Integrating GIS, ECDIS and Web-based Marine Information System for Maritime Navigation and Coastal Protection

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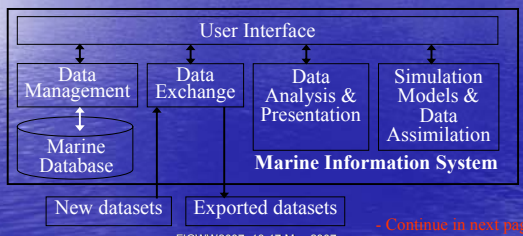
Topics:

1. Web-based Marine Information System (MIS)
2. ENC, DNC®, RNC for ECDIS
3. GIS Data for coastal protection/management
4. Conversion of GIS data to ENC or vice versa
5. Capacity-building of WEND and ECDIS
6. Q & A

1. Web-based MIS

- Principal components: MIS, GIS, ECDIS, Internet & telecom satellites
- Data: GIS data, ENC, DNC, RNC



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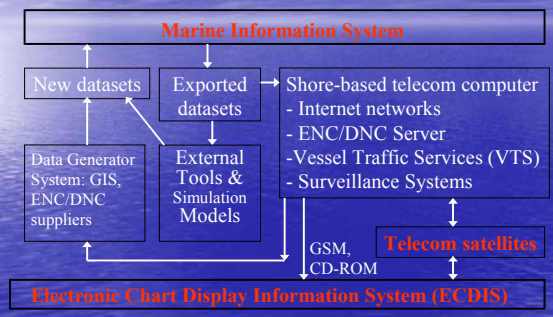
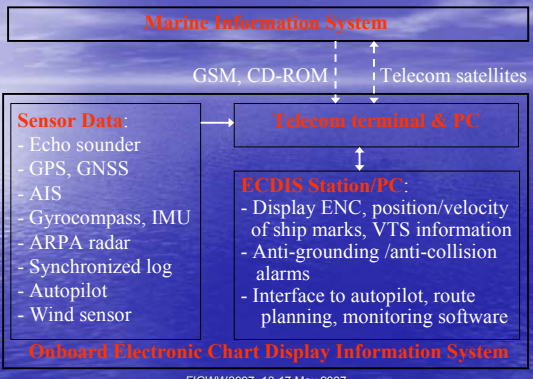
Linking Web-based MIS, GIS, ECDIS





2. ENC, DNC®, RNC for ECDIS

- Functions of ECDIS navigation station/PC are shown schematically in Figure 1, using the following data.
- Electronic Nautical Chart (ENC) must comply IHO S-57 Object Catalogue in vector formats, and other IHO standards; suppliers e.g., C-Map, Transas Marine Ltd
- Digital Nautical Chart (DNC ®) in Vector Product Format (VPF) supplied by NGA
- Raster Nautical Chart (RNC) displayed on RCDS
- NOAA's ENC® in both S-57 and GIS formats, free of charge to users through Internet

3. GIS data for coastal managment

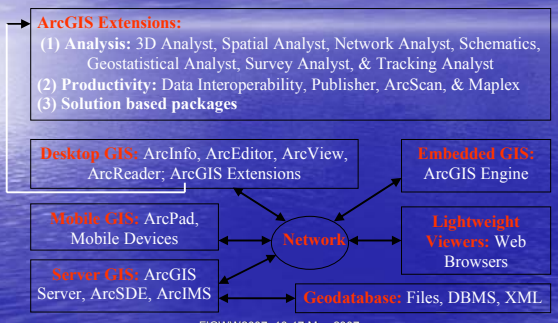
Critical infrastructures or GIS layers for protection (PSEPC, 2004):

- energy and utilities (e.g., electricity supply)
- information and communication systems
- (e.g., broadcasting stations)
- finance (e.g., banking system, investment)
- health care (e.g., hospital)
- food supply (e.g., agriculture, food safety)
- water supply and disposal (e.g., drinking water)
- transportation (e.g., air, rail, road, marine traffic)
- safety [and security] (e.g., nuclear safety)
- government (e.g., government services, assets)
- manufacturing (e.g., chemical industry).

GIS data acquired from intelligence mapping (Barter et al., 2000; Weitkamp, 2005)

- Mapping of: (1) all onshore geology, beach profiles, land use and flora; (2) all offshore geophysical objects, habitats and marine objects.
- Mapping and assessment (reverse engineering analyses) of all coastal engineering structures.
- Mapping and analyses of oceanographical and meteographical data including sampling and analysis of marine and terrestrial water and sediments.
- Socio-economic surveys and public consultation to establish the characteristics of coastal communities.
- Airborne/terrestrial LIDAR technology (e.g., Optech's ALTM, LIRIS-3D, SHOAL) are highly recommended.

GIS (e.g., ESRI) for the MIS



4. Convert GIS data to ENC or vice versa

- GIS data to ENC or vice versa by various vendors (e.g., CARIS, ESRI)
- Develop custom MIS software (e.g., Wan et al., 2005 in the Government of China)
- Software developer kits: Java, C++, ECDIS Kernel, CARIS HOM (for S-57) & DOM (for VPF)
- (Wan et al., 2005) recommends quad-tree data structures for fast updates and queries of large spatial databases

5. Capacity-Building for WEND & ECDIS production

- Capacity-building for Worldwide Electronic Navigation Chart Database (WEND) model under the leadership of IHO, IMO, NOAA and others.
- Replace S-57 with S-100 to accommodate more oceanographic and meteorographic info which are classed as Marine Information Objects (MIOs) and Additional Military Layers (AML objects) (Alexander, et al., 2007).
- Training for ENC data production and validation should be offered to Hydrographic Offices or regions which are lacking funding and technical expertise.

6. Questions & Answers?

Thank you.