

# Towards Simplification and Acceleration of Marine Surveying



In this interview, Harald Sternberg, Professor of Hydrography and Geodesy at HafenCity University, shares his thoughts on the key market trends, technology drivers and challenges, and the impacts of COVID-19 and climate change on the sector.

## ***What has been the impact of COVID-19 on your business?***

The biggest impact was problems in offline teaching, such as students lacking the technical equipment for home study (webcam, microphone, powerful computer for processing hydrographic data), and for the international students especially there were difficulties with travelling and less contact with the other students. Unfortunately, less practical teaching was able to take place due to additional organizational obstacles such

as the implementation of hygiene procedures and restricted group sizes.

However, after the initial problems at the beginning of the pandemic, the technical infrastructure improved drastically, with virtual platforms set up to provide organizational and didactic content. A well-developed digital infrastructure is another important improvement in the overall academic environment, but the lack of contact between teachers and students is still a barrier that cannot be replaced by video conferencing.

There were also disadvantages in terms of research projects and cooperation, as there was less exchange with academic partners, especially in the beginning. Since there were fewer conferences, it was difficult to make new contacts and to network and establish future research projects. Research cruises, including deep-sea monitoring, also had to be cancelled at the beginning of the pandemic but are now taking place, although with time-consuming organizational restrictions (quarantine, tests).

## ***What do you consider the key market trend in the coming years?***

I don't think there will be just one trend, but a series of further developments, and one of the trends will certainly be the incorporation of BIM in the hydrography sector. Platforms will become more and more modular and adapted to the different survey areas, such as inland water surveying from very shallow waters (creeks, small rivers) to medium-deep waters (coastal waters, large rivers, estuaries) with strong currents.

There will also be a trend towards unmanned vehicles, especially in harbours and other hard-to-reach areas. There, small remotely operated USVs are frequently deployed to cover risky survey areas that cannot be reached by ships. The transition from land to water will be better covered, so there will be a comprehensive underwater and land survey (for quay walls, landing sites, areas with varying water levels) by combining terrestrial scanners and MBES.

Lastly, I see increasing opportunities to hire hydrographic survey systems instead of buying them, due to modular systems and changing requirements.

## ***Which technological driver do you consider most important in the coming years?***

The most important drivers lie in the automation processes that simplify and accelerate all aspects of marine surveying. Examples are data acquisition with autonomous underwater and surface vehicles and research fields such as autonomous navigation and positioning (above and below the water surface) or even automatic target tracking.

Another example is automatic data processing, which starts with the weighting of individual sensors in Kalman filtering and includes automatic object detection and classification (from both acoustic and optical data) and advanced artificial intelligence for the stable representation of the environment and the automation of processes and methods to produce nautical charts according to S-57 standards.

Finally, sensors will continue to be combined (positioning devices, acoustic, optical, oceanographic, chemical and others), leading to new platforms for observing the marine environment, increasing accuracy and precision and creating multifunctional marine measurement systems.

## ***What do you see as the main challenge in the coming years?***

The biggest challenge is dealing with the immense amount of data that is constantly accumulating in the various fields.

It is also necessary to optimize the digital infrastructure, especially in the current pandemic, but the further exploration of undiscovered areas such as the deep sea and a better understanding of the ocean ecosystem are also on the agenda. Here, a current topic is the exploration of the deep sea for resources. This is a major challenge as it involves the sustainable use of the oceans, the establishment of marine protected areas, but also the exploration of renewable resources.

Increasing economic trade leads to the need for a stable marine infrastructure in coastal areas, ports and rivers. This is why there will be further large-scale projects such as the deepening of the river Elbe. It is the task of hydro companies and institutes to monitor and protect such projects with their expertise (also with regard to the environment).

***The climate crisis urges companies to contribute to a safer and more sustainable world. What is your vision on this?***

We are all urged to do our part, and this starts with adapting internal company policies to ensure a carbon-neutral company/institute. We need to balance the net benefits of each survey against the carbon emissions it generates and, with regards to marine mammals communicating through sonar signals, we need to try to avoid high noise emissions and operate in a responsible manner.

We also need to improve our methods for maintaining risk- and hazard-free routes through appropriate surveying in coastal and inland waters. For example, it is of major importance to ensure safe shipping passage, as accidents on the water can cause irreversible damage to the natural environment.

Research projects and extended exchanges between young and motivated researchers contribute to a better understanding of natural processes, which is the key to a safe and sustainable world. The hydrographic institutes can play an important role in this.

**Harald Sternberg**

Harald Sternberg was Professor of Engineering Geodesy from 2001 to 2017 and took over the professorship of hydrography and geodesy at HafenCity University in 2017. His research areas include mobile mapping systems on different carriers (cars, ships and indoor cars), the use of low-cost sensors for positioning, indoor positioning, including with 5G, monitoring of structures and analysis of mass data using artificial intelligence. In the field of hydrography, he works on autonomous underwater vehicles, the automatic analysis of underwater images and the interpretation of backscatter data. Prof. Sternberg has also been vice president for teaching since 2009.

---

<https://www.hydro-international.com/content/article/towards-simplification-and-acceleration-of-marine-surveying>

---