by Europe being transported by sea. For transport within the EU more than 40% of goods are carried by waterborne transport¹¹. Maritime transport continues to grow in importance, at twice the rate of global GDP growth.

Europe has changed and adapted to global influences, the waterborne sector has developed dramatically over the past century and has become increasingly complex in terms of specialised sub-sectors, technology, systems and in global competition.

Some examples of the importance of the maritime industry in Europe (*source: Vision 2020, Waterborne TP*):

- Almost 100% of the dredging technology and know-how is European. European companies dominate the world dredger and the free dredging market;
- Among the top 5 world ports 3 are European;
- The European Oil & Gas Service Industry is a world technology leader, exporting 70% of products. The top 3 engineering companies in this sector are European
- European maritime industry spearheads environmentally friendly technologies: e.g. European equipment suppliers have provided on-board total waste management systems ahead of future environmental regulations
- European shipbuilders are world market leaders by turnover, reflecting the focus on high value ships, e.g. almost all cruise ships are developed and built in Europe;

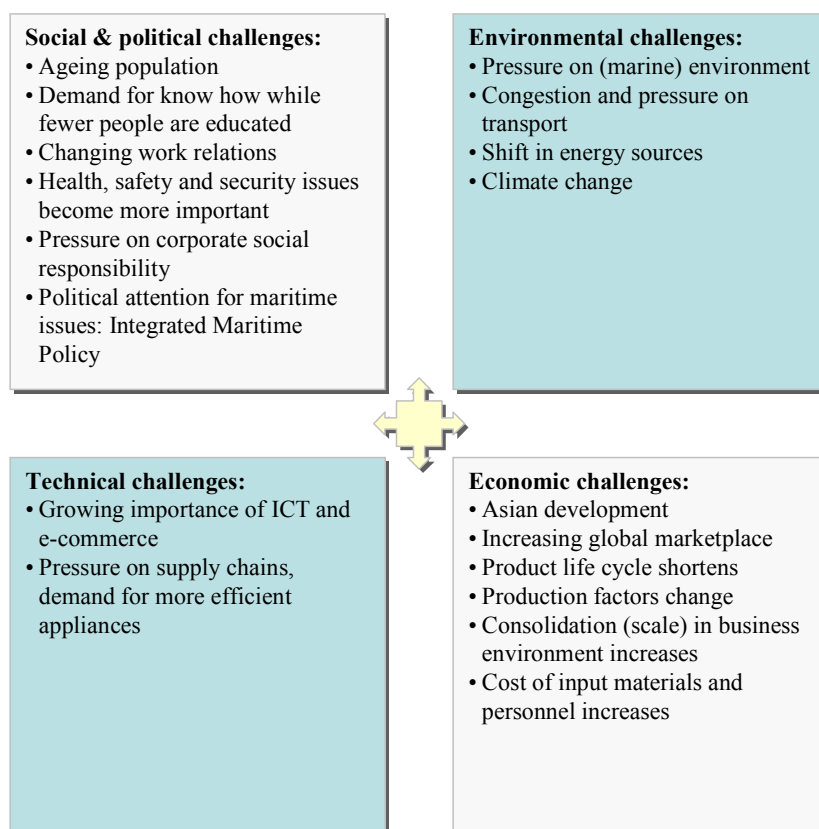
IV.3. CHALLENGES FOR THE EUROPEAN MARITIME INDUSTRY

While all sectors of the European maritime industry are still among the world leaders, globalisation and the need for a continued competitiveness bring challenges for the future. Regulatory and

¹¹ Strategic Research Agenda, Overview: *Waterborne Transport & Operations, A Key Asset for Europe's Development and Future*, Waterborne TP

economic pressures are setting boundaries; world wide competition is getting fiercer while the playing field (legal terms, environmental standards, economic standards) for companies in different parts of the world is unequal. The major challenges for the maritime industry⁶ are drawn in Figure 5, categorized into social and political, economic, technical and environmental challenges. A Maritime KIC should deal with these challenges and opportunities.

Figure 5 : Challenges ad opportunities for the European maritime industry



Source : Policy Research Corporation

⁶ Vision 2020: Waterborne Transport & Operations, A Key Asset for Europe's Development and Future, Waterborne TP

IV.4. VISION FOR A MARITIME KIC

The European maritime industry is market leader in all relevant industries and well coordinated by the platform *Waterborne TP*. The previous chapter showed that, in order to remain champion, the industry is in need of new competitive advantage(s) that can deal with tomorrow's challenges. These are not just created overnight, and require an interactive and solid knowledge base built on top academics in research institutions and universities.

A multidisciplinary approach however, should be the main pillar of the Maritime KIC. The benefit of a Maritime KIC would be greatest if it brings together all research and innovation of potential application to the maritime industries, along with the industry partners. This would present a major challenge for the EIT as it implies cross-disciplinary working. An improved cooperation and coordination between the maritime field and the marine field in the academic as well as business environment is the real value added of the Maritime KIC and one of the main building blocks of the Maritime KIC.

a/ Combined knowledge and expertise

In a Maritime KIC partnerships must be formed between selected people from universities, knowledge organizations, maritime businesses, classification societies, etc. Researchers, developers, builders and end-users need to cooperate to achieve innovative breakthroughs. The "user" feedback and directions from the industry are very relevant. The objective is to achieve joint, even open development. By organizing the academic component in the partnerships, both fundamental and applied research can be stimulated and accelerated, and an interactive, solid and coordinated knowledge base is created for the maritime and marine industry. As a consequence, the Maritime KIC contributes to the reduction of fragmentation in the maritime and marine knowledge and research capabilities.

These strategic partnerships create continuity/robustness on maritime and marine knowledge and consequently enable continuity of knowledge transfer to the industry (knowledge diffusion) and will create the right atmosphere for new radical and breakthrough technologies in the European maritime sectors. In this way institutes

like MIT can be followed, competitive advantages created and solutions developed that are environmentally friendly and competitive at the same time.

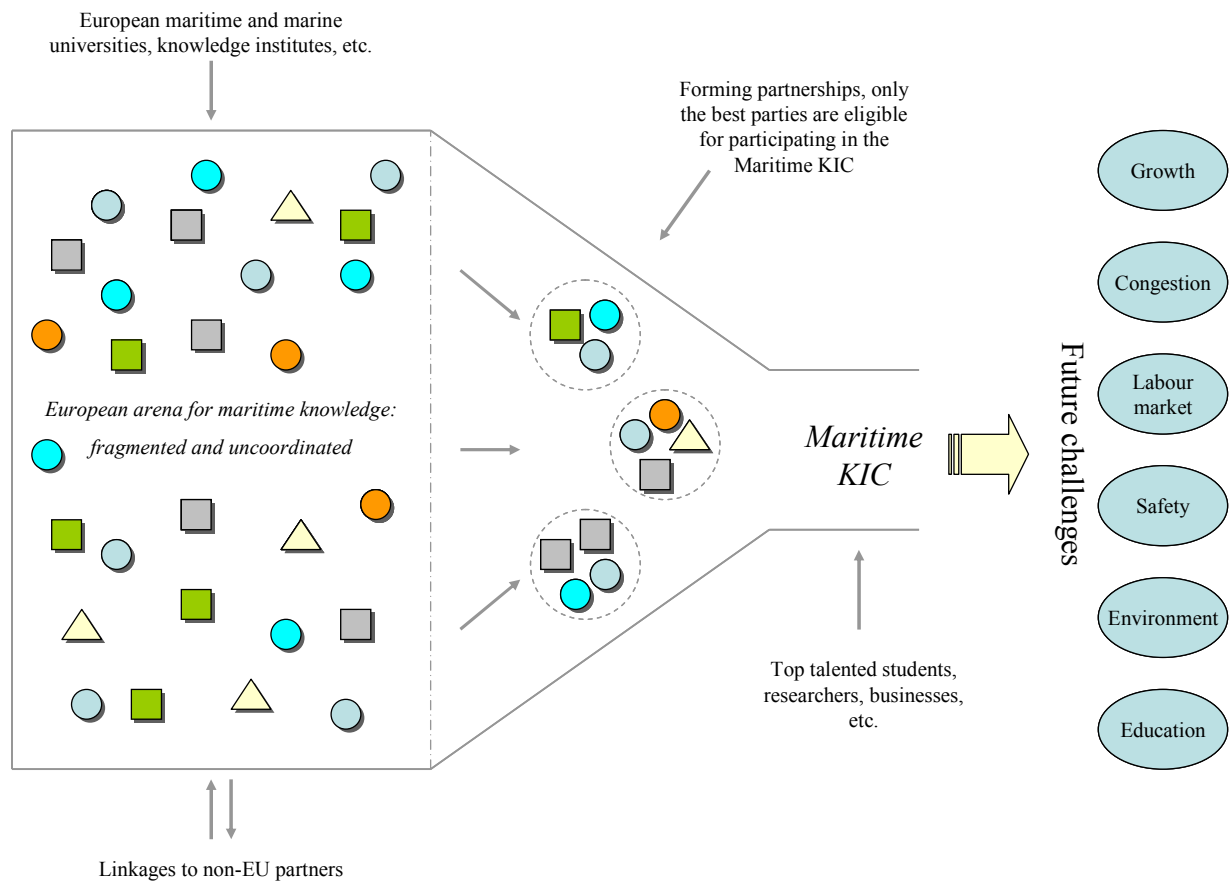
b/ Professional excellence as the main selection criterion

The level of ambition for the Maritime KIC should be set high, as this is the only way to reach a level of institutes like MIT. Excellence attracts excellence, and in this way the Maritime KIC will act as a magnet for the best of students, teachers, researchers, businesses, etc. The creation of the right strategic partnerships therefore is an important challenge for the Maritime KIC. The partnerships should be based on excellence and not on geographical spread over the European continent. The KIC should not form partnerships on the basis of bottom-up proposals. Only the best individuals (by proven excellence) are eligible for participating in the KIC, based on mutual accord between these individuals. These individuals are selected by the KIC. Figure 6 shows how partnerships must be formed.

The selection process of partners in the Maritime KIC should be clearly defined and transparent. In the follow-up study, this will be analysed thoroughly. A possibility would be that the selection process is consistent with research assessment schemes already in use within Member States. Also, some mechanism must be in place to deselect researchers or universities which do not meet performance targets and to add researchers and universities which show improvement to the necessary excellence rating.

Thereby, a mechanism could be included that would provide some seed funding to encourage new participants to develop and improve for the benefit of the research and innovation community. In principle, exclusion from the Maritime KIC should not imply an inability to attract funding for research and innovation in areas of maritime interest.

Figure 6 : Creating strategic partnerships, based on professional excellence



Source : Policy Research Corporation

c/ Management of the Maritime KIC

The ambitions of the Maritime KIC are high. Management is therefore critical to deliver on the objectives. This is even more critical given the partly virtual character of the Maritime KIC with the contributors distributed within other partner organisations. Turning the virtual concept into reality will require excellent management skills, and these are not usually in great supply in the university community. The link to industry could be very beneficial if the management of programmes is given to people with well-developed project management skills and experience. This would make a significant difference in terms of the delivery of outcomes.

IV.5. SCOPE OF THE MARITIME KIC

The Maritime KIC will be a network of top professionals from research institutes, universities, companies and government bodies from different countries across Europe. In the initial search for excellence to be eligible for the strategic partnerships, several directions should be chosen, i.e. which sectors and consequently how to structure the research approach as well as the structure of the educational part of the KIC.

a/ Theme coverage

The Maritime KIC is about the multidisciplinary challenges that maritime and marine fields expect to face. The Maritime KIC therefore is not sector based, but theme based and focuses on the cross-cutting issues between the maritime and marine fields.

The maritime KIC should actively identify professional excellence within the maritime and marine clusters, establish partnerships and set up a funding framework. The KIC should provide a coordinated and integrated knowledge base on maritime and marine science. Although the latter is not yet as organised as the maritime side, several high standard research institutions on the marine side are in place. In the start-up period the KIC may select partnerships between professionals from the maritime and marine side that already have the right incentives, structures and connections in place for a strategic partnership to be placed under the Maritime KIC.

In the in depth-study the cross cutting themes are identified that could be eligible for partnerships under the umbrella of the Maritime KIC. Below, some examples are given of themes that could be covered by the Maritime KIC:

- Simulation based design systems, to combine the expert tools in various knowledge domain;
- Goal based design, to ensure safe design of innovative vessels, not covered by the current rules because they are outside the knowledge/expertise base;
- Design of ships and shipping routes with minimal energy consumption, emissions, waste, friction and disturbing of the environment;
- Aqua farming as a solution for exhaustion of sea fish stocks;

- Energy solutions based on natural energy (wind, tide, salt-sweet water);
- Hydraulic engineering based on minimal environmental impact.

b/ Fundamental and applied research

An appropriate balance between fundamental and applied research is needed to secure long term sustainable and practical solutions for the maritime cluster. *Fundamental* research, typically publicly funded, focuses on the creation of knowledge, where *applied* research focuses on the applicability of knowledge and is therefore typically privately funded because the industries use the knowledge for commercial appliance. Fundamental research is needed for new technologies and applications (found by applied research). It is in the KIC's interest to have an adequate balance between both types of research so the concept of future applications drive acceleration of fundamental research into applied research. Therefore research areas have to be identified in which the KIC can accelerate innovation and consequently the results in business applications.

The ultimate objective of the European maritime policy is to create an integrated and multidisciplinary approach and therefore this should also be the case for the maritime KIC. Based on the availability of maritime and marine excellence within the European continent an adequate balance between marine and maritime research needs to be created. Specific research areas already require an integrated and multidisciplinary approach. Examples are the fields such as greenship concepts, offshore oil and gas exploration, offshore sustainable energy, sustainable fisheries and aquaculture, where fundamental and applied research in an integrated approach (marine and maritime) is necessary so that maximum economic value can be generated at no (or very little) environmental costs.

c/ Knowledge building blocks

An important question is how to distribute and share the knowledge developed to all other interested parties, in other words, how to achieve “open” innovation. Research networks organized around common research questions from market or government could be

effective as long as the industry, universities and research organizations can be attracted to participate.

Also, for knowledge transfer within networks and diffusion of knowledge into the European maritime cluster, the KIC needs to work out a vision on the educational part and configure educational building blocks. As these are dependent on the number of partnerships, this is an action to be taken in the next phase. As part of a total 'package' of educational and research building blocks a special Maritime KIC PhD-programme should be set up.

IV.6. ADDED VALUE OF THE MARITIME KIC

a/ Added value of the Maritime KIC

A Maritime KIC can add value for the following reasons:

- **Complementary to Integrated Maritime Policy:** It can integrate maritime and marine (and consequently environmental) disciplines and therefore accelerate targets/actions as set in the Integrated Maritime Policy;
- **Two dimensional integrated research approach:** It can create an European integrated approach for fundamental and applied maritime and marine research;
- **Establishing networks and cross-relations:** It can establish cross-relations and networks (following the example of MIT, Stanford, Harvard, etc.) between the maritime and marine faculties in Europe and enhance robustness and continuity on the academic side (target of the EIT). The networks and cross-relations can also be used for coordinated recruitment of students and researchers in order to cope with the future shortage of maritime personnel.
- **Accelerating knowledge diffusion:** it can create a network between maritime/marine faculties, knowledge institutions classification societies and industrial partners for the transfer and diffusion of knowledge within the maritime/marine industry, formulating a vision and setting a strategic research agenda;
- **Accelerating innovation:** By creating the integrated research approach within strategic partnerships op private and public parties, acceleration of innovation can be achieved on maritime applications that will keep Europe's maritime sectors champions;
- **Building long-term sustainable capabilities:** The combination of knowledge diffusion and better maritime business applications will lead to new capabilities for the European maritime industry;

- **Creating a sustainable future:** Eventually lead to a safe and sustainable future for the maritime industry and marine environment.
- **The identification of the knowledge** to be acquired for the future. Which technology has to be developed for creating innovation and sustainable development
- **Changing the image** of the maritime and marine fields.

b/ Summary of critical success factors

For the Maritime KIC to succeed several critical success factors should be aligned:

- Participating individuals should be selected based on professional excellence in their professional background (not on geographical spread, principles of proportionality, etc.);
- KIC members must be individuals; they could, and in practice are, tied to organizations and institutions but they are not representing their organizations;
- The Maritime KIC would have to be set up so that there is no dominance by a few large organisations and ensure that effective support is given to the SMEs which is where a lot of the innovation activity is concentrated;
- The KIC should primarily be focussed on European industries and knowledge institutes, but should be open for linkages with non-EU partners;
- The Maritime KIC should have an integral focus on maritime and marine affairs;
- All restrictions for knowledge transfer must be countered (adequate protection of intellectual property rights, equal participation, etc.);
- A governance concept of the Maritime KIC has to be established that is able to deliver on the complex challenges of the Maritime KIC.

V. ORGANISATIONAL STRUCTURE AND GOVERNANCE

V.1. INTRODUCTION

In the last chapter, the vision and value added of a Maritime KIC was set out. This vision has to be translated in an adequate organisational structure and governance. In this chapter, relevant aspects with respect to the organisational structure and governance are described.

The most critical element in determining whether a Maritime KIC would work is the approach to the management of the research and innovation programme. The Maritime KIC can only benefit the European maritime industry, in delivering the European maritime research and innovation agenda, if there is a very high level of integration and active engagement between industry, research institutions, industry partners and other stakeholders. This inevitably brings together a very large community of interests and achieving a balanced and shared vision will be a challenge.

The Maritime KIC will be a network organization and at the same time be part of the larger body of the EIT. Efficiency, transparency, incentives for excellence and accountability must therefore be enhanced at all times by the Maritime KIC structure. As there are few legal restrictions for a KIC to be set up, at least three participating organizations from two different countries need to enter the partnership, further study is needed to fill in structure and governance issues.

It should be acknowledged that an organization through partnership is relatively easy to organize, but very loose. Even with all commitments in place on the availability of personnel and funding, changing priorities at partners can easily lead to lack of R&D capacity/resources. Secondly the connection between the researchers stays “loose” as well. The governance structure of the KIC should ensure the important interaction between the individuals that form the partnerships. One of the possible solutions is to create a main organization with researchers/staff from industry/universities (on a temporary basis), in order to let the people work together and achieve a better control on their activities.

In the in-depth analysis in the follow-up study on the establishment of the Maritime KIC this issue will be addressed.

V.2. ISSUES REGARDING TO ORGANISATIONAL STRUCTURE AND GOVERNANCE

The following issues need to be addressed with regard to the organizational structure.

- Legal configuration;
- Integrated or distributed model;
- Financial requirements;
- Operational management affairs;
- Control and accountability;
- Relationship with EIT.

a/ Legal configuration

The legal configuration of a KIC is important to address in the next phase of the study. It is desirable to have to have multiple legal entities under the KIC, one for each centre of excellence (COE). In this way intellectual property rights are optimally protected and minimum obstacles are in place that prevent the transfer of knowledge between the participants. A possible model for the property rights would be that fundamental research can be shared with little restriction, but applied research, leading to short term industrial benefits should be protected. The management of

intellectual property rights is crucial for the sustainability of the competitive position of Europe.

b/ Integrated or distributed model

An important governance issue to address is how interaction between the strategic level and the operational level of the KIC will take place. There are several ways for this interaction to take form: *centralized, distributed and integrated*. Centralized encompasses that all decisions (both strategic and operational) are taken on a central level, top-down. This model is probably not desirable since substantial autonomy is necessary for Centres of Excellence (COE's) to perform well. In a distributed model, decisions are taken bottom up, which can be desirable since substantial autonomy is necessary for the COE's. On the other hand outcomes in such models not always meet the higher objectives. In an integrated model, strategic decisions are made on a central level (top-down), while operational decisions are taken bottom up.

In this case, where autonomous COE's will be structured under the KIC, it is not desirable to use a centralized approach. A choice has to be made between a distributed and an integrated model.

c/ Financial requirements

There are a lot of initiatives that are focussed on improving European research and innovation, not least the Framework Programmes. There should be a very clear linkage between the financial support programmes for research and innovations and the Maritime KIC which ensure that financial resources are used effectively and that all stakeholders are fully aware of the instruments provided by the European Commission and Member States to support research and innovation. The Maritime KIC is not an independent mechanism but it should be a focus to attract more funding in the pursuit of excellence.

The funding models are important to making this concept work and these must take into account the benefit that is available to the sponsoring party through working with the Maritime KIC. If the funding models and legal framework, particularly in terms of ownership and exploitation of IP, are too complex or not simple

enough, then the level of take up from industry is unlikely to be sufficient.

The KIC needs funding for operating the concept (organisational costs) and performing the programme. The funding should be enough to create critical mass in the KIC, which is essential in order to be successful. The majority of the funding should be directed at the programme; the organisational costs should be sufficient, but only a proportion of the total financial requirements.

Funding sources could be the EIT budget, but also private funding and an alignment of national programmes.

d/ Operational management of the KIC

The question of the daily/operational management of the KIC encompasses several issues that need to be addressed in the follow-up study. Must the KIC be led by a management board with a chairman, (and/or dean), should an advisory board be installed, etc? For these kind of steering mechanisms a selection procedure (who will assign the board, for what period, etc.) and a function profile (with selection criteria, tasks and responsibilities) need to be drawn.

Another point of consideration is whether an office for the coordination of the KIC and its support staff is needed to run the KIC from day to day.

e/ Accountability and control

The KIC and COE's receive public funding and should therefore be held accountable for mismanagement. Several instruments are available on accountability: a supervisory board, contractual agreements, management reporting systems, etc.

Another important part of the governance issues is the control. Control spreads over from internal control (auditing committee) to external control (annual reporting, remuneration of board members, and transparency on conflicts of interest). These specific governance issues should be set up in a way that creates maximum incentives for the COE's to achieve their objectives and create a total transparency.

f/ Relationship with EIT

The relationship between EIT and KIC will be shaped in a contractual agreement. The EIT shall organize continuous monitoring of the KIC and shall organize independent periodic evaluations of the KIC's performance¹². Therefore the contractor of the next phase of the study will have to work out how the relationship (monthly, quarterly, yearly reporting, topics to be reported, visitation processes, etc.) can be structured in a way that the right checks and balances exist.

¹² Article 8, General Approach on the establishment of the EIT, 27 June 2007, docnr. 11058. /07 EC: DG-culture document

Appendices

VI. PROCESS TOWARDS A MARITIME KIC

In this document substance was given to the concept of a Maritime KIC. The opportunity and vision were formulated for an ambitious level of maritime and marine research, integrated and multinationally oriented on the basis of excellence. Several prerequisites were formulated to meet a level of excellence and to ultimately become a player like MIT.

All *Waterborne* TP participants (and other stakeholders within the maritime cluster or marine arena) were requested to provide their feedback to this document and this feedback has been processed and reflected in this document.

The next step is to present this vision document to the European Commission. If the Commission also acknowledges the need for a Maritime KIC, funding for a follow up study will be sought, a contractor will be selected and the study results will be translated into a Maritime KIC. The funding for a follow up study should be primarily sought within the industry and its most important stakeholders, as the pre-study is also financed by the *Waterborne* Technology Platform and some members of the European Network of Maritime Clusters. In this way, funding partners acknowledge the relevance and importance of the study and the Maritime KIC and commitment is built for an active approach towards a Maritime KIC. The European Commission is asked to co-finance the study.