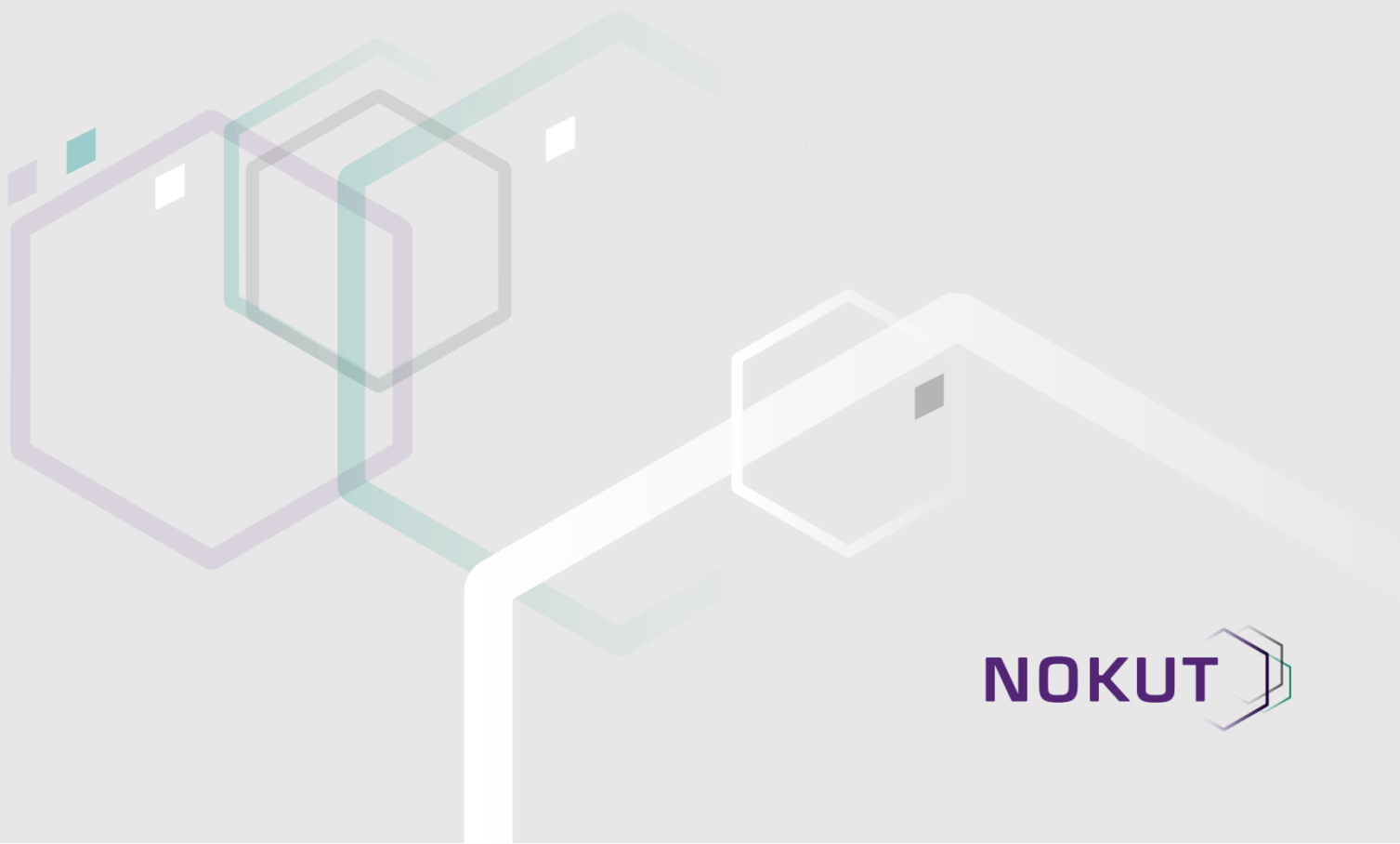


NOKUTs tilsynsrapporter

PhD in Nautical operations

Joint degree between the University College of Southeast Norway, UiT -
The Arctic University of Norway, NTNU - Norwegian University of
Science and Technology and Stord/Haugesund University College
September 2016



NOKUT 

NOKUT (Norwegian Agency for Quality Assurance in Education) is the controlling authority for educational activity at all Norwegian higher educational institutions. This is achieved, among other, through accreditation of new study programs. Institutions that provide higher education have different authorization to create new study programs. If an institution want to create a provision outside of its field of authorization, it must apply to NOKUT for accreditation.

Institutions:	University College of Southeast Norway, UiT - The Arctic University of Norway, NTNU - Norwegian University of Science and Technology and Stord/Haugesund University College
Name of educational provision:	PhD in Nautical Operations- joint degree
Degree/Studiepoeng (ECTS):	180
Expert Committee:	Professor Lennart Josefson, Chalmers University College Professor Pentti Kujala, Aalto University Associate Professor Alyne Delaney, Aalborg University PhD candidate Sondre Sanden Tørdal, University of Agder
Dato of decision:	07.09.2016
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Introduction

The external quality assurance performed by NOKUT consists of evaluating the institution's quality assurance systems, accreditation of new provisions and revision of accredited provisions. Universities and university colleges have different self-accrediting powers. For an institution without self-accrediting powers to establish a provision in a certain cycle an application must be made to NOKUT.

Hereby NOKUT presents the accreditation report of a PhD program in Nautical Operations - Joint degree. The expert evaluation in this report is part of the accreditation process following the joint application for accreditation of PhD-program of Nautical Operations from four institutions, submitted before the application deadline on November 1st 2015. This report clearly indicates the extensive evaluation performed to ensure the educational quality of the planned educational provision.

PhD-program in Nautical Operations at the University College of Southeast Norway, UiT - The Arctic University of Norway, NTNU - Norwegian University of Science and Technology and Stord/Haugesund University College fulfils NOKUT's conditions for accreditation and is accredited by resolution of 7th September 2016.

This decision does not have limited validity in time. NOKUT will however make a subsequent supervision of the educational provision within three years.

Terje Mørland



Director General

Information on accreditation of educational provisions (in Norwegian):

<http://www.nokut.no/no/Universitet-og-hoyskoler/Kvalitetssikring-og--utvikling/Akkreditering-av-nye-studietilbud/>

<http://www.nokut.no/no/Norsk-utdanning/Universitet-og-hogskole/Akkreditering-av-studietilbud/Korleis-sokje-akkreditering/>

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1 Information regarding the applicant institutions

This is an application for a joint degree program from four institutions: The University College of Southeast Norway/HSN (previously HBV), UiT – The Arctic University of Norway (UiT), The Norwegian University of Science and Technology/NTNU (previously Ålesund University College), and the University College of Stord/Haugesund (HSH). As accredited university colleges, HSN and HSH do not have power of self-accreditation for educational provisions in the third cycle. UiT and NTNU as universities have self-accreditation rights and are therefore not official applicants to NOKUT. NOKUT only accredits HSN and HSH's part of the program. However UiT and NTNU have participated both in the development of the application and during the accreditation process for a joint degree.

All institutions have quality assurance systems that have previously been evaluated and approved by NOKUT¹.

The institutions applied for accreditation of a PhD program in Nautical Operations - Joint degree (180 ECTS) by the application deadline of November 1st 2015.

The description of the program and the applicant's justification for the application

Norway has long traditions in seafaring, and maritime knowledge and expertise have been - and are - important for the nation. The ship's officer education has existed since the mid-1800s, and is offered in both the higher education and the vocational education sectors.

In recent times, the maritime operational complexity has increased, partly as a result of petroleum sector activities. Examples include anchor handling, towed cable systems, positioning of vessels in close proximity to other installations, offshore loading, diving operations and the use of underwater vehicles. This calls for a strong interaction between people, technology and organizations. The ship's officer education is a cornerstone of Norwegian maritime operational expertise, but the implementation of complex nautical operations requires a multidisciplinary approach and differentiated expertise, including research competence.

The national cooperation project MARKOM2020 was established by the government in 2011 to raise maritime education to a higher level with the goal for Norway to be among the world leaders in maritime professions education. This PhD Programme realizes a key objective of these national efforts, since it is designed to recruit applicants who have an operational educational and professional background, as well as a relevant master's degree. The Programme is also suitable for other vocational education backgrounds that are relevant to nautical operations.

2 Description of procedures

NOKUT makes an administrative assessment to ensure that all basic conditions for accreditation are fulfilled as expressed in the Regulations concerning supervision of the educational quality in higher

¹ A list of previously accredited study programs at HSN and HSH can be found at [NOKUTs webpage](#).

education (Academic Supervision Regulations).² For applications that have been approved administratively, NOKUT appoints external experts for the evaluation of the application. The external experts have declared that they are legally competent to perform an independent evaluation, and carry out their assignment in accordance with the mandate for expert assessment passed by NOKUT's board, and in accordance with the requirements for educational quality as determined by the Academic Supervision Regulations

The expert assessment includes a visit to the institution where the following groups are interviewed: the management of the university college, master students, PhD candidates, academic management, the discipline community, administrative management and possibly employers. In addition, the committee inspects the university college's infrastructure. Based on both the written documentation and information from the interviews, the expert committee shall conclude either with a yes or no as to whether the quality of the educational provision complies with the requirements in the regulations. NOKUT also requests that the expert committee advise on further improvements of the educational provision. All criteria must be satisfactorily met before NOKUT accredits an educational provision.

If the conclusion reached by the expert committee is negative, the report is sent to the applicant institution, which is then given three weeks to comment. Thereafter NOKUT decides whether the comments should be sent to the committee for additional consideration. The committee is given two weeks to submit the revised assessment. The board of NOKUT then reaches a final decision about accreditation.

3 Expert assessment

This chapter is the expert committee's assessment. The term "we" refers to the expert committee as such.

3.1 Summary of the report

Four institutions, namely, University College of Southeast Norway (HSN), Stord/Haugesund University College (HSH), Ålesund University College (HiÅ), now merged with Norwegian University of Science and Technology (NTNU), and UiT - The Arctic University of Norway (UiT) have a joint application for a PhD program in Nautical Operations. This is a sector in which Norway has a strong position internationally, but as a research area (and area for graduate education), it is young and not well established both nationally and internationally. This may be a consequence of the applied nature of Nautical Operations and its strong connection to the corresponding professional education on the BSc-level, i.e., how to control a ship and plan operations. Therefore, to strengthen the efforts to build up research in this part of the maritime sector, the committee supports the proposal.

The proposed PhD-program covers both nautical science, i.e., seafaring, navigation and manoeuvring water-based vessels, and operations, i.e., planning, implementing and evaluating nautical operations including legislative, organizational and human factors aspects. The proposed program is based on the specific competences of the four participating institutions; specifically, for HSH, Organisational security management, fire safety and evacuation research; for UiT, Maritime operations and sensor technology; for HSN, Maritime human factors and maritime port logistics; and for HiÅ (Now NTNU),

² <https://lovdata.no/dokument/SF/forskrift/2013-02-28-237?q=studietilsynsforskriften>

Maritime design and product development. The proposed program distinguishes itself from those already established in the research field of the marine technology, nationally and internationally, as it deals with the use of technology rather than research to develop new technology. On the operational side, the proposed program borders social science, established fields of legislation, work organization, ergonomics and the human-machine interface.

The combined faculty of the participating institutions is sufficiently large according to regulations but will be small in numbers at each of the participating institutions. There are also several of the faculty that are visiting professors or adjunct professors, and thus they will be more loosely connected to the institutions. While there are some areas with demonstrably high international scientific competence, there are also several faculty members who have only recently entered into an academic career path. Thus, the scientific level may not currently be uniformly high, nevertheless, there is a strong potential to build up the scientific level where needed. The committee is also, as mentioned, aware of the fact that the area of Nautical Operations is, by its very nature, applied and not well established – this is true also from an international perspective. The committee suggests that efforts should be made to support younger researchers of the faculty. The committee also suggest that the institutions formulate an improved research vision in order to strengthen interdisciplinary research and to wisely use the addition of the four new professors mentioned in the application.

The committee found that binding international agreements regarding research collaborations exist only for HSN. The committee recommends that all institutions actively work to establish more research agreements, and also establish international student exchange agreements on the third cycle level for the four institutions.

The applicants propose a four-tiered governance system with a high-level consortium, a program board, PhD-leaders at the four institutions (and primary PhD-supervision at the home institution) and administration. This will ensure equal involvement of the participating institutions and provide a high level of quality assurance of the program.

Within the program, the course package includes a compulsory course in Maritime HTO as well as elective courses that should provide sufficient breadth in knowledge and a base for the thesis work. Efforts have been made to ensure that students will have educational contributions from all institutions along with the associated, and necessary, funding for travel. An annual conference is also included to provide mutual information and enhance the atmosphere of a joint program. In general, the committee finds that the program has potential for students to fulfil the learning outcomes required in the Norwegian PhD-system. It is also shown how different courses and the thesis project contribute to that fulfilment. However, the committee recommends that more work is put in to the Maritime HTO course to ensure that students with a social science background are provided with a better base to support continued work in the program. The committee also finds that the infrastructure and academic support are adequate, with one minor uncertainty with respect to the availability of office space. To further improve the character of a joint PhD-program, the committee suggests the use of a modern communication platform.

In summary, the four participating institutions have proposed to create a joint PhD-program incorporating a well-composed course structure and with sufficient scientific breadth to have the potential to become internationally strong. The committee assesses that some complementary actions are needed to further improve the application.

3.2 Basic prerequisites for accreditation (§ 7-1)

3.2.1 Requirements assessed by NOKUT

§ 7-1 (1) The following requirements laid down in the Universities and Colleges Act shall be assessed for accreditation:

- a) Internal regulations and governance
- b) Appeals committee
- c) Learning environment committee
- d) Education plan
- e) Diplomas and Diploma Supplement
- f) Quality assurance system.

Assessment

The Regulations for the PhD Program in Nautical Operations (Joint Degree) have been prepared. The Regulations are based on and complement the *Regulations Concerning the Degree of Philosophiae Doctor (PhD) at UiT- The Arctic University of Norway (UiT)* (adopted by the University Board 25.10.2012 and later amended by Regulation 04.12.2014), and *Regulations for the Degree of Doctor of Philosophy (PhD) at Høgskolen i Buskerud og Vestfold (Buskerud & Vestfold University College, HBV, Now HSN)* (adopted by the College Board 09.05.2014). Both are based on standard regulations recommended by The Norwegian Association of Higher Education Institutions (UHR). The regulations are in line with the recommendations and contain all relevant information. A common diploma supplement containing all four logos is attached.

The committee finds that the application meets the regulations with respect to paragraph 7-1, but note that with regards to the quality assurance system it is not clearly stated how the annual assessment of the program will be carried out, if there is a common procedure that has been decided upon. Annual reports seem at the present to be produced locally according to local regulations. The committee would like to see the development of common procedures for the annual report, if they are not planned for, see also paragraph 3.4.6

Conclusion

Yes, the criterion is fulfilled.

The institutions should:

- Clarify that common procedures will be used for the annual report

3.2.2 Requirements in applicable regulations and curricula

§ 7-1 (2) Requirements of applicable regulations and curricula set by the Ministry of Education and Research must be satisfied.

Assessment

The institutions have shown that the total faculty includes 9.2 FTE's – full time equivalent in total, so the requirement of 8 full-time equivalent professors is fulfilled. Most of the professors are also permanent and 9 are at the professor level. Note though, that several professors are not connected full time (including some on the highest international level) to the institutions, or the proposed PhD-program at the institutions. It is also shown that at least 50% of the academic person-years allotted to the proposed PhD-program is faculty with primary employment at the four institutions.

The committee believes that the institutions have shown, in the application and during the interviews, that there is a potential to recruit and host 15 PhD-students, in terms of supervisory capacity and financing.

Although not formally required, the interviews indicate that it should be possible to keep a sufficient level of faculty and PhD-students at each of the institutions, with the aim to keep an equal distribution of PhD-students.

Conclusion

Yes, the criterion is fulfilled.

3.2.3 Recruitment of students

§ 7-1 (3) The recruitment of students to the program should be large enough to enable the institution to establish and maintain a satisfactory learning environment and a stable program.

Assessment

The application describes several possible recruitment channels through internal, national and international master programs. The application states a current capacity of 140 relevant internal master students yearly. The internal master programs consist of studies in technical topics, human factors, fire safety, and management. However, the application does not mention the merge between HiÅ and NTNU, which will further increase the internal recruitment potential. During the interviews at the site visits, the institutions mentioned other potential recruitment sources in addition to the ones presented in the application. HSN, for instance, has a maritime master program which could be included in the table of internal master programs with relevance for the PhD-program, in nautical operations (Table 3, p .10). It might be that the recruitment potential is larger than stated in the application, at least this was the committee's impression during the interviews.

Students with a social science background will also be able to be admitted as long as they have a relevant project and they can follow the courses.

The Norwegian Naval Academy seemed to show a big interest in the PhD program, and they may also serve as an additional source of recruitment to the PhD program. The institutions could have been

more informative in the application regarding the naval academy since it could have strengthened the application even further on recruitment of students, but also for the further employment of graduated Ph.D. students.

In general, the committee's impression is that the recruitment to the PhD program in nautical operations is satisfactory. Especially after the site visits at HSN and HSH where additional recruitment sources were mentioned by the institutions, and where the master students expressed great interest in the program. Some of the master students were positive to apply for the PhD program in the future.

Conclusion

Yes, the criterion is fulfilled.

3.2.4 Agreements regarding professional training

§ 7-1 (4) For programs including professional training, there must be adequate agreements regulating material issues of importance to the students.

Not relevant for the PhD-level.

3.3 Plan for the program (§ 7-2)

3.3.1 Program name

§ 7-2 (1) The program must have an appropriate title.

Assessment

The committee finds the name Nautical Operations (Norwegian *nautiske operasjoner*) appropriate. It is easy to understand and it communicates well. Nautical Operations reflects the intention to cover operations, i.e. manoeuvring and handling vessels at sea. Several different aspects of operations are covered, including legislation, organization and human factors aspects.

The name Nautical Operations also indicate a distinction from the established field marine technology, as the current application deals with the use of technology, not research on the development of technology in the maritime area.

Conclusion

Yes, the criterion is fulfilled.

3.3.2 Overall learning outcome

§ 7-2 (2) The program must be described with reference to learning outcomes, cf. National Qualification Framework for Lifelong Learning. The overall learning outcome for each program, defined in knowledge, skills and general competence, shall be described.

Overall learning outcome:

Knowledge (K1-K5)

The candidate:

1. is at the knowledge forefront of national and international research on nautical operations and their importance for efficiency and safety,
2. can contribute to theory or technology development in nautical operations and to development of knowledge relevant to nautical operations,
3. has a thorough knowledge of scientific theory that is relevant to the candidate's research field,
4. can assess the appropriateness of different research methodologies and methods for data generation and analysis related to nautical operations,
5. has a thorough knowledge of maritime stakeholders and their interrelations.

Skills (F1-F3)

The candidate can:

1. formulate scientifically founded research problems stemming from current research in order to plan and carry out research on nautical operations at an international level,
2. generate, process and analyse empirical data to present research findings in a way that qualifies for international peer-reviewed publication,
3. identify and analyse the need for knowledge, development and change of technology, decision making processes and operational decisions.

General Competence (G1-G5)

The candidate can:

1. identify relevant new ethical challenges and problems in one's own research and practice research with professional integrity,
2. disseminate research and development findings via national and international publications and conference presentations,
3. participate in professional maritime networks with other researchers, both nationally and internationally,
4. manage complex multidisciplinary assignments and projects,
5. contribute to creativity and innovation within one's field of research in collaboration with other stakeholders in the maritime industry

Assessment

The learning outcomes are in line with the National Qualifications Framework (NKR) and clearly states what a candidate with a nautical operations background should be able to know and do on completion of the program. The program is interdisciplinary, which is also communicated through the learning outcomes. The application clearly shows where in the program the different learning outcomes are achieved, and it is also seen that all learning outcomes should indeed be covered.

However, the committee has discussed whether it should be a clearly stated aim of the program that all the PhD students must be able to develop research, produce and generate new knowledge. It is not so clearly stated in the application as in the NKR, but was confirmed during the interviews. Although not precisely stated, this ability to create new knowledge will also be tested at the midterm evaluation.

Given that the research field is young, applied and not well-established (in relative terms), the committee believes that the learning outcomes should be more precise on this point and mention generate new knowledge explicitly. The committee therefore requires a more direct formulation.

Conclusion

No, the criterion is not fulfilled.

The institutions must:

- Include in the learning outcomes that all PhD students must be able to develop research, produce and generate new knowledge.

3.3.3 Content and structure of program

§ 7-2 (3) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved:

- a) Content and structure of the program.

Assessment

The proposed PhD program is multidisciplinary, with emphasis on an applied operational approach to nautical operations. The program will focus on the individual and collective decisions and grounds for decisions typically taken ahead of – as well as during - nautical operations. Decisions here are meant as assessments and actions made by planners, engineers and operational managers, based on, for example, risk assessment, analysis, and data collection.

The PhD program consists of a coursework component (30 credits) and a research component (150 credits). The coursework component is composed of PhD level courses divided into a compulsory part (15 credits) and an elective part (15 credits).

The coursework component's core areas have two compulsory and eight elective courses based on the program's overall profile. The core areas ensure the continuation of the central themes in the maritime-related bachelor's and master's degree programs at the four institutions.

The workload is calculated to 25-30 working hours per credit. This means that a subject of 5 credits will normally correspond to an effort of 125-150 working hours, and a course of 10 credits is equivalent to 250-300 working hours. The coursework component will include 750 to 900 working hours, equivalent to a half a person-year (0.5). The research component is standardised to 2.5 person-years in a full-time (100%) position. Overall, the PhD program is planned to take three person-years in a full-time (100%) position.

The coursework component includes three parts:

- The compulsory PhD course in science and ethics (5 credits).
- The compulsory joint course Maritime HTO (Human-Technology-Organisation) (10 credits).
- Continued theoretical / substantial / method-oriented education (15 credits).

Generally, learning outcomes of the courses are well connected to the overall learning outcomes. More details and explanations of the rationale of particular courses for meeting learning objectives are needed, however.

The goal of the compulsory course (HTO) should be stated more clearly. A short description of the course is provided in the application, but the goals should be better elaborated in writing. The interviews, for example, highlighted that the compulsory course is the only time when all the students come together, after which they disperse and specialize in their subject. Thus, the compulsory course has an important function as the “glue” holding the joint program together. The compulsory course prepares students for the thesis, guarantees interdisciplinarity and sets the coherence of the program. In connection with this required course there will be a two-day conference for both staff and students.

Additionally the applicants should clarify how HTO can cover all the learning outcomes. Given the students’ varied backgrounds - some in social science; many in different technical fields, the course may need to be modified accordingly. The applicants should describe how they will handle all these varied backgrounds.

Elective courses will prepare students for their thesis projects, but also have an important role in guaranteeing interdisciplinarity. Thus, there should be some guidelines for the students and supervisors to be able to select courses that will ensure this interdisciplinarity. There is a social science component in the compulsory course. The main social science topics are stakeholders and regulations as opposed to, for example, power, governance and culture of work. The program overall is addressing these other subjects in the electives. The committee sees a risk that the students who do not elect courses covering those elements, will not learn about other issues important to operations (such as the power, governance, and culture of work mentioned above).

In terms of the thesis work, how will it incorporate the interdisciplinarity? Should the technical side motivate the human factors and vice versa? This could motivate supervisors from different fields to work jointly on supervision (recommendations).

Furthermore, if the institutions had a clearer, stated research vision it would be easier for them to plan ahead and plan for interdisciplinary thesis projects, see paragraph 3.4.4.

Conclusion

No, the criterion is not fulfilled.

The institutions must:

- Elaborate further in writing on what precisely are the learning goals of the HTO (compulsory) course.
- Clarify how the Maritime HTO course can meet the learning goals, particularly in regards to students coming from varied (e.g., technical vs. social science) backgrounds.

3.3.4 Work and teaching methods

§ 7-2 (4) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved:

- b) Work and teaching methods.

Assessment

The presented work and teaching methods in the application consist of seminars, colloquia, lectures, individual work, group work, individual and group assignments, report writing, review article writing, laboratory exercises/experiments, and midterm evaluations. These methods are currently the standard work and teaching methods used in Ph.D. programs. The methods are varied and give the students a broad experience in both practical, theoretical, individual and group work. The Committee believes that these working methods are satisfactory and necessary to meet the national qualifications for lifelong learning.

The application presents several courses where the Human Technology Organization (HTO) course is a general course which is intended to give the students an overall view of the PhD in nautical operations. The application states that this course also will gather the PhD students across the four different institutions, where the students will meet and get to know each other. The committee believes that such gatherings among the students and the academic staff are an important factor to ensure that the students perceive the PhD as a joint degree and not only as an individual experience at each of the four institutions. To further ensure that the students and the academic staff experience the PhD program as a joint degree, the committee would like to stress that the students should take courses at the other institutions. The courses should be taught in blocks like one week, for example, to limit the students' travel back and forth between the institutions.

As the PhD program in nautical operations is a joint degree between four different institutions with large geographic distances between them, digital communication will play a significant role to ensure efficient and regular communication between students, academic staff and the administration. Also, the importance of frequently being informed about current research activities in the other institutions is crucial to ensure a joint experience. During the interview, the committee asked the administrative staff whether they had considered the issue related to efficient and regular communication between the four institutions. The response was that they had already a common working platform based on Fronter in addition to email and Skype. These communication tools are considered to be standard and is sufficient to start the program. However it may not be sufficient enough to ensure a high-quality communication platform in a joint PhD program. The committee believes that a more intuitive and modern platform should be used to enable more frequent interactions between researchers, students, academic staff, and the administration. This platform should increase the ability to discover recent activities at all four institutions, sharing files, and host public and private chat rooms. In general, the committee would say that this is an important factor to ensure a high-quality joint degree where long geographic distances between the institutions are present.

Conclusion

Yes, the criterion is fulfilled.

The institutions should:

- Ensure/require that the PhD students are taking elective courses at other institutions than their home institution. This will help to ensure that the PhD students perceive the PhD program as a joint degree.
- Consider a more dynamic and intuitive communication and sharing platform between the four institutions. This platform should ensure that students, academic staff, and the administration are well aware of the activities at the other institutions.

3.3.5 Examination and other types of evaluation

§ 7-2 (5) The following conditions shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved:

c) Examination and other types of evaluation

Assessment

The course-part of the PhD-program have a variety of examination forms. The committee found them well balanced and in line with the standard for Norwegian PhD-programs. They include oral presentations, oral examinations, evaluation of written manuscripts and home assignments. There is a midterm evaluation where the progress of the PhD projects is evaluated.

The examination of the PhD-thesis include a trial lecture and an evaluation of the dissertation by a commission. This procedure also follows the standard for Norwegian PhD-programs.

It is also clearly stated how different learning outcomes are achieved in the compulsory and elective courses and in the thesis work. However, with regard to the Maritime HTO course, the committee feels that more work is needed to clarify how students with various backgrounds will reach the learning outcomes, and also how it will be guaranteed that all students will take course sections on power, governance and culture (see, also paragraph 3.3.3).

Conclusion

Yes, the criterion is fulfilled.

3.3.6 Relevance of program

§ 7-2 (6) The program must have a clear academic relevance for employment and/or further studies.

Assessment

The program has been developed in close co-operation with the surrounding industry, and both the industry and the participating institutions see this program as very relevant to educate future experts for the industry as well as teachers for the institutions. There are a number of finalized research projects together with industry, and new international research projects are also just starting. Industry is also eager to develop topics and supervise the ongoing thesis projects.

There was a wide agreement that the nautical sector needs this competence developed by the program in the future to keep Norway in the leading edge also internationally. In addition, the whole maritime industry will benefit from this. The nautical operations will get more complicated in the future e.g. due to the rapidly developing technologies and new talented experts are needed. No similar program exists in Norway and this is an important first step to start building a wider academic community to this field in Norway. There is also a strong government support.

The committee noted also the high interest of Norwegian Naval Academy to educate their experts through this program. The Naval Academy also has high interest to build joint research programs with the institutes taking part in the program.

The relevance of the program is a very strong aspect of the application and the committee was even more convinced about this after the interviews, especially with the surrounding industry and governmental bodies.

Conclusion

Yes, the criterion is fulfilled.

3.3.7 Links to research, academic- and artistic development

§ 7-2 (7) The program must have satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.

Assessment

The application for the PhD program in *Nautical Operations* listed a number of research projects that will be relevant for doctoral students. Among these include:

- Research projects in connection with industries,
- Support of the Centre for Research-based Innovations (SFI) in Ålesund,
- MARCOM 2020, Special funding for improving nautical research in Norway, and
- Horizon 2020 applications

Table 5 of the application provided an extensive list of maritime PhD projects which had both industry and academic funding. Some of the joint projects include HSN's work with the maritime clusters in Haugaland, Sunnhordland and the SimSea simulator centre.

HSH also has close connections and research partners throughout Europe (examples DK and UK) and the United States; UiT has close connections in Japan.

An annual conference enabling students to present their own work and be introduced to new research was described during interviews, but there was no written description in the application.

Overall, the link to research is a strong point of the application. However, the lack of a clear research vision as commented earlier, makes it difficult for the committee to get an idea of what kind of research projects the candidates will work on. The four institutions should make a long term plan for research and outline how the candidates' projects will be connected to the research projects. The committee believes that this will also help fostering the interdisciplinarity of the program.

A joint degree program will make it easier for the institutions to introduce the candidates to ongoing research at the partner institutions.

Conclusion

No, the criterion is not fulfilled.

The institutions must:

- Make a common long-term research plan for the four institutions and plan how the PhD projects will be connected to ongoing research projects.
- Include a written description of the goals of the annual conference – e.g. where students can present their own work and be introduced to new research (from the interviews).

3.3.8 Student exchange and internationalization

§ 7-2 (8) The program must have student exchange and internationalization agreements, adapted to its level, scope and other characteristics.

Assessment

The institutions are committed to document their internationalization and exchange agreement with other institutions abroad. The application presents several agreements with other institutions abroad, both in terms of internationalization and exchange agreements. The committee noticed that UiT is not present in the table of internationalization agreements, and that HSH is not listed with any student exchange agreements. However, during the interviews, the committee was informed that UiT is currently working on an agreement with Tokyo University of Marine Science and Technology (TUMSAT). For the future, the committee would like to stress that UiT should establish agreements on internationalization, and that HSH should establish more agreements on relevant student exchange. Another topic which the committee found hard to understand was how active the listed internationalization agreements are today. Also, the committee noticed that some of the agreements were expired. The existing agreements should be considered by the institutions to be both valid and relevant for the PhD program.

The application presents a table listing all the current established exchange programs, where the majority are exchange programs related to first and second cycle studies (bachelor and master). Among the four institutions, HBV (now HSN) is the only institution which has established any exchange agreement for students in the third cycle level (PhD level). The current documented exchange agreements at HBV are distributed between two agreements. The first agreement (Politecnico de Milano, Italy) states an exchange of 2 students with a total duration of 20 months, and the second agreement (University of Split, Croatia) states an exchange of 2 students within a period of 5 months each. The current documented exchange activity on PhD level is seen by the committee as an absolute minimum (it is also a minimum according to the formal requirements from NOKUT). The committee recommends the institutions to establish more legally binding contracts for all four institutions, especially relevant exchange agreements in third cycle.

Conclusion

Yes, the criterion is fulfilled.

The institutions should:

- Establish more legally binding contracts for all four institutions, especially exchange agreements at HSH and agreements in third level cycle in general.

- Establish more agreements related to relevant internationalization agreements. The committee especially stress this matter for UiT since they currently do not have such agreements present, at least not any presented in the current application.
- Check the validity and relevance of all current agreements on internationalization and student exchange. If the agreements are expired or non-relevant, the committee would like to advise the institutions to renew the expired agreements and remove the non-relevant agreements.

3.3.9 Infrastructure

§ 7-2 (9) The institution must have facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the program.

Assessment

Technical and administrative services are good. The library services are standard and the students have access to digital journals. At both HSN and HSH the committee visited the ship simulation laboratories. They are equipped with up to date simulators (bridge, engine room) and personnel to help the students do their work. The interviewers were pleased with the infrastructure. The committee has not visited the infrastructure at the other two institutions (UiT and NTNU) since they have self-accreditation rights. Based on the description in the application, we believe that the other two institutions have infrastructure at least on the same level as the two other institutions.

HSN has offered PhD-programs (in another field) since 2010 and the administrative personnel is experienced when it comes to handling PhD-candidates. Support from the examination office, from the IT section, library and from the student organization regarding housing seems promising. There also seemed to be a close cooperation between the administrative staff at all four institutions.

At HSN there is enough space for the students and the offices were already in place. The committee is concerned, however, that work places are lacking for the candidates at HSH. The committee understands that a plan exists to expand the campus at HSH and during the interviews the committee got the impression that these are plans for ten years ahead. Before the program can be accredited, the applicants must clarify/demonstrate that there is, in fact, enough offices for the PhD-students at HSH. If there is not enough space at HSH, the institution can alternatively rent temporarily offices. In which case, legally binding agreements must be presented to NOKUT before accreditation.

For a joint degree ICT and communication systems are essential. The committee believes that a more intuitive and modern platform should be used to enable more frequent interactions between researchers, students, academic staff, and the administration. The committee recommends that a good interactive common working platform organized by the institutions will be in place upon accreditation, see also paragraph 3.3.4.

Conclusion

No, the criterion is not fulfilled.

The institutions must:

- Clarify/demonstrate that there is in fact enough offices for the PhD-students at HSH.

3.4 Academic environment associated with the program (§ 7-3)

3.4.1 The composition, size and competence of the academic environment

§ 7-3 (1) The composition, size and collective competence of the relevant academic environment must be adapted to the program as described by the program description and also adequate for conducting relevant research and academic or artistic development work.

Assessment

Overall, the faculty is well divided among the four institutions, covering different aspects of nautical operations, though the sub-area of nautical science is less well-covered.

The institutions have the majority of their faculty within these disciplines:

HSH: Organizational security management, fire safety and evacuation research

UiT: Maritime operations and sensor technology

HSN: Maritime human factors and maritime port logistics

HiÅ (now part of NTNU): Maritime design and product development.

These competences are also reflected in the proposed PhD-courses, and will be the primary fields for research. Some of the subfields have researchers on a high international level, for example fire safety and maritime port logistics. Though this competence is brought in by visiting professor IIs, with a weaker connection to the institutions. In other areas, with human factors and organizational focus, i.e., human technology interaction competence on an international level are being built up at HSN and HSH. There exist publications that are good and related to the field. Relevant research that is not directly related to the field can be used to build up research with a more maritime focus, which is a young research area with still fewer means for international publications.

The field of nautical operations is interdisciplinary. There are few examples of interdisciplinary research between faculty members at the four institutions or between the four institutions, but at the interviews the institutions showed a genuine interest in forming such research collaborations, with some current examples presented. In total, it seems to be a fair balance between the nautical operations side and the human factors side of the program. The faculty have the competence to succeed in the desired interdisciplinary field. It was confirmed during the interviews that the faculty is used to working interdisciplinary.

The present faculty consists of several young members formally approved to become primary supervisors. One may then argue that at the present the overall scientific level is a bit weak. However, given that this field is maybe more oriented towards professional development and not a traditional research oriented field, like the neighbouring Marin Technology, the committee believes that these criterions should be fulfilled to promote research into this area. The institutions is therefore required to clarify in more detail how to mentor and support young members of the faculty. The addition of four new professors to this PhD-program will also strengthen the application (though not existing today). The committee would like to see in what fields these positions will be selected and how they will be distributed among the institutions.

The committee would have liked to see more competence and elective courses in nautical science, areas like advanced navigation, manoeuvring, communication, situation awareness and arctic environment. These areas are covered at the BSc-level in the professional Master Mariner and Marine Engineering educational programs, but seem to be not fully covered at the PhD level.

Conclusion

No, the criterion is not fulfilled.

The institutions must:

- Explain which disciplines the four new professorships will be in, and explain the rationale for choosing these fields.
- Explain in greater detail the arrangements for mentoring younger faculty.

3.4.2 The academic environment's external participation

§ 7-3 (2) The academic environment must actively participate in national and international collaborations and networks relevant for the program.

Assessment

In the application, table 14 summarizes the academic community in respect to professional collaborations and networking. Table 14 gives an extensive list of research co-operation in Europe, USA, Brazil and Japan. In addition, the visiting level II professors from UK and Denmark clearly strengthen the program in the fire safety and logistics areas. It seems that institutions have a very good starting level for these activities, but it has to be remembered that this is an area where continuous efforts are needed to improve the activities. It is a long-term process to improve the close international co-operation.

During the interview, none of the international research co-operations above was especially pronounced, which may indicate that this research collaboration should be given more focus.

Conclusion

Yes, the criterion is fulfilled.

The institutions should:

- produce a roadmap to plan the possible future international co-operation including the possible partners and topics that can help the program to find the needed resources and time for these activities.

3.4.3 Academic staff and employment

§ 7-3 (3) At least 50 per cent of the academic FTEs allotted to the program must be staff with their primary employment at the institution. Of these, teachers with competence at the level of at least associate professor must be represented among those who teach the core elements of the program.

For the different cycles, the following additional requirements apply:

- a) For first cycle programs, at least 20 per cent of the collective academic environment must have competence at the level of at least associate professor.
- b) For second cycle programs, at least 10 per cent of the collective academic environment must be professors or docents, and an additional 40 per cent with competence at the level of at least associate professor.
- c) For third cycle programs, requirements are stipulated by Section 3-1 (3) of the Regulations concerning quality assurance and quality development in higher education and tertiary education.

Assessment

Overall, the proposed joint program meets the “numbers” requirements on academic staff and appointment: At least 50 per cent of the academic FTEs allotted to the program are staff with their primary employment at the institution. Of these, teachers with competence at the level of at least associate professor are represented among those who teach the core elements of the program. Additionally, this core faculty is supported by adjunct and other faculty with especially strong expertise and experience, providing mentoring support for the junior staff.

In terms of distribution, overall, faculty covering the necessary disciplines for the joint degree are available. Each institution has its specialties, however, with some disciplinary expertise stronger in some institutions than others. Furthermore, the faculty working in disciplines under the “Human Factors” umbrella are, on average, less senior and with less experience than the faculty available on the “technical” side. Therefore, the committee recommends some actions below, see also paragraph 3.4.1.

Conclusion

Yes, the criterion is fulfilled.

The institutions should:

- Ensure the junior faculty are paired with more experienced faculty to make certain students get quality supervision while faculty improve their own supervisory skills.
- Support the “Human Factors” side of the faculty to enable increased experience and seniority, equal to that of the more “Technical” side.

3.4.4 The academic environment’s research and development work

§ 7-3 (4) The academic environment must be actively engaged in research, academic and/or artistic development work.

For the different cycles, the following additional requirements apply:

- a) For first cycle programs, the academic environment must have documented results at a level that is satisfactory in relation to the content and level of the program.
- b) For second cycle programs, the academic environment must have documented results at a high international level of quality, with satisfactory academic breadth.
- c) For third cycle programs, the academic environment must have documented results at a high international level of quality with satisfactory academic breadth.

Assessment

The applicants have documented research within the following areas: mathematics, safety and risk management, innovation, fire safety, ship design, maritime technology, system design, maritime logistics, product development, maritime sensor technology, oceanography, human factor. So this means that covered topics are very wide and maybe some more focus is needed to achieve the highest international level. Some of the subfields have researchers on a high international level, for example fire safety and maritime port logistics. In other areas, with human factors and organizational focus, there exist publications that are good and related to the field, see also paragraph 3.4.1.

When analyzing, the field of nautical operations and documented results interpreted as peer-reviewed journal articles, we can conclude that there is a strong increase in publications in the recent years. The committee sees that the publication rate is heading in the right direction.

As an academic field this is an interdisciplinary field. There is no common journal platform internationally yet, which complicates the publication processes. The nautical science side is more of an applied field also internationally. There exist few established journals. There are also very few competitors and other research groups who publish internationally. This means that a considerable amount of development and research potential is available. Relevant research that is not directly related to the field can be used to build up research with a more maritime focus, which is a young research area with still fewer means for international publications.

The committee finds the breadth of the conducted research satisfactory and the main question is how will the institutions use the interdisciplinarity to be in forefront internationally? The future success of the program is depending on a good research vision and a long-term plan. For the whole research field of nautical operations, the institutions may not have research competence on a high international level of quality, though it has been discussed that this is not well established even internationally. However, to show that this level can be reached, the committee suggests that the institutions provide a research vision on how they can utilize this interdisciplinary program to reach a very high international level in the subfields of nautical operations, see also paragraph 3.3.7.

Conclusion

No, the criterion is not fulfilled.

The institutions must:

- Make a good research vision and most importantly show how to utilize the interdisciplinary program to reach world-class level on the selected topic areas

3.4.5 Supervision of professional training

§ 7-3 (5) For programs with supervised professional training, the academic environment and external mentors must have appropriate experience in the field of practice.

Not relevant for the PhD-level.

3.4.6 Supplementary provisions for joint degrees

All applicants applying for joint degrees must answer the supplementary criterias for joint degrees.

§ 7-4 (1) It must be clearly defined which parts of the program are the responsibility of each cooperating institution.

Assessment

It was clear from the agreement and from the interviews, that all four institutions have been roughly equally involved in the development of the program, and the final division of responsibilities. The institutions have found a structure to ensure the responsibilities, and also a common quality assurance system.

Conclusion

Yes, the criterion is fulfilled.

§ 7-4 (2) There must be satisfactory procedures in place for the development of and quality assurance of the program as a whole.

Assessment

When the application was developed, UiT and HSN were given the overall administrative responsibility of the whole program since they have experience with PhD. Since then HiÅ has become a part of NTNU. From the interviews, it appears to the committee that all four institutions are equally involved and committed to the program.

The four institutions have established a consortium to supervise the quality. According to the application, the consortium will consist of one head of a faculty / department / division of each institution. From the interviews, the committee got the impression that the Deans of the faculties are responsible for the joint degree. The four deans will have regular meetings in the consortium to develop the program. There is already a close collaboration between the institutions and they have started the meetings in the consortium already. There will be appointed one PhD leader at every institution that will be represented in the program board.

The consortium will implement the suggestions from the program board. The courses will be evaluated and an annual report for the joint PhD program will be made every year. The board will make an overall report of this program for the consortium.

One person in UiT has the role as the administrative coordinator for the program. The administrative staff at every institution reports to this coordinator. There is one administrative contact person at each institution. These four communicate with the coordinator. The administrative persons have contact and

the coordinator reports to the program board. There has already been interaction through the MARCOM project.

The administrative staff will meet at the annual conference for the PhD program every year.

Conclusion

Yes, the criterion is fulfilled.

§ 7-4 (3) The constituent parts of the program must make up a whole, as seen in relation to the program's level and learning outcomes

Assessment

The institutions have listed several measures in the applications to ensure the coherence of the program: The compulsory Maritime HTO course, with parts given at the different institutions, the elective courses students can take at different institutions, the annual conference, the thesis work and joint supervision.

During the interviews, the compulsory Maritime HTO course was highlighted as an important factor. The idea of joint research projects with supervisory committees from multiple institutions was also raised. The structure in MARCOM will allow and foster joint research activities. Also during the interviews, the PhD-students interviewed showed interest in such joint projects.

There are resources to make the practical side of the joint degree possible: in the MARCOM program there will be funding for the travels. The compulsory Maritime HTO course and also the elective courses will force this kind of movement. From the interviews, it was confirmed that the students both are motivated and are willing to move around if arranged practically.

A common shared communication platform for all the students and supervisors is one measure to enhance joint experience for the students in the program. One common ICT-platform for the daily contact between students to distribute information between students has already been planned from an administrative point of view, see also paragraph 3.3.4.

Conclusion

Yes, the criterion is fulfilled.

4 Conclusion

Based on the written application with attached documentation, the expert committee concludes the following:

The committee does not recommend accreditation of the PhD Nautical Operations

The expert assessment states which demands the institution is required to meet in order to achieve accreditation. In addition, the committee has provided advice for the further development of this study program.

The following requirements are not satisfied:

- § 7-2 (2) The program must be described with reference to learning outcomes, cf. National Qualification Framework for Lifelong Learning. The overall learning outcome for each program, defined in knowledge, skills and general competence, shall be described.
- § 7-2 (3) The following conditions shall correspond with and be adapted to the description of the learning outcomes so that the learning outcome is achieved:
 - Content and structure of the program
- § 7-2 (7) The program must have satisfactory links to research and academic and/or artistic
- § 7-2 (9) The institution must have facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the program.
- § 7-3 (1) The composition, size and collective competence of the relevant academic environment must be adapted to the program as described by the program description and also adequate for conducting relevant research and academic or artistic development work.
- § 7-3 (4) The academic environment must be actively engaged in research, academic and/or artistic development work.

The following requirements must be satisfied in order to achieve accreditation:

The institutions must:

- Include in the learning outcomes that all PhD students must be able to develop research, produce and generate new knowledge.
- Elaborate further in writing on what precisely are the learning goals of the HTO (compulsory) course.
- Clarify how the Maritime HTO course can meet the learning goals, particularly in regards to students coming from varied (e.g., technical vs. social science) backgrounds
- Make a common long-term research plan for the four institutions and plan how the PhD projects will be connected to ongoing research projects.
- Include a written description of the goals of the annual conference – e.g. where students can present their own work and be introduced to new research (from the interviews)
- Clarify/demonstrate that there is in fact enough offices for the PhD-students at HSH.
- Explain which disciplines the four new professorships will be in, and explain the rationale for choosing these fields.
- Explain in better detail the arrangements for mentoring younger faculty.
- Make a good research vision and most importantly how to utilize the interdisciplinary program to reach world-class level on the selected topic areas.

The committee offers the following advice to develop the study program further.

The institutions should:

- Clarify that common procedures will be used for the annual report
- Ensure/require that the PhD students are taking elective courses at other institutions than their home institution. This will help to ensure that the PhD students perceive the PhD program as a joint degree.
- Consider a more dynamic and intuitive communication and sharing platform between the four institutions. This platform should ensure that students, academic staff, and the administration are well aware of the activities at the other institutions.
- Establish more legally binding contracts for all four institutions, especially exchange agreements at HSH and agreements in third level cycle in general.
- Establish more agreements related to relevant internationalization agreements. The committee especially stress this matter for UiT since they currently do not have such agreements present, at least not any presented in the current application.
- Check the validity and relevance of all current agreements on internationalization and student exchange. If the agreements are expired or non-relevant, the committee would like to advise the institutions to renew the expired agreements and remove the non-relevant agreements.
- The institutions should: produce a roadmap to plan the possible future international co-operation including the possible partners and topics can help the program to find the needed resources and time for these activities.
- Ensure the junior faculty are paired with more experienced faculty to make certain students get quality supervision while faculty improve their own supervisory skills.
- Support the “Human Factors” side of the faculty to enable increased experience and seniority, equal to that of the more “Technical” side.

5 Commentary from the institution

The institutions response to the requirements that must be satisfied in order to achieve accreditation are:

3.3.2 Overall learning outcome

The wording of the second learning outcome in the Knowledge part (K2), is changed to: *The candidate can contribute to theory or technology development in nautical operations and to generate new knowledge, methods and/or practices relevant to nautical operations.* A new learning outcome has been added to the Skills part (F2): *The candidate can carry out research on nautical operations to generate new knowledge.* The updated overall learning outcome is given on page 11 of Appendix 1, Updated Curriculum; new text is marked as red.

Changes to the learning outcomes on program level are marked in red in the updated table 9 (from the application) that shows the relationship between learning outcomes and courses, see Appendix 2, Relationship between Courses and Overall Learning Outcomes.

3.3.3 Content and structure of program

A further clarification of the learning goals for the compulsory Maritime HTO course is given on page

9 of Appendix 1, Updated Curriculum; new text is marked as red.

Explanation on how candidates can meet the learning goals of the Maritime HTO course is elaborated on page 10 of Appendix 1; new text is marked as green.

3.3.7 Links to research, academic- and artistic development

A long-term joint research plan for the four collaborating institutions is given in Appendix 3, Long Term Joint Research Plan.

The description and the goals of the annual conference are included on page 12 of Appendix 1; new text is marked as red.

3.3.9 Infrastructure

Stord/Haugesund University College has signed an agreement to lease 20 offices in a neighboring building in Haugesund, of which 7 offices are allocated for the PhD students in the joint degree program.

Appendix 4 is a Letter of Confirmation by the Rector of HSH, while Appendix 5 is a copy of the signed Agreement to lease office space.

3.4.1 The composition, size and competence of the academic environment

The new professorships at the four institutions are in the following *disciplines* (qualification background):

1. *Maritime human factors* (human factors, navigation, nautical science and/or marine machine engineering). The position is at HSN.
2. *Maritime safety management* (safety management, risk analysis, accident analysis, organizational risk and behaviour and/or maritime education). The position is at HSH.
3. *Human factors and maritime safety* (risk handling, human machine interface and/or nautical science). The position is at NTNU.
4. *Advanced maritime vessel operations* (maritime technology, maritime data communications, navigation systems, marine cybernetics, decision support systems and/or autonomous/semi-autonomous systems). The position is at UiT.

The interim consortium has discussed the fields of the positions in terms of robust research groups and increased research collaboration between the institutions. The main goal of the positions is to strengthen the joint PhD program, while at the same time support the home institution research potential.

Appendix 6 shows the announcement for professorships in question.

The experienced staff member will work closely with the less experienced staff member in joint research projects. This will include the identified PhD research projects and other joint research projects and proposals. Each PhD student will be supervised by minimum two supervisors, one of which will be very experienced. The less experienced supervisor(s) can be head supervisor and will benefit from the guidance of the more experienced supervisor. This will include close co-operation in (1) planning the work programme of the PhD project, (2) managing the PhD project, (3) participating in field work, and (4) working on joint journal and conference publications arising from the PhD project.

The more experienced supervisor will be available for face to face meetings with the less experienced supervisor and the PhD student and will also be available for more frequent skype meetings. In addition to the planned work on the joint PhD projects, the more experienced staff member will work with the less experienced staff member in preparing joint research proposals for national, EU Horizon 2020 and international research calls. When appropriate, the more experienced staff member will introduce the less experienced staff member to research networks he/she is a member of, including consortia for proposal writing. The less experienced staff member will be invited to visit the more experienced staff member's home institution to gain experience in working in foreign institutions.

3.4.4 The academic environment's research and development work

The new vision for research and innovation is: "*International leading in nautical operations with focus on safety and efficiency*".

The plan for utilization of inter-disciplinary program to reach excellent level is depicted in the answer of 3.3.7 where the main inter-disciplinary research areas are identified with the supporting research fields that will be combined to answer research questions of relevance to nautical operations.

The institutions response to the requirements that should be satisfied are:

3.2.1 Requirements assessed by NOKUT

Common procedures will be made for the annual report, as well as for other parts of the program. The work will start in the fall semester of 2016. As a platform for common procedures the institutions have; 1) the cooperation agreement, 2) the PhD regulations and 3) the description of the quality assurance system. In addition three of the institutions (those which run PhD programs) have Regulations for the Degree of Doctor Philosophy (PhD), adopted by the institutional boards, based on *Recommended Guidelines for the Doctor of Philosophy Degree (PhD)* from the Norwegian Association of Higher Education Institutions (UHR).

3.3.4 Work and teaching methods

The students must visit all institutions through the compulsory Maritime HTO course. Students can select courses at any of the four institutions, and will be encouraged to do so whenever relevant to the project. Faculty members from two of the institutions (HSH and UiT) contribute jointly to the elective course *Maritime Organisational Safety Management* where teaching will take place at both institutions.

All four institutions are using the learning platforms *Fronter* or *It's Learning*. A joint system for the academic and administrative staff and PhD students will be decided when the current fusion processes between Norwegian Higher Education Institutions have been completed.

3.3.8 Student exchange and internationalization

The four institutions will identify academic research partners which are relevant for the program and which are based upon the long term joint research plan as well as the research interests to existing and new staff members. The institutions will jointly visit prospective partner institutions to write Erasmus+ exchange agreements which include the third cycle. See also answer to criterion 3.4.2.

The four institutions will also work to get more relevant internationalization agreements.

To check the validity and relevance of all current exchange and internationalization agreements the institutions will start a process in the fall of 2016 to evaluate the status of the internationalization and student exchange agreements.

3.4.2 The academic environment's external participation

The institutions are in the process of establishing a common roadmap to identify future partners for co-operation. Institutions in Japan (Tokyo University of Marine Science and Technology), USA (MIT), China (Dalian Maritime University), and Brazil (University of Sao Paolo), as well as European Universities (Strathclyde University, Scotland), are candidates that have been approached. Please also see answer to criterion 3.3.8.

3.4.3 Academic staff and employment

The supervision committee attributed to each PhD student will always include one experienced faculty member (amendment to §14 guidance/supervision) to ensure the quality of the supervision to the student and to enable less experienced faculty members to learn and improve their own supervisory skills. See also answer to criterion 3.4.1.

In order to support and increase the seniority of the Human Factors staff, three of the vacant professorships are related to Maritime Human Factors (at HSH, HSN and NTNU), see Appendix 6.

6 The expert committee's additional evaluation

6.1 Evaluation of the comments from the institution

§ 7-2 (2) The program must be described with reference to learning outcomes.

The institutions must:

Include in the learning outcomes that all PhD students must be able to develop research, produce and generate new knowledge.

Assessment

The committee believes that, although the learning outcomes were in line with the National Qualifications Framework (NKR), the learning outcomes should be more precise and explicitly mention that candidates shall be able to generate new knowledge.

The committee finds that the wording of the second learning outcome in the Knowledge part (K2) and in the skills part (F2) have been changed accordingly in the Curriculum and in Appendix 2, Relationship between Courses and Overall Learning Outcomes.

Conclusion

Yes, the criterion is fulfilled.

§ 7-2 (3) Content and structure of the program shall correspond with and be adapted to the description of the learning outcome so that the learning outcome is achieved.

The institutions must:

- *Elaborate further in writing on what precisely are the learning goals of the HTO (compulsory) course.*
- *Clarify how the Maritime HTO course can meet the learning goals, particularly in regards to students coming from varied (e.g., technical vs. social science) backgrounds.*

Assessment

The institutions have elaborated further on both the learning goals for the HTO course and on how the goals in the Maritime HTO course can be met. The primary objectives for the Maritime HTO course are to 1), provide students with a thorough insight into the national and international laws and regulations that govern nautical operations, as well as an overview of the complex array of stakeholders in the maritime industry; 2), teach students the basics of innovation theory in order to understand their research contributions in relation to social and industrial relevance in terms of the maturity of the research project; and 3), to provide students with a common knowledge platform in the areas of significance for nautical operations. These objectives are elaborated with seven learning goals for the course. Learning goals are by their nature necessarily broad, but the institutions have ensured that multi-disciplinarity and varying viewpoints are included. Newly added text emphasises the cross-disciplinary nature of the Maritime HTO course and the necessity of varying viewpoints. This may facilitate that learning goals can be met by students coming from varied backgrounds.

Conclusion

Yes, the criterion is fulfilled

§ 7-2 (7) The program must have satisfactory links to research and academic and/or artistic development work, adapted to its level, scope and other characteristics.

The institutions must:

- *Make a common long-term research plan for the four institutions and plan how the PhD projects will be connected to ongoing research projects.*
- *Include a written description of the goals of the annual conference – e.g. where students can present their own work and be introduced to new research (from the interviews).*

Assessment

The institutions have provided a new document containing the joint long term research plan for the four institutions and as such given directions for hiring processes of selecting faculty members (competencies, experience and personal skills that are required), for use of resources (funding for research, purchase of infrastructure, time allocation to research) and for the identification of future national and international partners for research and innovation collaboration.

The joint PhD-programme's vision for research and innovation is:

"International leading in nautical operations with focus on safety and efficiency"

The vision points to the academic goal of becoming a leading maritime PhD-programme in accordance with Norway's position as one of the major maritime nations with a long tradition for maritime commerce, navigation, exploration, ship building, and training of seafarers.

In addition the new document lists the strong field of competencies for each institution which contribute to the joint PhD-programme in Nautical Operations and the following research focus areas have been defined linked to the core competencies: 1) Advanced use of simulators; 2) Training and assessment; 3) Testing and evaluation; 4) Decision support systems and semi-/autonomous operations; and 5) Efficient and safe nautical operations, represented by: logistics, operational/team performance and green shipping and propulsion systems.

The vision as such can be considered well defined and it is ambitious enough. The research focus areas defined can be considered fairly pragmatic which is understandable as all the institutions have long history of applying simulators for research purposes. Once the doctoral programs have been ongoing in full strength, the research focus will most probably move towards more theoretical areas, but this plan seems to make a good starting point.

In the updated curriculum, the institutions have described in more detail the annual conference (gathering) including well specified goals for this gathering.

Conclusion

Yes, the criterion is fulfilled

§ 7-2 (9) The institution must have facilities, library services, administrative and technical services, ICT resources and working conditions for the students, which are adapted to the program.

The institutions must:

- *Clarify/demonstrate that there is in fact enough offices for the PhD-students at HSH.*

Assessment

The institutions have taken steps to ensure there is enough office space for PhD students at HSH. They have now provided written documentation of a long-term contract for additional building space in close proximity to the other University buildings.

Conclusion

Yes, the criterion is fulfilled.

§ 7-3 (1) The composition, size and collective competence of the relevant academic environment must be adapted to the program and adequate for conducting relevant R&D work.

The institutions must:

- Explain which disciplines the four new professorships will be in, and explain the rationale for choosing these fields.
- Explain in better detail the arrangements for mentoring younger faculty.

Assessment

The institutions have motivated their choice for the fields for the new professorships and have decided as below.

1. Maritime human factors (at HSN)
2. Maritime safety management (at HSH)
3. Human factors and maritime safety (at NTNU, professor / associate professor)
4. Advanced maritime vessel operations (at UiT)

The committee finds that this choice will strengthen and distribute the scientific competence. The institutions have also presented measures for mentoring younger faculty including face to face meetings at PhD supervision occasions and support with research applications.

Conclusion

Yes, the criterion is fulfilled

§ 7-3 (4) The academic environment must be actively engaged in research, academic and/or artistic development work.

The institutions must:

- *Make a good research vision and most importantly how to utilize the interdisciplinary program to reach world-class level on the selected topic areas*

Assessment

The institutions have formulated a vision for research and innovation as: “*International leading in nautical operations with focus on safety and efficiency*”, and also presented a long term research plan (See also 7-2 (7)). As such they have given directions for hiring processes of selecting faculty members (competencies, experience and personal skills that are required), for use of resources (funding for research, purchase of infrastructure, time allocation to research) and for the identification of future national and international partners for research and innovation collaboration. They have also shown how the main inter-disciplinary research areas are identified with the supporting research fields that will be combined to answer research questions of relevance to nautical operations. Moreover, they have presented measures intended to reach a world class level in the identified topic areas.

The vision points to the academic goal of becoming a leading maritime PhD-programme in accordance with Norway’s position as one of the major maritime nations with a long tradition for maritime commerce, navigation, exploration, ship building, and training of seafarers.

In addition the new document lists the strong field of competencies for each institution which contribute to the joint PhD-programme in Nautical Operations. The following research focus areas have been defined linked to the core competencies: 1) Advanced use of simulators; 2) Training and assessment; 3) Testing and evaluation; 4) Decision support systems and semi-/autonomous operations;

and 5) Efficient and safe nautical operations, represented by: logistics, operational/team performance and green shipping and propulsion systems.

The vision as such can be considered well defined and it is ambitious enough. The research focus areas defined can be considered fairly pragmatic which is understandable as all the institutions have long history of applying simulators for research purposes. Once the doctoral programs have been ongoing in full strength, the research focus will most probably move towards more theoretical areas. The plan seems to make a good starting point.

Conclusion

Yes, the criterion is fulfilled.

6.2 Final conclusion

In summary, the four participating institutions, University College of Southeastern Norway (HSN), Stord/Haugesund University College (HSH), Norwegian University of Science and Technology (NTNU), and UiT - The Arctic University of Norway (UiT) have proposed to create a joint PhD-program incorporating a well-composed course structure and with sufficient scientific breadth to have the potential to become internationally strong. The committee assesses that the institutions have satisfactorily complemented their application by responding to comments on criteria that must be satisfied.

The committee also acknowledges that the institutions have satisfactorily responded to comments on criteria that should be satisfied.

Based on the written application with attached documentation elucidated at the on-site interviews, and the response from the institution after the first version of the report, the expert committee concludes the following:

The committee recommends accreditation of the PhD programme in *Nautical Operations: Joint Degree at University College of Southeast Norway (HSN), Stord/Haugesund University College (HSH), Norwegian University of Science and Technology (NTNU) and UiT- The arctic University of Norway (UiT)*.

7 Decision

The PhD program in Nautical Operations- Joint degree fulfils all criteria for accreditation as detailed in Chapter 7 §§7.1 - 7.4 of *Regulations concerning supervision of the educational quality in higher education (Academic Supervision Regulations)* of 28. February 2013.

The PhD program in Nautical Operations- Joint Degree is accredited.

8 Presentation of the expert committee

Professor Pentti Kujala, Aalto University, Finland

Kujala is Doctor of technology, Helsinki University of Technology, Faculty of Mechanical Engineering (1994). He is an experienced scientist and lecturer. He also has a technical background from the field as Project manager Kvaerner Masa-Yards and Aker Finnyards/Aker Yards. From 2006 he is Professor of Safety of marine traffic and winter navigation safety, Helsinki University of Technology.

He is the Head of the Mechanical Engineering study program in Aalto University, 2014-2015 and has participated in the coordination of the planning of a new master program for Applied Mechanics for Aalto University 2013-2015. He teaches all levels within subjects such as ship vibrations, winter navigation, vehicle engineering and safety of marine traffic. He currently supervises seven PhD students and has previously supervised 50 master students and PhD-students.

Professor Lennart Josefson, Chalmers University College, Sweden

Lennart Josefson is professor in Solid Mechanics at the Division of Material and Computational Mechanics at Chalmers University College. He is head of the department there. His educational background is within civil engineering. Josefson teaches all levels at the university within machine engineering and solid mechanics. He has supervised 7 PhD-students and several master students. His main research areas are Computational Welding Mechanics and Fatigue, research areas related to Naval Architecture. He has published extensively within the field, for example in International Journal of Fatigue.

Associate professor Alyne E. Delaney, The University of Aalborg, Denmark

Delaney is Associate professor at the Department of Development and Planning, Aalborg University. Her background is within Cultural Anthropology, University of Pittsburgh, USA (2002).

Her research background focuses on coastal areas on maritime-related research projects. She has worked with Japanese fishers since 1991 and have been based in Europe since 2003. She has a particular interest in resource rights, social organization, disaster and revitalization, and visual research methodologies. She teaches these subjects at all levels at the university. She has published extensively within maritime anthropology and policies.

PhD candidate Sondre Sanden Tørdal, University of Agder, Norway

Tørdal has a Master degree in Mechatronics from the University of Agder. He participates in a research group at the Department of Engineering Sciences at the University of Agder. His research interests are within technology, mathematics, mechanical engineering and offshore technology.

9 Documentation

Archive number 15/707-1 *Norges arktiske universitet, Høgskolen i Buskerud og Vestfold, Høgskolen Stord/Haugesund, Høgskolen i Ålesund - søknad om akkreditering av ph.d.-studium i nautiske operasjoner (fellesgrad).*

Archive number 15/707-2 *Supplering av søknad - Norges arktiske universitet, Høgskolen i Buskerud og Vestfold, Høgskolen Stord/Haugesund, Høgskolen i Ålesund - søknad om akkreditering av ph.d.-studium i nautiske operasjoner (fellesgrad).*

Archive number 16/0028-12- *Tilsvaret til rapportutkast - Norges arktiske universitet, Høgskolen i Sørøst-Norge, Høgskolen Stord/Haugesund, NTNU (Høgskolen i Ålesund) - Akkreditering av ph.d.-studium i nautiske operasjoner (fellesgrad)*