

Invited Reply

Should hydrography become an IT science, e.g. "hydrogeomatics"™?

The “As It Was” column in Hydro international enticingly recounts the lore and art of the Nautical Science of Hydrography; however, hydrography has clearly evolved towards Information Technology, data management being key to realising full value for our efforts. Captain Cook laboured to collect ten bits/hour of information using lead lines and sextants while today’s multi-beam systems, side-scan sonars and airborne LIDAR gather billions of bits/hour that must be quality assured, processed, stored and eventually visualised as information. Unlike Captain Cook, whose challenge was the extension of sparse data over large areas, we have the opportunity to creatively employ a robust dataset. Data-rich Navigation Surfaces will replace the sporadic shoal-biased readings of today’s charts while additionally forming the foundation for Coastal Zone Management, environmental modelling and innovative navigation uses such as Dynamic Under Keel Clearance Management.

Denis Hains, Acting Dominion Hydrographer & DG CHS, Science Sector, Hydrographe fÃ©dÃ©ral & DG SHC intÃ©rimaire, Secteur des sciences, Department of Fisheries & Oceans Ã© MinistÃ©re des PÃ¢ches et des OcÃ©ans, Canada

Hydrography has taken part in the general migration towards the digital™ Information Management (IM) and Information Technology (IT) in all the spatial sciences over the last five to ten years. The question is how well are we doing managing the data and converting it into information useable by an expanding range of users? The capacity to digest all the new digital data has not yet kept pace with data collection and has not yet reached a level where we can easily and quickly disseminate digital data products that can respect all international standards.

Given this transformation, perhaps it is time to rename "Hydrography" in "Hydrogeomatics" or "Digital Hydrography" or "Marine Geomatics", or something else. CHS will celebrate its centenary between May 25th and 27th 2004. I would invite any interested leaders in hydrography to take part in a special session at the Canadian Hydrographic Conference. This special event could be a forum to bring together the international community to hold a discussion on the topic.

While hydrography may be considered a science, it is questionable whether IT is a science. For hydrography, IT is normally used as a tool. Hydrography may be taken in the same context of basic applied scientific disciplines as geography, geodesy or surveying. The name "geomatics"™ I find a particular anathema. It was coined first, I believe, in my adopted country, Canada, where there is an endless quest to find words that require little or no translation between French and English. Unfortunately, it has proved appealing to various teaching institutions and is now a well accepted term. This does not make it any more appealing to me and certainly the suggestion of "hydrogeomatics"™ is even less appealing.

When I am asked what I do I say, for simplicity, "I make charts of the oceans" or I am a marine geographer. During the sixties oceanography was much promoted and joined the common lexicon. Accordingly, I am sometimes asked "Don't you have something to do with oceanography?" To which I reply "No, but they are our better educated cousins!"

Hydrography has many facets and its practitioners come from many educational backgrounds. In particular, they need knowledge of

surveying, which is really a sub-discipline of engineering. They need to know about acoustics, geology and the law, to name but a few. Knowledge of computers and information technology is essential in almost all present-day professions and is typically picked up during years at university. However, to suggest that hydrography is an IT Science is surely quite incorrect?

Drs ing A. Lubbes, Divison Technical Manager, Fugro NV, The Netherlands

The question of whether or not hydrography should become an IT science is, I think, already answered. The truth is that with the advent of modern sensors like multi-beam echosounders, Doppler logs and inertial systems data collection and data processing has grown into a complex, computer-intensive process that requires a multitude of software tools to QC, visualise, analyse and interpret the data. This process necessitates the use of specialist tools such as databases and Geographical Information Systems for administrative and evaluation purposes and these do require extensive IT skills and services. So yes, I would support the term 'hydrogeomatics' as successor to the term 'hydrography'.

Having said all this, this does not mean that 'the computer' has taken over and that people no longer need any survey knowledge. The contrary is true, as the human factor is essential to QC and for control of the process to avoid (sometimes pretty subtle) mistakes that can have a great impact on the end result. Tides, offsets, time synchronisation, squat, datum shifts, draught and heave, to mention but a few, do play an equally important role as they have in the past; indeed, as data complexity has grown, so has the number of mistakes that can be made. The competencies and requirements of the modern hydrographic surveyor have definitely widened; nowadays both a solid understanding of hydrographic survey principles and a good understanding of processing methods, data management and computer literacy in general are required.

Hans van Opstal, CARIS, The Netherlands

This is very difficult to answer without proper definitions. What is hydrography? Is IT a science? What does geomatics mean? These are many definitions and there are as many different answers to your question. I'm only allowed 250 words and will thus limit myself to IHO definitions.

Therefore my 'hydrography' deals with safety of navigation and includes hydrographic survey (minimum depths, obstructions, tides) and compilation of nautical publications (paper charts, ENCs, sailing directions). My 'geomatics' deals with modern technology to collect the required data and convert that into relevant information.

Whatever acquisition technology and whatever conversion and presentation tools are being used, my hydrographer should always be focused on the safety of navigation. This applies to the decisions he has to take at sea, as well as to good understanding and well thought out use of automated systems, both onboard and ashore.

That being said, the question whether my 'hydrography' should become an IT science is, of course, nonsense. Yes, hydrography shall increasingly make use of information technology and so will navigation. The hydrographer's task, however, to 'describe the physical features of the navigable portion of the Earth's surface for the purpose of navigation' remains the same. The challenge is to provide the information in a form required by present and future navigation information systems.

It goes without saying that the training programme for hydrographers has to keep pace with new developments and will therefore increasingly contain fewer 'old basics' and more 'applied geomatics'. My modern hydrographer, however, should continue to be trained as a critical, conscientious and safety-of-navigation-conscious perfectionist.

Dr Shoichi Oshima, Executive Director of Japan Hydrographic Association, Japan

Yes, I believe that hydrography is already becoming an IT science and that this trend will continue into the future. For example, if we consider recent improvements in the accuracy and efficiency of depth echosounders we can see that these improvements have resulted in the collection of large detailed quantities of both shallow water and deep ocean depth data. In dangerous shallow waters, where survey boats cannot conduct efficient depth sounding, airborne laser depth sounders can collect dense depth data. In the remote deep ocean, where depth data is quite sparse, satellite altimetry can provide estimated depth figures. When needed, this data can be converted to GIS-readable formats to meet the needs of engineering, science, environmental monitoring and ocean safety. As bathymetry is a base of all ocean activity, these needs will become much more emphasised in the future and technology can pave the way for continual improvements to be made in the field. With a continuing integration of technology with practical know-how, combined with scientists' strong desire to unlock the secrets of the sea, I believe 'hydrogeomatics' should be well on its way to becoming an accepted IT science.

Note from the Editor

No clear trend or indication can be observed in the replies. Everybody, however, is pointing out the importance, not to say necessity, for hydrographic surveyors to be able to handle and manage by means of automation, the enormous amount of data nowadays collected as a result of modern equipment and automation. Quo vadis hydrography?