Marine Cartography

The hydrographic and cartographic community is having to adapt to what is becoming â€˜continuous changeâ€™. Such changes include new systems, new processes, regulations and an increasingly dynamic digital world. Never has the term â€˜change is permanentâ€™ had more meaning. To keep pace with change, to meet the challenges faced, and to enable the skills and knowledge required to be maintained and to be passed on means the need for quality â€“ and recognised training is ever-more apparent. Official navigational data and products such as those provided by hydrographic offices around the world are underpinned by the skills, knowledge and experience of marine cartographers. This article focuses on the uniqueness of the marine cartographer and the importance of retaining those core skills independent of product, process or system and the need for the marine cartographic and hydrographic community to embrace continuous professional development.<P>

With the advent of digitalcartography, the development of Electronic Navigational Charts (ENCs) and the growing utilisation of hydrographic databases and Geographic Information Systems (GIS), there is a danger that traditional cartographic skills and knowledge could be lost, with a focus on being able to process navigational data through GIS solutions. Whilst the new skills required are of course vital, the traditional cartographic skills and knowledge are equally if not more important as they underpin the work of the marine cartographer, independent of system, software or process.

Marine cartography is a complex discipline. The prerequisites of a marine cartographer cannot be categorised into specific qualifications. For example, a degree in GIS, hydrography or geography may well indicate the individual has a good academic background and knowledge in related fields, but does not indicate whether they will have the required aptitude or attitude to undertake the work. The attention to detail, application, critical analysis, informed decision making, the need for accuracy and a flair for design are the key tools required in the marine cartographer's toolbox.

For the mariner, there is a reliance placed on the chart, its accuracy and content that far exceeds the reliance placed on land maps, as most of the detail depicted on a chart is not visible, i.e. it is below the surface. Decisions have to be made by the chart user, often in hostile conditions, bad weather or poor visibility that mean the user places implicit reliance on the chart.

Therefore, the decisions made by the marine cartographer in selecting detail, in the depiction of that detail and in ensuring that all information that should be shown is shown is a skill that should not be underestimated. Those decisions are the cornerstone for safe navigation.

Training in Marine Cartography

Traditional training for marine cartographers concentrated on the skills and knowledge to compile a navigational chart by hand. Technical drawing skills, design, clarity and accuracy together with a knowledge of the chart, its components and construction, research methods, data assessment and chart maintenance, and a knowledge of the chart user are the core elements of cartographic training. The developments in digital compilation systems and GIS have meant that training programmes have had to evolve to include new developments, systems, software and standards. A generation of potential new marine cartographers have been brought up with IT skills and are invariably immediately comfortable in a GIS environment. That in itself can be an issue. Can you teach attention to detail, accuracy and chart design in a GIS environment? Is there still a place for hand drawing skills? The answer I believe is yes, but with an understanding required by the programme designer of how old and new processes can be aligned and balanced to support a valued and valid learning experience.

An additional requirement of the marine cartographer is the ability and knowledge to understand the needs of the end-user. Building in field trips, sea experience and practical survey experience into such training programmes enhances the training experience and provides the learner with a clear link between compiling the navigational chart and the requirements of the user.

At the UK Hydrographic Office (UKHO), the training programmes are designed to provide the students with a rounded learning experience through theory and practical application and then, supported by field trips and visits to related work areas, to enable placing the learning into context.

International Training

Since 2002, the UKHO has trained over 200 students from more than 45countries. The training provided supports the aims of the International Hydrographic Organization (IHO) capacity-building programme. Training in the international environment requires a slightly different approach when designing such learning. An understanding of the organisational requirements, its processes and products can play a valuable role in determining course structure and design. The UKHO has delivered training at the UKHO, and 'in country'. 'In-country' training is inevitably delivered to officers from the same organisation who all have the same objectives. This means that course design is determined predominantly by the organisational requirements and, in some cases, the coursework undertaken can be 'localised'. This kind of bespoke training enables the training to be more valid to the organisation, but it is important that such a design retains the core

programme to enable consistency and to ensure standards are not compromised.

However, training at the UKHO usually means that officers are from a variety of countries. This means that the training design has to be generic, with any specific student requirements met if possible once the course has commenced.

The hydrographic and marine cartographic community is truly international and such courses also provide the opportunity for like-minded individuals to share experiences and knowledge, and to continue to communicate in the future, thus creating an international network of learning, which – although 'unofficial' – can only be beneficial to enhancing capacity.

International Accreditation

In 2005, the UKHO was awarded recognition by the IHO/International Federation of Surveyors (FIG)/International Cartographic Association (ICA) Advisory Board on Hydrographic and Cartographic Standards, at the Category B level of the IHO M8 Standard of Competence for Nautical Cartographers1. This standard lays down the foundation for marine cartographic training courses and the key skills and knowledge required for such programmes. Importantly it also recognises the need for students to possess both 'education and experience' to become proficient cartographers. This supports the requirement of any learning programme and, in what is a rapidly developing environment, this need for continuous development through training and experience is even more paramount. However, any development needs to be structured to ensure equitable and meaningful learning opportunities and to provide a framework for future recognition and standards.

Standards provide the foundation for the work of the hydrographer and marine cartographer and thus standards as laid down by the IHO play an important role in enabling consistency and accuracy of data and products. The role of training is emphasising those standards, putting them into context and ensuring the students can relate their work to the relevant international standards. This is now even more important with the development of the ENC.

ENC

This article is not going to delve into the intricacies, regulations and standards of ENCs. However, as most organisations' ENCs are derived from the paper chart and with the ideal of ENCs to provide a worldwide seamless, consistent, standardised database, the need for implementing, applying and understanding such standards can only benefit paper and ENC chart production and ultimately the needs of the end-user.

The UKHO delivers ENC training and concentrates on students gaining a knowledge of the international standards related to ENC production, in particular S-57 (IHO Transfer Standard for Digital Hydrographic Information) and then applying that knowledge within a production system. However, certainly when training international students, there has to be recognition that their organisations may have different systems, or indeed no system. Such training has to be generic and highlight the qualities of a variety of systems and concentrate on the reinforcement of knowledge rather than system functionality.

The ENC training provided by the UKHO to international organisations has highlighted the importance of such events in what is a developing product. Not only does such training provide organisations with increased capability, but it also provides an opportunity to discuss key issues and to provide a future informal forum to enhance communication and co-operation. Such training supports the World Electronic Navigation Database (WEND)2principles in that it enables communication and understanding of key issues including data production and standards, and also supports WEND 4.1: "Member states' HOs are strongly recommended to provide, upon request, training and advice to HOs that require it to start developing their own ENC?provision".

Conclusion

Training in marine cartography and providing ongoing learning and development opportunities is a challenge for the hydrographic community. Hydrographic offices are having to balance the need to train new staff and to develop existing staff with the need to keep pace with new developments and regulations. The development of new products and new systems means that organisations have the dilemma of trying to predict future resource and skill requirements to meet future challenges. However, provision of such recognised and quality training to the international community can only enhance and increase the capability of international organisations, enable all to have a clear understanding and work towards adopting the same standards, and thus ultimately to support Safety of Life at Sea (SOLAS).

Organisations have a responsibility to provide their staff with the requisite skills and knowledge to produce and maintain accurate and safe products and to support their responsibilities under SOLAS. In addition, there has to be recognition within the international community that only recognised and standardised training programmes offer that opportunity. In addition, any learning and development has to be supported with the opportunity to reinforce learning and practise the skills learnt as international standard M8 states: "nautical cartographers must possess both education and experience to carry out their work effectively".??In addition, those delivering such training cannot stand still, and programmes and learning interventions have to evolve to meet emerging needs and incorporate any future changes to standards, procedures and processes. The role of the marine cartographer is evolving, with new skills and knowledge required to meet the challenges ahead. What has not changed is the important and unique role of the marine cartographer in providing safe, accurate and quality navigational data to the end-user.

References

1IHO Publication M8. Standards of Competence for Nautical Cartographers, Second Edition. Monaco: International Hydrographic Bureau, 2007.

2IHO?Publication M3.. Resolutions of the International Hydrographic Organization, Technical Resolution K2.19. Monaco.