THE FIG/IHO/ICA IBSC "STANDARDS OF COMPETENCE FOR NAUTICAL CARTOGRAPHERS"

CONCEPTUAL APPROACH AND DEVELOPMENT

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Background

- 1977 The “FIG/IHO International Advisory Board on Standards of Competence for Hydrographic Surveyors” is formed.
- 2000 ICA becomes the 3rd international body of the Board and its name changes to “FIG/IHO/ICA International Advisory Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers”.
- 2009 Change of name: The “FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers”.
- Membership on the IBSC:
  - FIG four (4) members
  - IHO four (4) members
  - ICA two (2) members.

Background (continued)

- The Standards:
  - Are known as S-8 describing the competencies for Nautical Cartographers
  - They indicate the **minimum** degree of knowledge and experience considered necessary for Nautical Cartographers
  - They provide a set of formal outlines against which the Board may evaluate programmes submitted for recognition
- Two levels of programmes: Category A and Category B (S-8A & S-8B)
- ***Category A***: A programme which provides a comprehensive and broad-based knowledge in all aspects of the theory and practice of nautical cartography and allied disciplines for individuals who will practice analytical reasoning, decision making and development of solutions to non-routine problems.
- ***Category B:*** A programme which provides a practical comprehension of nautical cartography for individuals with the skill to carry out the various cartography tasks.

Developments in Education

- Ongoing responsibility of the Board: Maintaining the standards in line with changes in science, technology, practice and increasing diversity of the disciplines covered.
- Consideration of developments in education: **Constructive Alignment**
- "Coherence between assessment, teaching strategies and intended learning outcomes in an educational programme" (J. Biggs, 1996)
  - Formulate intended learning outcomes and list content to be covered
  - From the intended learning outcomes, develop the teaching strategy and the assessment criteria
  - Learning outcomes must be well defined in terms of scope and be measurable through assessment
  - Within designed assessment regime, organize activities to teach student how to meet the assessment criteria, and therefore, the learning outcomes
  - Deliver material constructively **in a way that the learner thinks** and align the assessment accordingly through a set of learning outcomes.

Standards Development - New Version Reasoning – Characteristics [I]

- The Board decided to revisit the style in which the standards are presented. This includes:
  - Adoption of the **Constructive Alignment** approach
  - Separation of the CAT A and CAT B Standards
  - Removal of options
  - Structure of Standards with subject groups identified as:
    - Basic (B) and Essential (E) at Category B level; and
    - Basic (B), Foundation (F), and Cartographic Science (C) at Category A level

Standards Development - New Version Reasoning – Characteristics [II]

- The subjects are further divided into topics and topics into elements with one or more learning outcomes associated with each element
- Bloom's taxonomy (Bloom, B.S. (Ed.) 1984, Anderson, L.W. et al. 2001) has been applied to describe each element of the standards.
- The associated verbs used within the learning outcomes are an indication of the depth of learning.
- Further indication of level expected is achieved through quantifiers that are given within the element.
  - Basic (B);
  - Intermediate (I); or
  - Advanced (A)
- Inclusion of e-learning components

Subjects in the Standards for Nautical Cartographers

S-8A Subjects	S-8B Subjects
B1 Mathematics, Statistics, Theory of Errors B2 Information and Communication Technology B3 Earth Sciences	B1: Mathematics, Statistics, Theory of Errors B2: Information and Communication Technology B3: Earth Sciences
F1 General Geodesy F2 Hydrography and Nautical Products F3 Photogrammetry and Remote Sensing	E1: General Geodesy E2: General Cartography E3: Hydrography and Nautical Products
C1 General Cartography C2 Data for Nautical and Special Purpose Charting C3 Geospatial Information and Processing C4 Nautical Cartography C5 Legal aspects (Relating to nautical cartography) C6 Special Purpose Charting C7 Map/Chart Reproduction	E4: Data for Nautical and Special Purpose Charting E5: Photogrammetry and Remote Sensing E6: Geospatial Information and Processing E7: Nautical Cartography E8: Legal aspects (Relating to nautical cartography) E9: Special Purpose Charting E10: Map/Chart Reproduction
COMPREHENSIVE FINAL CARTOGRAPHIC PROJECT	COMPREHENSIVE CARTOGRAPHIC PROJECT

Extract from S-8A relative to Content and Learning Outcomes

F1 General Geodesy		
Topic/Element	Content	Learning outcomes
F1.1 Introduction to geodesy **(A)**	(i) Shape and size of the Earth as a sphere, ellipsoid of revolution and geoid (ii) The authalic sphere as a model of the Earth (iii) Traditional geodetic datums (iv) Terrestrial reference systems and reference frames.	Describe in detail the figure of the Earth as a geoid, an ellipsoid of revolution and a sphere. Characterize the geometry of lines on the sphere and the ellipsoid.
F1.2 Coordinate systems, frames and datums **(A)**	(v) Local and global Cartesian coordinate systems. (vi) Modern geodetic datums based on terrestrial reference frames. (vii) Datum transformation techniques including similarity transformations and grid based approaches. (viii) Computations on the sphere (ix) Computations on the ellipsoid	Define and specify geodetic reference systems and associated reference frames.
F1.3 Geodetic transformations and associated computations **(I)**	(x) Vertical datums and associated transformations.	Describe, select and apply horizontal and vertical datum transformation methods.
F1.4 Spherical and ellipsoidal computations **(I)**		Perform grid, spherical and ellipsoidal computations on spherical and ellipsoidal surfaces and evaluate the results.

Practical Exercises and the Final Project

- The standards specify the requirement for a comprehensive final project of four (4) weeks in duration, which is independent of any practical work undertaken during previous programme modules.
- Specifications for project work given to students expect the programme participants to be involved in planning, execution and reporting on the project that is suited to the level of the standard.
- The project specifications relate to programme outcomes and assessment requiring programmes to demonstrate that:
  - students can apply knowledge gained in the programme,
  - design and conduct tests,
  - function in a team, solve problems and
  - communicate.
- Prepare students for the professional environment through the application of knowledge gained in previous courses together with elements of professional conduct such as ethics, health and safety.

Procedure for recognition of a program

- Educational bodies are invited to submit their designed course against the relevant Standard (A or B) to the Board before 31st December each year for consideration at the Board's next plenary meeting.
- Usually with some iteration between the submitting organization and the Board, the submission is:
  - recognized,
  - recognized subject to meeting some conditions defined by the Board or
  - not recognized.
- The recognition is valid for six (6) years

Internal review

- Institutions are required to have in place an internal review process for the Programme.
- It is recommended that any Programme will also undergo a comprehensive internal review every 3-5 years, to address any issues that may arise and to update course content.
- The methodology adopted by the institution for the internal review will need to be furnished in detail as part of the submission.
- The summary of any recent internal review undertaken for a programme submitted for recognition will need to be included in the submission. The Board wishes to see how feedback from all sources, including students, is formally taken into account by the Programme.

Student feedback

- The IBSC strives to ensure that quality control measures are in place and a part of this process involves consultation with the student body.
- It is important that students passing through the Programme are able to contribute to development and change.
- Mechanisms such as student liaison meetings help in dealing with issues that arise during delivery.
- On completion of the Programme a questionnaire should be circulated to solicit opinions on matters such as accessibility to resources and delivery of each course.
- Summary results from questionnaires should be included in the submission.

Programme reviews and on-site visits

- Institutions with recognized programmes should be prepared to allow an IBSC visit, to view the facilities and to meet staff and students involved.
- The guidelines for the IBSC visit are:
  - A programme review is a process for evaluating and continuously enhancing the quality and currency of programmes.
  - The evaluation is conducted through a combination of self-assessment, followed by peer on-site consultation by the IBSC, for the mutual benefit of all parties.
  - In addition, a visit serves to raise the profile of hydrography and nautical cartography with other in-country agencies and regionally.

Documentation

Companion Document :

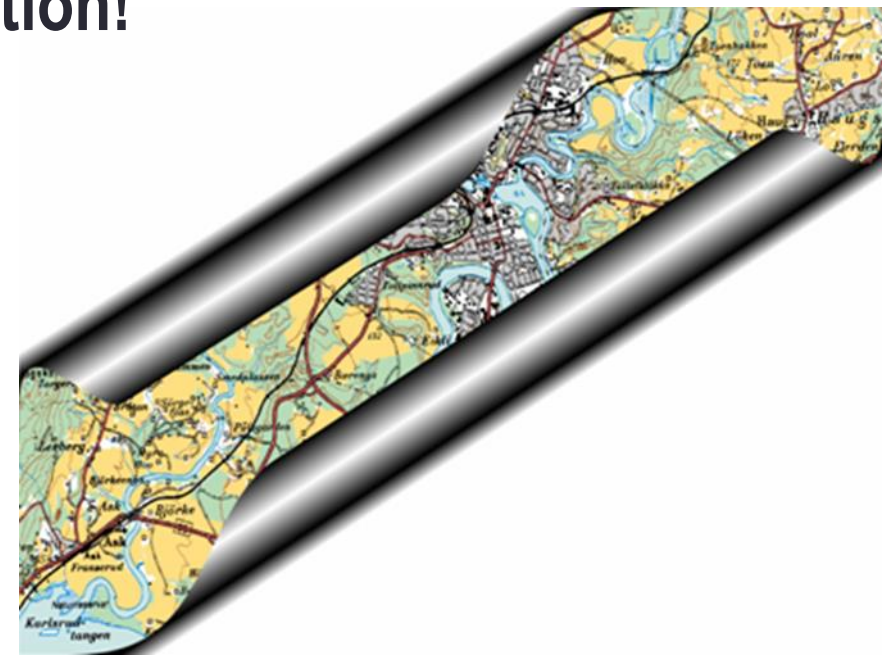
“Guidelines for the Implementation of the Standards of Competence for Hydrographic Surveyors and Nautical Cartographers”

- Procedures for recognition
- Time frames
- Practical exercises
- Student assessment
- Internal review
- Student feedback
- Programme reviews and on-site visits

Ratification

https://www.iho.int/iho_pubs/IHO_Download.htm

Thank you for your attention!



Questions??