A centre of marine technology knowledge for the future

For generations, Norway has been a major maritime power, not least due to our dependence on the sea, combined with long-term thinking and a high level of knowledge and expertise in marine technology. Today, we are facing a new geopolitical reality, as countries that have been technological leaders for generations are currently being challenged by offensive major powers that are positioning themselves for leading positions in research and development. Within certain fields, Norway has been a world leader in the supply of knowledge. Marine technology knowledge and maritime technology have been, and remain, two such fields, a situation that has made Norway a major maritime power. It is by no means given that we can retain this position in the future.

In its maritime strategic plan (2007), the Stoltenberg government stated that “In the course of the years, MARINTEK and NTNU have made major investments in experimental infrastructure. At present, these institutions are international leaders in their fields. However, the need for significant upgrades and new investments that will enable these institutions to maintain their international competetiveness and offer Norwegian industry attractive research services is becoming ever more evident.”

The government made this point once again in its White Paper on Innovation, where it went even further: “If the research centre and laboratories in Trondheim are to maintain their internationally leading position, it is essential that they should be able to satisfy the requirements of the Norwegian maritime industries, both today and in the future.” At that time, an earmarked grant from the Ministry of Trade and Industry was allocated to a pilot study aimed at concretising plans for a new marine technology knowledge centre in Trondheim – an Ocean Space Centre. In its White Paper on research policy (2009) the government pointed out that “public-/private-sector cooperation will help to realise a research infrastructure that will be of the utmost importance for both industry and the public-sector research community.” In this case, the Ocean Space Centre was used as an example of public-/private-sector cooperation - a forward-looking way of organising research and development.

The pilot study for the Ocean Space Centre was submitted to the Ministry of Trade and Industry and the end of January 2010. The maritime knowledge community has engaged in a broadly-based cooperative attempt to study this next-generation research and laboratory centre for the marine sciences. The project steering group includes representatives of such important industrial companies as Teekay, Statoil, Statkraft and the Ulstein Group, in addition to MARINTEK, SINTEF, NTNU and the Marine Research Institute. Besides the Ministry, financial contributors to the pilot study have included Den Norske Veritas, Statkraft, the Norwegian Shipowners’ Association, SINTEF and MARINTEK. The aim of the study has been to establish this marine technology knowledge centre in Trondheim.

Global challenges – growing need for knowledge

Few people remain in doubt that we currently face major challenges. Crises in food production, energy generation and climate changes are central keywords. Norway has both a national and a global responsibility to mobilise this country's human and economic resources to produce the technological solutions, knowledge and expertise that are needed to combat the negative effects of global climate change. It is only natural to place investment in ocean space and the development of marine technology in this context.

Most of the surface of the Earth consists of water – and about 80% of our oceans are more than 3000 m deep. This huge, and unresearched, ocean space has enormous potential, and a new boost in knowledge will be essential if we are to be able to solve the great challenges of our time. There is no doubt that research-based knowledge will be more important than ever.

The potential for knowledge generation and industrial development based on expertise in marine technology is enormous. Marine technology and competence are critical input factors in the offshore petroleum sector, shipping and ships' equipment industries, and in fishing and aquaculture. Marine technology and competence are also decisive factors in the development of technologies that will be capable of exploiting renewable ocean energy.

Knowledge has always been the driving force behind Norway's position as a major maritime power. Research and development in marine technology have been central factors in the development of modern Norway.

Ocean Space Centre

In order to generate tomorrow's knowledge about complex relationships in the sea – and to be able to identify solutions to the major challenges of our time – there is a need for infrastructure for research and development. This lies at the very core of the Ocean Space Centre concept, which is aimed at providing possibilities for the study of central problems related to the sea; problems of great importance for climate and the environment, for the balanced utilisation of marine resources, for access to energy and for the development of the Arctic region.

Norway has special international obligations where marine resource management, particularly in the Arctic, is concerned. This international position is another powerful argument in favour of Norway assuming a leading role in the marine technology of the future.

The scientific reports that accompany the pilot study describe in detail the gap between current laboratory facilities and future needs, in addition to the infrastructure that we believe will be required in a long-term perspective, i.e. until 2050.

Main elements of the future centre

The following paragraphs describe the most important elements of the infrastructure that will make up the Ocean Space Centre:

- A flexible ocean space laboratory with complete ocean environmental modelling and deepwater facilities, which will be an important tool for the development of future marine technology. This is particularly important in view of the challenges presented by renewable ocean energy and oil and gas production in very deep water and sensitive regions.

- A unique 3D flume tank for the study of the effects of complex flow conditions and internal waves on slender marine structures.

- A combined towing tank and wave-generation basin, as well as a combined flume and cavitation tunnel, designed to meet the challenges facing the shipping, fishing and aquaculture industries, advanced marine operations under extreme weather conditions and the development of renewable ocean energy resources.

- The arctic laboratory of the future: a wind tunnel with cold-climate facilities, a laboratory for the study of oil in ice, and laboratories with the potential for testing marine operations under conditions of icing in heavy seas.

- A groundbreaking design laboratory capable of dealing with future challenges at the interface between structures and materials technology.

- Unique saltwater laboratories for the study of interactions between technology, biology and the environment.

The sum total of all this will be an infrastructure for research and innovation without equal anywhere in the world, and which will set new standards in marine technology. This will offer Norway new advantages and help to provide a knowledge boost on a global scale.

It will also help to encourage modern forms of working and cooperating across scientific disciplines, in which industry and academia will collaborate in new ways. An “experience” component in the shape of a visitors’ centre aimed at encouraging curiosity in adults and children is also being considered. The siting of the Ocean Space Centre still requires further consideration. One obvious possibility would be to locate the centre close to, or actually in, the sea, in order to exploit the potential for research implicit in using the ocean itself as a laboratory. However, the pilot study did not arrive at any definitive conclusion as regards the location of the centre.

“Centre of gravity”

Torgeir Reve, professor of strategy and international competitiveness at the Norwegian School of Management, has studied the social and industrial value of investing in the development of a knowledge centre of this sort. Reve’s conclusion is that Norway could become a “hub of maritime knowledge.” *“What we need to do is to develop, finance and establish the Ocean Space Centre in order to develop knowledge in the field of ocean technology for the future. Investments in infrastructure on this scale will require close collaboration with the maritime sector and energy suppliers, in addition to the heavy involvement of the Norwegian authorities where financing and implementation are concerned.”* The vision is that Norway’s marine technology community should become a global hub of knowledge – a Centre of Gravity – for the ocean technology of the future.

Conclusions

Realisation of the Ocean Space Centre will be a national boost with international dimensions and global perspectives. In the future, there will be room for very few globally leading knowledge centres in marine technology. Norway should have the ambition of being one such centre – based on the continued development of its current position, which it has taken generations to achieve.

Today, we do not know what knowledge will be needed within the next fifty years. There is no doubt, however, that both knowledge and technology will make huge leaps within that time span. A closer coupling between national and international knowledge communities will be essential.

Modern infrastructure – adapted to the requirements of the future for innovation and knowledge generation in marine technology – is a *sine qua non* for maintaining and strengthening Norway’s role as a major maritime power.

A future knowledge centre in marine technology will make a core contribution to implementing the government’s declared aim that *“Norway will be a world leader in maritime research and innovation.”* The Ocean Space Centre is thus visionary, realistic and essential.

Read more at: www.oceanspacecentre.no (in Norwegian)