

Evaluation of Strategic Area:

Marine and Maritime Research

1) Strategic Area Concept

Three quarters of our planet's surface consists of water. Our seas and oceans constitute a major resource for mankind, providing food, livelihoods, energy and many other ecosystem services. Yet, both because of natural and human-induced changes (e.g., global climate change, over-exploitation by fisheries, competing claims in the coastal zone, etc.) there is an increased pressure on the sustainability of the mentioned ecosystem services and resources use.

The marine domain and the use of its resources have been traditionally of major macro-economic importance for Norway. **Given this importance and the overwhelming changes that are currently occurring in this area, the establishment of a Strategic Research Area in this domain at NTNU was very appropriate.**

The title of the Strategic Focus Area (SFA) refers to both marine living resources management and maritime technology (shipyard, offshore technology etc.). At the onset of the SFA, the maritime area got a focused Centre of Excellence (CeSOS, Centre of Ship and Ocean Structures) and consequently, operates quite independently from the rest of the SFA.

We therefore recommend to adjust the name of the SFA to the real focus areas of the domain and restrict the focus to the area of marine (living) resources management.

The current direction uses "*Marine and Coastal Development*" as the local working name for the SFA. It reflects better the focus, although it suggests implicit choices which do not seem to be fully appreciated throughout the conceptualization and structure of the SFA. Focusing on "development" implicitly suggests that the socio-economic and governance aspect has a central role in the conceptualization of the Area, but in reality, it doesn't.

We recommend the SFA to explicit the implicit choices they make in the conceptualization of the strategic area. The notion of the role of social sciences in the domain needs to be fully appreciated and requires a better understanding of and embedding in the concept of the SFA.

2) Degree of Interdisciplinary and cross-border activities

The Marine SFA achieved real cross-border coverage, in the sense that it involves scientists from 6 out of the 7 faculties existing at NTNU. Only the medical faculty is not involved. In addition, the area has a well established and close interaction with SINTEF Aquaculture and Fisheries.

This factual information shows that the Marine SFA has definitively achieved a cross-border range of activities, in the Trondheim science region.

The question however remains to which extent they have achieved an interdisciplinary approach in the strategic area. The nature of the domain requires a strong basis in natural sciences. Natural variability, environmental events and global climate change have important consequences for the productivity, and thus potential exploitation of the resources of marine and coastal ecosystems. Understanding and predicting them is a major challenge for the future and has impacts on the direction of research. The ocean and coastal zones suffer from environmental degradation and pollution. This may have significant effects on the productivity and the exploitation of the resources and the livelihood of the people living from these resource uses. These profound changes in the marine and coastal zone ask for novel governance systems based on technical, institutional and societal innovations.

The current profile of the strategic area has a strong embedding in the natural and technical (engineering) sciences. This is further enhanced by the strong linkage with SINTEF Aquaculture and Fisheries. The combination provides an excellent position to the strategic area to cater for technical solutions to the vast challenges we are faced with in the marine and coastal domain.

However, if the area wishes also to have a strong position in catering for appropriate governance systems, the societal sciences involved need to be enforced. At this moment some key disciplines in this area, especially in the field of business administration, marketing, consumer sciences and regulatory framework systems are lacking.

We recommend the strategic area to define its ambitions with regard to the type of solutions they want to provide and translate this into a plan for competences needed to fulfill this ambition, especially with regard to societal sciences, and to enact upon it.

3) The identification of Sub-areas

The SFA had identified 5 sub-areas, which covers well the main potential market or utilisation sectors for the research groups, e.g., using the Ocean Space, Aquaculture, Fisheries, Seafood. One of the areas (Communities and Culture) seems not to fit into this list as it does not cater for a specific industrial or economic sector. The separation of societal sciences from the natural and technical based sub-areas may decrease the power to develop proper interdisciplinary approaches in the other domains.

To avoid that the respective sub-areas and especially the social sciences sub-area withdraw in their respective comfort zones, the strategic area may re-conceptualize its division in sub-areas.

4) Achievements

According to the received documents, the strategic areas were implemented with the following goals:

- a. *to increase horizontal communication within NTNU*
This was specified in terms of: generate synergy and interaction between basic and applied sciences and promote interdisciplinary (cross-boundary) cooperation
- b. *to increase the profile of NTNU at national and international level*
This was specified in terms of: identify opportunities of strategic national importance and promote international cooperation, networks and visibility.

a. **Horizontal communication**

The SFA achieved this objective very well. Its members come from 6 out of the 7 faculties at NTNU. The leadership has spent much efforts in horizontal communication by bringing people together and have them discussing joined strategies and possible cooperative research. All members of the SFA whom the evaluators spoke to, reported the horizontal communication as their main motive to stay and endorse the SFA.

Yet, to our view, further optimization can still be obtained. Connecting the *faculties* rather than single professors in natural and social sciences, and Sintef is the major challenge. Today the connection seems to be based on single professors within the faculties only but not the faculty in a formal manner.

If the SFA wants to be structurally embedded in the policies and priorities of the different participating faculties, it should be recognized as a priority area by each of these faculties. .

b. Increase profile

The Marine Strategic Focus Area has many perspectives to become one of the main profiling areas for NTNU. It already made significant achievements, but these can still be further improved. The main achievements are (briefly summarized):

- the establishment of a European Technology Platform on Aquaculture, which was initiated by the Marine SFA, leading to a central role of SINTEF in this (Sintef carries the secretariate of the TP). The TP still needs to set off with activities, but it's existence provides excellent opportunities for NTNU to become an important player in the European Aquaculture Area (currently, not the institution but some single professors have a high reputation in the field).
- The Marine SFA has developed plans for a new Masters of Science in the area of Marine Living Resources Sciences. If the university succeeds to implement this Masters, it may become a cornerstone in NTNU's policy to increase profile in the World, through recruiting students from Europe and elsewhere.
- The construction of a new laboratory facility where graduate students, originating from different faculties but all doing thesis work within the SFA domains, can sit and work together.
- The acquisition of a new research vessel

All in all, the Marine SFA has clearly invested in developing in infrastructure, both physically (vessel, laboratories) and organizationally (Masters; TP). This provides a strong starting position to build on a high international profile. However, currently the "software" or content is still insufficiently developed.

To reach that level, the Marine SFA should develop a very clear strategy, with tangible objectives, measurable results, and controllable milestones and have the plan financially approved by the University Board and the respective Faculty Boards to make it successful.

5) Added Value

a) Productivity

Available information shows that over 7 years time about 450 papers in refereed journals were produced and about 40-50 professors are member or participate in the focus area. This means an average output of about 1,5 papers per professor per year. With this output, NTNU is *not* positioning itself among the international top. **Clearly, the productivity needs to be increased if the SFA wants to attain the Institutional Objective to become leading in its Domain.**

Quantitative productivity does not say everything but more information was not available to the evaluators.

The University should enable the leadership of the Marine SFA to develop and monitor quantitative progress in its science policy by providing sound regular bibliometric analyses, targeted to the area, comparing the output with international levels in the same area, benchmarking the growth in average Impact Rate of journals in which the SFA is publishing with the international average of its domain, providing data on Citation Index and H-index per individual and per sub-team participating in the area, etcetera. Only then, the leadership of the Marine SFA is capable to enact on policy goals regarding quantity and quality of the research output.

The strategic area seems to have only recently active application to the EU. Among the recent applications are three in the area of aquaculture which are highly profiling the first is the technology platform (EATP), Marie curie ITN (EMMA),

In the report EU funded projects:

EU 7th framework programme (appl pending) : 17

EU 6th framework programme : 13

EU 5th framework programme and before : 16

b) Added value of networks

The strength of NTNU is the technology domain. This provides a most interesting opportunity to create a specific and unique profile for the Marine SFA, integrating both natural, social and engineering sciences. Not many other universities in Europe will have a similar combination with this strong focus on hardware and technology within such a typical “soft” domain as marine living resources sciences. Therefore, if NTNU can stimulate its Marine SFA to act as a real unit with strong policy support and (within the university widely) accepted priority setting and plan setting, this Marine SFA could provide a unique selling point to NTNU!

c) Added value of collaboration with SINTEF

SINTEF and NTNU share a common strategy on the areas which deserve to be strengthened and on the development of educational courses.

The added value for SINTEF is the knowledge generator. The strategy areas are important for SINTEF to get the right contacts within NTNU. On the other hand, SINTEF motivates NTNU scientists to participate in consulting activities. In this way, basic knowledge in technology can be developed in such a way that it is easily converted and applied in applied projects and those scientists learned at the same time to collaborate in SINTEF projects.

The added value for NTNU is the window to companies and to finance provided by SINTEF. Further, through SINTEF, NTNU is able to attract external funding for its PhD students.

This is a real win/win situation.

However, the backside of the current collaboration is that it draws largely on the personal commitment of some individuals at both institutions.

We recommend that the cooperation with SINTEF is further formalized, and common quantitative goals are introduced by both institutions (SINTEF and NTNU). Target activities should be: EU applications, contract research, publication strategy.

d) Added value for local industry and community dividends

The Marine SFA, together with SINTEF may generate local social and industrial dividend by the creation of the program Trondheimfjord (OSRL). But it remains to be capitalized.

6) Overall Conclusions

- a) It has been stressed above that the Marine SFA has been working too high extent on the “soft” side (objective of horizontal collaboration), has restricted itself until today on bringing people together, creating a collaborative atmosphere; exchanging information, motivating people to join. They have been successful in this. However, if the Marine SFA wishes to contribute to the institutional goals of becoming a leader in Europe, more powerful acting is needed. Strong leadership will benefit from the development of a clear businessplan, with tangible objectives, measurable output, fixed and controllable milestones underway, which is submitted to the faculties and the top of the university and wherefore political, administrative and financial endorsement is contracted. Only if they succeed in doing so, they will achieve the institutional goals.
- b) We believe that the top management of the university should liberate all means to enable the Marine SFA to act as outlined under above; this requires administrative, financial and above all political support internally. It requires professionalizing of the strategic areas. We believe that one possible model (besides other possible alternatives) could be to turn these SFA into a sort of graduate school according to the Dutch model.
- c) SFA has been very successful in developing cross-border (inter-faculty and NTNU-SINTEF) collaboration. The main achievements are primarily visible in new “hardware”(facilities and equipment) and in the initiation of a new MSc Coastal Development. The “software” achievements are there, but we felt that more could be achieved if there would have been a clear plan what, where to go and how to achieve. We recommend that each sub-area develops a **business plan**, with tangible goals, sets of progress indicators and milestones.
- d) SFA has been very active in enacting its international profile with significant results (TP; Marie Curie ITN, Design-Act, *EM.*). At the national level, some significant projects (Calanus a.o.) were developed; however the impact of SFA seems less apparent. Profiling activities seem too much restricted to core fields of aquaculture and Ocean Space and strongly based on personal commitment of individuals. Powerful enaction requires vision, strategy and implementation planning.

- e) The Marine SFA has far too long followed a passive “bottom up” approach. We recommend a more pro-active and aggressive leadership to realize its goals, to increase its profile both internally but above all, institutionally (Business plans, Roadmaps, tangible goals). Performance measures to assess the quality and progress in achievements (Balance Score Card) of the SFA, with follow-up consequences.

Finally we believe that SFA has the possibilities to be one of the most perspective and promising areas for NTNU to reach its institutional goals.

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