

Introduction

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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 paper, 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.



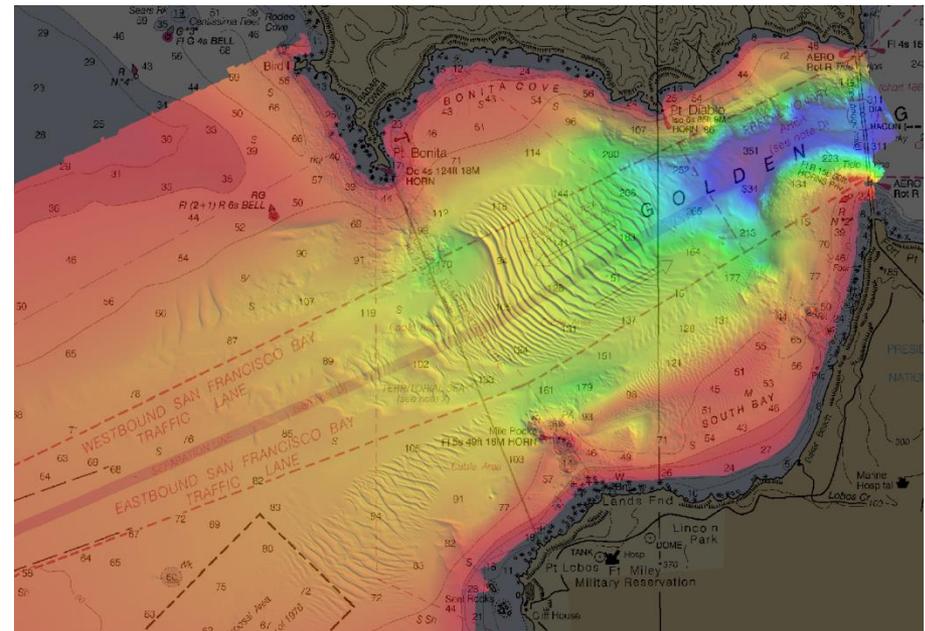
Blue Economy - Some Facts And Figures

- 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**



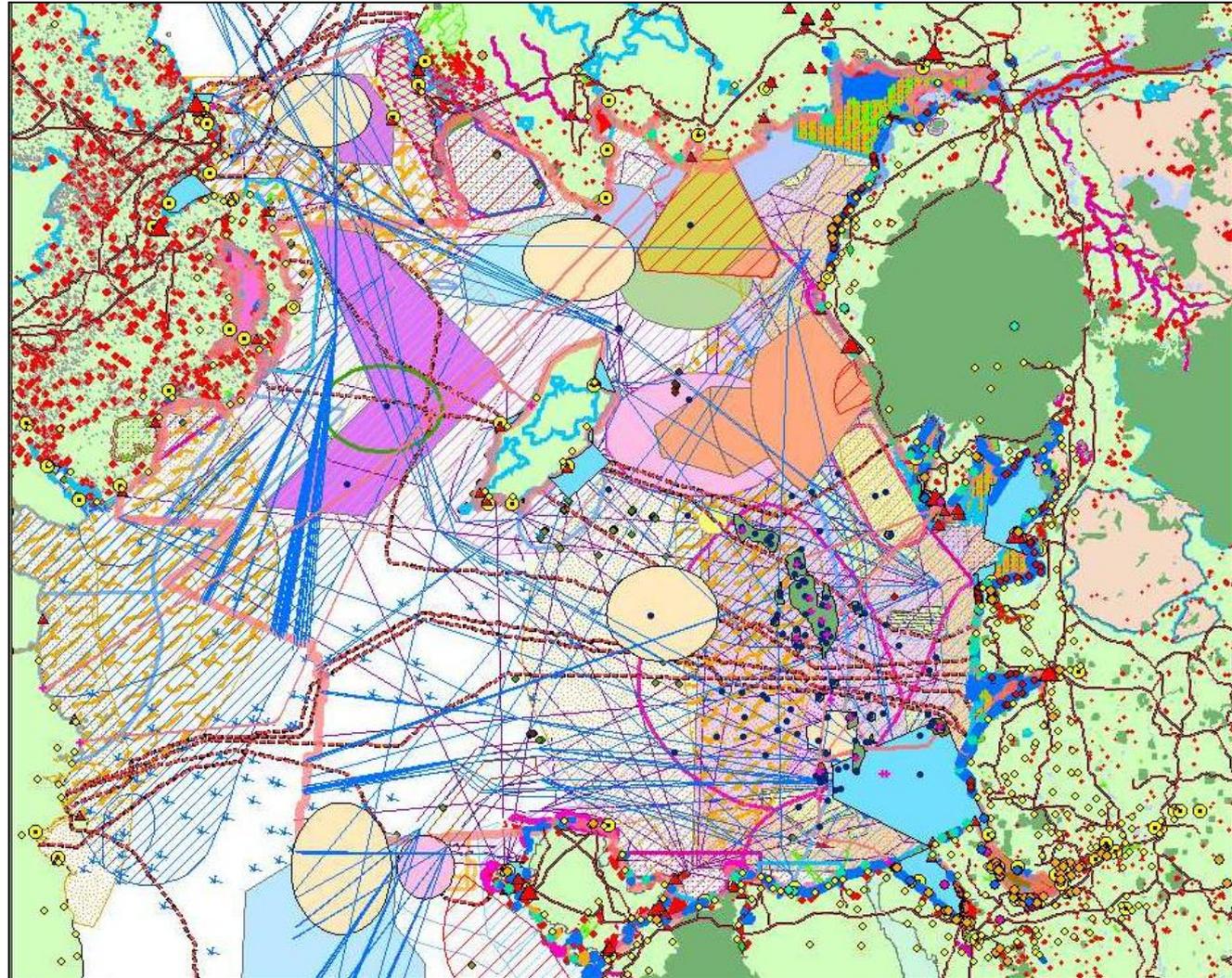
The Land-Sea Interface

- **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



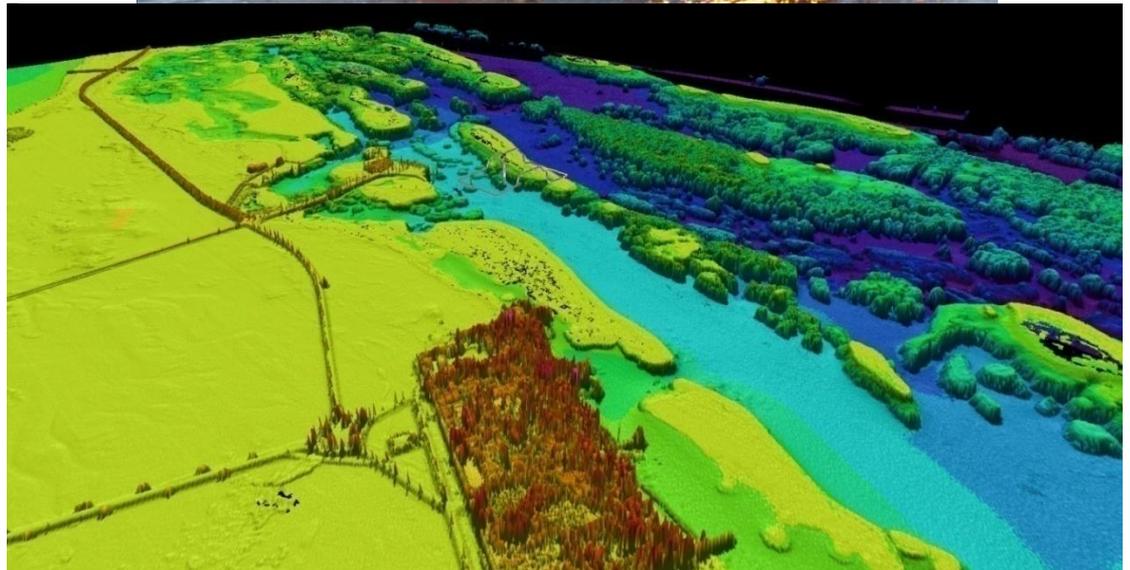
Stakeholders

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**



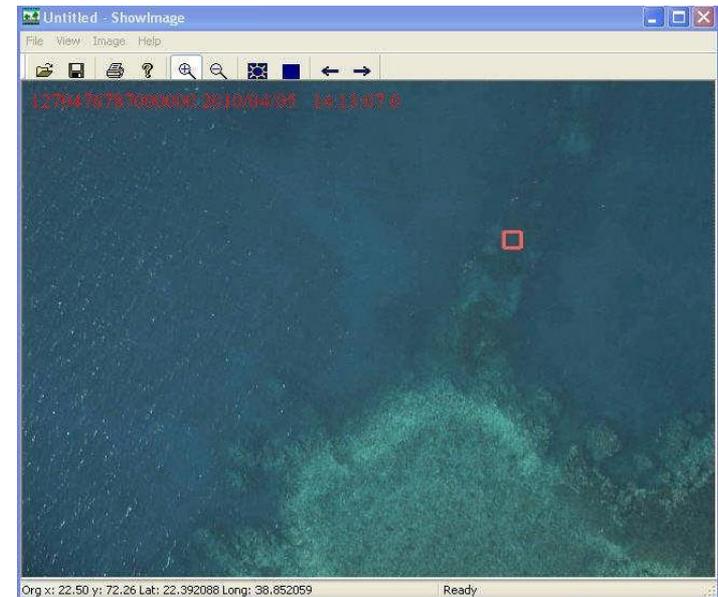
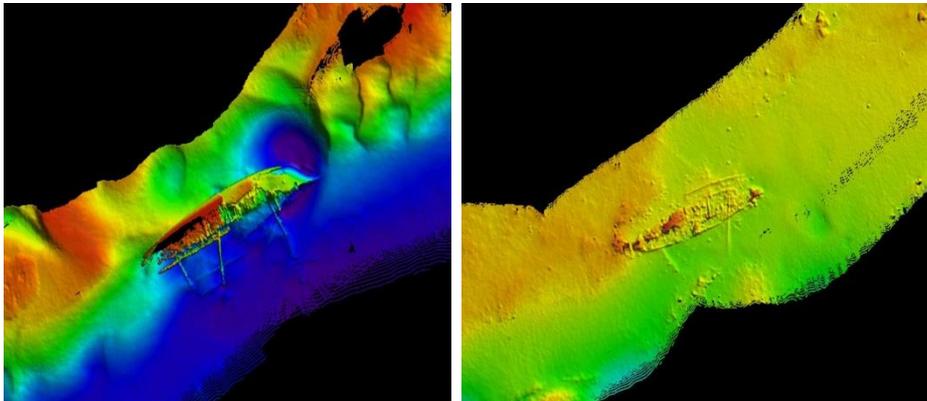
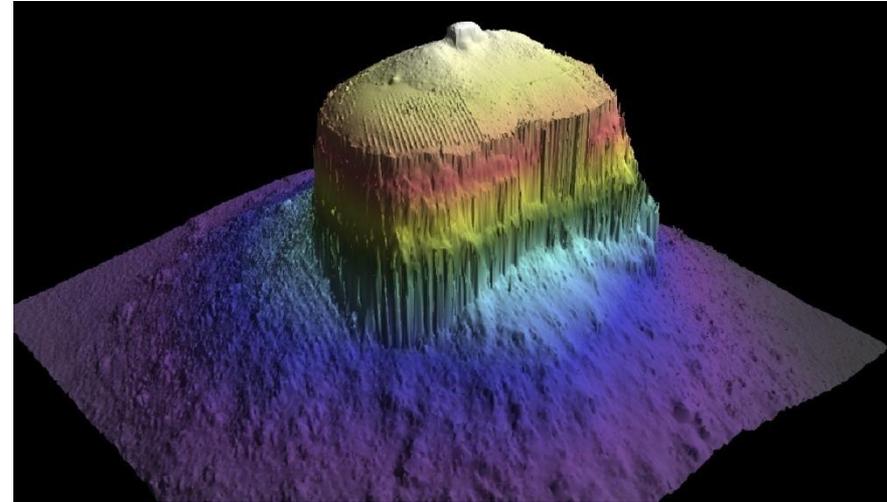
Integrated Geospatial Data Acquisition

- 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



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:

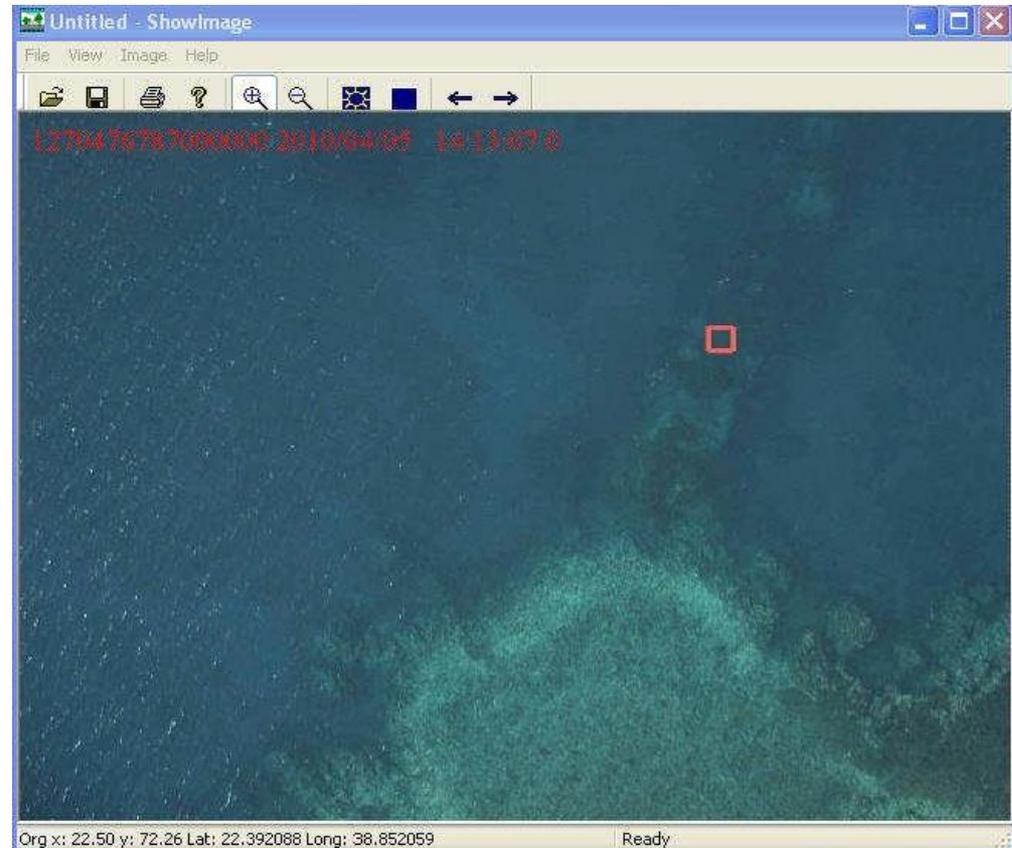
- Multi-beam and single-beam echosounders
- Sidescan (interferometric) sonars
- Bathymetric and topographic LiDAR systems
- Horizontal laser linescanning systems (deployed from both boats and terrestrial vehicles)
- Magnetometers
- Gravity meters
- Shore-based Doppler radar
- Airborne Synthetic Aperture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



Tools of the Trade

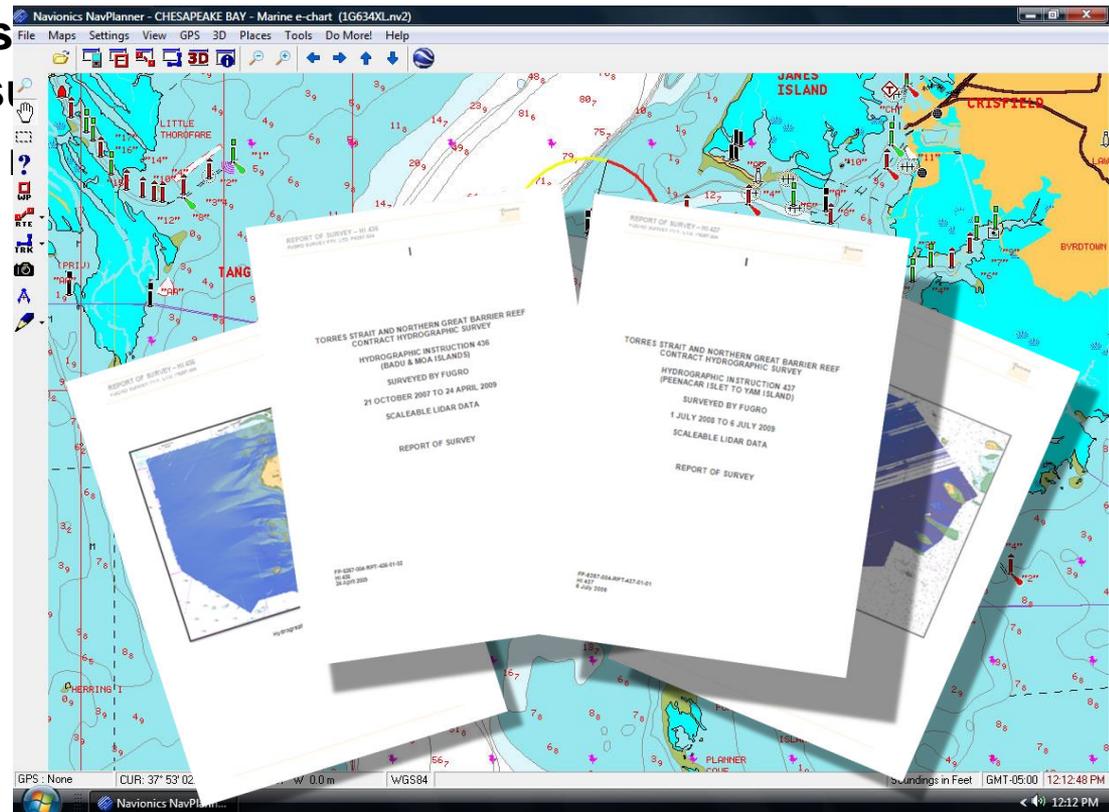
Passive sensors might include but are not limited to the following:

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



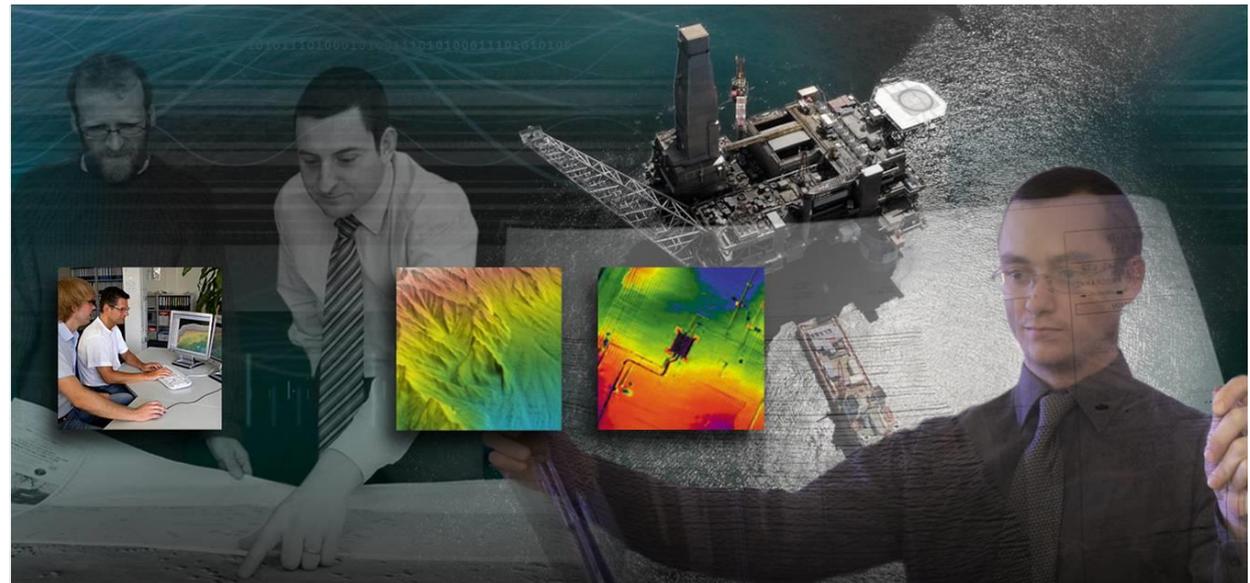
Data Layers - Present And Near-Future

- 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 s
- 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**

