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**Q1**

There are so many landmark moments to highlight from the history of hydrography, and we are all aware that today's innovations are built on the achievements of our predecessors.

Hydrography is a discipline that has always benefited from tremendous international cooperation, which has spurred much of our progress. This goes back to when zero-degree longitude was agreed by the main chart producing nations in 1884. We should also point to the work of the United States Coast and Geodetic Survey's Nicholas H. Heck in developing and perfecting wire-drag surveys between 1906 and 1916, as well as the discovery of the 'echo sounding' technique by the German physicist Alexander Behm, following the Titanic disaster.

From a UK perspective, we can point to the use of constant radar ranges to assist the surveyors of HMS Seagull in 1947, and the first sidescan sonar that was undertaken by HMS Bulldog in 1987 of Mounts Bay in Cornwall.

We then saw a rapid series of advances from the advent of the systems that enabled full bathymetric coverage of the seabed in the 1980s and 1990s, including the ECDIS trials undertaken in the North Sea in 1988. In 1994 Global Positioning System (GPS) became fully operational for navigation systems and in 1997, the UKHO produced its first ENC, foreshadowing the digital era that is now well and truly upon us.

I also believe that we will look back on the Nippon Foundation's GEBCO Seabed 2030 Project as a very significant initiative in the history of hydrography, bringing together global expertise from a wide array of partners, including the UKHO, as it strives to achieve the complete mapping of the world's oceans by 2030.

**Q2**

It is hard to look beyond the S-100 standard when it comes to the technological innovations that will define the next decade for digitally-focussed hydrography. This new standard will underpin the next generation of marine data products, including gridded data, high-density bathymetry, dynamic ECDIS, under-keel clearance management, web-based services and more.

By equipping them with far more granular bathymetric data, seafarers will enjoy significantly enhanced situational awareness, helping them to make better navigation decisions. More than this, S-100 will also play an important role in helping shipping to meet the new challenges and goals of our era, including decarbonisation and autonomy, by enabling safer and more efficient voyage planning, passage execution and traffic management.

We also see great promise in the potential of Artificial Intelligence and Machine Learning as technologies that can significantly speed up and automate our work. We have seen already through our Generalise Addictive Model (GAM) Service that machine learning can make an important contribution in tackling the increasing levels of bathymetric data cleansing and verification tasks that we face, delivering the same levels of certainty and accuracy but at unprecedented speed.

From a UK perspective, we are also excited about the possibilities for the new UK Centre for Seabed Mapping (UK CSM). The shared vision of the UK CSM members is for it to become the key focal point for the UK's seabed mapping community. The UK CSM has over 20 members and will play a vital role in co-ordinating the collection, management and sharing of seabed mapping data through collaboration, as well as championing the importance of marine geospatial data in the UK.

**Q3**

It's hard to choose! Perhaps because it reflects so much of our thinking at the UKHO, I thought the article in Volume 27 of IHR on NOAA's decision to retire its paper chart portfolio and transition to ENCs was a very significant article and also a compelling explanation of the reasoning behind the decision (<https://doi.org/10.58440/ihr-27-n03>). The authors set out a very clear rationale for NOAA's decision to focus exclusively on ENC production, highlighting the considerable benefits to the mariner, as well as the rapid decline in demand for paper charts. As the article rightly concluded, NOAA may have been the first hydrographic office to take this step, but it will not be the last. The UKHO has since followed suit, setting out our own plans to withdraw from the production of paper charts and increase our focus on digital navigation products and services, for the same reasons that were so well outlined in this article.