Nautical Chart System II

Using ArcGIS Nautical to Produce Navigational Products
Agenda

- Project Overview
- System Overview
  - Nautical Information System (NIS)
  - Product Library
  - ENC Products
  - Paper Products
  - Workflow
- Transition Activities
Why NCSII?

- NCS I technology not compatible with today’s technology and architecture and Security demands
- Increased product & services responsibility (ENC, RNC, POD, online ChartViewer, pocket chart, Weekly updates)
- No staff increases to maintain added responsibility
- Product Standardization and consistency
- Increased requirement from Ping to Customer
- Increased efficiency due to a central database
- Commitment to a COTS solution for long term support and enhancement of the production system.
Project Overview

- Contract awarded in 2004
  - Integrated COTS solution
  - Multiple phases
    - Requirements
    - Trade Study
    - System Selection
    - Integration
    - Acceptance of IOC
Project Overview

• 443 requirements identified
  – Based on NOAA’s perspective of available COTS functionality
• Central Database for one time application and review of data
• Produce all Products
  – ENC
  – Charts in multiple formats- Traditional, POD, RNC in BSB format, RNC in Geotiff, ChartViewer, Pocket chart,…
• Weekly Update service for all products
Project Overview

- Trade Study
  - Revealed that there was no out of the box Commercial-Off-the-Shelf (COTS) vendor
- ESRI’s ArcGIS Nautical Solution provided the most capability and flexibility
- Officially selected in 2007
- NOAA, ManTech and ESRI spent the next two years evolving the COTS into a integrated system
System Acceptance

- Occurred in February 2009
  - Initial Operating Capability
    - All mandatory requirements
    - Demonstrate end-to-end-capabilities
      - Source load (multiple formats)
      - Continual Maintenance
      - Critical corrections
      - Multiple ENC updates
  - Officially accepted on February 13, 2009
NCSI to NCSII

ENC New Editions
Maintenance Copy
Product Databases
Published Products

Data applied one time
Updates sent to products
Weekly Updates Copy

ENC Weekly Updates
Weekly Updates Copy

Paper, RNC, POD
Weekly Updates

Source Data
Notice Mariners
Raster Data

NIS

Source Data
Notice Mariners
Vector Data

Nautical Information System

- Data centrally managed and edited in the NIS
- NOAA ENCs – initial data load into the NIS
- 22 scale bands - multiple representations of each feature
- Aids to navigation will exist one time
- Maintains spatial and non spatial data
- Product neutral
# Data Storage in the NIS

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<th>ENC, Paper</th>
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<tr>
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<td>ENC, Paper</td>
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Aids to Navigation Conflation

- Aids are stored only once in the NIS
- Best position is used
- Stored at smallest scale that the aid is located
- System knows that the aid must appear on every larger scale product in that location

<table>
<thead>
<tr>
<th>Scale</th>
<th>Product</th>
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<td>Location X</td>
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Source Application in the NIS

- Changes are made in edit versions (copies) of the NIS.
- Once these changes have been reviewed and determined to be correct, they are then moved back into the NIS, overwriting the old data with the new.
- Data stored in the NIS is transferred to product databases based on a set of defined filters (i.e. product footprint, scale, etc...)
- Data stored in the product databases is then used to create individual products.
Product Library

- Application within the Nautical Solution software that facilitates the maintenance of Electronic and Paper Chart products
  - Each product is a separate database
    - Based on product footprint and scale
  - NIS updates sent to products
  - Product level editing allowed for product finishing only
  - Cannot change the underlying data
ENC Products

- Filters control the flow of data from the NIS to the ENC
- ENC specific processes
  - Creation of S-57 topology
  - Setting of Scale Minimum for ENC consistency
- Supports - New Editions, Updates, or re-issues
Paper Chart Products

- Extracts data from the NIS
- Visual Specification Tool (VST)
  - Database driven cartography
- Master version is exported as:
  - GEOTIFF for RNC and Print on Demand
  - Color separated PDF for lithographic operations
- Supports - New Editions, Crit updated editions and Notice to Mariners
Product Finishing
Product Finishing
Product Finishing
Data Driven Surround Elements

When data is updated in the NIS it can be linked to surround elements on the product and automatically update them.
Customized Workflow

NCS II High Level Workflow (End-to-End)

Acquire and Prepare Source
- Acquire CM Source
  - Acquire CRIT Source
  - Acquire CRIT Source

Compiler / Apply Source to NIS
- Compile CM Source to NIS
- Apply CM Source to NIS

Sync Data from NIS to Products
- Sync CM Updates to Products
- Sync CRIT Updates to Products

Maintain Products
- Paper Product
  - Apply CRIT Updates
  - Beauty CRIT Changes
- ENC Product
  - Apply CRIT Updates
  - Beauty CRIT Changes

Publish Products
- Paper Product
  - Publish New Edition Paper
  - Generate History Report
  - Update Website ENC
- ENC Product
  - Publish New Edition ENC
  - Generate History Report

JTX Workflows

User Roles
- NDE Compiler/Reviewer
- CRIT Compiler/Reviewer
- NIS Compiler/Reviewer
- CRIT Compiler/Reviewer
- Product Library Series
- Process Owner
- CRIT User
- Product ENC Reviewer
- Product Paper Compiler/Reviewer

Central Databases (NIS, CKB), Product Library / Navigator
- NDE Compiler/Reviewer
- CRIT Compiler/Reviewer
- NIS Compiler/Reviewer
- CRIT Compiler/Reviewer
- Product Library Series
- Process Owner
- CRIT User
- Product ENC Reviewer
- Product Paper Compiler/Reviewer
- NDE New Edition/Archival
Workflow

• Utilized the ESRI Job Tracking Extension (JTX) to implement workflow management
• Needed to establish structured workflow to manage:
  – Jobs
  – Resources
  – History and Archiving
• Certain aspects needed customization to handle Notice to Mariners written by NOAA and published by the US Coast Guard
NCSII JTX Implementation
Transition Activities

- Expect to maintain CGD 5 coverage in NCS II; Produce ENCs and ENC updates; and produce 20 paper charts starting Oct 2009
- Projected 5 years until entire chart suite is transitioned
- Looking to improve the product through user outreach
- Large data clean-up effort (CGD 5 will complete in ’09 and CGD 1 in ’10,...)
Conclusion

• Multi-year effort
• Have a established a COTS relationship with ESRI
• NCSII will improve production efficiencies over time
• Scalable for the next generation of navigational products