

## **Ocean Technology Hydrography education in the Netherlands**

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The four year OT program is based on Terschelling. A year ago, November 2016, the bachelor education program Ocean Technology at the Maritime Institute Willem Barentz was visited by an audit panel of NQA representing the Dutch Ministry of Education. The panel judged the education program as good, with two of the four categories even as excellent. Earlier in 2016 the program had received extension of its Cat. A recognition by the International Board on the Standards of Competence for hydrographic surveyors. Among twenty other Cat. A programs worldwide, Ocean Technology and a Chinese program, with 208 weeks, take the longest time to complete.

Students entering the course typically are 18 years old, ready to enter a higher education of their choice. We must always make sure such program is sufficiently put in view of these youngsters – and their parents. The OT program contents is largely determined by the Standards of Competence for hydrographic surveyors as formulated by the International Hydrographic Organization. Companies employing graduates are satisfied that these SoC and Cat. A recognition fulfill their requirements. Through traditional lecturing and project based training, students develop their knowledge and skills; this package is judged as being of high level and complying with modern industry requirements. At least one day per week is spent on practical work, which is individually reported in a workbook. Students get to know their future work environment by a half year apprenticeship, while their final work consists of a graduation assignment defined by one of the companies or government

bodies. Integrated practical assignments, such as the Oosterom survey and the oil spill prevention project, require meticulous preparation and reporting. Apart from 30m survey vessel Octans, OT students conduct their practical work with two smaller craft, which may be used autonomously.

The hydrographic surveyor...

... is characterized – as may be any professional worker – by a more than average level of a number of personality descriptors. We have identified ten of those. Before I give you our list, I'd like you to think about such descriptors fitting to your ideal surveyor profile. Perhaps we may identify one or more additional parameters.

The idea of using these descriptors was born when it became clear a gap exists between a surveyor's educational assessment (in our situation using European credits) and the values assessed by his or her employers. The educational program leads to graduation when the student has accumulated 240 ec. In order to be able to internationally exchange and compare the qualifications of various training programs, European institutes have ratified the so-called Dublin descriptors, which were defined in Dublin 2003. These do apply to our Ocean Technology program as well, but are meant to guide the operational BSc students on a more generic scale. The five Dublin descriptors are:

1. Knowledge and understanding
2. Applying knowledge and understanding
3. Making educated judgements
4. Communication
5. Lifelong learning skills

Have you thought of the ideal surveyor personality yet? Here is the list with our descriptors:

initiator	creative
decisive	team player
flexible	assertive
stable (stress prone)	convincing
adaptive (quick in learning)	autonomous

We ask students to assess themselves annually and make them identify items on the list that require some more of their focus for the year to come. The list is also included in apprenticeship instruction manuals in order to invite companies to use, if not the same, a comparable set throughout. Whilst the list is still young and “under construction”, individual descriptors may be reviewed and replaced by more appealing notions.

So here is my question once more: can you think of any stronger and/or more distinctive terms? We can shortly discuss them after the presentation, if possible. If not, please make a note of them and contact me.

Educating Ocean Technology...

... is a lot of fun! I have seen approximately 300 students to their diploma in the 24 years I've been teaching. The program started in 1979 at the nautical college in Amsterdam. I was lucky enough to take part as a student in the second year. In 1994 I started teaching, parttime until 1999, when I took over the co-ordination from my retiring predecessor Aat van Dam.

In 2002 the course was moved from Amsterdam to Terschelling. The new location offered many advantages such as direct access to the sea, with complex tidal variations and sound velocity issues. Initially student numbers dropped, so the professional field was unable to find sufficiently qualified employees. Gradually the inflow level went up. The number of young graduates, required annually for an even balance in the Dutch/Flemish hydrographic domain, would be between 30 and 40, a number based on repeated enquiries amongst corporate members of the Hydrographic Society Benelux. In 2016 27 students entered the course, of which recently 25 have moved on to the 2nd year – they are right here, taking part in the conference, starting up their network and trying to relate to you all, to get connected...!

Although undermanned, we have grown into a strong team providing a high standard of training, as witnessed by the recent accreditations I mentioned earlier. Main strengths are:

- small scale, short communication lines
- effective balance between theoretical and practical training
- mature interaction between course content and innovations

For use on the survey vessel Octans and the survey boats Cumulus and Razende Bol, we have recently received four Reson 8125 multibeam sounders. We are now able to fully demonstrate and practice state-of-the-art multi-beam surveying; to be more precise: state-of-the-art as it was in 2013 or so. Although not in the same league as the knowledge and facilities of research institutes like in New Brunswick and New Hampshire, we do try to follow the content presented by the Ocean Mapping Group, in their half-yearly commercial course on the subject. Although the institute does not have the capacity to maintain the latest instrumentation, we do have several weeks in

which equipment builders allow students to operate their latest models in a major integrated survey project.

In designing the course program we use the Standards of Competence for Hydrographic Surveyors. Those standards are quite convenient as they determine the edges of our professional domain. We also use the characteristic sequence of hydrographic projects. This sequence has six main phases:

1. acquiring contracts through tendering
2. developing any project specific hardware/software and subcontracts
3. preparation, incl mobilization, calibrations and sea trials
4. survey data acquisition, the main aim of the game
5. data processing
6. data presentation and reporting using agreed formats

This simple model is used to make the students think about their work as most always being in one of the six phases. An example is the application of a multi-beam simulator. Such tool may conveniently be used as an *a priori* estimator of the error budget, to see whether a suggested equipment configuration together with an acceptable level of calibration might be satisfying the contractually agreed data quality tolerances. In this way the surveyor may use the tool during tendering (phase 1). While evaluating the data quality on board, the surveyor again may be using the simulator just to see – and in some cases convince the client’s rep – that the work indeed compares to the agreed tolerances.

In the first year hydrographic subjects are introduced as three project assignments. For about half the time OT students are involved with subjects

both applying to mariners and surveyors, such as knowledge about ships, navigation and safety at sea. Further to the one day per week of practical training, the year ends with two weeks of basic survey work. During the first year students are required to complete 50 out of 60 European credits; if not, they are formally requested to leave the education.

The second year is for the central survey knowledge, like underwater acoustics, coordinate computations. Emphasis is put on the quality of measurements and methods to evaluate that quality. Early in the year our students are invited on board one of the hydrographic vessels of the Dutch HO, which resorts under the Royal Dutch Navy. For many, this week is a first encounter with the work at sea. Usually it is quite clearly a strong motivator for students to proceed with hydrography. Another special week will be the visit to a mayor hydrographic event like this one. The main reason for such sponsored visit is to start their social network and develop a place for apprenticeship, graduation assignment and eventually employment.

I want to end this presentation by emphasizing our attempts to improve international communication and exchange. By inviting the other Cat. A courses and get access to or share each others knowledge base and references, everyone may benefit from innovations and optimized working procedures. We have students building a Wikipedia tree of hydrographic subjects, whereby hydrography students worldwide are invited to partake and continuously maintain and improve the information provided.

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