

Strategy 2019

World Class Ocean Technology
from Norway



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Revisions				
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1. Introduction

GCE Ocean Technology strengthens the innovation and internationalisation of its Norwegian ocean technology cluster.

PURPOSE OF THIS DOCUMENT

This document is aimed at existing and potential partners and members in GCE Ocean Technology. The purpose is to present the overall goals and strategies to develop the Ocean Technology Cluster.

BACKGROUND

Hordaland is internationally renowned for its world-class subsea, marine and maritime clusters. GCE Ocean Technology represents the world's most complete cluster within ocean technology. The cluster was awarded status as Norwegian Centre of Expertise (NCE) in 2006, based on the strong and growing subsea life-of-field expertise in and around Bergen. NCE Subsea was awarded status as a Global Centre of Expertise (GCE) in 2015, and entered the GCE-programme on 1 January 2016.

The previous strategy was established by GCE Subsea in 2016 and spanned from 2016–2021–2026. This document is a strategy revision based on the GCE Subsea application¹ and the previous NCE Subsea strategy document².

STRATEGY PROCESS

This strategy revision is based on a strategy process executed in 2018. The strategy process has been both extensive and inclusive. Many cluster actors were involved in the 2012–2016–2022 strategy process, as well as the GCE Subsea application in 2015. Targeted project groups have been engaged to develop the key strategic focus areas and projects for GCE Subsea. The plan presented is deeply rooted in the cluster – it represents the shared understanding of the goals and strategies for further cluster development.

STRUCTURE OF THIS DOCUMENT

This document gives an introduction to the GCE programme and the Ocean Technology Cluster therein and its corporation and development as well as the GCE Subsea facilitator. Section 7 presents the vision and section 8 the more detailed goals and strategies.

More detailed annual action plans are created each year simultaneously with the budget. A larger revision of the strategy is planned every third year.

The term “Ocean Technology Cluster” or “Cluster” describes all companies, organisations and institutions that typically are or can be partners and members in GCE Ocean Technology.

¹ Global Centre of Expertise Subsea, NCE Subsea's application to the programme: Norwegian Innovation Clusters – GCE Level, 24. April 2015

² Strategiplan NCE Subsea 2012-2016, Rev01, 23. November 2012

The term “GCE Ocean Technology facilitator” refers to the people working in GCE Ocean Technology.

2. Norwegian Innovation Cluster – GCE Programme

Norwegian Innovation Clusters is a government supported cluster programme. The programme aims to trigger and enhance collaborative development activities in clusters. The goal is to increase cluster dynamics and attractiveness and the individual company's innovativeness and competitiveness. The programme is organised by Innovation Norway and supported by Siva (The Industrial Development Corporation of Norway) and the Norwegian Research Council.

Norwegian Innovation Clusters supports clusters on three levels:

- **Arena:** immature clusters
- **Norwegian Centres of Expertise (NCE):** mature clusters with a national position
- **Global Centres of Expertise (GCE):** mature clusters with a global position

Arena is a 3–5-year programme, while NCE and GCE are 10-year programmes. There are annual evaluations of each cluster determining whether they are on the right track according to their strategies and whether they deliver according to quality standards sufficient to continue as part of the programme. The clusters are partially funded and have access to advisory services, cluster development support, networking activities and profiling services.

The specific objectives of this development are determined for every level, but should for all clusters be put into effect through the following common goals:

- The cluster businesses, knowledge institutions and development actors should increase their interaction and cooperation.
- The cluster should increase their capacity for innovation through collaboration with R&D or other knowledge providers.
- The cluster should enhance their access to relevant expertise.
- The cluster firms and knowledge providers should increase their international orientation.
- The cluster should establish an environment promoting the development and application of knowledge as the foundation for entrepreneurship, investment, innovation and change.
- The cluster's resources and potential should be visible.

For more information see: <http://www.innovationclusters.no>

3. Cluster Corporation and Development

Operators and suppliers on the Norwegian continental shelf have been, and still are, global front runners in developing advanced subsea solutions for production of oil and gas resources. The operational needs of these fields combined with their geographical proximity to each other, resulted in the emergence of a cluster for subsea services and technologies. The cluster was awarded the status of Norwegian Centre of Expertise (NCE) in 2006. Since the start of the NCE period, the cluster has matured significantly. The trust within the cluster has increased and challenges have been solved through collaboration.

In 2015, NCE Subsea counted 126 partners and members. The cluster companies' turnover and value creation have doubled between 2006 and 2013. With more than 20,000 employees and an annual turnover of 51 Billion Norwegian kroner in 2013, the cluster represents one of Norway's largest and most international clusters and is crucial to value creation in Norway³.

The Norwegian-based subsea industry has more than a 50 % global market share⁴. The average recovery of oil from Norwegian offshore fields is 46 %⁵, which is significantly higher than the global average of 20–40 %⁶. This is largely due to a proactive life-of-field programme where products and services are continuously developed in order to maintain and upgrade the producing wells. This way the cluster has obtained unique and unrivalled global expertise. Increasing the international oil recovery rate towards the Norwegian level would create tremendous value. A mere 1 % increase in the average recovery rate would lead to an additional 35 to 55 billion barrels, equivalent to one to two years' worth of global oil production⁷.

Following the oil price drop starting in 2014, the cluster redefined its positions, focusing on subsea solutions beyond oil and gas. The cluster was awarded status of Global Centre of expertise (GCE) in 2015 for its ability to execute this strategy. Appendix C shows an outline of the change in focus over the last few years.

GCE Ocean Technologies' combination of companies, specialised service providers, research and development (R&D) environments and development agencies makes the cluster a global knowledge hub. The cluster develops and supplies innovative ocean technology within a wide range of applications, including subsea oil and gas production, marine renewable energy production, marine

³ Jakobsen, E., Iversen, L., Jordell, H. and Røtnes, R. (2012): Samhandling i og mellom klynger – evaluering av seks NCE-prosjekter [Collaboration in and between clusters – evaluation of six NCE projects], Report no. 40/2012, Menon Business Economics and DAMVAD

⁴ Oljeteknologiindustrien, Norges nye fastlandsindustri. Norwegian market share from Rystad Energy 2011.

⁵ Norsk Olje og gass: www.norskoljeoggass.no/no/Faktasider/Okt-utvinning/

⁶ Recovery rates, enhanced oil recovery and technological limits, Ann Muggeridge et al, Phil. Trans. R. Soc. A 2014 372, Dec 2013

⁷ Eni: www.eni.com

food production and exploration of marine mineral resources. The cluster's resource base consists of industry companies, R&D and higher education institutions, joint innovation support resources and joint test facilities and R&D infrastructure.

The cluster's key players are located within half an hour's drive from the city centre of Bergen. The close proximity between businesses, R&D environments and support agencies ensures easy mobility/access and efficient communication and knowledge sharing.

4. Key Global Drivers

The cluster is facing several challenges and opportunities.

Potential: The Ocean Industries are estimated to double their contribution to the global economy from 2010 to 2030⁸. A significant portion of the growth is expected in areas where Norway has comparative advantages.

Increased demand for energy, food, mineral and medicine⁹: The global energy demand is set to grow by 25 % by 2040 in the New Policies Scenario¹⁰. Oil and gas will form two of the four pillars in the energy mix for decades to come.

Climate and environment: Environment and climate change represent major drivers towards more energy efficient, environmentally friendly and carbon neutral energy production.

Balancing the need for increased productivity with protection of the ocean resources and coexistence of ocean industries utilising marine resources is essential.

Digitalisation: The cluster faces a large drive and change towards digitalisation¹¹. This is seen by many as a fourth industrial revolution – hence the term Industry 4.0.

⁸ The Ocean Economy in 2030. OECD, April 27, 2016

⁹ Ny vekst, stolt historie. Regjeringens havstrategi. Mars 23, 2017

¹⁰ International Energy Agency (IAE), World Energy Outlook 2018

¹¹ digital - 21. Digitale grep for norsk verdiskaping 2018

5. GCE Ocean Technology Facilitator

GCE Ocean Technology is an industry driven initiative for the strengthening and internationalisation of business, research and education.

The GCE Ocean Technology cluster project's main objective is: collaboration in order to strengthen the cluster's competitive advantages in the global market, realise sustainable growth and create value.

A joint effort is needed to renew the cluster beyond oil and gas. The cluster's resource base lays the foundation for industry crossovers and entries into new markets. GCE Ocean Technology will facilitate multidisciplinary collaborations between companies, industries and competences. Innovative solutions will be developed to meet the long-term shift towards a low-carbon society and sustainable utilisation of marine resources.

A variety of related industries enhance innovation^{12,13}. With strong related clusters in the Hordaland region, GCE Ocean Technology is in a unique position to realize the ocean technology solutions of the future.

All organisations established in Norway that are providing products or services to the ocean industries, or intend to do so, are welcome as members. Partners are companies viewed as particularly important for the development of the cluster, as well as R&D and education institutions and governmental organisations.

The GCE Ocean Technology facilitator will be a driving force for increased knowledge and innovation collaboration among the members/partners, and towards national and international clusters.

The purpose of GCE Ocean Technology is to strengthen innovation, increase international involvement and increase capacity, competitiveness and value creation among the members/partners in the cluster as well as the cluster as a whole.

GCE Ocean Technology will facilitate the development of the subsea cluster both according to the cluster's vision and objectives, and in relation to the GCE programme's framework and ambitions. Thus, GCE Ocean Technology is considered as a means of support for development of the cluster within defined and targeted areas.

¹² Frenken, K., Van Oort, F., and Verburg, T. (2007). Related Variety, Unrelated Variety and Regional Economic Growth. *Regional Studies*, 41: 685-697 Aarstad, J., Kvitastein,

¹³ Aarstad, J., Kvitastein, O. and Jakobsen, S-E. (2015): Related and unrelated variety as regional drivers of enterprise productivity and innovation: A multilevel study. Submitted Research Policy

6. Implementation

The following five key strategic focus areas have been established:

- **Market** – Succeeding in the global energy market and developing solutions beyond oil and gas. Increasing knowledge about the global ocean industry market.
- **Competence and Infrastructure** – Attracting talents, develop competence and offer advanced infrastructure.
- **Technology** – Stimulating technology development
- **Entrepreneurship and Business Development** – Attracting capital and investors. Creating new entrepreneurs and growing businesses.
- **Digitalisation and Supply Chain Innovation** – Digitalisation and improvement of work- and production processes throughout the supply chain.

An illustration of how these areas interact with possibility, challenge and capability is shown in Appendix A. See goals and sub-goals in section 7 for more details.

Some of our key services include:

- Dissemination of knowledge
- Projects and activities that increase the members' knowledge and expertise
- Joint research, development and innovation (RDI) projects
- Projects and activities that support members operating in global markets
- Business development programmes that support start-ups and growth companies

FIVE-STAKEHOLDER-MODEL

A key element in the GCE-programme is developing stronger interaction between industry, R&D and government. Fostering entrepreneurship and attracting capital are important elements to help increase innovation. The figure below illustrates the link between all these five components. This is based on the MIT-REAP project conducted in 2016–2017 and form the basis of our broader collaboration model.

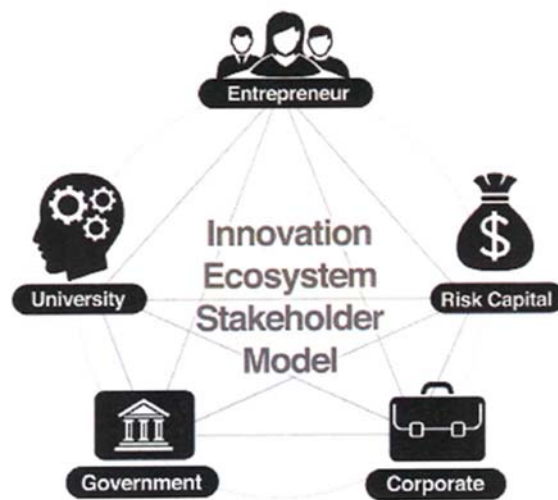


Figure 6.1 Five Stakeholder Model (MIT-REAP)

7. Vision

Vision: Creating Global Winners in Ocean Technology

The cluster's vision for the future: “The cluster develops enabling ocean technology through crossovers between companies, industries and competences and meets the demands of the future global market. Its position as a global knowledge hub for ocean technology solutions is supported by interaction with related ocean industries, embedded in a joint innovation platform. The cluster attracts companies, capital, knowledge and skilled individuals. Through enabling ocean technology, GCE Ocean Technology makes a significant contribution to Norway's value creation and ambition to create global winners.”

8. Goals and Strategies

Main goal: Increase the cluster's competitiveness and global market share and take a leading position in sustainable utilisation of ocean resources.

CORE STRATEGY: Strengthen the joint innovation platform, expand collaboration with world-class clusters and capitalise on our experience from the Norwegian continental shelf in the international market.

Main effect: GCE Ocean Technology will make a significant contribution when it comes to realising sustainable utilisation of ocean resources. Increased export of our solutions will create huge value for both the cluster and Norway. Also, raising international recovery rates will make a significant contribution to meeting the global energy demand. Society at large will benefit from the cluster exporting its health, safety and environmental standards, practices and technologies – thus improving the way the global subsea industry operates. The cluster's greatest asset is by far the present value of future labour¹⁴. The focus on strengthening the resource and knowledge base will enable entry into related emerging and growing markets. This will generate great value and position the cluster for the future.

The GCE Ocean Technology sub-goals with result/effect indicators and strategies below are closely linked to the key strategic focus areas listed in section 5:

¹⁴ Perspektivmeldingen 2013, Meld.St.12 (2012-2013)

Sub-goal #1: Strengthen the Cluster's knowledge base

Result/effect: Double the cluster companies' volume of international pre-competitive RDI projects during the GCE period.

STRATEGIES:

- Use the strong R&D and education institutions and networks to establish new national and international education programmes in collaboration with the industry.
- Expand participation in international pre-competitive RDI projects.
- Create new knowledge links and strengthen the joint innovation platform.
- Increase mobility of students and researchers.
- Improve access to education and training through eLearning.

Sub-goal #2: Extending delivery beyond oil and gas

Result/effect: Double the cluster revenue in ocean industries outside oil and gas by the end of the GCE programme period.

STRATEGIES:

- Create new knowledge links and strengthen the joint innovation platform.
- Expand collaboration with world-class clusters and research centres within Ocean Innovation.
- Raise awareness of the possibilities and potential in utilising subsea technology and the knowledge base in related industries.

Sub-goal #3: Increase product- and service innovation speed

Result/effect: Increase the number of new or improved products and services introduced by the cluster by 5 % every year.

STRATEGIES:

- Strengthen the cluster's joint innovation platform with emphasis on improving existing and creating new joint R&D test facilities.
- Increase research-based innovation with focus on international pre-competitive RDI collaboration projects.
- Provide support and facilitate external funded RDI projects and JIPs.

Sub-goal #4: Create new entrepreneurs and grow businesses

Result/effect: Double the early-stage investor capital invested in the cluster.

STRATEGIES:

- Strengthen entrepreneurship programmes and establish a service innovation programme with focus on value proposition and market.

- Help companies improve their business models and add services to products.
- Attract investors and funding.

Sub-goal #5: Create global SME winners

Result/effect: 2 per cent point annual increase in the number of SMEs operating globally.

STRATEGIES:

- Join forces, learn from each other and develop our strategic partnership with NORWEP, Innovation Norway and export-oriented Norwegian clusters that help SMEs establish operations in major international markets.

Sub-goal #6: Accelerate digitalisation and strengthen supply chain Innovation

Result/effect: Increase the number of new or improved work- and production processes being introduced in the cluster by 5 % every year.

STRATEGIES:

- Learn from other industries and clusters.
- Standardise requirements, work processes and interfaces throughout the supply chain.
- Strengthen multidisciplinary collaboration and focus on life cycle costs.
- Improve the feedback loop from operations to engineering.

Sub-goal #7: Increase host attractiveness

Result/effect: Establish three new international centres of excellence in the cluster.

STRATEGIES:

- Strengthen the cluster's joint innovation platform and knowledge base.
- Promote active communication that increases the cluster's international profile.
- Stronger coordination of activities with other clusters and development agencies in the region.

EXIT STRATEGY

The 10-year nature of the GCE-programme calls for an exit strategy to secure long term funding of the facilitator after 2026. A key strategy is to build a project/activity base beyond available GCE funding. This can be done on its own or through various partnerships.

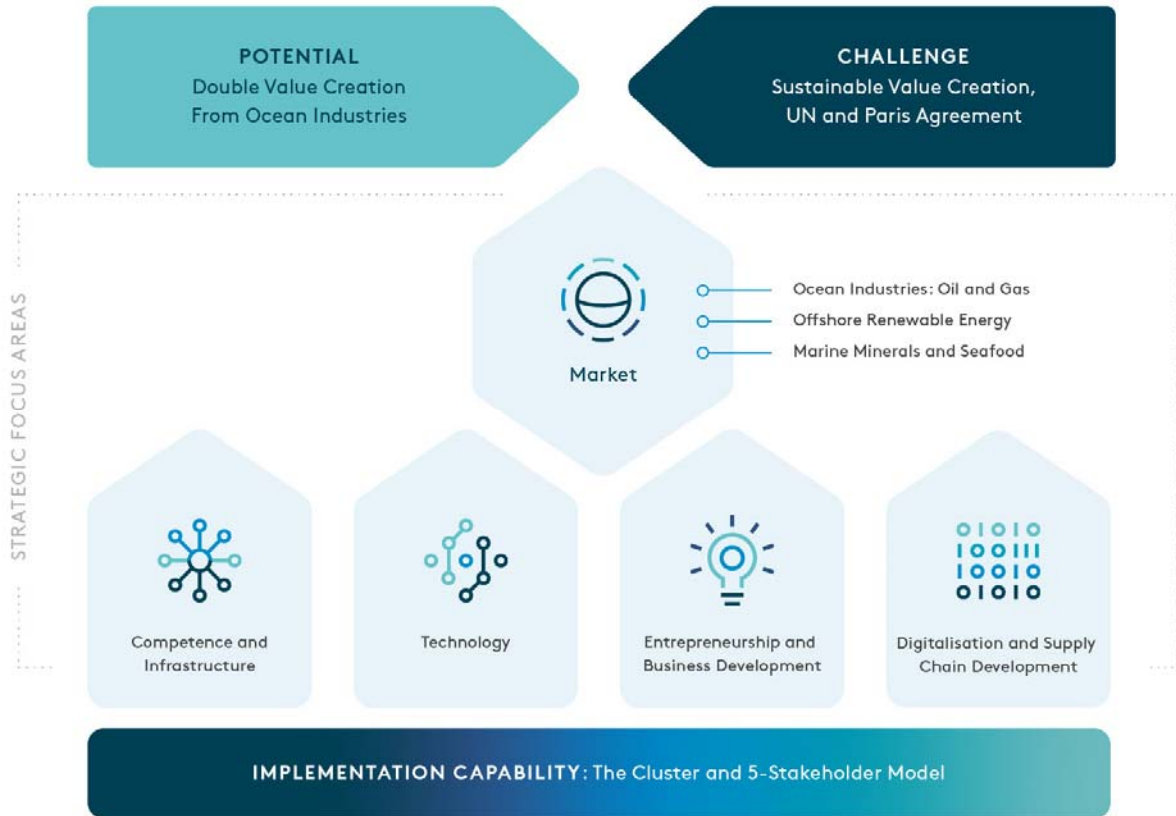
More focus will be given to the exit strategy in coming strategy revisions.

9. Success Factors

The following **critical success factors** have been identified for the cluster project:

- Secure active participation from the cluster in realising the implementation plan.
- Expand the platform for facilitating and carrying out major, integrated, international RDI projects.
- Encourage companies to think in terms of long-term competence building and acknowledge the importance of joint R&D infrastructure.
- Closer collaboration with related export-oriented clusters, NORWEP and Innovation Norway to support innovation and knowledge collaboration with international partners and joint SME entries into global markets as a cluster, as opposed to individual organisations and companies.
- Increase funding beyond the GCE-programme.

Appendix A / GCE Ocean Technology Strategy Map



Appendix B / Cluster Development

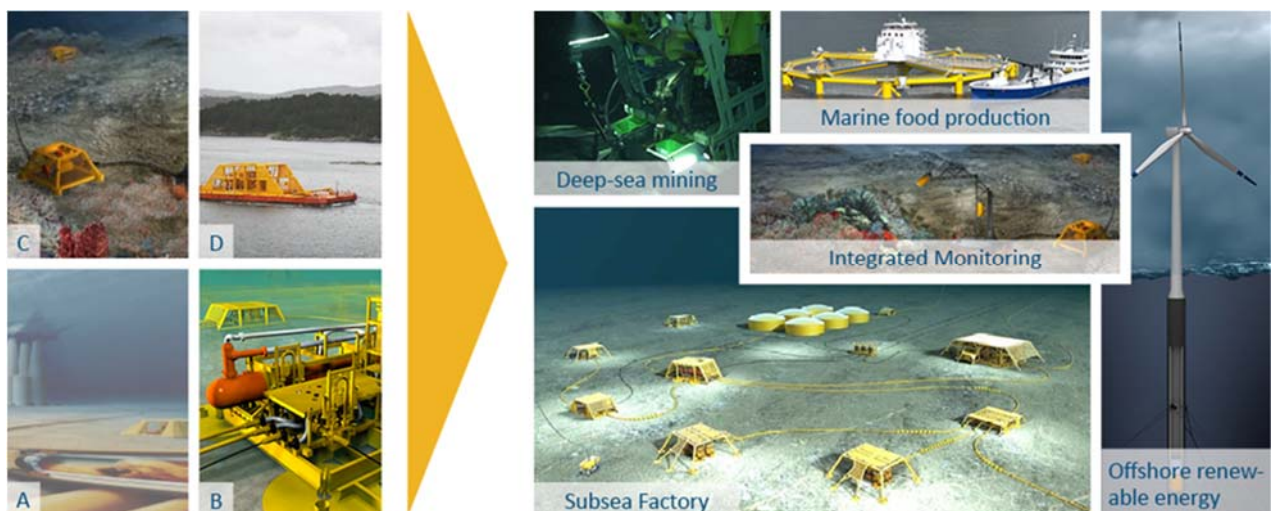
MAIN CHANGE FROM NCE SUBSEA TO GCE SUBSEA

New focus areas:

- **Ocean Innovation:** subsea solutions and knowledge beyond oil and gas
- **Work Processes:** strong focus on global competitiveness

Increased focus on:

- R&D test facilities and infrastructure
- International education, mobility and R&D programmes
- Supporting members in international markets



Cluster milestones to the left and GCE Subsea focus to the right. (From GCE Subsea application)

CHANGES FROM SUBSEA TO OCEAN TECHNOLOGY

Merging the focus areas Ocean Innovation and Market. Defining ocean industries as marked. Increased focus on digitalisation across the supply chain.