FROM PAPER TO ELECTRONIC CHARTS

Lessons learned, new directions, and a vision what lies ahead
FROM PAPER TO ELECTRONIC CHARTS

• A look at the past

• New directions - Where do we go from here?

• A glimpse of what lies ahead
“Progress is made by moving forward, but understood by looking backward”

–Søren Kierkegaard*

*OK he did not actually say this but something darn close
LOOKING BACKWARD

• The Regan era “Contract with America” had a proposal to privatize NOAA and USGS production of Charts and Maps

• In 1993 Al Gore’s “Reinventing Government” triggered a request from NOAA, to convene the National Research Council (NRC) to assess national needs, trends, and opportunities in nautical charting information

• Their 1994 report was used as a roadmap. It included key recommendations regarding various aspects of chart production, privatization and dissemination of data
THE DRIVING PRINCIPLES

• CHARTING A COURSE INTO THE DIGITAL ERA, 1994

• The underlying concept of the NRC report was that the US, and the world, were heading to a new era and that electronic charts would be the focus of all future commercial navigation

• The report included recommendations for the following topics; Changing Needs for Nautical Information, Survey Activities, Database Development, Chart Production and Distribution, Resources for NOAA’s Nautical Information Programs
1994 NRC REPORT

• “NOAA should establish new processes aimed at minimizing the time between the acquisition of new data and the publication of those data for public use.”

• In the early 1990’s NOAA updated approximately 300 charts per year, with about 50-100 discrepancies being required to trigger an update.
PRIVATIZATION

• “NOAA should explore avenues for entering into arrangements with private companies in which NOAA will obtain a share of revenues, royalties, or fees in exchange for use of NOAA-certified data in value-added nautical information products produced and distributed by the private company. Where necessary, NOAA should seek enactment of legislation to enable it to retain funds generated from arrangements with private-sector partners.”

• At the time NOAA was looking at shrinking revenue for chart production
NOAA CREATES PROPRIETARY RASTER CHART FORMAT

- NOAA Developed and patented methods used in their digital charts
- NOAA licensed the format under a Cooperative Research and Development Agreement (CRADA) to Blue Marble Geographic, Seoul and the Better Boating Association (BSB)
- The format was modified and became the property of BSB. All US raster charts were issued in this format. Companies supporting the format were required to get a license from BSB
- BSB was later sold to Maptech, Maptech went bankrupt in 2007
THE BSB FORMAT AND CRADA

• The format was licensed to companies and countries worldwide.

• BSB, Maptech and NOAA benefitted from technology which should have been in the public domain.

• NOAA attempted to promote a new CRADA for vector charts. This effort was defeated by a wide-ranging consortium of domestic and international companies.

• NOAA decided to offer vector and raster charts for free.

• Who owns the format today? Uncertain...
NOAA STARTS PRODUCING RASTER AND VECTOR CHARTS

• In 1995 NOAA begins producing raster charts based on paper charts

• NOAA believed that the adoption of Electronic Charting Systems (ECS) would occur prior to the completion of official Electronic Nautical Charts (ENC’s), so they promoted an alternative, raster charts
RASTER & VECTOR

NOAA embarked on a two pronged approach, embracing the ideas that:

• Raster charts could be made available faster than vector, and

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SUCCESS

• NOAA’s plan to get charts into the market quickly was very effective

• NOAA’s plan created a revenue stream that was directed back to the agency to fund certain activities related to chart production

• Chart updates now come out as often as every week

• Eventually the charts became freely available on the Internet
FAILURE

- The plan created a cartel and unfairly rewarded an alleged technology partner in a non-competitive process.
- Initially, charts prices were not dictated by the free market.
- Ultimately, the cartel was defeated by industry.
- The maintenance, ownership, and control of the standard should have been the responsibility of a non-profit industry association.
NRC PLAN WAS MOSTLY EFFECTIVE

• The 20-25 year plan for directing NOAA’s efforts was very effective

• The NRC plan was good governance in that it included many voices but resulted in a small number of clear suggestions

• If possible, NOAA should embark on this effort again to define a clear path for the next 10-20 years
Reliance on the United States Coast Guard as the source of expertise to create and implement performance standards for ECS systems

- This role was delegated to the USCG and outside the scope of the report and suggestions.
- NOAA should take on this role as the USCG has not acted in a timely fashion.
- The USCG’s role should be to enforce regulations, not create standards.
NOAA’S ROLE IN ELECTRONIC CHARTING SYSTEMS

- NOAA creates and maintains the data, but has only a small roll in defining how they are used onboard US Vessels.

- Who can better articulate this, or understand the relationship between an electronic chart and the use of the chart?

- NOAA leadership should initiate whatever steps are necessary to take on the role of managing ECS standards for the United States.
NATIONAL EMBARRASSMENT

- Vessels in nearly every other country in the world can legally navigate within their waters with electronic charts.

- In the US, this has only become available in the last few months, in fact the RTCM SC 109 standard for ECS was only released a week ago.

- The United States should establish a leadership role in electronic navigation and strive to lead, and not lag the rest of the world by 15+ years.
IMAGINE A DIFFERENT WORLD

• What if the United States put a man on the moon 15 years after the Russians? 1984 rather than 1969?

• This is our level of success with regards to ECS. WE ARE 15 YEARS BEHIND the rest of the world

• When did it become OK to follow rather than lead?
HERE’S AN EXAMPLE OF WHAT WE COULD DO...

- Here is an example provided by Neil Weston at NOAA
- It shows high resolution gridded tidal current predictions
- This system could massively reduce CO² emissions in the US
- It will also coincidentally save industry $ billions…
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GRIDDED HIGH RESOLUTION TIDAL CURRENT DATA BASED ON SENSOR INPUTS

- Sensor driven CFD model create high resolution tidal current models
- Route optimization algorithms alter the route to save time and fuel
- NOAA already has the expertise, knowledge and data needed
SURFACE CURRENT OVERLAYS

• NOAA should come up with a clever name for this concept

• The system should cover all coastal and near coastal and offshore, including parts of Canada such as British Columbia

• The system should be rolled out using existing, open, data standards, with an eye to the future S-100 standard

• It should include other types of predictable and interesting data types such as wave height and wind
OTHER BENEFITS

- The recent tragic loss of the El Faro could have been prevented as the system would have indicated excessive seas along the route of the ship.

- All vessels on international voyages arriving and departing US ports would benefit from the system.
• What can we learn from our success and missteps along the way? NOAA should focus on open standards and not create non-competitive exclusive relationships with private industry.

• Where could better decisions and stronger leadership take us in the future? Relieve the USCG of their role in defining ECS systems in the US.

• What are the key technologies and features we can expect in the future? Further integration of important data into a dynamic chart.

• Where should we focus limited resources to make the biggest impact? Requisition a new NRC report and follow their guidance.