HYDRO INTERNATIONAL INTERVIEWS ARNE INDREEIDE

Hydrography for Offshore Exploration and Exploitation

Hydrography began as an activity to collect data for chart production and safe navigation. With the start of offshore oil & gas exploration/exploitation and other civil engineering projects, hydrographic data also came to be of vital importance for another sort of user. A separate type of hydrography was seen to be developing; is there any similarity and/or interchange of knowledge and experience between the two? In our October 2004 issue we interviewed Admiral Maratos from the IHO on the matter. For the present issue, Arne Idreeide, Advisor to Statoil, Norway and former EAB member of HI, agreed to be interviewed and give us his views.

Please give our readers a brief summary of your start and involvement in hydrography.
Prior to taking up my present position as surveyor in Statoil in late 1976, I had from time to time been involved in water-depth surveying of inland lakes in Norway related to planning and construction of hydroelectric power plants. My main working activity in the period 1961 to 1976 was geodetic land surveying.
From 1977 onwards my involvement in seabed survey planning, design and management steadily increased and soon became my main activity.

What is the history of Statoil and what is its main field of interest today?
Statoil was founded in 1972 and its first sub-sea construction project (Statpipe) was initiated in 1980. Since then, its offshore project activities have been progressively increasing, such that Statoil is, for instance, currently the worldâ€™s largest operator of sub-sea pipelines. The companyâ€™s activities have become increasingly diversified but its main field of interest is still oil & gas exploration and exploitation, including the development of an extensive gas transportation system.

Is Statoil a nationally or internationally orientated company? What is its position within the oil and gas producing companies?
Until recently the Norwegian shelf was the dominant area of activity for Statoil but it is now actively shifting focus to include the international market, both offshore and onshore. With regard to worldwide oil and gas production, by volume Statoil is (still) a relatively small company.

We understand that your advisory work for Statoil is focused mainly on hydrographic matters. Can you inform our readers on the position of hydrography within Statoil?
There is rocky and steep seabed in the vicinity of Norwegian coastal areas and the presence over considerable areas of both seabed pockmarks and relict iceberg plow-marks in the shelf area (wd < 400m) and extensive sediment slides on the continental slope. This meant that the significance of seabed topography was soon widely recognised within Statoil as an important part of the offshore project design basis. Detail mapping of seabed topography was consequently given high priority in the context of project activities. A seabed survey group of some five persons was established early within the company and this has lately been increasing to some twenty persons, now also covering other seabed survey objectives in addition to topographic surveying.
Recognition of the importance of survey issues has led the company to provide a supporting role, including financial support, for technology development. This is aimed at the combined improvement of survey data quality together with survey operational cost-efficiency. Such proactive co-operation between end-user, technology-providing companies and survey contractors has proven to be mutually beneficial and similar co-operative activities are therefore underway. A general observation here: the more detailed and reliable such seabed documentation is, the more optimised construction design and operations can be, thereby positively effecting construction safety as well as total project cost!

Do you agree that hydrography for offshore oil & gas exploration/exploitation differs from hydrography for nautical purposes and, if so, what do you consider to be the main difference?
The defining difference between the two applications is the significance of water depth. As is discussed below, the requirements for nautical charting are depth dependent; the requirements for oil and gas exploration/exploitation are independent of depth. Seabed construction activities generally require the same type and quality of â€˜measurementâ€™ (positioning, geological sampling, etc), as similar activities onshore. The amount of water above an area does not â€˜lessenâ€™ such requirements; in this respect, the water column should be considered as an additional, and cost-increasing, obstacle - the more water the worse the effect.

Does hydrography for offshore exploration/exploitation require a different type of hydrographic surveyor and, if so, in what respect? Is a different education required?
This is more for the survey operators to evaluate and decide upon, but on a general basis I would think that the systems and equipment

used are in principle the same, so the main issue is to be acquainted with the different product requirements of a different type of client. I do not believe that this requires a significantly different education.

The International Hydrographic Organisation (IHO) has developed standards for nautical charting. What is the situation with regard to the offshore industry? Do ISO, IHO, IMCA, Company standards or others apply here?
When oil & gas exploration is being planned in a new area, such planning begins based on existing information, i.e. nautical charts. Very soon, however, more detailed information is required; for example, water depths beyond that required for nautical navigation convenience and security. In addition, types of data not normally required for nautical charts may be required for oil & gas exploration, for instance sub-seabed geology etc. The differing requirements for nautical charting and for offshore exploration/exploitation can be most readily appreciated where sub-sea construction activities are involved. Nautical charting requirements tend to be depth dependent (re. IHO charting standards). The requirements for construction activities, on the other hand, remain the same independent of depth. Seabed surveying and mapping for such construction activities has, so far, had to be based on industry standards/guidelines developing in co-operation between oil & gas companies and the offshore survey companies. These still evolving standards/guidelines are, in effect, compromises between idealised requirements and technological possibilities/achievements.

Will the growing technology create a split in hydrographic personnel: the less educated field staff being guided online by highly educated staff from behind their desks?
This is, unfortunately, a possible trend and is to be feared. From a distance it may, in principle, not look so disadvantageous, but I fear that such a trend could significantly reduce the onboard level of ability for the continuous monitoring of data quality, both at individual sensor level and that of the integrated product. In my judgement, data-quality monitoring must be concentrated onboard, at the data acquisition phase. The present level of QC in the field should be consolidated rather than â€˜exportedâ€™ to shore. Data quality is best observed and understood onboard, thereby enabling immediate and cost-saving intervention if so required.

What is your view on soaring oil prices? Will this encourage new offshore projects and investments and thus more work for hydrographic surveyors?
The present high price of oil will very likely accelerate the exploration and development of new oil fields but, as I see it, the larger part of seabed surveying (from a Norwegian perspective) is, and will continue to be, mainly related to gas transport systems.

Do you expect any new breakthroughs in hydrography: emerging technology, new methods, higher required accuracy or anything else?
Any new â€˜revolutionâ€™ in hydrographic mapping such as the already implemented combined availability of Multi-beam Echo sounder Systems (MES) and global GPS positioning is not very likely to occur. But I do expect the now emerging availability on offshore survey vessels (!) of precise WGS ellipsoid height from 3D GPS positioning to become an invaluable improvement in offshore hydrographic surveying. This represents the most precise and repeatable depth datum offshore, but primarily for recording, processing, compiling and filing of depth data. MSL is foreseen to remain the final map depth datum, but then estimated on a more precise basis, i.e. including concurrent GPS-based observations.
A probable future requirement will be for the provision of deep-water seabed data with the same precision and spatial resolution as is achievable today at lesser depths, e.g. in 3,000m water depth as in 300m water depth, and with similar operational cost-efficiency. This will be a â€˜breathtakingâ€™ challenge for the offshore survey industry. It is in this environment that I expect untethered, self-propelled survey vehicles (UUV) to fully verify their (potential) unprecedented operational efficiency, combined with acquisition of data of increased quality.
I also dare to promote my â€˜qualified guessâ€™ that 3D multi-swath MES (compared to the existing 2D single swath MES) is now technologically possible. Refer here to the example of EchoScope! Such 3D multi-swath MES may significantly improve both reliability and detail of seabed topographic surveying, including acoustic imaging (!) due to the possibility of repeated insonification of local targets at different angles from successive vessel locations.

Do you have â€˜a personal messageâ€™ regarding hydrographic surveying in general and/or the hydrographic surveyor in particular?
The advent of GPS was viewed by many hydrographic surveyors with dread as "the end of the profession of hydrographic surveying as we know it". In fact, the pessimists were proved wrong: the use of GPS has opened up a whole new range of possibilities for the (hopefully 'careful') exploitation of the marine environment and for hydrographic surveying. The oceans form over 70% of the surface area of our planet. Its resources remain largely untapped. The hydrographic surveyor has a central role to play in the future realisation and management of these resources.