Intelligent Exploitation of the Blue Economy - A Hydrographic Perspective

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- The Land-Sea Interface
- Stakeholders
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Introduction

- How do you intelligently exploit the Blue Economy?
- Economic benefits derived through maritime trade are only really benefits when they arrive on land: at market.
- The land-sea interface is a critical component of any successful interaction between the Blue Economy and the terrestrial market which it serves.
- Land and sea data have always been dealt with as separate entities, by separate agencies, often on distinct geodetic reference frames.

What is the ‘Blue Economy’

The Blue Economy is a term coined by several different initiators:

- **a review process introduced by Gunter Pauli, examining current business, industrial and commercial modes of operation**
- **For the *Maritime Alliance*, the Blue Economy is "....*the sum of all economic activity associated with the oceans, seas, harbours, ports, and coastal zones.*“**
- **The Maritime Affairs Department of the European Commission, focus on "Blue Growth". *Blue Growth* is "*a long-term strategy to support growth in the maritime sector as a whole.*"**
- **For the purposes of this presentation, we are focussing on that definition promoted by the Maritime Alliance, IHO and others.**

Blue Economy - Some Facts And Figures

- There has been a relatively recent recognition of the importance of maritime business from outside of the normal agencies and industries for whom the ocean is a direct link to their operations
- In the past barely a thought was given to where many goods come from or how they arrived
- An improved awareness has helped focus on the maritime element of global trade, or the Blue Economy
- For the hydrographic surveying community this is good news

Blue Economy - Some Facts And Figures

- World seaborne trade figures have increased considerably since the 70‘s (2.5 billion tons) to the present day (over 8.7 billion tons) - more than a threefold increase
- Developing countries continued to account for the largest share of global seaborne trade (61.2% of all goods loaded and 55 % of all goods unloaded)
- The world fleet of propelled sea-going merchant ships of no less than 100 GT comprised 79,471 ships of 1,048,336,000 GRT
- The world‘s cargo carrying fleet in 2010 comprised 54,897 ships (910.1million GT)) Completions during 2010 totalled 2,602 ships of 147.6 million Dwt (93.9 million GT)

Blue Economy - Some Facts And Figures

The UNCTAD Review of Maritime Transport 2012 stated that the world cellular container ship fleet stood at 10,066 vessels, with a combined total carrying capacity of 17.9 million TEU.

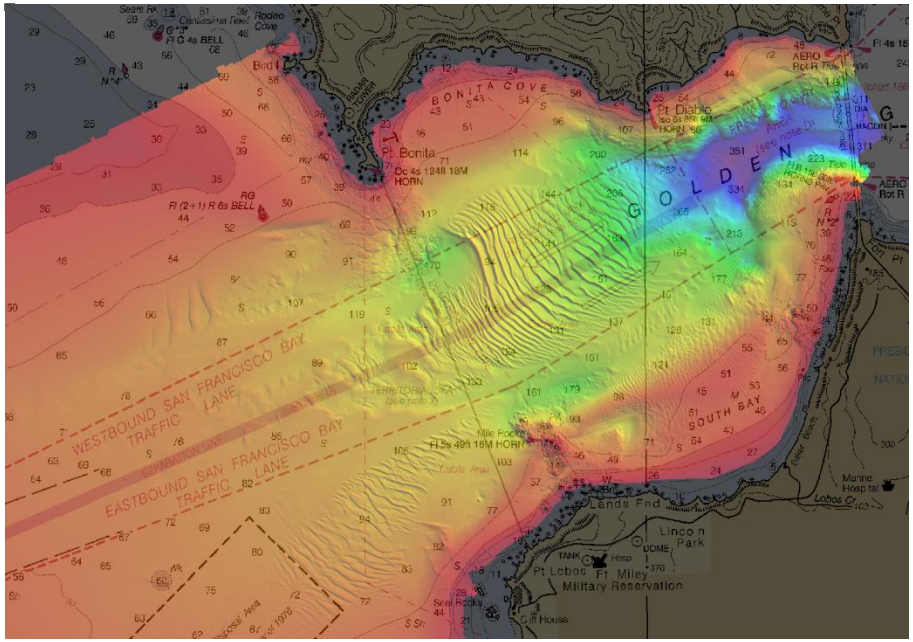
- **The new Maersk *Triple E* class vessels are capable of carrying up to 18000 TEUs.**
- **Such ships are over 400m long, 59m wide and 75m high; this is sufficiently large to hide a 106,000 tonne US *Nimitz* class aircraft carrier**
- **18,000 twenty-foot containers laid end to end would be 108km (68.2 miles) in length;**
- **this volume of materiel is a staggering logistic issue for any national road and rail (intermodal) distribution network.**

Blue Economy - Some Facts And Figures

- **Other equally massive ships are increasingly tasking the facilities and capacities of national port infrastructures**
- **Royal Caribbean's *Oasis of the Seas* and *Allure of the Seas* each have a capacity of 6,360 passengers plus some 2,100 crew**
- **a gross tonnage of 225,000 tons**
- **this makes them the largest passenger ships afloat**

The Land-Sea Interface

- critical to the Blue Economy is the creation of reliable data which supports the sea-to-land transition
- ….in other words coastal environmental data
- this interface is the most navigationally hazardous, technically challenging and cost-inefficient
- a sound understanding of the ways to combat these challenges and acquire data fit-for-purpose and to international standards is necessary



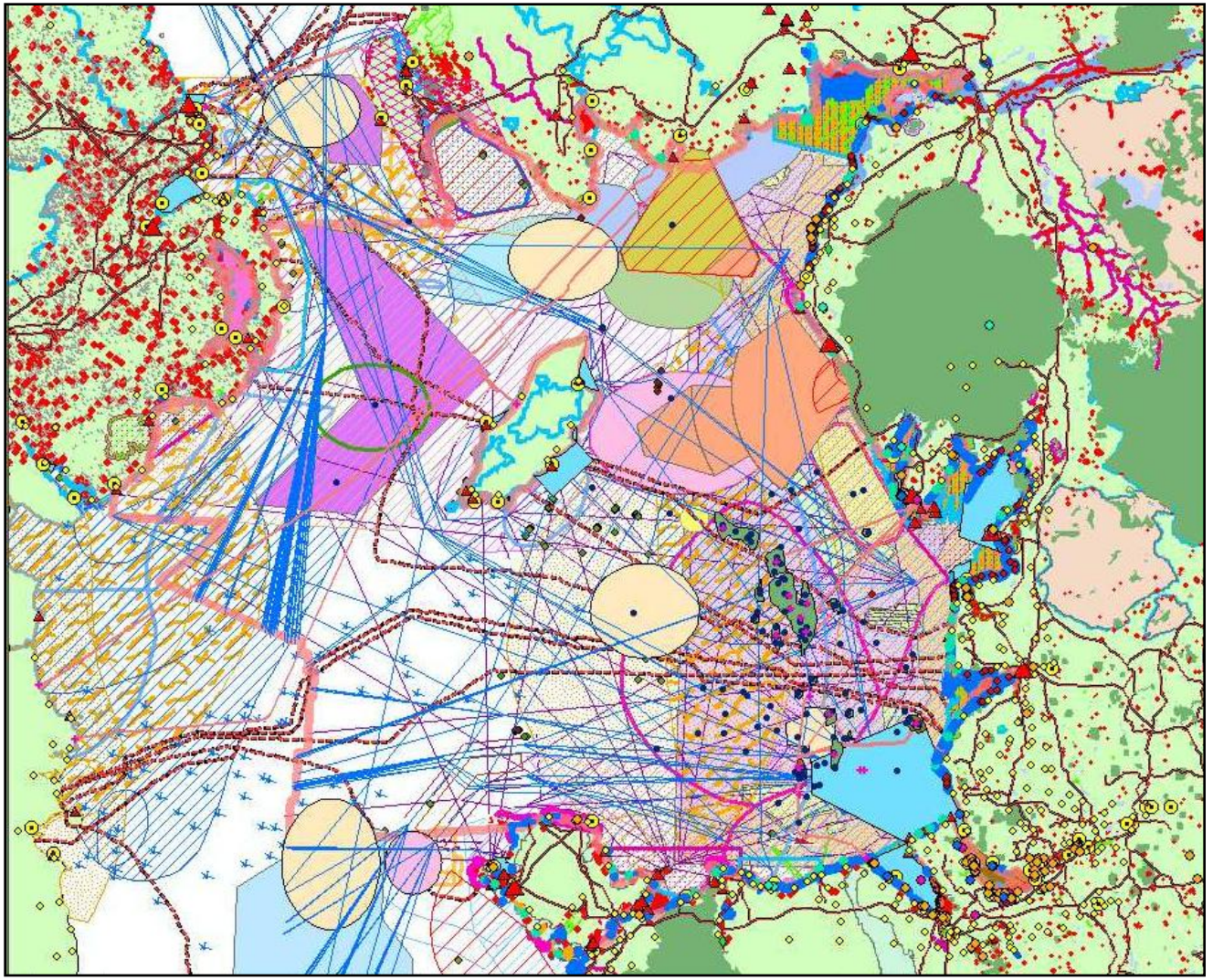
The Land-Sea Interface

- there remains a legacy approach to survey specification
- the realm of nautical cartographer and terrestrial mapper have traditionally been dealt with completely separately
- we need to encourage a survey design paradigm inclusive enough to be of interest to other potential stakeholders – this is key
- we need to encourage the design of a survey polygon that is based on need
- a charted contour often suffices as a guide to the survey limit
- this is not necessarily what the cartographer or the stakeholders want
- the rapid advances in a variety of technologies renders this old approach obsolete
- new but now proven technologies offer an opportunity to fully capture all necessary data
- the land-sea interface is no longer the obstruction it once was
- this critical boundary is now possible to chart much better for all users

Stakeholders

Economic activity in the Irish Sea and coastal hinterland

- Land Use
- Tourism
- Oil & Gas
- Mariculture
- Coastal Defence
- Ports & Navigation
- Military Activities
- Culture
- Conservation
- Dredging & Disposal
- Submarine Cables
- Fishing
- Renewable Energy
- Marine Recreation
- Mineral Extraction



Source: Defra Irish Sea Planning Pilot – 2006

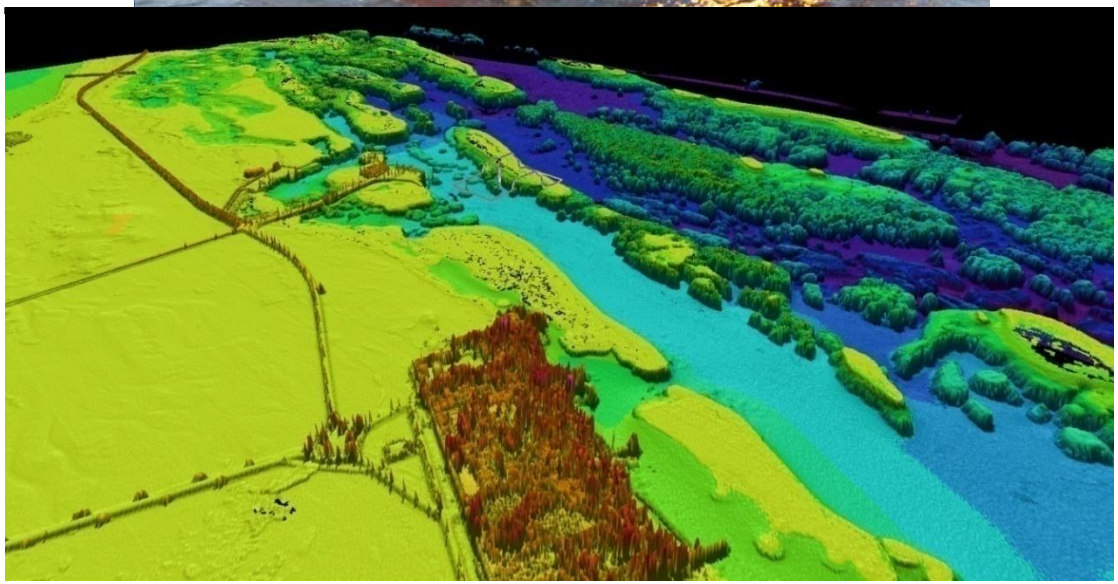
Stakeholders

Such stakeholders might include but are not exclusive to the following:

- **Cadastral (land usage and ownership) surveyors**
- **Nearshore oil and gas industry**
- **Tourism**
- **Aquaculture**
- **Cultural agencies**
- **Conservation and natural resource groups**
- **Renewable energy industry**
- **National security and defence agencies**
- **Cable route surveys for O&G, telecommunications and power**
- **Fishing agencies**
- **Recreation industry**
- **Nearshore mineral extraction activities (e.g. beach renourishment; sediment mining)**
- **Coastal engineering (construction etc.)**

Integrated Geospatial Data Acquisition

- Modern survey companies have excellent tools at their disposal
- Providing the translation parameters are known, a single product can satisfy the needs of all recipients
- This has been delivered on more than one occasion to a growing number of hydrographic agencies

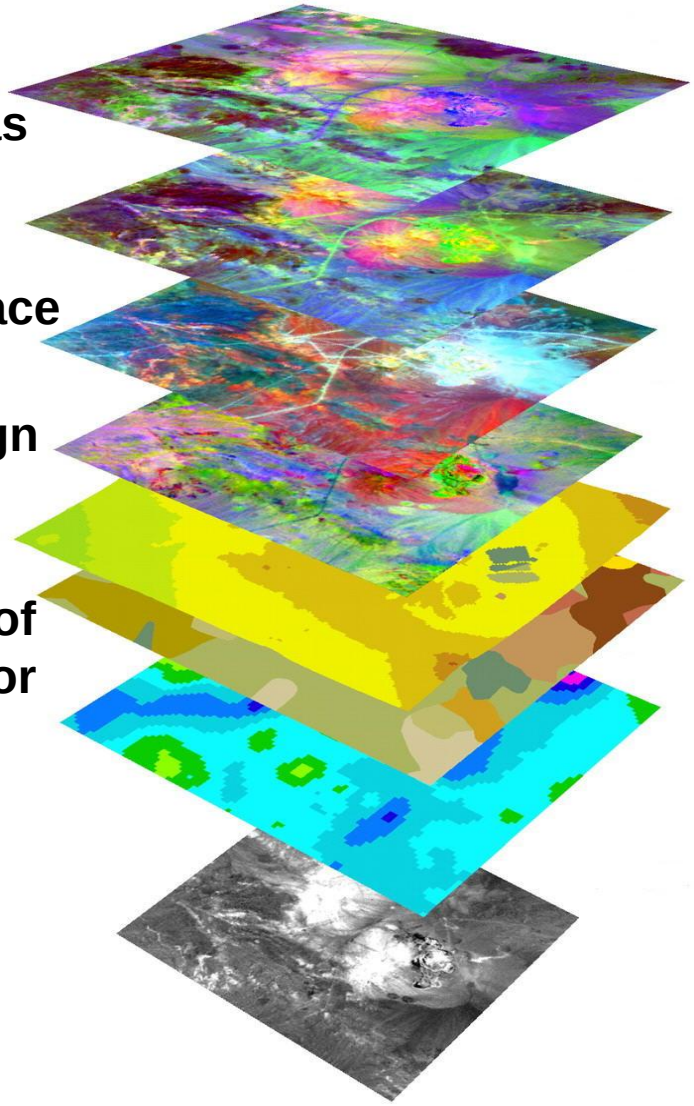


Integrated Geospatial Data Acquisition

- **Data collected from non-surveying third parties needs to be very carefully assessed against other more rigorously appraised data**
- **The veracity of data therefore depends not only on the mode of collection but on who has collected it**

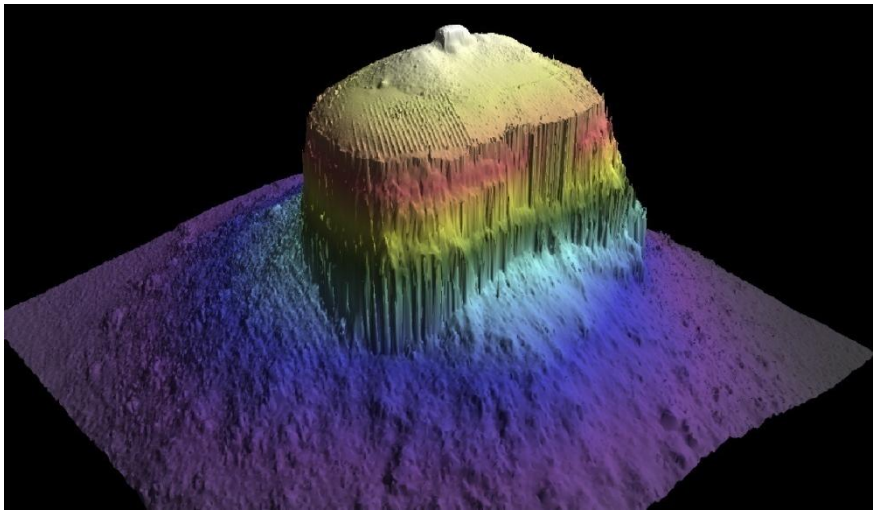
Fuelling the Associated Generic MSDI

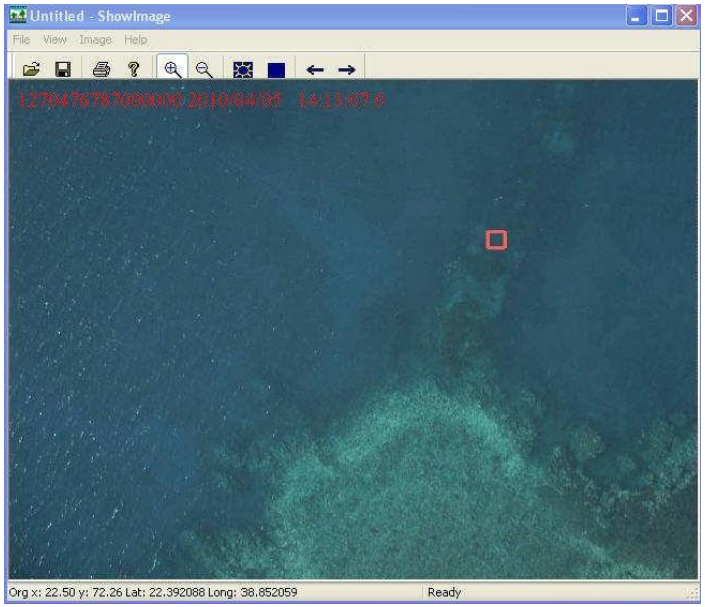
- National Marine Spatial Data Infrastructures (MSDI) should ideally address the needs of as many legitimate stakeholders as possible
- Some of the layers will contain information pertinent to the nearshore or land-sea interface
- Focus on customer needs, as in data acquisition prioritizing, also aids in the design of the national GIS and therefore the MSDI subcomponent
- Data stored in such a way leads to a myriad of specific products which are actually easier for the stakeholder to access and build

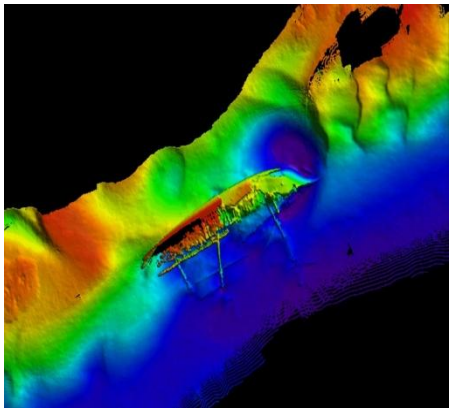


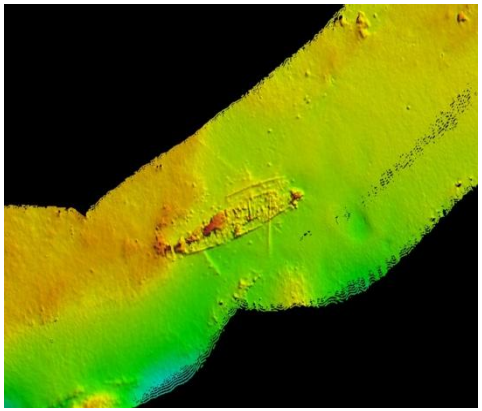
Tools of the Trade

- Current technology allows the efficient data capture of the land-sea interface with a combination of technologies and techniques
- These include sensors fitted to both airborne and waterborne platforms
- Data can be acquired from a number of sources; these can be grouped into active and passive sensors





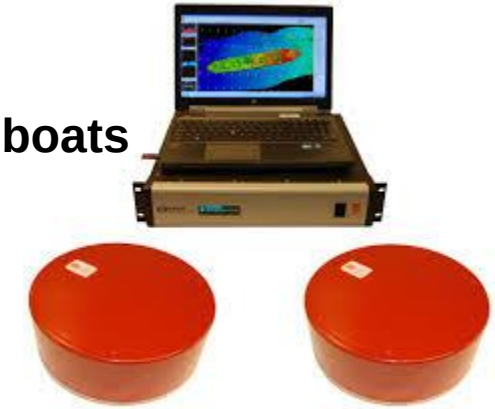




Tools of the Trade

Active sensors might include:

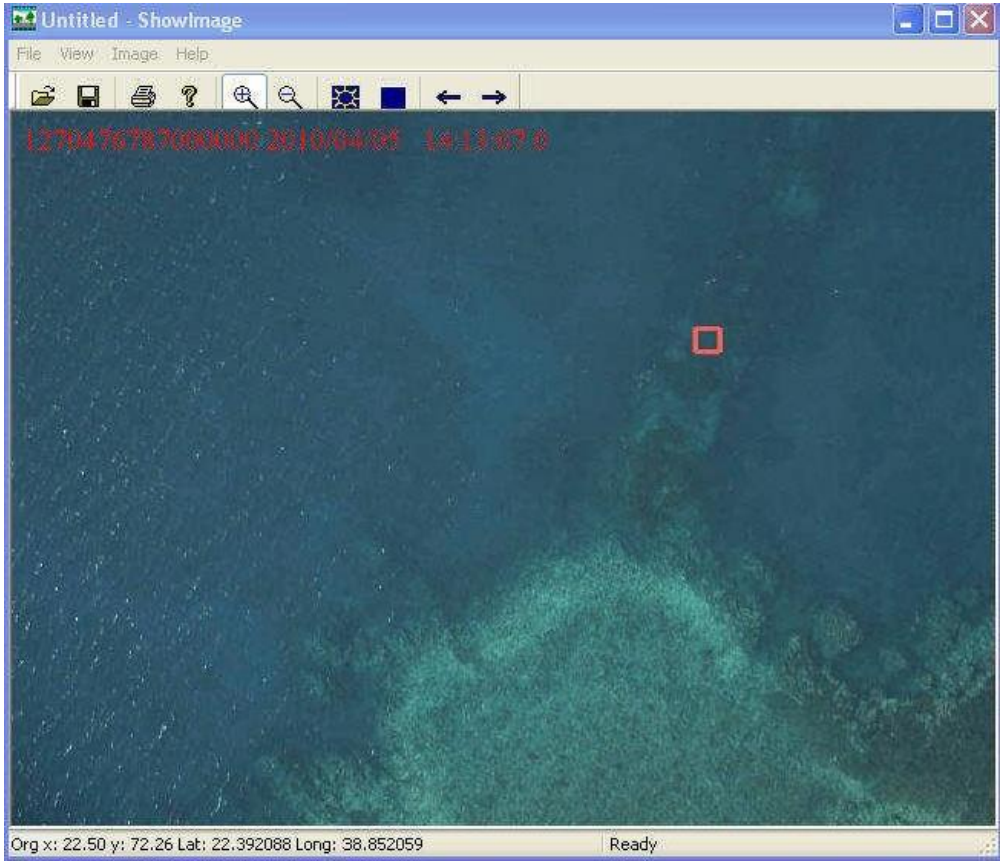
- **Multi-beam and single-beam echosounders**
- **Sidescan (interferrometric) sonars**
- **Bathymetric and topographic LiDAR systems**
- **Horizontal laser linescanning systems (deployed from both boats and terrestrial vehicles)**
- **Magnetometers**
- **Gravity meters**
- **Shore-based Doppler radar**
- **Airborne Synthetic Aperture Radar**



Tools of the Trade

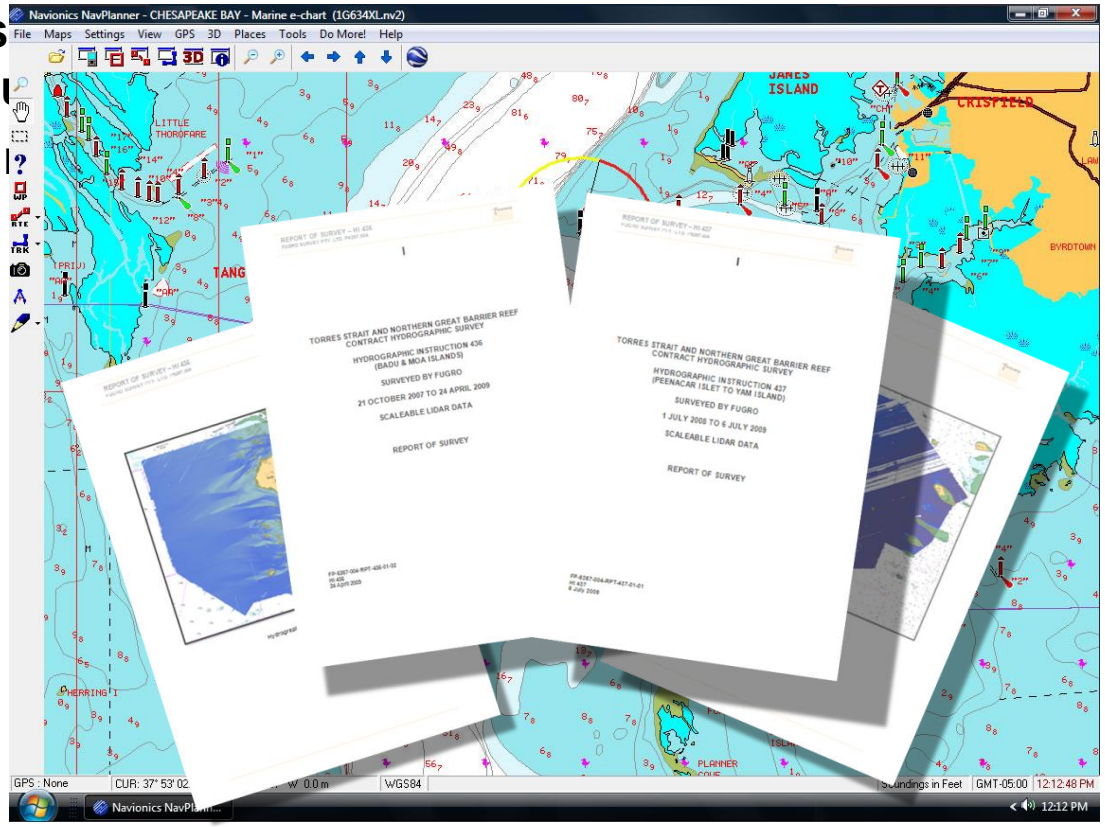
Passive sensors might include but are not limited to the following:

- **Aerial cameras (visible spectrum)**
- **Hyperspectral imagers**
- **Multispectral imagers**
- **Satellite imagery**



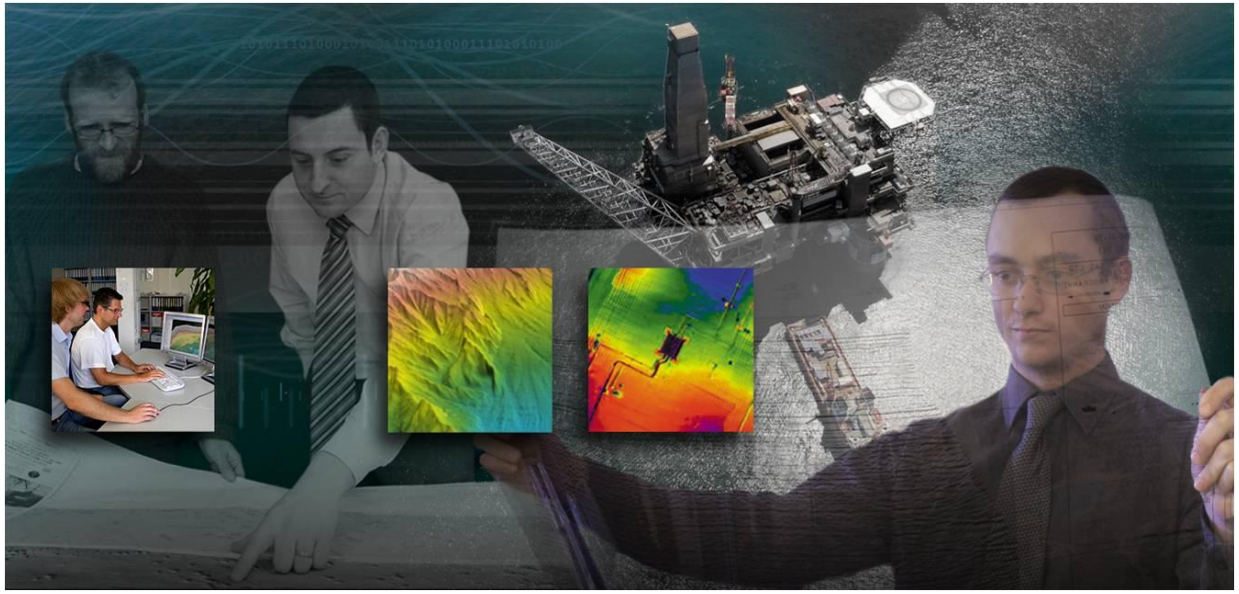
Data Layers - Present And Near-Future

- Current data layers which typically need to be populated are based on the structure of paper, raster and electronic nautical charts (ENCs)
- These layers of information follow historic protocols for the prioritization and hierarchy of data
- A similar methodology has
  hydrographic tasking for su
- This does not address the
  stakeholders



Data Layers - Present And Near-Future

- It is necessary to try and implement a more holistic survey budget plan (smart procurement techniques; survey once provide to many)
- Inclusion of a number of additional stakeholders during the planning and consulting phase will adjust the initial survey area and data collection parameters
- A more inclusive data collection mission is fulfilled for the benefit of all stakeholders

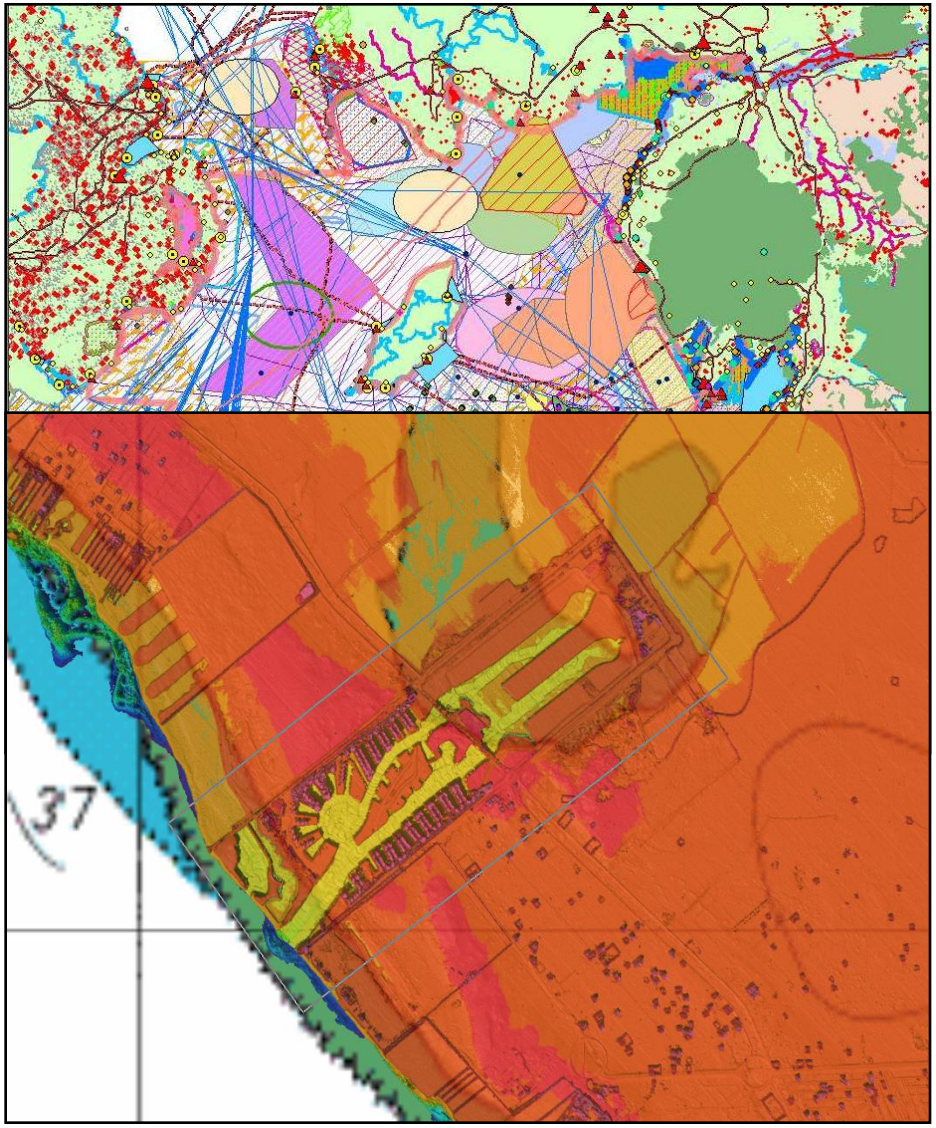


Conclusion

- There has been a huge increase in reliance on the sea:
  - as a means of transportation;
  - as a source of energy of various types;
  - as a source of food and nutrients;
  - as the carrier medium for the globally vital Blue Economy input to the world's overall trade volume.
- As seaborne trade has increased, so has the importance of overcoming historic shortfalls in effective geospatial data collection across the land-sea interface
- Growth both in trade and the size of vessels now carrying this trade has been alarming
  - placing increasing pressure on existing infrastructure
  - logistic operations of even the largest port complexes

Conclusion

- Hydrographic surveys need to be planned to support this level of business
  - to overcome the traditional land-sea boundary issues
  - to meet the needs of a greater number of stakeholders
- This can be achieved with appropriate use of today's technology
  - utilized by cartographers with a greater awareness of potential stakeholder investment
- Encourage adoption of a more holistic survey planning paradigm



Thank You