



Helping Build Your Capacity in Nautical Charting & Hydrography

Helping Chart your World

Rajesh Alla

Riyadh, Kingdom of Saudi Arabia

04 - 06 March 2013

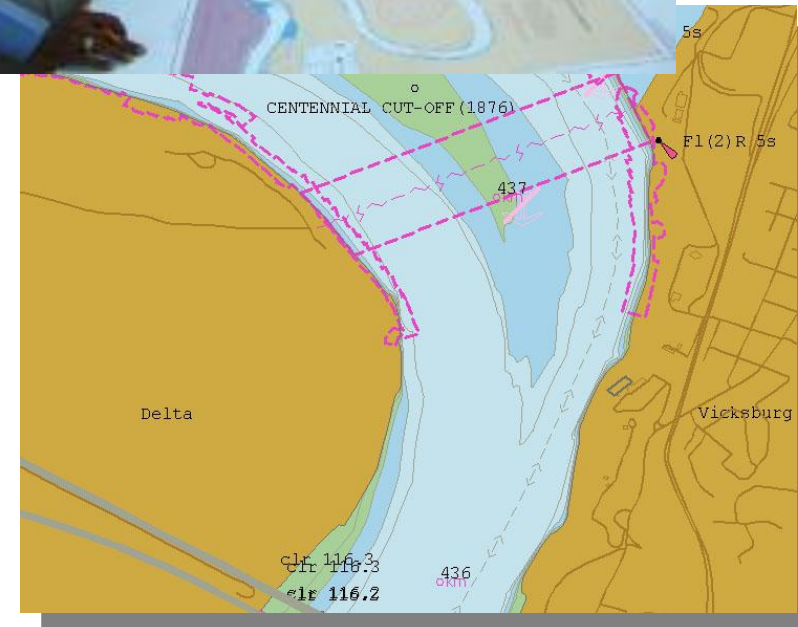
Company Background

Marine Services

Capacity Building

Case Studies

Conclusion

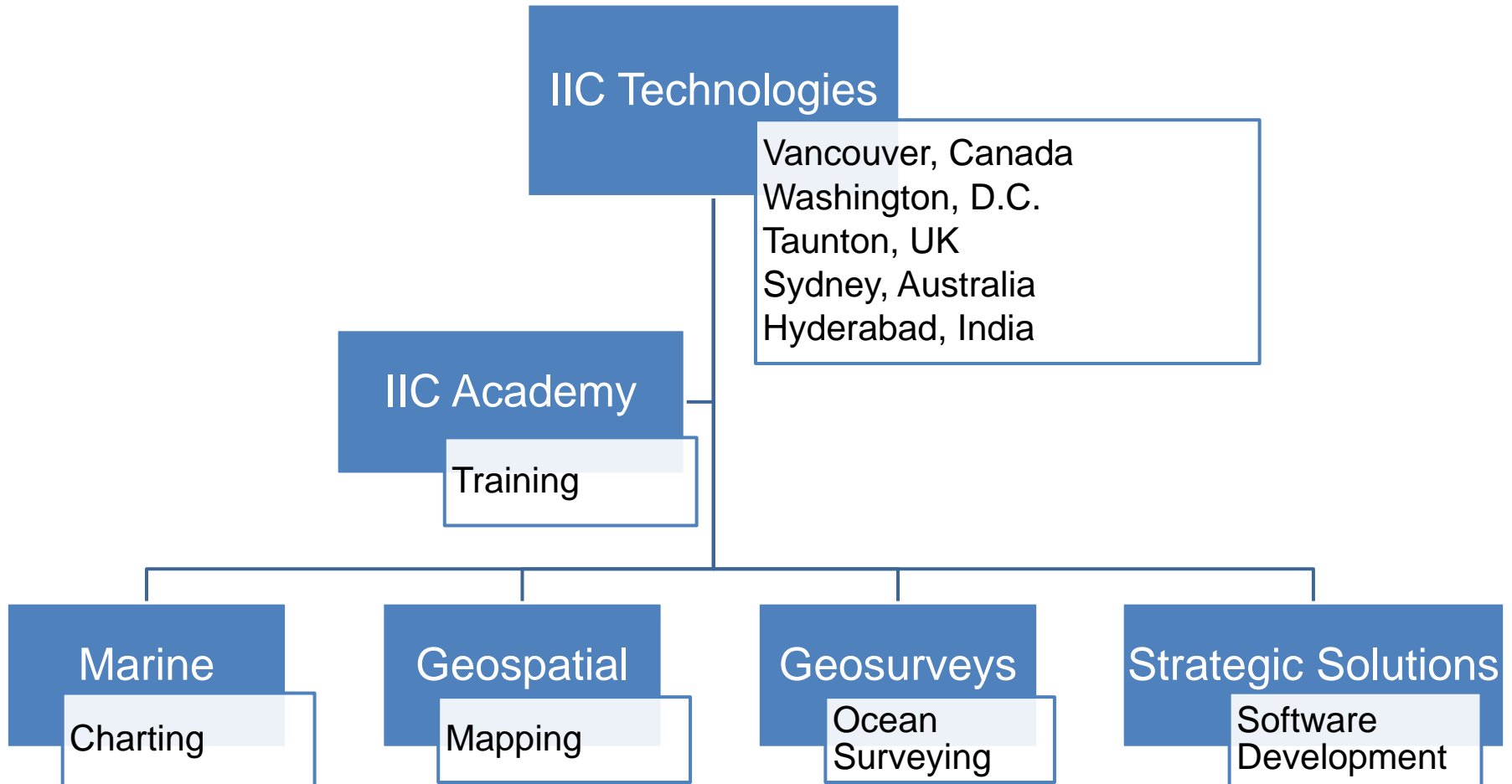


Company Background



NEW PATHS, NEW APPROACHES

Company Background



Company Background



- **Norwegian Mapping Agency** paper chart and ENC production
- **Canadian Defense Department** production of DNCs
- **Australian Hydrographic Service** 80+ charts from source
- **Indian Navy** paper chart and ENC production
- **Brazilian Hydrographic Office** 150 charts
- **NOAA, USA** ENC & chart production
- **Canadian Hydrographic Service** multibeam & lidar processing
- **US Army Corps of Engineers** river ENC
- **Land Information New Zealand** CARIS HPD data maintenance
- **GCS, Kingdom of Saudi Arabia** hydrographic training & production
- **UKHO** ENC production, HPD maintenance

Hydrographic Value Chain



Data Value Chain

Data Acquisition

- Hydrographic
- Geophysical
- Oceanographic
- Airborne Lidar
- Satellite

Survey Data Processing

- Bathymetry Data Cleaning
- Surface Modeling
- Image processing
- Deconfliction

Marine Products

- ENC's / IENC's
- Military Overlays
- Paper Charts
- Geophysical Products

Verification & Validation

- Spatial Accuracy
- Feature Verification
- Logical Consistency
- 3rd Party Checks
- Vertical/Horizontal Consistency

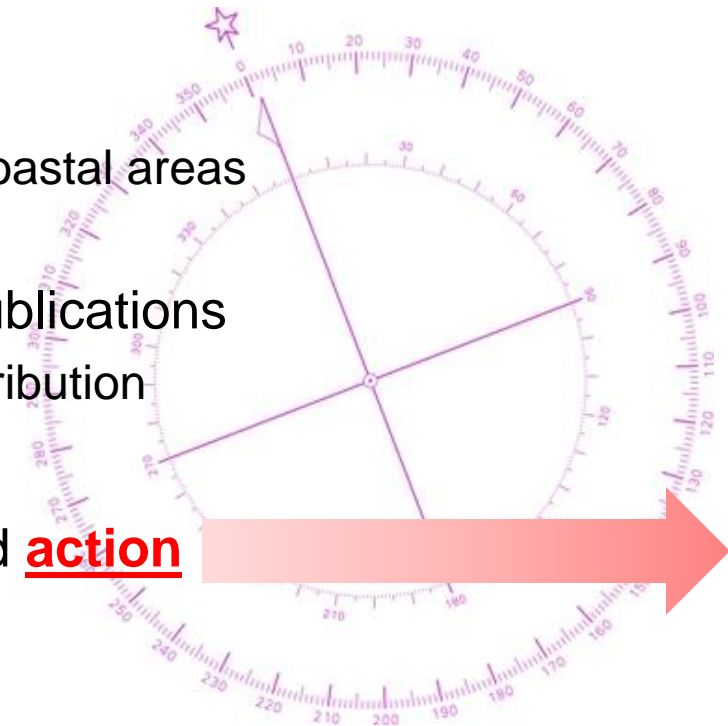
Updating & Maintenance

- Database maintenance
- Data Assessment
- Data critical updates
- Data management
- Data warehousing

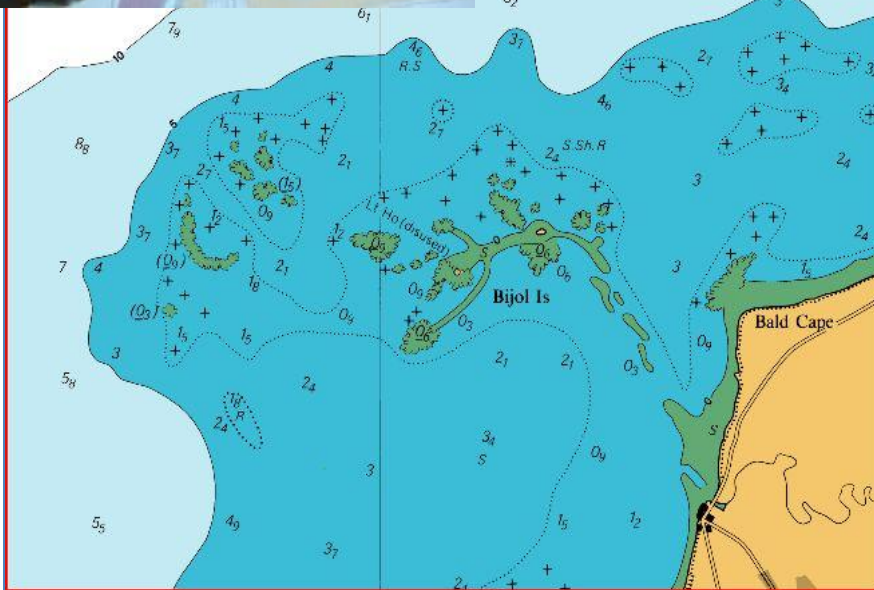
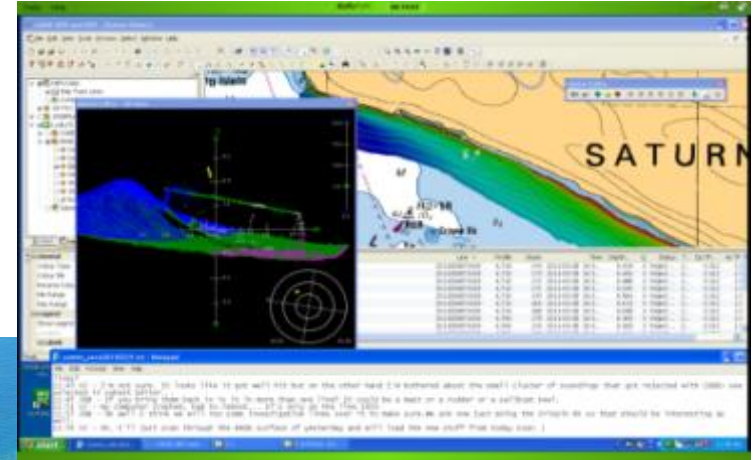
Education & Training

IHO's official “capacity building” strategy

- Three phases of development
 1. Maintain existing charts & publications
 - Improve infrastructure to collect/circulate information
 2. Creation of a surveying capability
 - Surveys of ports and approaches
 - Build survey capacity for offshore & coastal areas
 - Work toward hydrographic databases
 3. Produce paper charts, ENCs and publications
 - Production, updating, and maybe distribution
- Four step process
 - awareness, assessment, analysis and **action**



IIC can help with the **“action”**...



Action Items.... Experience



Surveying and Mapping



Bathymetric Data Processing



ENC Production & Maintenance



Paper Chart Compilation



Hydrographic Database Management



Education & Training

Surveying & Mapping Operations



Kingdom of Saudi Arabia Hydrographic Survey Operations

Airborne Bathy Lidar



Multibeam, Sidescan,
Sub-bottom Profiling



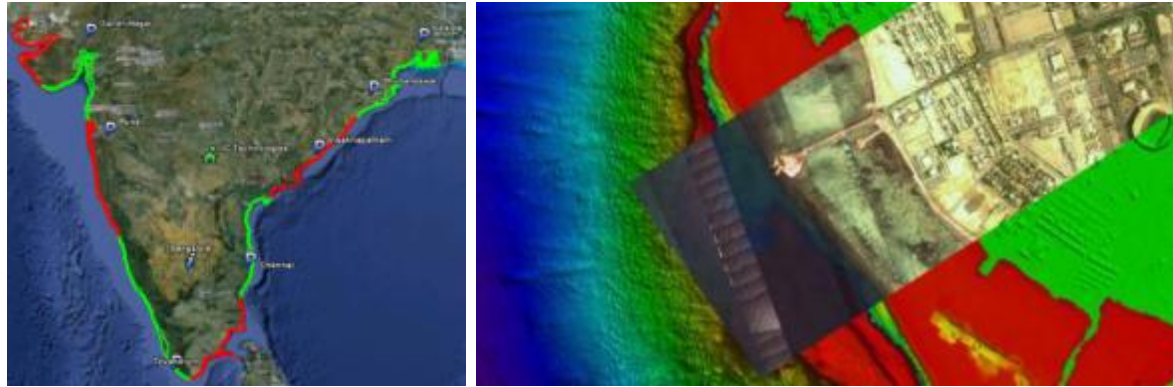
Geodetic & Tidal Control

Surveying & Mapping Operations



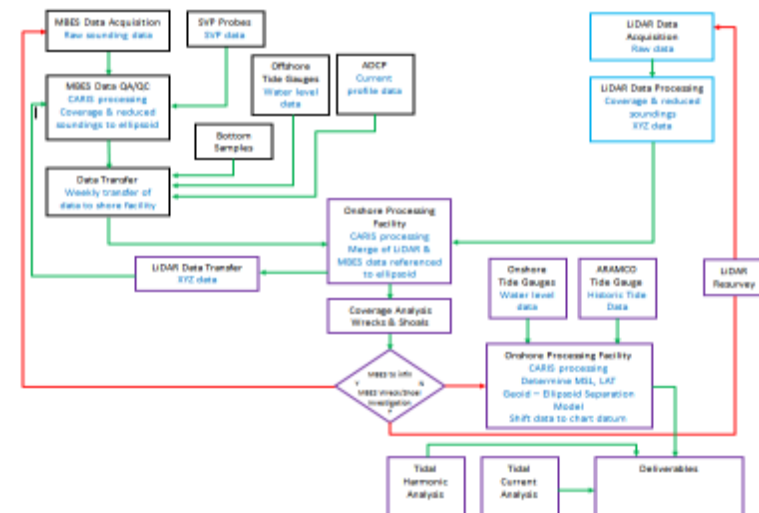
India Coastline Mapping

- 3 aircraft
- Photo acquisition – 9 cm GSD
- Post processing of raw image
- Preliminary aerial triangulation
- DEM and ortho photo generation



Bathymetric Data Processing

- UKHO
 - Processing dense xyz soundings, producing high resolution contours, contour smoothing, deconfliction and shoal sounding selection.
- Canadian Hydrographic Service
 - Production of new ENC's from bathy source data
 - Processing of Airborne Bathy Lidar & Multibeam Survey data
- Saudi Arabia
 - Bathymetric data processing and LiDAR processing



ENC Production & Maintenance

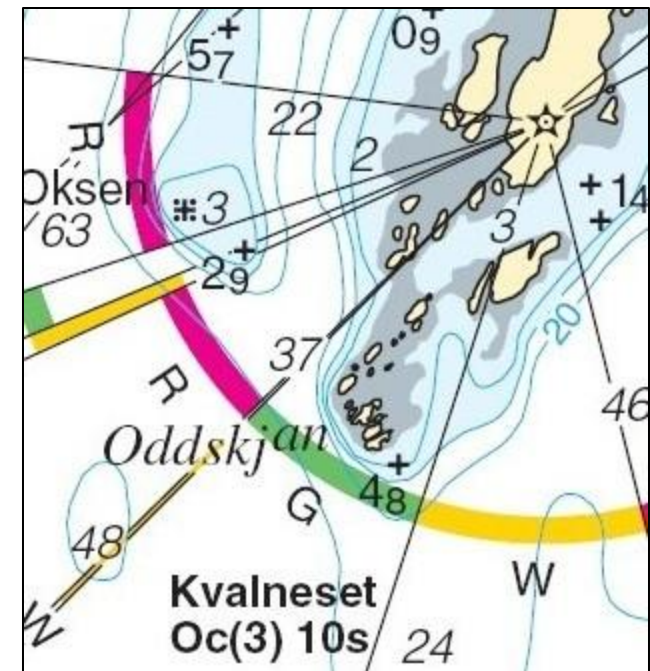


- UK Hydrographic Office - over 2000 ENCs produced
- NOAA - continual maintenance of 500 ENCs plus production
- US Army Corps of Engineers - over 7000km of Inland ENCs produced, plus continual maintenance
- Canadian Hydrographic Service (CHS) – over 200 ENCs
- Norwegian Hydrographic Service
- Australia – upgrade 300 ENCs
- Brazil – over 120 ENCs
- New Zealand – 20 ENCs
- France (SHOM)
- Germany (BSH)



Paper Chart Compilation

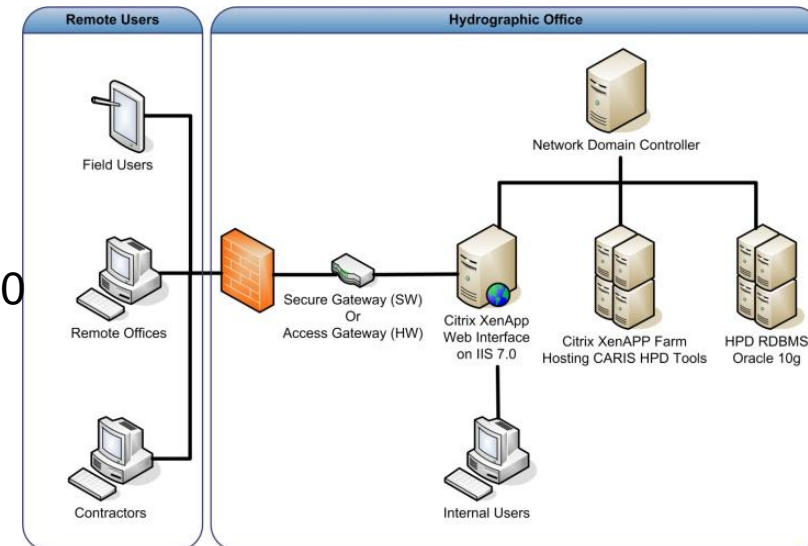
- US Army Corps of Engineers
 - One of the first paper charts compiled from ENC data
- Norwegian Hydrographic Service
 - Print-ready paper charts with complex cartography
- Australia
 - Over 80 paper charts plus Papua New Guinea
- New Zealand
 - Compiled 20 paper charts



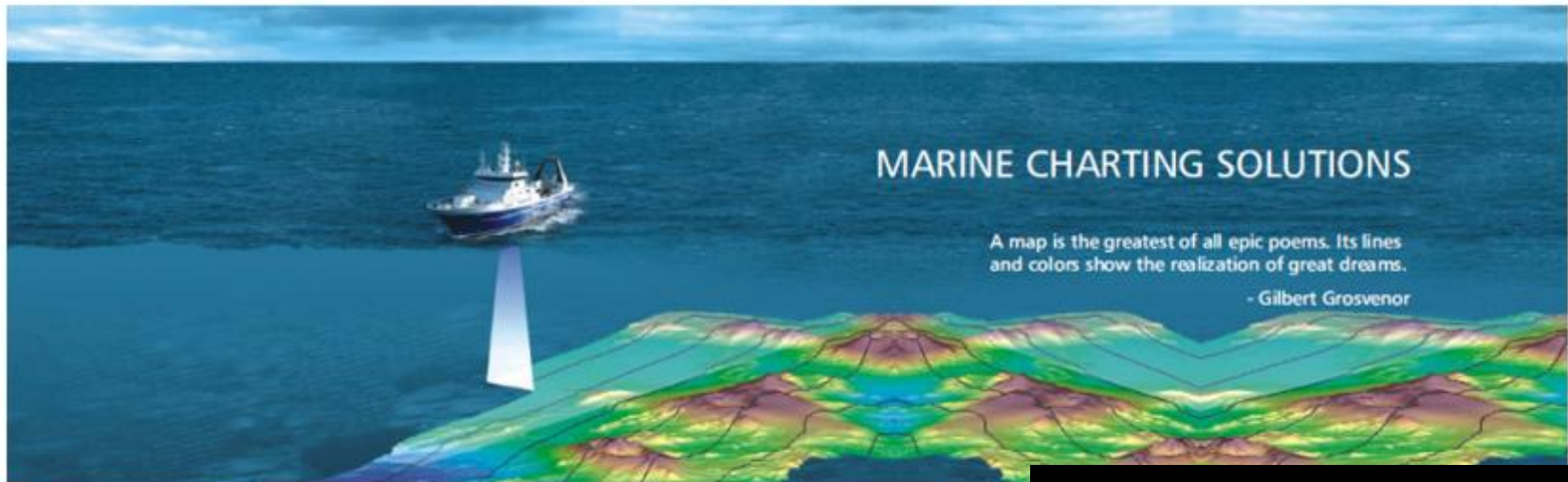
Hydrographic Database Systems



- UK Hydrographic Office
 - **Remote production via Citrix** of over 200 (of 900) paper chart masters using CARIS HPD Paper Chart Editor (PCE)
 - 10 R&D trials to improve efficiency and “**capacity**”
 - Horizontal & vertical deconfliction for complete harmonization
- Canadian Hydrographic Service
 - Preparing over 100 of charts for HPD loading, including harmonization
- NOAA
 - Testing ESRI PLTS database systems
- New Zealand
 - **Remote access (via Citrix)** to produce 100 paper chart masters
 - Delivery of HPD-ready files



[Home](#) | [About Us](#) | [Methodology](#) | [Program Calendar](#) | [Facilitators](#) | [Registration](#) | [Archives](#) | [Media](#) | [Careers](#) | [Contact us](#)



PROGRAMS:

GEOSPATIAL

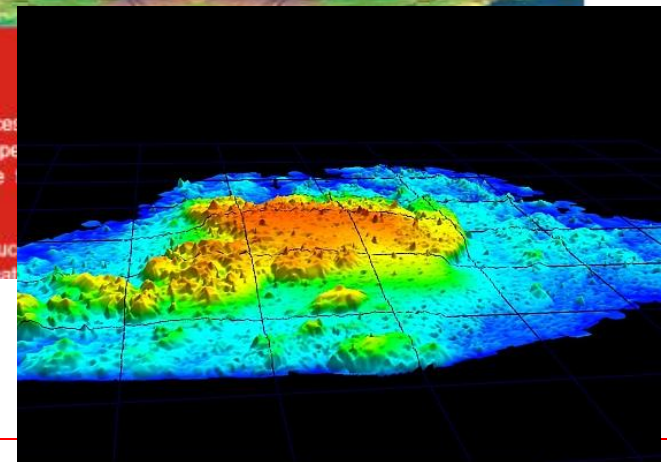
MARINE

GEO SURVEYS

Welcome to the IIC Academy

IIC Academy seeks to be an "international centre of excellence" in geospatial sciences, the training arm of IIC Technologies, which brings over two decades of global experience in geospatial projects and services. The Academy's industry-focused programs are customizable and range from short term fundamental to long term advanced levels.

Using best practices, the academy empowers its learners to be industry-ready and successful in the workplace. The academy also supports interdisciplinary applied research that



- IIC Academy is the training division of IIC Technologies
- Internal and external training: they link and they support
- Saudi Arabia: IHO S8 Cat B cartographic training
- Indian Port Authority
 - Multibeam Echo Sounder (MBES) training
- Oman navy
 - ENC production training
- Inland Waterways Authority
 - River chart training
- Indian Hydrographic Office



#1 Case Study: Cat B S8 Course



N.128


*FIG - IHO - ICA International Board on
Standards of Competence for Hydrographic Surveyors
and Nautical Cartographers*



CERTIFICATE OF RECOGNITION

The FIG - IHO - ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers, having reviewed the course programme "*Marine Geospatial Information*" submitted by the *IIC TECHNOLOGIES ACADEMY (INDIA)* against the "Standards of Competence for Nautical Cartographers" S 8 (3rd edition), and being satisfied that it meets the requirements prescribed for a category *B* course, hereby awards this certificate of recognition for a period of 6 years.

Signed at Monaco


Prof. Dr. Lysandros Tsoulos
Chairman of the Board

This day the *1st* of *July* 2012

#1 Case Study: Cat B S8 Course



15 week course plus 11 weeks of practical work - Flexible delivery

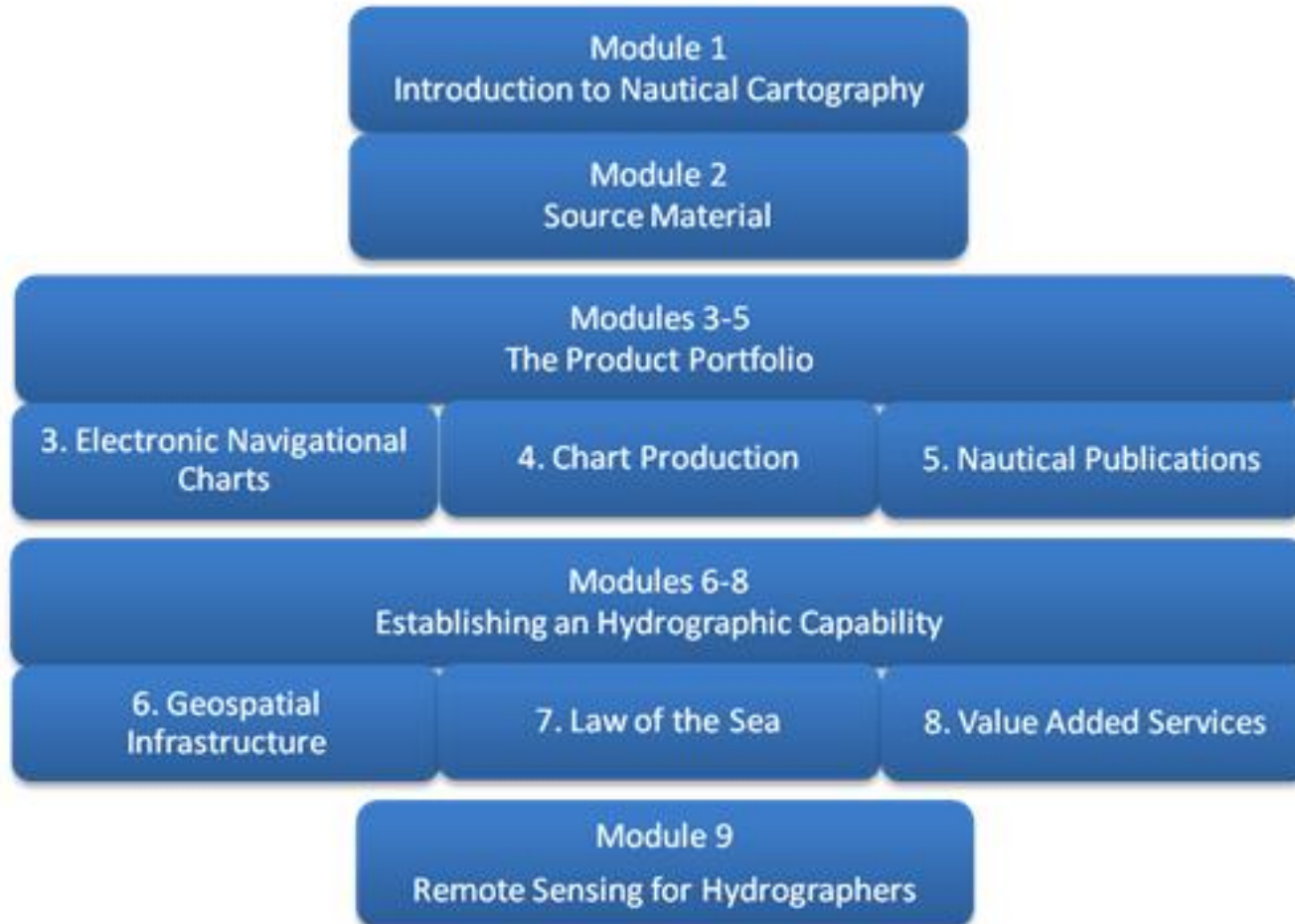


Figure 2. The modular design of IIC's S8 nautical cartography course.

#1 Case Study: Cat B S8 Course



- Marine Geospatial Information (rather than “Cartography”)
- Example modules:
 - Marine geology
 - Evaluating bathymetry for charting
 - ENC data creation and editing
 - Emerging standards: S100
 - “Update” and maintenance
 - Nautical publications
 - Marine Spatial Data Infrastructure (MSDI)
 - Remote Sensing for Hydrographers
 - Photogrammetry
 - Image Interpretation for Nautical Charting

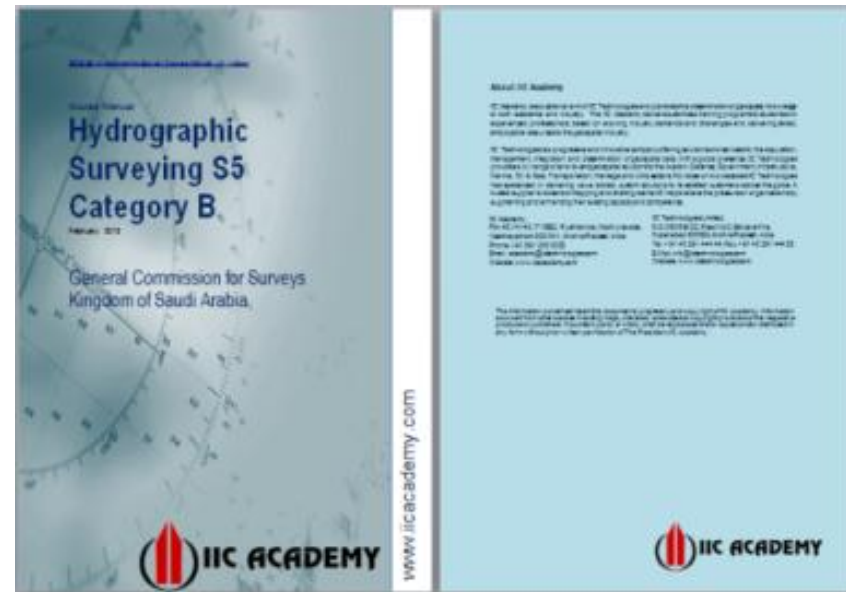
A collage of course materials. At the top is a slide with the IIC logo and the text "Marine Geospatial Information Course". Below it is a slide titled "Key Points: Nautical Publications" and "Module 5: Nautical Publications Design, Compilation and Updating of Nautical Public". The bottom section shows a preview of "UNIT 5" with a yellow border, including a "Writing Notice to M" section and an "IHO Recommended Layout" section.



#2 Case Study: Saudi Arabia



- IIC Academy capacity building:
 - Training personnel from the General Commission for Survey
 - Providing course material and mentoring
- Cartography (S8)
 - Training to Cat B standard
 - Assisted with gaining own Cat B
 - Continuing support in development of processes and procedures
- Hydrographic Survey (S5)
 - Providing trainers, material
 - Assistance to gain their own Cat B
 - Tutors and mentoring
- Saudi Arabia is now recognized by IHO/FIG/ICA to provide official S5 and S8 courses



#2 Case Study: Saudi Arabia



#2 Case Study: Saudi Arabia



#2 Case Study: Saudi Arabia



#3 Case Study: Oman



- 6 – Month Training on ENC and Paper Chart Production
 - Training in Hyderabad, India
 - Classroom followed by Practical work
 - Fully embedded within the IIC Production Environment
 - Exposure to all Production & Process Flows
 - Help in the setup of a ENC/Paper Chart Production Environment

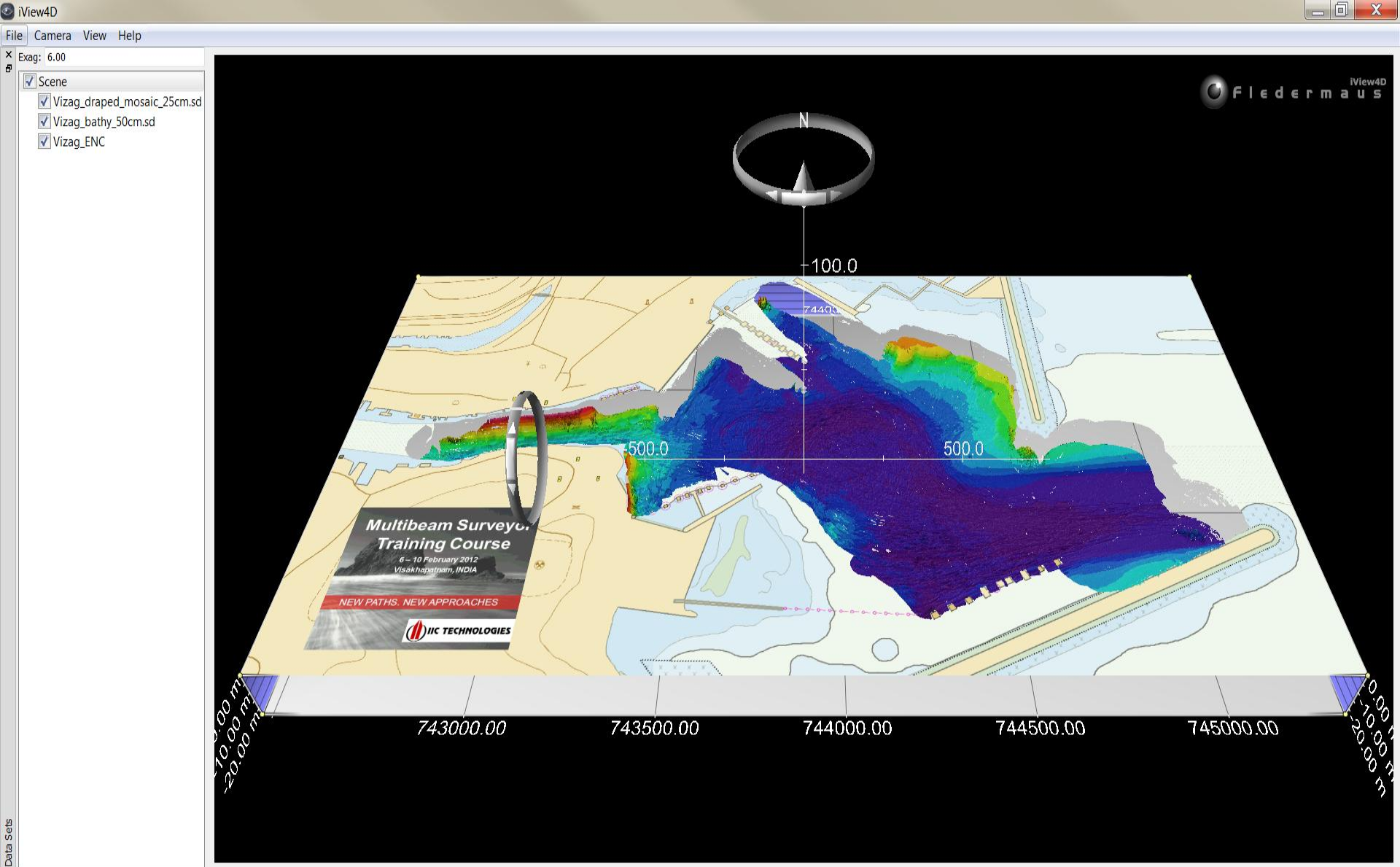


#4 Case Study: MBES Course

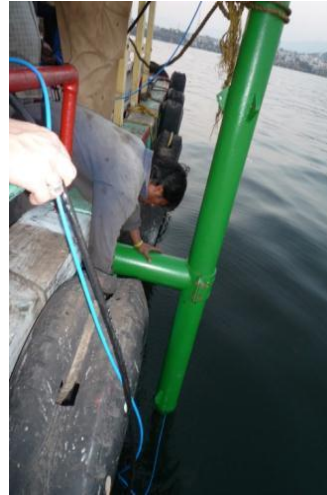


- Week-long multibeam echosounder (MBES) course
 - Training in Vizag, India
 - Course offered earlier this year
 - Classroom and shipboard practical work
 - Full setup of hydrographic equipment
 - Actual on-water surveying
 - Processing of survey data at end of week
- Next course: Jan 28 to Feb 1 (5 days) **Completed**
- Course outline available upon request
- Onsite training at your facility also available

#4 Case Study: MBES Course




#4 Case Study: MBES Course



NEW PATHS, NEW APPROACHES

#4 Case Study: MBES Course



**Visakhapatnam Port
Bathymetry**
Multibeam Course for Hydrographic Surveyors
6-10 February, 2012

IIC Technologies Private Limited
8-2-350/5/B-22, Road No 3, Banjara Hills,
Hyderabad 500034, Andhra Pradesh, India
Tel: +91 40 3914 4444 ; Fax : +91 40 3914 4455
E-mail info@iictechnologies.com
Website www.iictechnologies.com



Update Table...

Table of Contents

1. Introduction	3
2. Data Acquisition.....	3
2.1 Mobilisation	3
2.2 Patch Test.....	4
2.3 Multibeam Data Collection.....	4
3. Data Processing.....	5
3.1 Vessel file and data conversion.....	5
3.2 Attitude Editor.....	7
3.3 Navigation Editor.....	7
3.4 Tide, sound velocity and data merge.....	8
3.5 Compute TPU	9
3.6 CUBE.....	9
3.7 Data cleaning.....	10
3.7.1 Surface Filter.....	10
3.7.2 Subset Editor.....	11
3.8 Backscatter mosaic creation.....	12
3.9 Export.....	12
3.9.1 Soundings.....	12
3.9.2 BASE surface.....	12
3.9.3 Backscatter mosaic.....	12
4. Results.....	13

IIC Research & Development Laboratory



#5 Case Study: “Pending” Cat C S8



Four week – 22 day “Cat C S8 Training in Nautical Cartography

Module 1

Source Data analysis, understanding bathymetric surveys and processing them for inclusion within ENC’s and Paper Charts

Module 2

ENC Production

Module 3

Paper Chart Production

Module 4

Creation and Issue of Notice to Mariners for Paper Charts and ENC Updates

IIC Research & Development Laboratory



Citrix Business Partners



ORACLE



Citrix Users

“97% of Fortune Global 100 Now Use Citrix Software”

USA

All 20 of the largest U.S. federal agencies

All 10 of the top U.S. banks

All 10 of the top U.S. automotive manufacturers

All 10 of the top U.S. healthcare organizations

All 10 of the top U.S. Oil and Gas companies

Europe

All 10 of the top banks

All 10 of the top chemical companies

All 10 of the top telecommunications service companies

9 of the top 10 high-tech companies

Survey Description



Vancouver
Survey Site

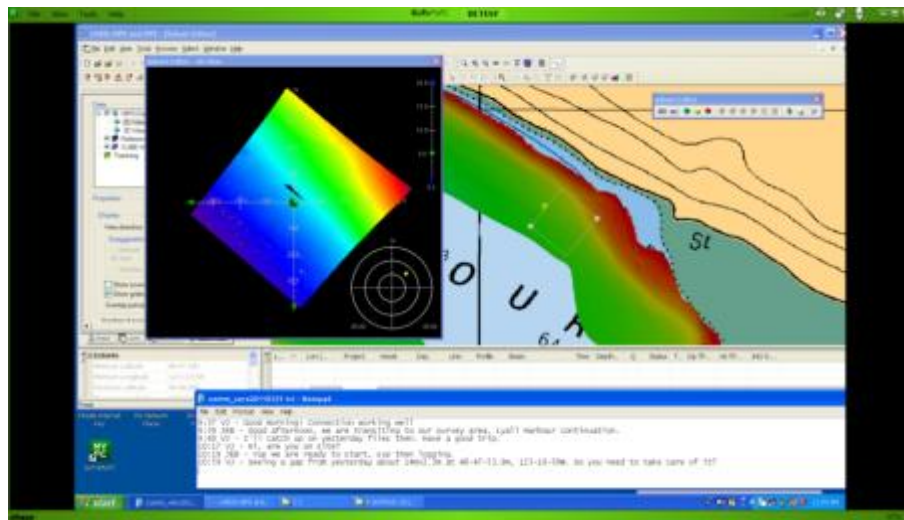
Toronto

4000 km



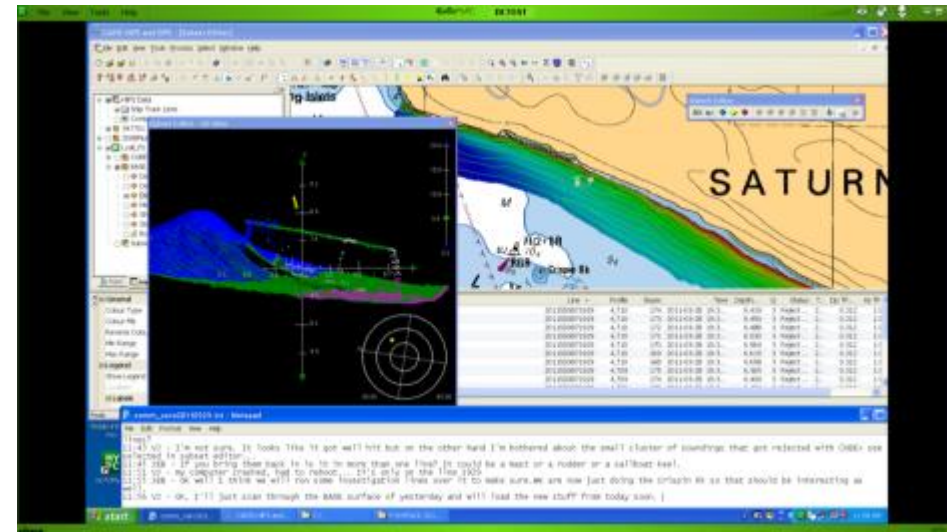
Real-time communications....

Real-time QA/QC of the data was being performed so the survey could be adapted to correct defects (data gaps, uncertainties outside of specifications, more data needed over certain features to resolve multiple hypotheses, etc.) before the survey crew left the project area



Identifying an acquisition data gap

"I'm seeing a gap from yesterday about 14m x 2.3m at 48-47-53.9N, 123-10-58W"



problem soundings above a wreck

"it looks like it got well hit but the on the other hand I'm bothered about the small cluster of soundings that got rejected with CUBE> see selected in the subset editor"

Costs....



The remote processing side used the existing Internet and existing hardware. No special purpose set-up costs were necessary.

PC box:~\$1000

Standard IT software:~ \$100

- (OS, antivirus, text editor, ftp client site licensing and/or open source)

Wireless mobile Internet stick:~ \$150

- month to month plan (or free on a 3-year contract);

Specialized software: pricing dependent on individual vendor agreements;

- CARIS HIPS, BASE Editor, Fledermaus, etc.

Two to three days if IT support to set it all up and test it.

Ongoing costs

Citrix **GoToMyPC** remote access flexible plan..... \$35/month first 500MB

for each additional 500MB..... \$5/month

(daily usage is about 100MB/day)

Ongoing IT support and system maintenance

- **IIC Technologies has experience in**
 - Hydrographic Surveying Data Acquisition
 - Data Cleaning and Processing Workflow
 - ENC & Paper Chart Production
 - Verification & Validation
 - Database Maintenance
 - Workflow
- **IIC Academy provide training & education**
 - Onsite and offsite
 - Transferable training skills and courses
 - Assist with IHO/FIG/ICA recognition
 - Provide ongoing mentoring and assistance
 - Provide ongoing course maintenance and upgrades

January 29-30, 2014



5th Workshop on Electronic Charting



www.iictechnologies.com