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THE INFLUENCE OF INTERNATIONAL STANDARDS ON THE TRAINING AND EDUCATION OF HYDROGRAPHERS

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ABSTRACT

In 1972 two international organizations — FIG (Fédération Internationale des Géomètres) and IHO (International Hydrographic Organization) — decided that some form of international accreditation for hydrographic surveyors was desirable. The former was concerned with the need for commercial firms working in the offshore to have some recognized certification of the quality of staff which they might employ. The latter was driving towards providing developing nations with a capability in hydrographic surveying and this meant the training of personnel.

A jointly sponsored working group was set up, which later led to the formation of an International Advisory Board. A standard Syllabus and recommended levels of experience were established. It was realized from the start that individual accreditation was impractical and a decision was reached to accredit individual teaching establishments. They in turn could provide individual certification if they wished.

The Board and the Standards have now been in place for eight years. The process is now well established and, although amendments have been made each year to fit new and changing circumstances, the result has been to increase the completeness and quality of hydrographic training throughout the world. Institutions which had apparent gaps or weaknesses in their Syllabi have been urged to

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improve them. Schools, such as the Indian Navy's Hydrographic School at Goa, funded partly by UNDP, now offer their courses to developing countries on an international standard that is followed by several advanced industrial nations, including France, the United States and the U.K..

INTRODUCTION

During the International Congress of Surveyors (FIG) at Wiesbaden in 1971, concern was voiced that there were no international standards of competence for hydrographic surveyors. This concern was particularly felt by companies working in the North Sea offshore oil industry, who would have liked a set of Standards that would assist them in selecting personnel. A year later, at the International Hydrographic Conference in Monaco, the position was put forward by Canada that there was a need for international training standards as an aid to developing countries in setting up their own hydrographic courses. [KAPOOR, 1980].

As a result of the interest of FIG and the IHO, a joint Working Group was established in 1974. The report of this group was presented to the two parent bodies in 1977, and resulted in the publication of Standards of Competence for Hydrographic Surveyors and the formation of an International Advisory Board to administer the Standards.

It had been realized earlier that it was impractical for an international board to administer standards for individuals in different countries, and it was proposed that educational institutions be accredited as being capable of producing hydrographic surveyors. These surveyors were classified into Categories A, B and C. Only the first two categories were given direct attention, and these are defined as follows :

Hydrographic Surveyor, Category A

A comprehensive and broad-based ability in all aspects of the theory and practice of hydrography and allied disciplines. With appropriate experience, to be able to plan and direct any type of hydrographic operation and take responsibility for its accurate and thorough execution. To be able to develop new approaches to hydrographic operations and assess recorded data.

Hydrographic Surveyor, Category B

A practical comprehension of hydrographic surveying and skill in carrying out the various hydrographic tasks. He will normally work as an assistant, but, with appropriate experience, will be able to perform these tasks without direct supervision and be able to analyse the recorded data.

The Standards were defined primarily with two elements : a Syllabus that must be adhered to at a defined level dependent upon whether A or B category, and a requirement with respect to practical experience. The practical experience

includes a part of the actual training and basic experience, defined as an aggregate period of at least two years in the field.

The method of administering the Standards is that, by working through a National Focal Point in each country, educational institutions may submit programs on the education and training of hydrographic surveyors to the Advisory Board. The Board will then compare them against the Standard and either advise on amendments, reject or approve against one of the two categories. The Board does much of its work by correspondence but meets once a year to review courses and to amend the Standards in accordance with suggestions and evidenced needs. To date, eight Category A courses and three Category B courses have been awarded as reaching the Standards. Interest in the process appears to be increasing and at present the Board is reviewing approximately four courses each year.

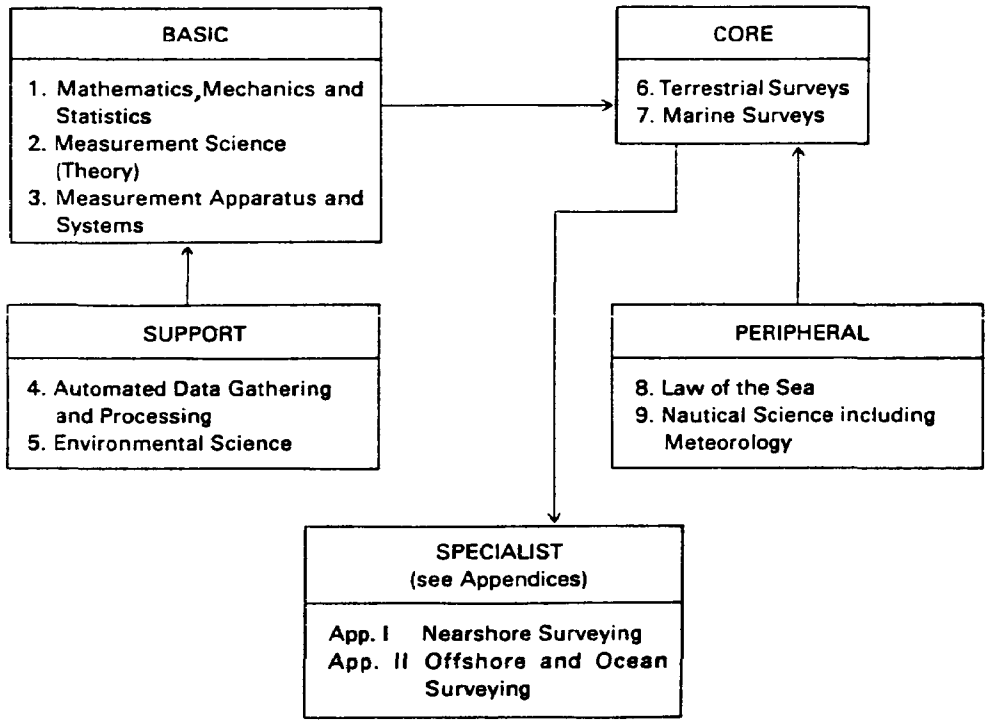
THE STANDARDS

Hydrographic surveyors enter the profession from a wide variety of backgrounds, depending particularly on whether they are part of naval hydrographic offices or from private industry. In Canada we are somewhat anomalous in having a civilian government hydrographic office. Backgrounds vary from graduation at naval academies, to diplomas from technological institutes, university degree courses in surveying or other physical sciences. Unlike their oceanographic cousins, they do not normally pursue their academic studies to the doctoral level, but in industry, a number of hydrographic surveyors have practised earlier careers as masters and mates of merchant vessels. To attempt to bring all these varied academic backgrounds to a reasonably common point, the Standards establish a set of basic subjects in Mathematics, Mechanics and Statistics; Measurement Science (Theory); and Measurement Apparatus and Systems. The Standard permits exemption in these subjects provided that the National Focal Point can confirm that these are prerequisites for the entry to a course being submitted. [IHO-FIG, 1983].

In the Syllabus, two subjects are required as support to the main core. These are Automated Data Gathering and Processing and Environmental Sciences. The former concerns the ubiquitous computer which has now entered every phase of a surveyor's work. The latter recognizes the fact that hydrographic surveying today is truly multidisciplinary and that the student must have a good understanding of subjects such as Oceanography, Geology and Geophysics. There are two core subjects required to be covered in detail. These are Terrestrial and Marine Surveys. Finally, there are two subjects which may be considered peripheral to the main studies required for a hydrographic surveyor. These are Law of the Sea and Nautical Science. In retrospect, the Board now considers Law of the Sea a specialist subject that is more applicable to government offices than to Industry. The requirement for Nautical Science, which in essence means navigation, seamanship and meteorology, has been contentious. Some believe that a hydrographic surveyor must be a true navigator and sailor. Others, including the Board, believe this to be an impractical requirement for all to comply with. It is an

SYLLABI

GROUPING OF SUBJECTS



essential requirement, however, for hydrographic surveyors to understand operations aboard ships when at sea. [KAPOOR, 1980].

THE INFLUENCE OF THE STANDARDS ON PROFESSIONAL DEVELOPMENT

It is now eight years since the first edition of the Standards was issued. As noted earlier, eleven courses have been approved. Two more are currently before the Board seeking approval. The majority of those courses that have been approved have required some form of amendment before final approval has been given. Sometimes these amendments have been minor and at times major. There has been, in some instances, a reluctance by the submitting institutions to incorporate subjects that they have felt not applicable to the work for which they were preparing their students. However, the Board has generally been of the opinion that graduates will be recognized as having passed a program categorized and approved against the Standard, and that they may move to another employer with a credential valid for the entire hydrographic survey profession. The result has

hopefully been to produce graduates with a broad base of knowledge, who can readily move from Government to Industry and vice versa. There have been some comments that the Standards are unduly demanding and unnecessarily broad and this will be discussed later.

The use of the Standards by developing countries as a basic Syllabus for developing courses is not completely known. Certainly the Hydrographic School at Goa, India, is partly funded by UNDP as a measure to provide a centre for teaching hydrographic surveys for developing countries in Southeast Asia. [Naval Hydrographic Office, India, 1982]. Its courses have been approved by the Board as meeting the Standards at the 'A' level. A course recently reviewed by the Board for the Australian Maritime College, in Tasmania, has plans to set itself up as a training centre in hydrography for persons from the western Pacific countries. In Brazil, there is a very active hydrographic school associated with the Naval Hydrographic Office which offers instruction to persons from other South American countries. Although that organization has not yet requested accreditation of its courses, it has participated very actively by providing a member of the Board. An important move recently has been the provision of a Syllabus in Port Surveying to the new World Maritime University at Malmö, Sweden. This Syllabus has been provided by the International Hydrographic Organization and is essentially modelled along the lines of the Standard.

Rather an anomaly in the system has been brought about by a request to the Board to accredit the program of the U.K. Royal Institution of Chartered Surveyors, which provides a program of examinations rather than of courses leading to examinations. This organization provides a hydrographic specialization and, as it is widely considered, may indirectly result in a dissemination of the Standard throughout many developing countries of the Commonwealth.

In establishing the Standards there were some who argued for lower levels of knowledge in order to be acceptable to developing countries. However, it was recognized that in a number of developing countries modern hydrographic equipment was already in use and it was therefore not reasonable to have too low a level. It was realised that, nevertheless, the hydrographic instruction between countries was quite variable and that it was sensible to use a minimum level as the Standard. Several of the courses submitted have been in several areas well above the minimum Standard but all are now similar in terms of the subject matter taught.

It is clear that during its rather brief tenure the Board has established itself as a rigorous and demanding group and this in turn is steadily resulting in a world-recognized standard of education and training for hydrographic surveyors. At the same time the Board has left itself open to consider amendments to the Standards as the profession itself changes with the adoption of new systems and methods. The fact that there is some concern in hydrographic circles that there may be some use of the accreditation in selecting graduates for work with Industry shows that the system is working according to its design. At the same time some care must be exercised in ensuring that the system does not develop elitists but rather that an improved standard of hydrographic education and training becomes available to those who seek it.

FUTURE DEVELOPMENTS

Although the Standards were established to cater to the needs of both FIG and IHO, and thus to those of Industry and Government, it has become clear that to date the Standard has been more accessible to the latter than to the former. Part of the difficulty has been associated with the requirement for two years of practical experience. Government Hydrographic Offices with associated training establishments have not found this a difficulty. Young hydrographic surveyors entering the profession are simply programmed through several years of sandwiched theoretical and practical training. Typically, a recruit may spend three years at a naval academy studying navigation, seamanship and all aspects of naval warfare. This would be followed by three years of seagoing aboard a warship, then into a basic hydrographic school ashore, followed by two or more years' practical hydrographic experience, and finally to an advanced theoretical school ashore for six months or more. In most cases, this type of program is not available to civilian non-governmental education institutes, as normally they only have students available for classroom instruction. While most such institutions do insist on some form of field camp, this is only for a limited period. Until recently, the heavy requirement for field experience, which is nevertheless only a minimum requirement, has not been possible to meet except by those institutions with a "sandwich" plan. Since the civilian institutions, such as the North East London [INGHAM, 1977] and Plymouth Polytechnics in the UK and the Humber Institute and University of New Brunswick in Canada, are the main source of recruits for Industry, the Board has recently decided to take action. A new academic Standard covering categories A and B has been established that requires only compliance with the Syllabus. The concept proposed by the Board is that a national organization, such as the Canadian Hydrographers' Association in this country, or perhaps the RICS or the Hydrographic Society in the UK, Netherlands or USA, could use this international accreditation of a course to insist that graduates complete two years of defined experience before being granted national individual accreditation by one of those bodies.

A second area of concern to the Board has been the demanding breadth of the Standard. It has been pointed out that the knowledge requirements for port surveyors are different from those surveying with the oil industry offshore and that the requirements of Industry are in some aspects different from those of Government hydrographic offices. "Why", it may be asked, "does a Government surveyor need to learn about geotechnical soil reconnaissance ?" or "Why does the Industry surveyor need to learn about chart compilation processes ?". Certainly, all knowledge is of value, but to insist upon a student studying a subject that he will never meet in his professional life requires questioning, particularly if a course has a limited duration.

An earlier approach to the above matter was to partition the subject matter of the Standard in association with different sub-disciplines of hydrographic surveying. It was felt, for instance, that a port surveyor might be more interested in photogrammetry than offshore positioning by satellite and that, for an oil and gas industry surveyor, the requirement would be reversed. However, even this small

example tends to question this idea with the satellite positioning system GPS threatening to provide a common basis for all positioning. An approach which is now being given some thought is based on the idea that all surveyors at sea require some common basic knowledge. On study it was found that there is a rather large core of basic knowledge. For instance, all hydrographic surveyors, and indeed all surveyors, must have a good knowledge of Mathematics and Physics. Moving then to one step of specialization, all must have a good knowledge of Geodesy, Acoustics, Computer Science and Marine and Terrestrial Surveying. All, as has been argued earlier, must be familiar with Nautical Science. Only when we specialize still further is it possible that not all hydrographic surveyors need to know all the possible subjects. It has therefore been suggested that there could be a selection of peripheral subject modules, from which the student could select a certain number but need not take all. Geology, Geophysics, Cartography, Law of the Sea, Oceanography might all be in the form of modules from which a selection could be made. Although this approach infers that a graduate may not be versed in every aspect of every subject, he/she will have at the very least a solid grounding in the essential subjects.

It should be stressed that these latest developments are still being considered. It must also be emphasized that the Standard is not static and that the Board is very much aware of its commitment to both Government and Industry, to produce an excellent world class of hydrographic surveyors to meet the needs of the future in both the developing and developed nations.

A list of courses which have been awarded Certificates of Recognition by the Board as of July 1985 is as follows :

1. Basic and Long Hydrographic Courses at the Royal Naval (UK) Hydrographic School, HMS *Drake* — 'A' Category, 28 June 1980. Reaffirmed July 1983.
2. L'Ecole Nationale Supérieure des Ingénieurs des Etudes et Techniques d'Armement (ENSIETA) of the Service Hydrographique et Océanographique de la Marine, France — 'A' Category, 5 December 1980.
3. The Royal Australian Navy's Course for 4th Class Hydrographic Surveyor — 'B' Category, 14 May 1981.
4. Basic and Long Hydrographic Specialist Course of the Indian Naval Hydrographic School, Goa — 'A' Category, 1 March 1982.
5. 4-Year Course Programme of Hogere Zeevaartschool, Amsterdam — 'A' Category, 14 June 1982.
6. Course Submission of L'Ecole des Hydrographes of the Service Hydrographique et Océanographique de la Marine, France — 'B' Category, March 1983.
7. Specialization Course in Hydrography of the Portuguese Naval Hydrographic Institute — 'A' Category, June 1983.
8. Graduate Education Programme in Hydrographic Surveying of the US Naval Post Graduate School — 'A' Category, May 1984.
9. Syllabus of the Final Examination in Hydrographic Surveying Submitted by the Royal Institution of Chartered Surveyors (UK) — 'A' Category, May 1984.
10. Intermediate Hydrography and Oceanography Course of the Hydrographic Institute of Portugal — 'B' Category, August 1984.

11. Programme of the Hydrographic Surveyors Officers Courses of the Hydrographic Institute of Spain — 'A' Category, July 1985.

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