This paper was presented at The XXVI ISPIM Conference – Shaping the Frontiers of Innovation Management, Budapest, Hungary on 14-17 June 2015. The publication is available to ISPIM members at www.ispim.org.

Future Skill Profiles – a Key to Renew Marine Industry

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Abstract: The goal this paper is to find out why and how the marine industry cluster will change in the future and explore how to build win-win strategy for the future so that both companies and education institutes are successful in their operations. An essential question is how to renew the education sector at different educational levels so the focus of this paper is on the skills and competences for the future needs of the cluster. As a framework we have used future oriented process model which combines futures research, foresight, concept design and R&D&I activities. The main findings include alternative scenarios of the Finnish marine industry cluster and future skill profiles. Finally, recommendations for different actor groups to achieve the new demands and fulfill the roles and expectations in the future are presented.

Keywords: Futures research; marine industry; skills; know-how; innovation; education; renewal; scenario

1 Introduction

Foresight of skills and competences in marine industry cluster project in 2010-2011 focused on two specific innovation management problems (Meristö & Laitinen 2011). First, how to break the dominant logic (Bergman et al. 2014) of the traditional roles in the marine industry ecosystem and how to renew the whole industry cluster to meet the future challenges. Second, how to renew the education sector at different educational levels and to develop new skills and competences for the future needs of the cluster. The case study consists of the marine industry cluster in Finland, including all the key actors from different sectors according to Triple Helix framework .

When inspecting marine industry, it is important to notice that it is heterogeneous in many respects, such as diversified markets (shipbuilding, ship repair, naval shipbuilding, boatbuilding, offshore oil & gas, offshore wind, underwater etc.), type of firms (generalists or firms focused on one market; different in size , global or regional etc.). Customer base is also wide and varied (shipyards, shipping companies, governments,

private owners, offshore majors, research institutions). Marine suppliers deliver materials, systems, equipment, act as service providers in engineering and consulting or are integrated as subcontractors in pre-product manufacturing and assembly. The industry provides a very wide range of supplies for more than 20 different ship-types of a broad spectrum of sizes and on top all offshore systems. The industry provides equipment and services from a single bolt to the biggest engines in the world and jobs from simple cleaning to high sophisticated scientific engineering. Therefore, it is difficult to identify the marine industry as one entity, well-structured and working according to predefined patterns. Nowadays, customer orientation, a broad product portfolio and organisational flexibility is seen as the key to success (Balance Technology Consulting 2014).

The competition in the marine industry is increasing and the position of the Finnish marine industry cluster is threatened by Asian competitors including e.g. Chinese and South Korean companies. Marine cluster in Southwest Finland is networked based ecosystem but due to the increased global competition many of its actors are in the risk of losing their position in the market. At the same time, the education capacity related to the marine industry and its continuity is threatened as well.

Technological expertise in Finland is at high level, but pitfalls are usually in the field of business skills and market knowledge, especially in international context. Also, network based business models are not so familiar to the Finnish enterprises. Concerning the future market challenges the facts are not available and the information needs have to tackle with more creative approaches, such as scenario work. Another national feature is that Finland is relatively small country and therefore finance and capital market solutions are important factor in the Finnish marine industry. The global situation is affected also by the subsidies which vary according to the country.

2 The aim and research questions

The goal is to find out why and how the marine industry cluster will change in the future. Another goal is explore how to build win-win strategy for the future so that both companies and education institutes are successful in their operations. Additionally, the aim is to define what are the future skills and competences needed in the marine industry to respond to the future challenges, and who should do, what, and when to achieve the desired position in the future market.

As a summary, the key research questions are as follows:

1. Why will the marine industry change in the future?
2. How can marine industry meet the future challenges?
3. What kind of innovations are needed to respond to those challenges?
4. What are the development impulses to the marine industry cluster / network and its different actors?

3 Research design

The results of this study are based mainly on the foresight project concerning future skills in marine industry. The research partners of the project were Machine Technology Center

Turku Ltd and Laurea University of Applied Sciences/FuturesLab CoFi, which was responsible for the foresight part of the project. The project was carried out during April 2010 – June 2011, and it was funded by National Board of Education and European Social Fund (ESF). The project focused on marine industry cluster as a whole. The cluster is a multidimensional network, which forms a strong ecosystem for the marine industry in Finland. It consists of industry companies from shipyards to all kind of companies playing a role as main and/or subcontractors in the projects, but also regional development organizations and NGOs enabling the fluent bureaucracy and universities, education institutes and research institutes producing innovations and skillful personnel in cooperation with the industry itself.

The theoretical framework for the research project relies on futures research paradigm, triple helix context (Etzkowitz & Leydesdorff 2000) as well as innovation management in networks. As a framework we have used future oriented process model which is adapted version from Meristö & Laitinen (2009). The framework combines futures research, foresight, concept design and R&D&I activities.

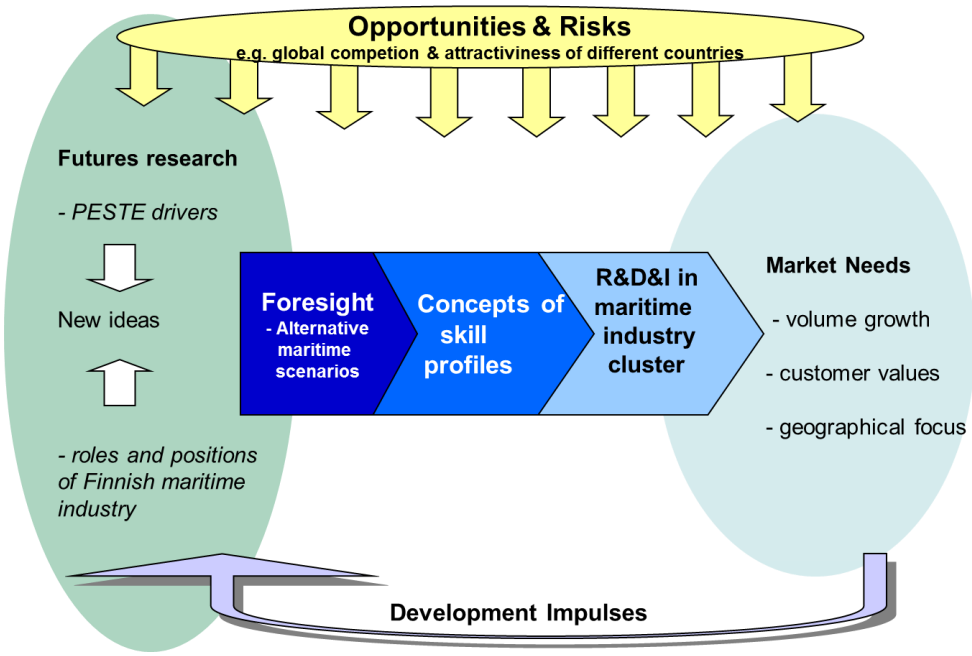

Figure 1 The framework for the future oriented innovation process model (adapted from Meristö & Laitinen 2009).

As a starting point there is the generation of new ideas based on both outside and inside views of the development going on, i.e. PESTE drivers consisting of political, economic, social, technological and ecological factors having influence on the future as well as marine cluster factors including alternative roles and positions in the future, too. From futures research perspective alternative scenarios were created for the marine industry in the long run compared to the market needs, value growth, geographical focus or customer values in order to cope with questions like the own position in global competition. These

scenarios were applied as a platform for future skill and competence needs, i.e. by using visionary concept design, future oriented skill profiles were created, and R&D&I needs in marine industry cluster identified, too. As a result, the development impulses to the whole innovation process were recognized and formulated as recommendations to different actor groups and opportunities and risks identified.

The research process began in the spring of 2010 and ended in the autumn of 2011. The data gathering for the study was multidimensional including two web-based delfoi surveys (Turoff & Linstone 2002) to the marine cluster actors from triple helix perspectives to get a basic data base, three multi-actor workshops facilitated by the research group to produce visionary knowledge from addressed themes related to supply, demand and strategic actions and finally, depth interviews in the field to get the final feedback from the companies also abroad. Two different web surveys gathered 90 responses, around 120 persons together participated in three workshops and 38 persons were interviewed by the project manager.

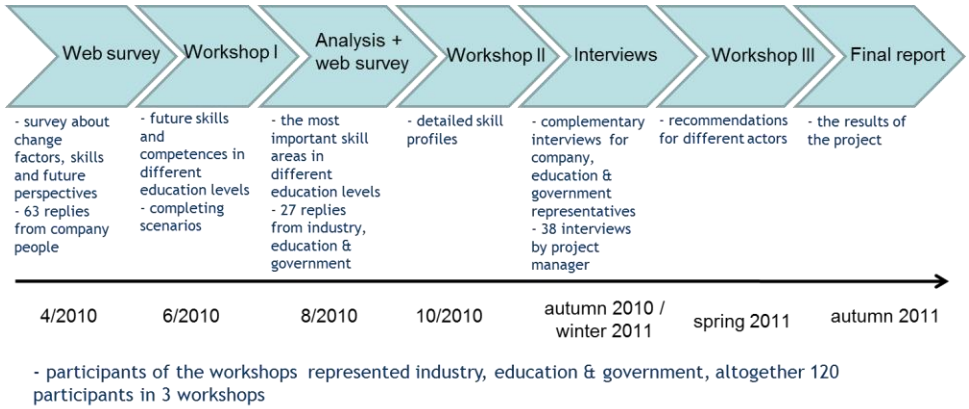

Figure 2 Process of the study: phases, content and participants.

The methodological toolbox used in the project covered multidisciplinary environmental scanning (PESTE analysis), multiple scenario analysis (e.g. Van der Heijden 1996), core competence tree synthesis and visionary concept design (Kokkonen et al. 2005) to produce e.g. the final skill profiles, but also the key roles of the Finnish marine cluster in the whole industry branch. Each phase, survey and workshop was documented carefully and the feedback from the advisory board of the project was collected in a keen co-operation with the project manager. The final report was presented in a closing seminar and the recommendations for each actor group in the cluster were formulated.

4 Results

The main findings include the roles and alternative scenarios of the Finnish marine industry cluster. Also, alternative future skill profiles at different education levels are introduced. Finally, recommendations for different actor groups to achieve the new demands and fulfill the roles and expectations in the future are presented.

According to the results, the Finnish marine industry will develop weaker in the future than the global development in general. Finland's weaker development results from high cost level, stiff work system, disadvantageous geographical location and disappearance of the know-how because the marine industry is not kept tempting amongst potential future work force. However, it was seen that the Finnish marine industry could have several different roles in the future. Special vessels (e.g. ice-breakers) were seen as the most probable focus area but also consulting services, device & systems supplying and passenger vessels with high capacity were seen to have remarkable role in the future. Offshore-solutions and repairing work could have emerging role in the Finnish marine industry. Some participants thought that the marine industry will end totally in Finland. Currently, the situation has improved because of the new arrangements concerning ownerships structures. Also, new orders for the near future have been received (Meristö & Laitinen 2011).

The future role of the Finnish marine industry were also illustrated by alternative scenarios (Figure 3) which were develop as research work to support the future driven approach in the workshop process. The main drivers for the scenarios were the geographical focus (Finland vs. global) and operational focus (manufacturing vs. services). Altogether, four different scenarios were created: 1) Manufacturing without manufacturing in Finland, 2) Traditional marine industry in Finland, 3) Coordination of networks and management of service concepts and 4) Consulting based scenario. Moreover, in the workshop participants created one additional scenario which was 5) Ecological future awareness.

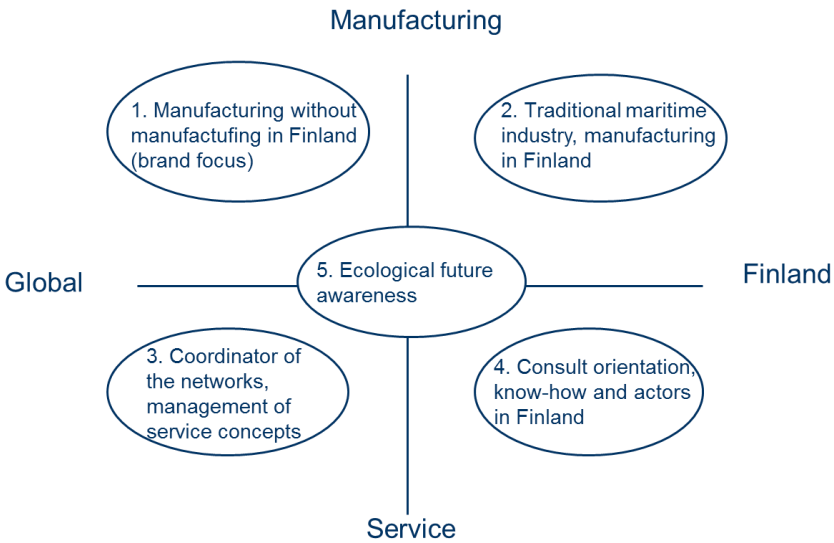

Figure 3 Alternative scenarios for the Finnish marine industry (Meristö & Laitinen 2011).

Alternative skill profiles were processed during the workshop process so that scenarios were used as filters to create visionary features (Kokkonen et al. 2005; Meristö et al. 2011) to the profiles (Figure 4). Skill profiles included descriptions of needed skill areas, appropriate education, suitable work/training experience and potential professions.

Different education levels were also taken into account. Altogether, 11 skill profiles were created. Some of the skill profiles are suitable only for certain scenario, but some skill profiles are appropriate for several or even all the scenarios. An essential feature in the profiles is that they bring out new wholenesses which are not achieved on traditional training programmes. The ability to renew, project management skills and operating in the international environment are cross-sectional themes as well as versatility to manage wholenesses, challenges of the supervisory tasks and management of ecological challenges.

The emphasis in Scenario 1) 'Manufacturing without manufacturing in Finland' is in global issues and it can be seen from the skill profiles which are travel mechanic, person to set international factories and international manufacturing expert. In Scenario 2) 'Traditional marine industry in Finland', typical skill profiles would multi skilled polytechnic engineer, future shipbuilder and supervisor whereas innovation manager, project manager in offshore supplies and expert in technical support would be appropriate profiles for Scenario 3) 'Coordination of networks and management of service concepts'. An expert in technical support is suitable also in Scenario 4) 'Consulting orientation'. Multi skilled welders are needed in that scenario, too. In Scenario 5) 'Ecological future awareness', one profile would be particularly suitable: sales person of energy efficiency services.

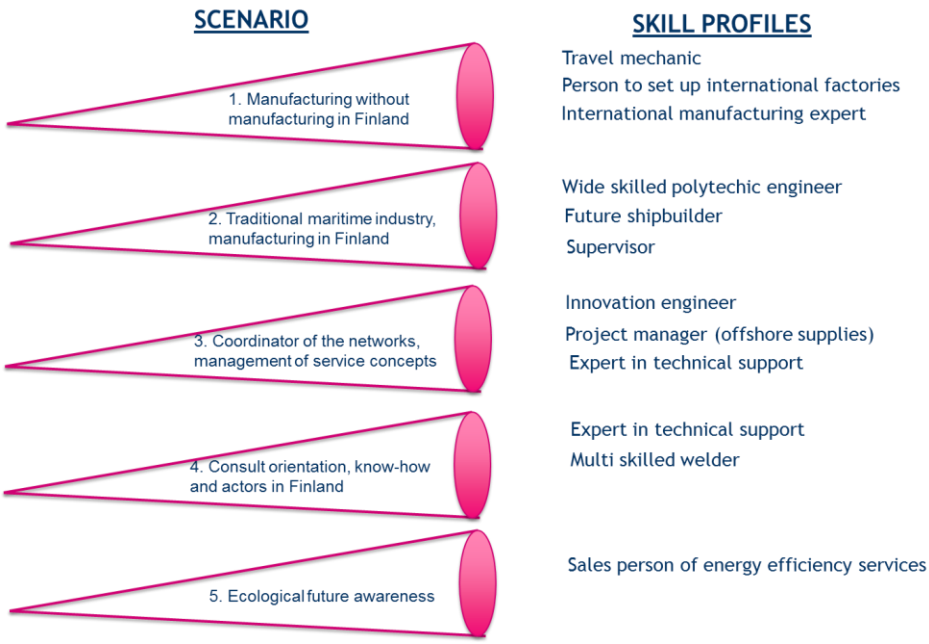

Figure 4 Skill profiles in alternative scenarios (Meristö & Laitinen 2011).

For each skill profile, detailed descriptions were defined including skill areas, education, work/training experience and potential professions. The idea behind the skill profiles is that all skills and know-how does not necessarily come from education although work and traineeship experience are also often important, i.e. skill profiles are more like career path descriptions. It is also noteworthy that when the time scale is long to the future it is

not possible know what exact professions are existing in the future. However, skill profiles form a package of needed future skills, so they are possibly useful skills also in some new potential professions. In the definition of know-how we have applied the approach of core competence tree (Meristö 1993) in which the know-how is not only knowledges & skills but also values & attitudes, and contacts & experiences. It is essential to ensure that there are sufficient know-how factors behind the core competences. If the competitive advantage is based on many different factors and not only on e.g. knowledge, it makes the competitive advantage sustainable.

As an example Figure 5 illustrates a detailed skill profile project manager in offshore activities. Typical skill areas needed in that position would include leadership skills in international supplier networks, good contacts, business knowledge, expertise in offshore as well as in contact legislation. A suitable education could be obtained in a university of technology. It would be very useful if studied included also some courses about business and management. A typical training path could include work and training experience in ferries and in international offshore production units. A potential profession for that kind of person could be e.g. project manager.

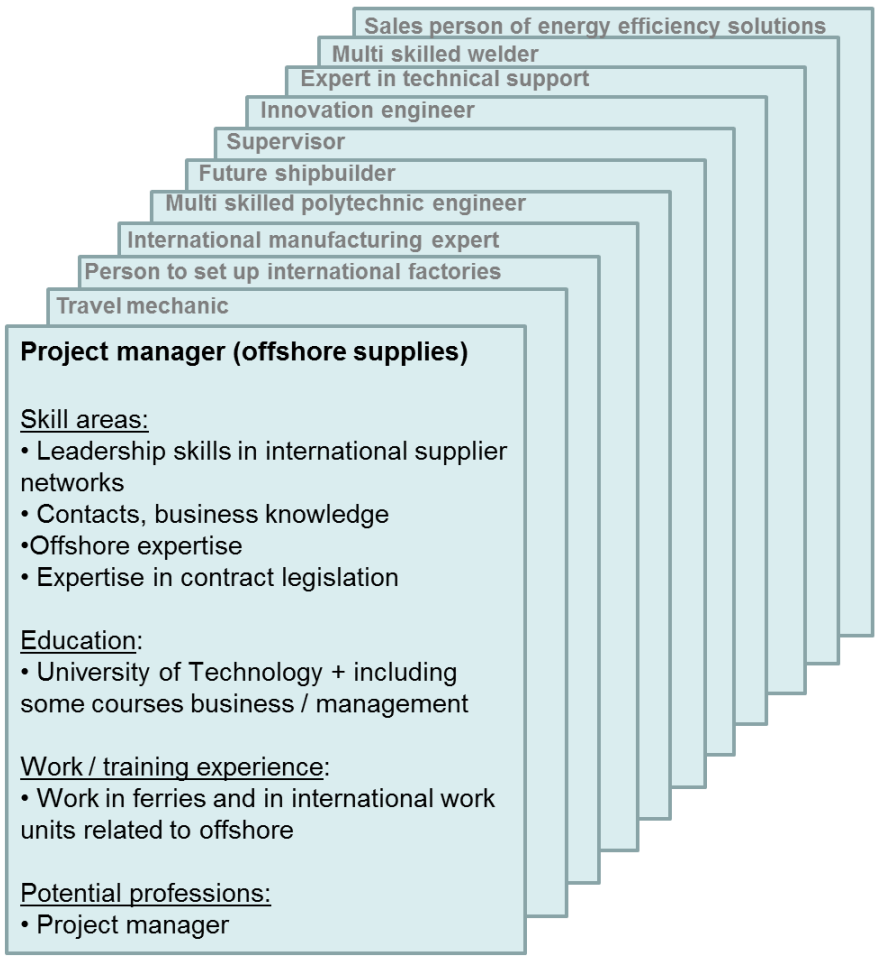

Figure 5 An example of a skill profile created in the project (Meristö & Laitinen 2011).

The results include also recommendations for different actors related to marine industry in order to respond to the challenges which industry in confronting. An interesting observation was that that numerically most recommendations were given to the educational institutions. It was e.g. recommended that they would take more active role in cooperation with companies but also with research institutions so that the latest information could be integrated to the teaching. Teaching modules should be flexible and agile reactions to new technology would be important. Also, obligatory or half-obligatory international training period for all students should be included into the education programmes. Industry, on the other hand, has to guarantee the work circulation for the personnel also internationally. Companies should also develop their international network and invest for personnel training. The research cooperation of the industry should be wide-ranging not only with old partners but new partners as well which could help to bring fresh ideas to the industry. Public sector should take care of flexible structures and develop finance mechanisms.

As a summary from our results, it can be said that new fields of skills require the new focusing of basic research to promote long term progress (Figure 6). National marine industry strategy and development of measuring and risk assessment methods towards lean resource management is important. Attention must be paid to a water study, which is important especially in Scenario 5 'Ecological Future Awareness'. Generally, it is necessary to attempt towards practical applications from too theoretic approach.

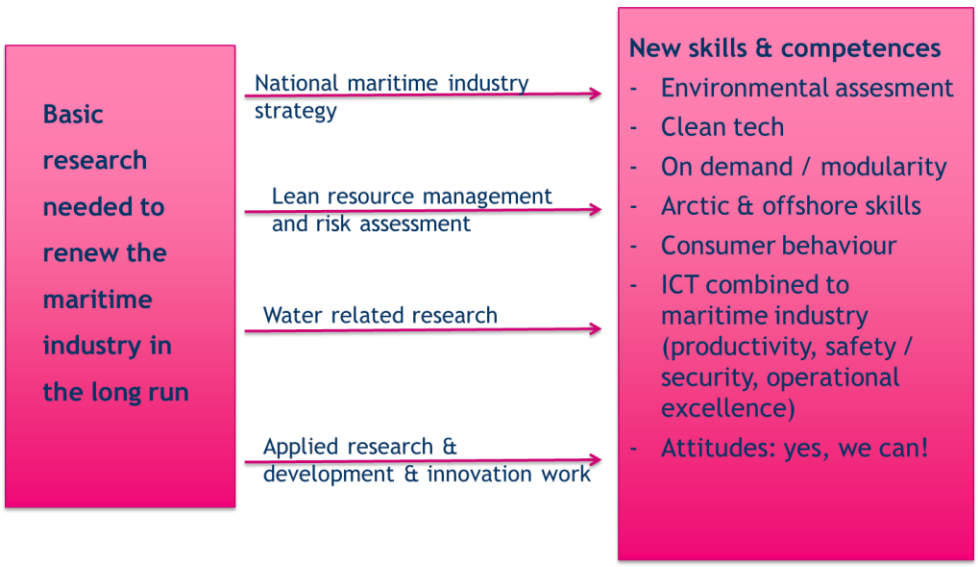

Figure 6 Summary of the results concerning new skills and competences.

Our results seem to be in line with other studies. European marine industry report (Balance Technology Consulting 2014) mentions in their recommendations that maintaining excellence in innovation and technology is the key issue besides high product quality, long term system reliability, after sales services and cost competitiveness for the globally acting European suppliers in all marine markets. Also, good knowledge

of the market (customer) needs and technological trends are needed. The report also emphasizes the importance of maintaining the knowledge base by enhancing education and training. Industry and universities are recommended to jointly develop adequate curricula and to offer related studies which was also recommended in our results, identically.

5 Conclusions and practical implications

Regarding innovation management, the main outcomes are related to co-operation and future driven thinking. Co-operation across the boundaries is essential part of the new perspectives. Especially, new partners are important because they may enrich the co-operation in creative way compared to the old and known partners. Out of the box thinking and making courageous decisions is necessary when dealing with the strategic decisions. Scenarios are also a good too to open new perspectives to future driven strategy planning. The multi-actor research project also stimulated collaborative attitudes and helped to form a shared vision of the future of Finnish marine industry.

As in futures research generally, also in applying it to the innovation management, the time dimension is important. Long-term perspective will help to produce radical ideas and implementing them to the practice also requires extra time. In marine industry the problems were long time ago recognized before actions were implemented.

All the actors i.e. core industry partners, related industries as well as enablers from the development organizations, educational institutes and universities and the society as a whole can and already have exploited the research findings in their own strategy work. The educators have strengthened their co-operation and renewed their supply for the marine industry companies and tailor-made precise education programs, too. Companies around the marine cluster have prepared a broader market strategy and developed also their ownership strategies towards a more stable direction. Also, the regional developers have strengthened their network strategies to improve the competitive advantage in this field. The society as a whole has got a fresh view to the future from different perspectives and a better understanding from the impacts e.g. of environmental issues, employment elements or outsourcing and international competition to the marine industry. Also, all the actors participated the project have got new partners and refreshed old partnerships for a keener cooperation in the future.

References

Balance Technology Consulting (2014) Study on Competitive position and future opportunities of the European marine supplies industry. Final report. In co-operation with Shipyard Economics Ltd. & MC Marketing Consulting. Funded by the European Commission, DG Enterprise and Industry.

Bergman, J-P., Jantunen, A., Tarkiainen, A., (2014). Managerial cognition and dominant logic in innovation management: empirical study in media industry. International Journal of Business and Innovation.

Etzkowitz, H., L. Leydesdorff (2000). The dynamics of innovation: From national systems and 'Mode 2' to a Triple Helix of university-industry-government relations. Research Policy 29.

Kokkonen, V., Kuuva, M., Leppimäki, S,, Lähteinen, V., Meristö, T., Piira, S. & Sääskilahti, M. (2005). Visioiva tuotekonseptointi - työkalu tutkimus- ja kehitystoiminnan ohjaamiseen. (Visionary concept design – a tool for steering R&D activities). Technology Industry Association in Finland (in Finnish).

Meristö, T. (1993). Tulevaisuuden näkemisestä tulevaisuuden tekemiseen: Suomi 2020.(From Seeing the Future to the Making the Future). In Prime Minister's Office (1993). Suomi 2020: visioita kansakunnan tulevaisuudesta. Suomen tulevaisuuspoliittinen selonteko, 147-162. Prime Minister's Office Publications. (in Finnish).

Meristö, T., Kettunen, J. & Laitinen, J. (2011) FUNNOVATION – Tools and best practices towards future-oriented innovations. The Proceedings of the 4th ISPIM Innovation Symposium, Wellington, New Zealand - 29 November - 2 December 2011.

Meristö, T. & Laitinen, J. (2011). Meriteollisuuden osaamisen ennakointi. (The Foresight of Skills in Marine Industry). Turku 2011.

Turoff, M. & Linstone, H. A. (2002) The Delphi Method: Techniques and Applications. IS@NJIT.

Van der Heijden, K. (1996) Scenarios: the Art of Strategic Conversation. J. Wiley.