

UAS-PD Maritime

Programme document

Taskforce PD Maritime

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Introduction

The maritime domain is undergoing radical changes as a result of three global developments:

- The need to drastically reduce greenhouse gases;
- The trend towards unmanned or low crewed shipping;
- The rapid evolution of sensors and data processing methods.

The Universities of Applied Sciences (UAS) which offer maritime education and have a maritime research group have decided to join forces in response to these changes and develop a maritime Professional Doctorate (PD) degree program. The current PD program proposal is a follow up to the proposition approved by the Vereniging Hogescholen (VH) in 2021.

The proposal is developed as a collaboration between the key professors in the domain of these UAS, Delft University of Technology, supported by Netherlands Maritime Technology. It follows the generic framework developed by the VH (VH, 2021). We are convinced that a PD degree program tailored to the maritime domain will contribute to the sustainable transition of the domain and strengthen its positive impacts on the Dutch maritime industry and society as a whole.

The PD program will offer a new career perspective for researchers and practitioners and allow the domain to professionalize and respond to industry and society challenges. By using practice-oriented research, based on interventions and short-cyclical research output, PD candidates are enabled to come with applied solutions.

The maritime PD is a degree program composed of courses and the successful completion of an individual research portfolio. The program will be implemented in the framework of a joint pilot by the VH and is foreseen to start in January 2023. During the 4 years pilot phase from 2023 to 2027, an initial number of 8 candidates will be allowed to start their PD trajectory in one of the three participating UAS. This document describes the profile of the program, its structure and method of assessment.

Professional profile

Profile in outline

The UAS-PD Maritime educates highly qualified, practice-oriented, research driven maritime professionals. A combination of a researcher and an innovator, of substantive, technological knowledge and deep understanding of the daily practice of the maritime sector. Focused on sustainability, safety and efficiency of the maritime sector, with an eye for innovation, digitalisation and automation. The maritime knowledge agenda may serve as a guideline. The PD is a transcendent thinker who can define and concretise research independently. A proactive and initiating researcher and innovator, both in the field of scientific research and in practical implementation. The PD promotes innovation and creates support for implementation. He/she is a designer of interventions in practice with an intended effect broader than the immediate working environment. The PD is able to influence or describe the implementation of his/her idea in practice with an eye to the added value for the end user and knows how to disseminate the idea effectively.

Focus

The maritime sector is undergoing radical changes as a result of three global developments:

- The need to drastically reduce greenhouse gases;
- The trend towards unmanned or low crewed shipping, not only due to a technology push, but also because there is a social need to shift transport from road to water.
- The rapid evolution of sensors and data processing methods, reflected in keywords such as Big Data, Internet of Things, Artificial Intelligence and Smart Sustainable Industry.

In its study Trends and the Dutch Shipping Industry, the Ministry of Infrastructure and Water Management identifies five megatrends for the shipping industry in the period 2020-2030:

- digitalisation,
- energy transition,
- extreme weather situations/climate change,
- more efficient and different ways of working and
- changing political and economic order.

The same topics are also reflected in the four priority innovation themes of “Nederland Maritiem Land” (NML):

- Extraction at sea
- Clean ships
- Smart & safe shipping
- Effective infrastructure

These developments and trends guide the focus of the UAS-PD Maritime programme.

Added value, usefulness and necessity

In order for the maritime sector to be able to respond effectively to the challenges outlined above in the fields of sustainability and safety, practice-oriented research, innovations and sufficient highly qualified personnel are required. This need has been confirmed by companies and industry representatives in the professional field advisory committees of maritime Bachelor's and Master's degree programmes. The existing continuous learning pathway mbo4-AD-Bachelor-Master will be further completed by adding a professional doctorate to meet the need for highly educated, practice-oriented research professionals.

This addition to the continuous learning pathway is particularly desirable, as there is no academic alternative in the Netherlands for hbo-masters educated in the maritime nautical domain. As a result, there are no opportunities in the Netherlands for transferring from a higher professional education (HBO) master's degree to a research-oriented post-graduate programme in the nautical part of the domain.

"The maritime sector is a sector par excellence where academic and practice-oriented research can and should reinforce each other, partly due to the strong drive to make shipping more sustainable and

to automate it to a large extent. From the academic world we can come up with technological solutions, but without a thorough understanding of the daily practice of the sector it is hardly possible to use the full potential of these developments. Both industry and academia would benefit greatly from typical practice-oriented PD research that can fill this gap."

Prof.ir. J.J. Hans Hopman, Chairman Maritieme Techniek en Transporttechniek, TU Delft

Programme level

The UAS-PD Maritime programme trains to doctorate level (EQF 8) as described in the Framework for Qualifications of the European Higher Education Area (QF-EHEA) - also known as the Dublin descriptors - and the European Qualifications Framework for lifelong learning (EQF). Both frameworks are compatible with each other (European Commission, 2008). An overview of the requirements for candidates at this level is given in the table below.

EQF 8	Dublin descriptors Qualifications that signify completion of the third cycle are awarded to students who:
Knowledge at the most advanced frontier of a field of work or study and at the interface between fields;	Have demonstrated a systematic understanding of a field of study and mastery of the skills and methods of research associated with that field;
The most advanced and specialized skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice;	Have demonstrated the ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity;
Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research.	Have made a contribution through original research that extends the frontier of knowledge by developing a substantial body of work, some of which merits national or international refereed publication;
	Are capable of critical analysis, evaluation and synthesis of new and complex ideas;
	Can communicate with their peers, the larger scholarly community and with society in general about their areas of expertise;
	Can be expected to be able to promote, within academic and professional contexts, technological, social or cultural advancement in a knowledge based society.

The main differences with Master's level (EQF 7) are the degree of independence and the degree of complexity of the practice matter, as well as the requirement that the PD candidate is able to contribute new ideas or knowledge with a broader validity than the case studied, while a professional Master's student works mainly on his own development and does not need to make an original transferable or generalisable contribution to practice.

Nature of the programme and roles of the PD

An applied research and innovation project, based on a complex issue in maritime professional practice, forms the core of the PD Maritime programme, this is supplemented by educational courses. The PD candidate during the program is mostly active in the professional field.

Since a PD professional works in a complex environment, the PD program has to mirror this. To fulfil his tasks a PD has to take on multiple roles. The PD has a role as an **innovator**, with transferable skills (problem-solving capacity, flexibility, relationship between target groups). The PD has a role as a

researcher applying theoretical and practical knowledge & methods concerning complex practical issues. The PD also has a role as an **advisor**, involved in positioning, profiling and professionalization in the Maritime domain.

These different roles of the PD (researcher, innovator, advisor) are practiced simultaneously. Together they realise the PD **professional**. The whole is more than the sum of the parts. Therefore the final qualifications of the PD program are defined as integrated learning outcomes, in which different combinations of roles are required. This holistic attitude fits with a maritime professional working in the field.

Final qualifications

The final qualifications of the PD program are at doctorate level (EQF8) as described in the paragraph program level. The final qualifications are defined as five learning outcomes, that all have to be achieved by PD candidates at the final assessment.

Learning outcome	Roles	Core	Quality	Frame
a. PD candidate independently makes an original research plan based on a complex unknown unpredictable issue with a high risk of failure from maritime practice.	Researcher Innovator	Self-written research plan	Description is made of e.g: State of the art (literature review). Gap analysis Availability of data Possible practical scenarios and stakeholders Current situation and risks	Different (f)actors High-risk conflicting interests Critical case studies Concerns a field not previously or barely researched
b. PD candidate independently designs a well-founded methodical research and applies knowledge of maritime and other relevant knowledge domains or professional practices in the maritime context, whereby part of the results merits a nationally or internationally assessed publication.	Researcher	Description made of: Research questions Research methods (e.g. in research plan)	Demonstrates that it: Adds something new (e.g. peer reviewed, grant). Is relevant to others.	Makes a well-considered choice of the chosen methods. Substantiates the research on the basis of maritime and other relevant knowledge domains (multidisciplinary) and professional practices and indicates its relevance in the maritime context.
c. Based on the analysis of the complex unknown unpredictable problem situation, PD candidate	Researcher Innovator Advisor	Gives a specification of the contribution (e.g. prototype, model).	Assesses the associated professional development of individuals and groups	Explains the relationship between scientific research and the given contribution to the solution

<p>provides a scientifically substantiated contribution to its solution, which meets feasibility and acceptance criteria in the maritime profession.</p>		<p>Explains why it is a contribution to the solution and what the follow-up could be.</p> <p>Implementation evaluation with (for example):</p> <ul style="list-style-type: none"> - A validation of the success factors - Feedback from industry - Practical validation - Proof of concept 	<p>Describes practical feasibility</p> <p>Conducts feasibility study, taking into account interests of stakeholders, showing potential.</p>	<p>Different (f)actors</p> <p>High-risk conflicting interests</p> <p>Critical case studies</p> <p>Concerns a field that has not previously or barely been researched</p>
<p>d. PD candidate contributes to progress in the maritime professional practice by means of realised (or minor revisions) scientific publications and other impactful forms of knowledge sharing.</p>	<p>Researcher</p> <p>Innovator</p> <p>Advisor</p>	<p>Contribution to seminar/congress</p> <p>Writing a blog</p> <p>Publication in (popular) scientific magazine</p> <p>Production of electronic tools (a computer program, a game)</p> <p>Providing guest lectures</p>	<p>Description of why the maritime profession would be "helped" by the contribution.</p>	<p>Any contribution must be qualified in some way (peer-reviewed, or impact measurement, or professional supervisory panel).</p> <p>1 peer-reviewed article in scientific journal (at least accepted or minor revisions before publication)</p>
<p>e. PD candidate autonomously steers his own planned development and accounts for the results of his own activities and the results of the work of others in the collaboration environment.</p>	<p>Professional</p>	<p>Asks for feedback (360 degree feedback/ personal evaluation plan)</p> <p>Studies methods/ measurement tools</p> <p>Makes personal development plan</p> <p>Provides well-considered justification for choices regarding his own development</p>	<p>Annual planned retrospective review</p>	<p>Ensures professional recognition of used work of others</p> <p>Takes an active part in collaborations</p> <p>Ensures effective professional content visibility in process and results</p>

The step to formulate indicators for every learning outcome, via the concrete input in the columns core, quality and frame is stated here:

Learning outcome	Indicator
<p>PD candidate independently makes an original research plan based on a complex unknown unpredictable issue with a high risk of failure from maritime practice.</p>	<p>The self-written research plan describes:</p> <ul style="list-style-type: none"> - the state of the art based on a literature review - a gap analysis from this review - the identification of not previously or barely researched field(s) towards a solution, with possible practical scenarios and stakeholders - the current situation and risks, - the identification of critical case studies and/or (high-risk) conflicting interests.
<p>PD candidate independently designs a well-founded methodical research and applies knowledge of maritime and other relevant knowledge domains or professional practices in the maritime context, whereby part of the results merits a nationally or internationally assessed publication.</p>	<ul style="list-style-type: none"> - Elaborates on the results of the research plan with research questions and research methods: - Describes relevant methods and underpins why a certain method is chosen (and others are not chosen) - Research questions are aligned with the overall issue; they substantiate the research on the basis of maritime and other relevant knowledge domains (multidisciplinarity) and professional practices and add relevance to the maritime context.
<p>Based on the analysis of the complex unknown unpredictable problem situation, PD candidate provides a scientifically substantiated contribution to its solution, which meets feasibility and acceptance criteria in the maritime profession.</p>	<ul style="list-style-type: none"> - Explains why this is a contribution, f.i. by adding proof of concept, or a feasibility study, which shows the technical and organisational feasibility.
<p>PD candidate contributes to progress in the maritime professional practice by means of (almost) realised scientific publications and other impactful forms of knowledge sharing.</p>	<ul style="list-style-type: none"> - Extends the description of the why and how; an indication of the impact on the maritime professional field (f.i. amount of viewers of the blog, amount of quest lectures and students participating). - At least one peer-reviewed article in a scientific journal (at least accepted or minor revisions before publication)
<p>PD candidate autonomously steers his own planned development and accounts for the results of his own activities and the results of the work of others in the collaboration environment.</p>	<ul style="list-style-type: none"> - writes a personal development plan - reflects and updates this at least on a yearly basis. - includes feedback of relevant stakeholders in this plan - Describes the collaboration (context) relevant to his PD - Describes the role, responsibility & tasks of participants (including own) within this collaboration

Learning Environment

Pedagogical design

Learning takes place during a PD programme in two respects: firstly, the PD candidate learns from carrying out research independently, under supervision, and secondly, the PD candidate is expected to follow approximately 30 ECTS of educational courses.

Learning on the job

For learning by doing research, a master-apprentice relationship is applied between the daily supervisor and the PD candidate. The supervisor (master) supports the PD candidate (apprentice) in carrying out the research tasks, choosing courses and other matters. It is estimated that this will require about 200 hours of the supervisor's time on an annual basis.

Educational courses

Approximately 30 ECTS of courses are reserved during a PD trajectory. This corresponds to about 840 hours. In this document, hours are used as not all the courses relevant to a PD candidate are expressed in ECTS. Following 840 hours of educational courses is a right for the PD candidate. The registration of these hours therefore serves to protect the candidate. The PD candidate can partly decide for himself/herself how to demonstrate that certain learning outcomes have been achieved; in addition to the course material provided, other sources of education or, for example, previously acquired demonstrable knowledge/skills can be used. However, candidates are encouraged to develop themselves further and make use of the available hours to which they are entitled.

The courses followed by the PD may take place in 4 different areas of development:

1. In-depth knowledge of the chosen research topic in order to develop towards learning outcome d
2. Research skills in order to develop further towards learning outcomes a, b and c
3. Professional skills to develop towards learning outcomes d and e
4. Further personal development e.g. (mental) health, vitality, etc.

There is no strict limit to the number of hours that should be spent on each development area, as the different backgrounds of the PD candidates make it difficult to determine in general what kind of development is needed. The aim is to spend at least 200 hours on each of the subsections 1, 2 and 3. However, this also depends on the wishes of the PD candidate and the skills he/she has already acquired.



Figure 1 Apportionment of study load being pursued.

The development areas are deliberately linked to the learning outcomes. This makes it easy to evaluate by both the supervision team and the candidate during the progress meetings.

Programme content

The programme of the curricular education will be almost entirely tailored to the needs of the PD candidate. Given the limited size of the pilot (8 candidates), it is not feasible to set up a programme and a full network. However, it is possible to set up a broader graduate network with PDs from the other

disciplines. In this national, programme-transcending, PD network, a small number of courses relevant to many could be offered with the secondary aim of enabling PD candidates to get to know one another.

For each development area, different types of courses can be considered and the implementation is flexible. It is up to the candidate and the supervision team to properly express the usefulness of the courses in the portfolio.

The maritime PD programme only has limited compulsory subjects. This would make the programme too scholastic. It is also difficult to find subjects that are valuable to all PD candidates as their background and skills are (or can be) far apart. By arranging the courses to be offered on an elective basis, the curriculum can be attuned to the needs of the PD candidates as much as possible.

National PD network

By setting up a national, cross-pilot, PD network, PD candidates will have the opportunity to meet others who are also in a PD trajectory and probably face the same challenges. By organising a number of meetings with many candidates, they get the opportunity to exchange ideas.

Courses that could be organised on the level of the national PD network are:

- National Kick-off
- Writing a journal article
- Choosing appropriate research methods
- Presentation
- (Mental) Health
- Ethics and scientific integrity
- Intervention meetings/networking sessions

Research skills

There are two ways to develop research skills, the first is to follow courses and the second is to complete certain parts of an academic research cycle. Research skills are developed not only by attending courses, but also by carrying out tasks such as presenting or writing articles. Hence, hours are also allocated for the completion of these components.

Research skills hours can be obtained through::

- Courses at university graduate schools
- General courses offered by the participating universities of applied sciences
- Specialist courses offered by the supervision team from the PD programme
- Completing certain essential elements of a researcher's work (see Table 1)

Table 1 Structure of the essential parts of the research work

Activities	Hours	Maximum number of repetitions
Presentation en cooperation		
Presenting to a small group	4	2
Presenting to a large international audience	8	2
Participation in project consultations or partnerships	4	2
Writing and publishing		
Writing a manual, user instructions, etc.	10 – 20	1
(Co)writing a research proposal	10 – 20	1
Writing of the first conference paper	8 – 15	1
Writing of the first journal article	10 – 20	1

Professional skills

Professional skills may include, for example, working together, presenting, writing articles, skills in the English language, etc. The courses are chosen by the supervisor and the candidate together. For example:

- English classes such as TOEFL/IELTS/Cambridge etc.
- Courses at the graduate schools of universities
- Courses given/organised by the PD network
- Courses offered by the universities of applied sciences within the PD network
- Online courses
- Professional training at e.g. NMT, Old Library and others

Knowledge

In order to gain more in-depth knowledge, the following possibilities could be considered:

- Master courses at a university (of applied sciences)
- Summer/winter schools
- Courses offered by equipment suppliers
- Post-graduate courses
- Conferences and lectures on the subject
- Courses at research schools at universities
- Online courses

Personal development

Doing a PD programme is taxing, mentally demanding and sometimes not fun at all. More and more attention is being paid to the (mental) health of this group, but this is still a point of concern. By building in the possibility to follow mindfulness, stress management or even assertiveness training within the PD programme, we create the conditions for candidates who need it. This also stimulates the supervision team to be aware of this aspect. Taking courses in this area is not compulsory.

Embedded in the professorships and the (international) network

There are two ways in which a PD trajectory can come about. The first way is that candidates apply for an existing position within a research project that has been granted. The second way is that a candidate comes up with a project proposal on the basis of his/her own work or experiences. In both cases, the candidate is placed in the professorship that best fits the chosen project.

Because the maritime academic world is small, the formation of the task force, an assessment committee and a supervisory committee already require support from the network and the professional field. TU Delft has been involved from the beginning of this pilot and can offer support to the PD candidates in various ways.

Universities abroad have been contacted to be part of the assessment committee. This process is ongoing, but seems promising. A list of potential candidates has been set up and the taskforce is contacting them to see if they are interested.

Matching and selection of candidates

Within the maritime PD programme there is room for four candidates in the first year. At Rotterdam University of Applied Sciences, there is room for a candidate who sets up his/her own project, while at NHL Stenden, there is room for three candidates who either join an existing project or set up their own project, with preference for the first.

For the selection of candidates, the following process will be applied:

1. Candidates are selected if they meet the selection criteria
2. Candidates are assessed against the selection criteria

3. If no choice can be made after assessing against the criteria, a draw will be made.

The following requirements apply to candidates for the PD position:

- Has a Master's degree in a relevant field
- Has required practical knowledge or experience related to the subject of the PD
- Has sufficient time available (full time or in case of part time at least 50%)
- If part-time, has an employer who is prepared to support the programme
- Has a good personal motivation to enter the programme.

If the candidate meets these requirements, he/she will be invited for an intake interview. During this interview, it will be assessed how well the candidate meets the requirements.

After the University of Applied Sciences has submitted a PD proposal to the Graduate Committee of the Maritime PD, this Committee will assess the proposal according to the following criteria:

Practical relevance (35%)

- The planned research and design together solve a problem that currently exists in practice;
- There is a practical basis for the plan, for example through information from industry, the applicant's employer or company or interviews with employees or industry experts.

Scientific relevance (25%)

- The research plan is based on sound theoretical principles;
- The proposed research builds on state of the art scientific literature and as such contributes to science and innovation within the industry;
- The research design consists of substantiated scientific research questions as well as an effective research method.

Feasibility (25%)

- The research method is feasible in terms of
 - o Time;
 - o Infrastructure;
 - o Available knowledge within the research group and supervision from UAS and industry.

Social relevance (15%)

- There is potential benefit for society as a whole;
- There is potential for education in the relevant discipline, for example; input for a subject, guest lectures, students assisting with research, improvement of compulsory courses etc.;
- The project works towards one or more of the sustainable development goals (SDG), is part of one of the Topsectoren¹, or is part of another socially relevant challenge.

¹ [Home | Topsectoren](#)

Support and supervision and the lecturers

A number of parties are involved in supervising a PD candidate. Figure 2 shows how these parties relate to each other. The graduate network sets up a supervisory committee which is responsible for supervising the candidate.

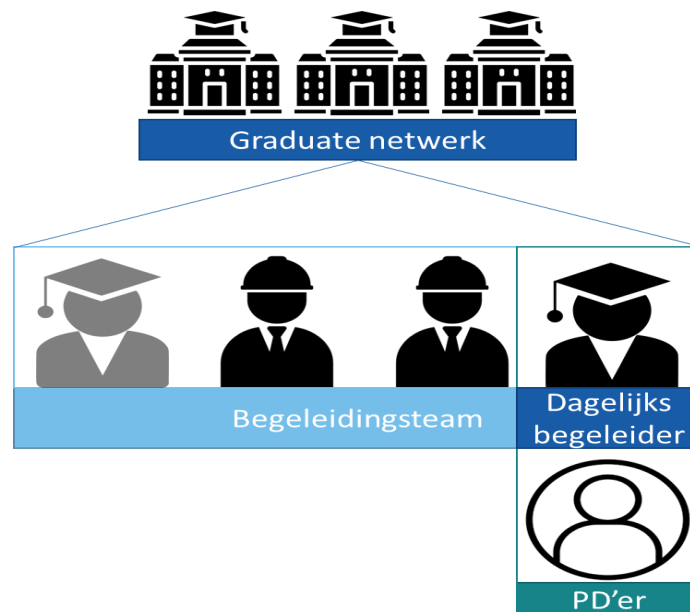


Figure 2 overview of parties involved in the supervision of a PD candidate

The supervisory committee consists of the following members (see Figure 2):

- The professor of one of the participating universities of applied sciences whose professorship has the closest connection to the candidate's topic
- Two external professionals involved in the research who have a PD or PhD or a comparable level of thinking.
- Possibly a member of a research group with a PhD.

Most of the supervision is done by the daily supervisor, which is either the professor or a PhD member of the research group. This supervisor assists the candidate with all aspects of the PD trajectory. The supervisor's workload is estimated at 100-200 hours per year, depending on the candidate's wishes. The supervision includes discussing progress, reading documents, thinking about methods, etc.

The other supervisors play a smaller role. They may be, for example, an expert in (a part of) the research field or a practical supervisor from the candidate's own professional practice. In this way, they can offer support. A supervisor who is an expert in the field of research methods, for example, could also be chosen to guide the candidate in this. The workload for these supervisors is estimated at 30 - 50 hours per supervisor.

It is important that the full supervisory committee is regularly informed about the progress within the PD trajectory. The responsibility for this lies with the PD candidate, who is encouraged to schedule a meeting with the full supervisory committee every two to three months.

The supervisory committee and the wider graduate network are jointly responsible for the supervision of the candidates. This means that if one of the members of the supervisory team drops out, the graduate network will step in to fill the gap in supervision. Due to the limited number of professors in the maritime domain, there is always a risk that if one of the professors drops out, a large part of the knowledge will disappear. The graduate committee has a role to play in filling this knowledge gap.

Due to the limited scope of the maritime pilot, the graduate network cooperates with parties outside the direct network in the organisation of educational courses.

Next to specific maritime courses, PD candidates are given access to the general courses offered by the universities. These courses focus on the professional skills and (mental) health of employees and students.

In addition to the internal courses, we are also looking at a partnership with the graduate school of Delft University of Technology. Here there is a wider range of courses available to which the PD can then also gain access. In this way, a valuable and personal interpretation can be given to the educational courses. We also consider the possibility of subsidiary courses or contract education where a subject can be followed at a university for a fee.

Study load and duration

Basically, there are two different situations possible for the PD trajectory. The first is a full-time candidate, the second is a candidate who does other work for his employer part of the time. In the case of a full-time candidate, a lead time of 3-4 years is assumed. For the part-time variant, a longer lead time is assumed, which depends on the amount of time the candidate has available, the skills the candidate has and other factors.

Within the duration of the programme, approximately half a year is always spent on cursory education.

Procedures

A national PD protocol will be developed. It specifies the formal process of admission, counselling, testing, degree awarding and ceremony. The procedure for the supervision of the candidate can be found in Figure 3. In addition, a global overview of the full-time PD process can be found in Figure 4. The procedure for (final) assessment of the PD candidate can be found in the chapter Assessment.



Figure 3 Supervision structure PD candidate

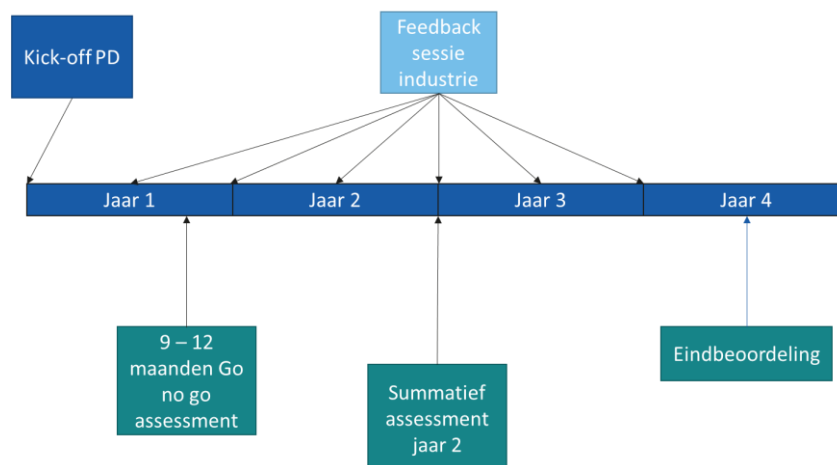


Figure 4 PD trajectory in outline

Assessment

View on assessment

The PD Maritime programme team values the seamless connection between education, learning and examination (constructive alignment). It is required that feedback and examination are supportive of sustainable learning and the long-term objective of educating self-learning professionals. All feedback and assessment moments are considered learning moments. This regards feedback that is aimed at learning and that is integrated in the learning process. Feed-up, feedback and feedforward help the PD candidate develop specifically. As the PD candidate receives more feedback, he/she has the opportunity to adjust. This should result in that the final summative testing does not lead to any surprises.

The PD Maritime programme team encourages PD candidates to take responsibility for their own learning process and offers them possibilities for personal profiling. The PD candidate may introduce all experience and quality, regardless of whether this knowledge and experience was obtained in previous education, by informal learning or springs from personal qualities and learning ability.

Maritime PD's will start working in a complex, innovative and changing international work environment. PD's will be expected to contribute to the developments in the field. This is reflected in the learning outcomes and the context of independence and complexity in which they are assessed. This means that PD candidates learn to research, design and develop from a perspective of curiosity and social and societal awareness. The programme therefore works on forms of assessment that are both in line with the educational concept and professional field, and that do justice to the individual quality of each PD candidate, also in collaboration with others.

A complex, integral competence as described in the learning outcomes calls for a holistic assessment. The guiding principle of this holistic assessment is that the adequate performance of the PD candidate cannot be broken down into separate sub-aspects. The different roles of the PD professional (researcher, innovator, advisor) are practiced simultaneously. The whole is more than the sum of the parts. Therefore integrated learning outcomes and not the underlying specific roles are at the base of the assessment programme. This holistic attitude fits with a maritime professional working in the field.

Assessment programme

It is important that the assessment programme of a study is well thought through, contributes to the PD candidate's intended learning behaviour, is aimed at the intended learning outcomes and is feasible. The PD Maritime programme team values a holistic assessment of the competence of the PD candidate regarding the execution of the task, the learning process, the application of knowledge, the attitude and the outcome, and therefore works with a portfolio based assessment.

With the portfolio, the PD candidate is expected to provide convincing evidence for having achieved the learning outcomes in the appropriate context. The PD candidate can use the indicators of the learning outcomes as a backbone for this portfolio. Throughout the programme, the PD candidates work on their evidence portfolios. During progress meetings, the evidence portfolio is discussed with the supervisor. In those meetings, immediate feedback is provided aimed at the learning process, or the next step in the development of the PD candidate.

The main deliverables of the PD programme are scientific papers, technical prototypes, designs, intervention/implementation. Together with collected feedback from stakeholders and a brief reflection report this constitutes the evidence portfolio. At the final assessment a public defence is also part of the procedure.

During the assessment, the portfolio is discussed with the assessment committee. After the student has shown and motivated the evidence portfolio (in public at the final assessment), the assessment committee gives feedback, feed forward and (in the case of a summative assessment) a decision.

The programme consists of three assessments. These assessments are planned in consultation with both the PD candidate and the supervisor:

- Year 1: First assessment (go / no-go, summative)
- Year 2, 3: Progress assessment (formative)
- Year 3, 4: Final assessment (summative)

The first assessment can be regarded as a go/no-go moment for the PD candidate. In this assessment the research and innovation plan of the candidate has a central position. The candidate doesn't need to present a portfolio for the first assessment, just the research and innovation plan. In this plan the PD-candidate describes how they plan to do their research and innovation project and how the learning

outcomes will be achieved. During the assessment the assessment committee will judge if the research and innovation plan is suitable for the candidate to achieve the required learning outcomes.

The progress assessment emphasises learning and development and is held at the end of every year, starting the second year. The PD candidate receives targeted feedback and feedforward, to coach the PD candidate to the final level. The assessment determines if the candidate can continue the programme as planned, if the achievement of the learning outcomes is on track, or if changes need to be made to the plans.

The final assessment is dominated by testing at the final level, a public defence is part of the assessment procedure. In this last phase, the PD candidate must be able to demonstrate all learning outcomes at the final level. This means that they achieve the intended learning outcomes in a context of independence and complexity at PD level (EQF8).

All phases of the PD programme are tested based on the same learning outcomes. However, in the first assessment the assessment committee focuses on the expected contribution of the research and innovation plan to the realisation of the learning outcomes for the PD candidate. In the progress assessment the learning outcomes are assessed at final level, but since this is a progress assessment not all learning outcomes have to be at final level yet. In the final assessment all learning outcomes must be achieved at the final level.

Assessment model

Indicators are added to the learning outcomes, so more concrete judging of the learning outcomes is possible. See Final qualifications for the indicators in detail.

Organisation and ways of assessment

The applied research and innovation project forms the core of the programme, supplemented by other educational offerings. The evidence portfolio consists of professional products created within the research project: the scientific paper (article submitted and accepted, or reviewed with minor revisions), the technical prototype/product, an implementation evaluation, and other relevant products. During the programme, PD candidates are expected to ask for feedback from supervisor, fellow students, and experts. The most important feedback is also added to the portfolio. In addition, PD candidates may have performed other activities that contributed to their development, such as conference attendance, a presentation, etc. Finally, the portfolio contains a brief reflection report, of which the main goal is to connect the portfolio content to the learning outcomes. This serves as a concise reading guide for the assessors for judging the learning outcomes.

The evidence portfolio contains at least:

- Research and innovation plan;
- Scientific paper at the final assessment;
- Technical prototypes that demonstrate the solution;
- Implementation evaluation;
- Proof of educational modules completed, seminars/conferences visited, etc.;
- Relevant feedback and feed forward received from the stakeholders;
- Brief reflection report covering the learning outcome and indicators;

During the assessment, a PD candidate should be able to explain their choices orally and gives the assessors the opportunity to ask questions to determine if the learning outcomes have been met and to which level the candidate masters the subject matter. At the final assessment this will take place as a public defence. Progress meetings with the supervisor work towards this assessment moment. The feedback, feed forward, or decision by the assessment committee should not come as a surprise to the candidate, because during each progress meeting the evidence portfolio and the deliverables have been discussed thoroughly with the supervisor and feedback has been given and documented.

Learning Progress

Throughout the programme, the PD candidates work on their evidence portfolios. During progress meetings, the evidence portfolio is discussed with the supervisors. In those meetings, immediate feedback is provided aimed at the learning process, or the next step in the development of the PD candidate. The PD candidate also learns by following a selection of courses aimed at research competences, professional competences, personal development and (mental) well-being. A variety of courses is offered, from which PD candidates can choose depending on their learning needs. In the research and

innovation project the specific knowledge and skills are further expanded, deepened and integrated by working on a real-life research project.

Assessment of Learning

At each assessment, all learning outcomes are tested. In the first assessment (summative) the research and innovation plan will be evaluated with regard to the expected contribution to the realisation of the intended learning outcomes. More in detail the plan will be evaluated on its practical relevance (35%), its scientific relevance (25 %), its feasibility (25%) and its social relevance (15%). The first assessment is a go/no-go moment. If the candidate passes this first assessment he/she can continue the programme. If the candidate does not pass this assessment, he/she can either make adjustments to the plan (in consultation with the supervisor), or must stop the programme. An updated research and innovation plan can be presented to the assessment committee for a re-assessment.

The progress assessment is an assessment for learning (formative). Based on the feedback and feed forward the PD candidate can continue the programme, possibly with an adjusted plan (in consultation with the supervisor).

In the final assessment (summative), all learning outcomes must be demonstrated at the final level. A public defence is part of the final assessment.

For the first and the final assessment the PD candidate has two chances per academic year. The first-chance assessment is planned in consultation at the end of each year (or sooner when a candidate is ready). This provides the student with a clear milestone and incentive to finish the evidence portfolio in time. Resits are planned in consultation. This is considered to help prevent delay and improves the program feasibility.

Roles and Responsibilities

Supervision team

Each PD candidate has a first supervisor, who is always a professor from the graduate committee of the programme. The first supervisor is responsible for taking care of the progress meetings. Next to this a candidate also has a supervisor from the professional field. These supervisors together form the supervision team.

Assessment committee

The independent assessment committee is composed by the graduate committee, on the recommendation of the supervisors. The assessment committee consists of at least two professors (of applied sciences) from both Dutch and international universities, as well as an expert from professional practice. The professors are qualified examiners, the experts from the professional field have an advisory role. Members of the assessment committee can not be part of the supervision team for the candidate concerned.

Assessment Process

Prior to the assessment, the PD candidate submits their portfolio of supporting documents. Each assessment is conducted by an assessment committee. At the end of the assessment, they withdraw to arrive at a judgement. The PD candidate will be informed of the final verdict soon after the assessment. The PD candidate will receive the digital assessment form with feedback and feed forward within 15 working days after the assessment.

Quality Culture

The quality of teaching and research is the number one priority for the PD Maritime programme team. Regular calibration sessions are held to share and harmonise ideas about learning outcomes, levels, indicators and standards.

In addition, working with actual practical assignments for real clients contributes greatly to the quality culture. This creates a learning environment that is very similar to the working environment of the maritime professional. That stimulates a professional attitude among teachers, researchers and PD candidates.

Furthermore frequent feedback moments between PD candidates and supervisors, the formal assessment moments and the public defence as part of the final assessment contribute highly to the quality culture for both candidate and supervision team.

Assessment Quality and Assurance

The PD Maritime programme team takes the following measures to promote validity, reliability and transparency:

- the graduate committee is responsible for the quality of the education and assessing;
- the programme is in line with the testing policy of the connected universities;
- the connected universities provide sufficiently qualified teachers and examiners (using the Basic Examination Qualification: BEQ);
- in case of irregularities or complaints, PD candidates can turn to the graduate committee and, if necessary, lodge an appeal;

Validity, reliability and transparency:

Validity

- the evidence demanded is in line with the learning outcomes and the context of that phase of the program;
- the indicators cover the learning outcomes;
- the products are presented to experts and/or external stakeholders for feedback purposes.

Reliability

- the scientific papers are reviewed by an independent reviewer (this person cannot act as independent assessor);
- an assessment is carried out by an assessment committee;
- the assessors are well versed in the learning outcomes and the domain of the maritime PD programme;
- the reliability is improved through feedback from teachers, researchers, experts and/or stakeholders and reviewers;
- the graduate committee regularly calibrates on the grading, learning outcomes, levels, indicators and standard.

Transparency

- the explanation of the assessment and feedback and feed forward are recorded in a digital assessment form and accessible to the PD candidates;
- the programme applies guidelines for the evidence portfolio;
- the supervisors are in constant dialogue with PD candidates about how they want to demonstrate their learning outcomes and about the quality of their products;
- the assessment of the learning outcomes is explained in a transparent way;
- the process of establishing the grade is clear for PD candidates and assessors.

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