



Intelligent Exploitation of the Blue Economy - A Hydrographic Perspective

Don Ventura – Fugro Pelagos, Inc. IHO-FIG Blue Economy Seminar, Ocean Business, Southampton, 14 April 2015

- **Blue Economy - Some Facts And Figures**
- **The Land-Sea Interface**
- **Stakeholders**
- **Integrated Geospatial Data Acquisition**
- **Tools Of The Trade**
- **Data Layers - Present And Near-Future**
- **Conclusion**



- **How does one 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 came 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 60 % of all goods unloaded (2014))**
- **The world fleet of propelled sea-going merchant ships of no less than 100 GT comprised 81,584 ships of 1,094,026,000GRT as of Jan 2013**
- **The world's cargo carrying fleet in 2011 comprised 55,138 ships of 1,483.1 million DWT (991.2million GT). Completions during 2010 alone 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 6,175 vessels, with a combined total carrying capacity of 19.9 million TEU.

- The new Maersk *Triple E* class vessels were the first vessels recently capable of carrying over 18000 TEUs. This has now been eclipsed again by the 19,000+ capacity of ships like the CSCL *Globe* and MSC's *Oscar* class
- Such ships are 400m long, 59m wide and 75m high; this is sufficiently large to hide a 106,000 tonne US *Nimitz* class aircraft carrier behind
- 19,000 twenty-foot containers laid end to end would be 116km (72 miles) in length;
- this volume of materiel is a staggering logistic issue for any national road and rail (intermodal) distribution network.



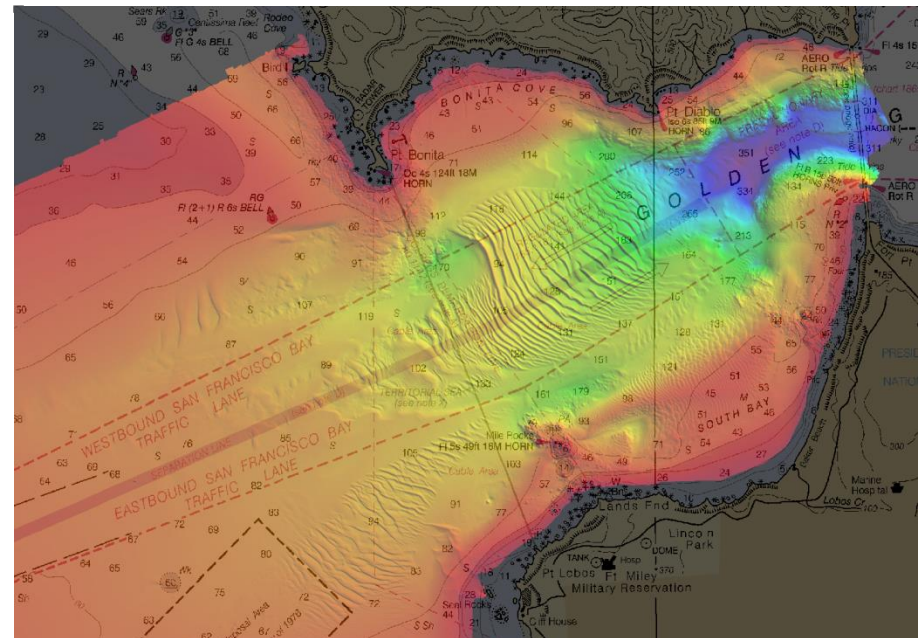
Blue Economy - Some Facts And Figures

- 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

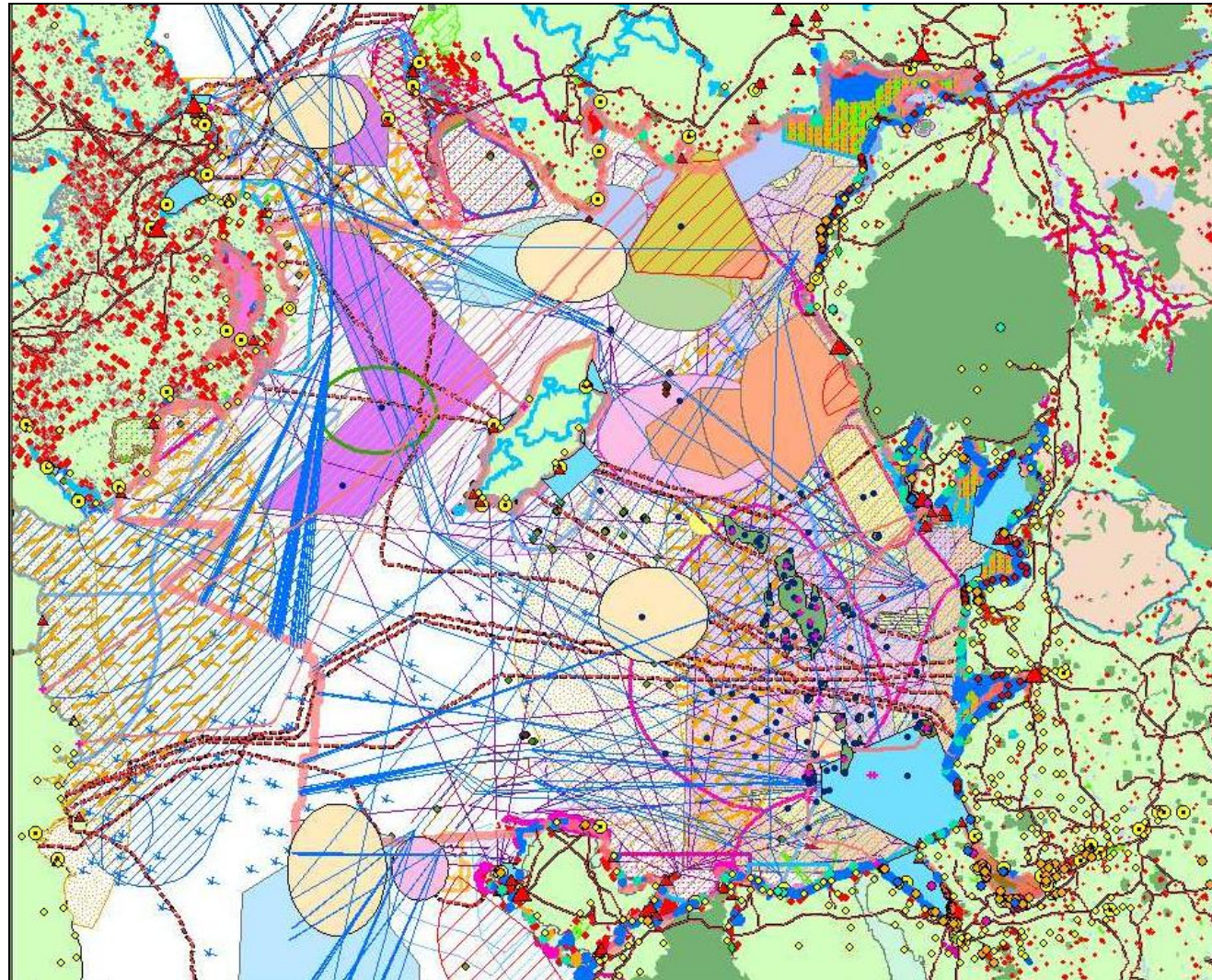
- **critical to the Blue Economy is the creation of reliable data which supports the sea-to-land transition**
- **....in other words coastal environmental data**
- **this interface is the most navigationally hazardous, technically challenging and cost-inefficient**
- **a sound understanding of the ways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



- **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**

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

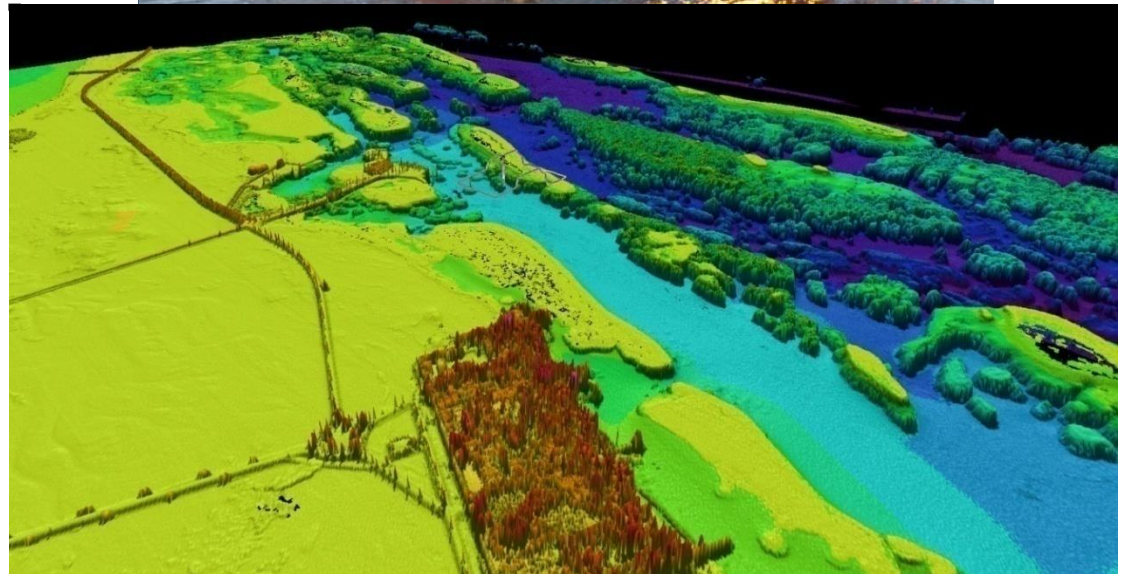


Source: Defra Irish Sea Planning Pilot – 2006

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.)**

- **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**



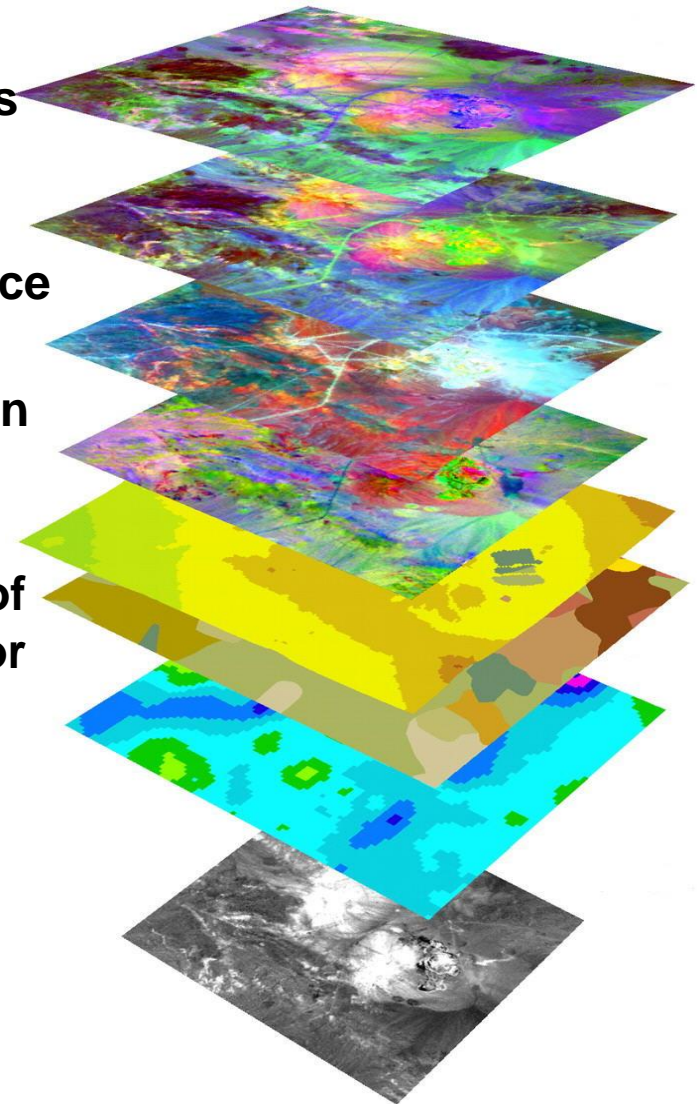
Integrated Geospatial Data Acquisition

- **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**



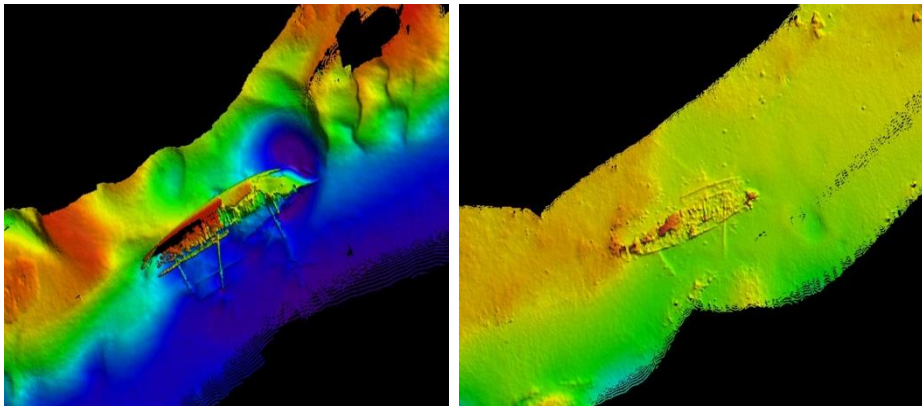
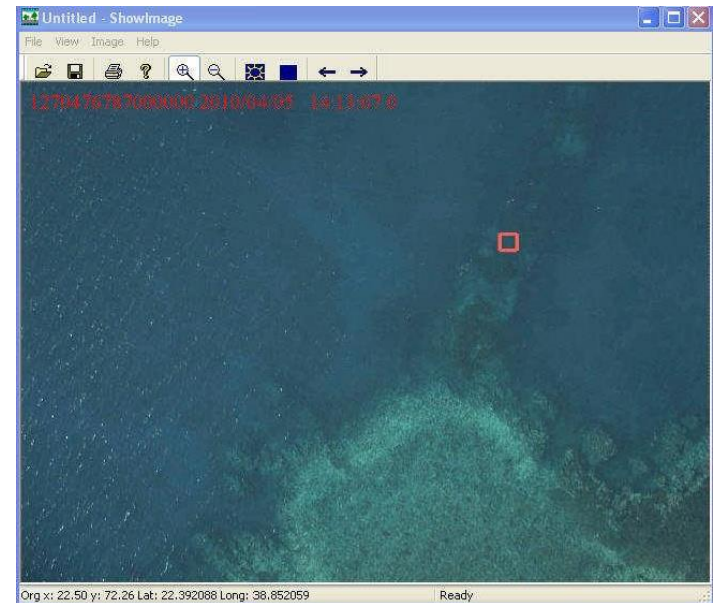
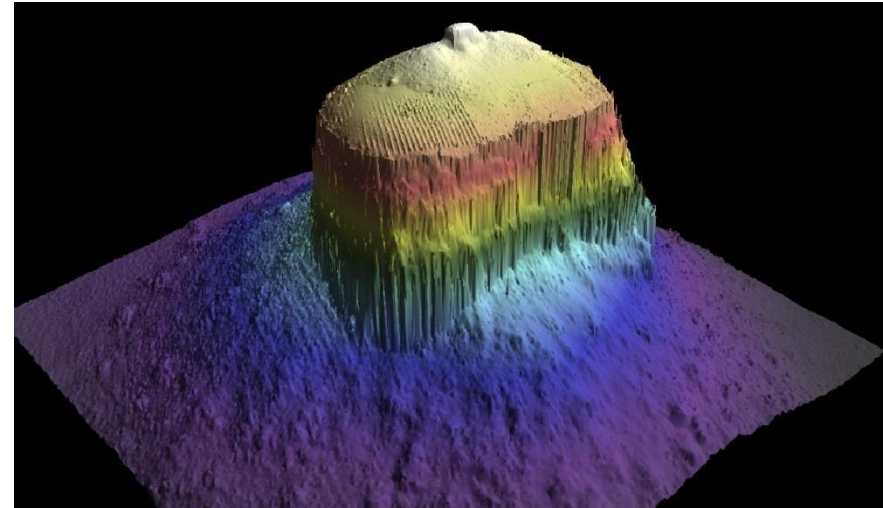
Fuelling the Associated Generic MSDI

- **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**



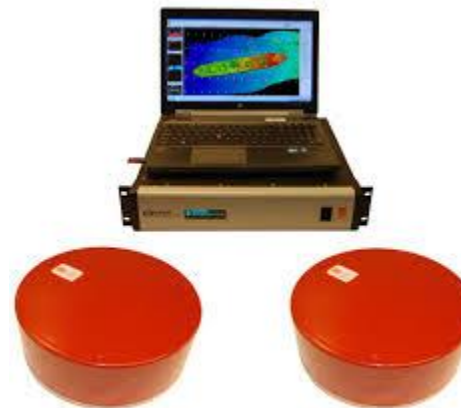
Tools of the Trade

- **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**



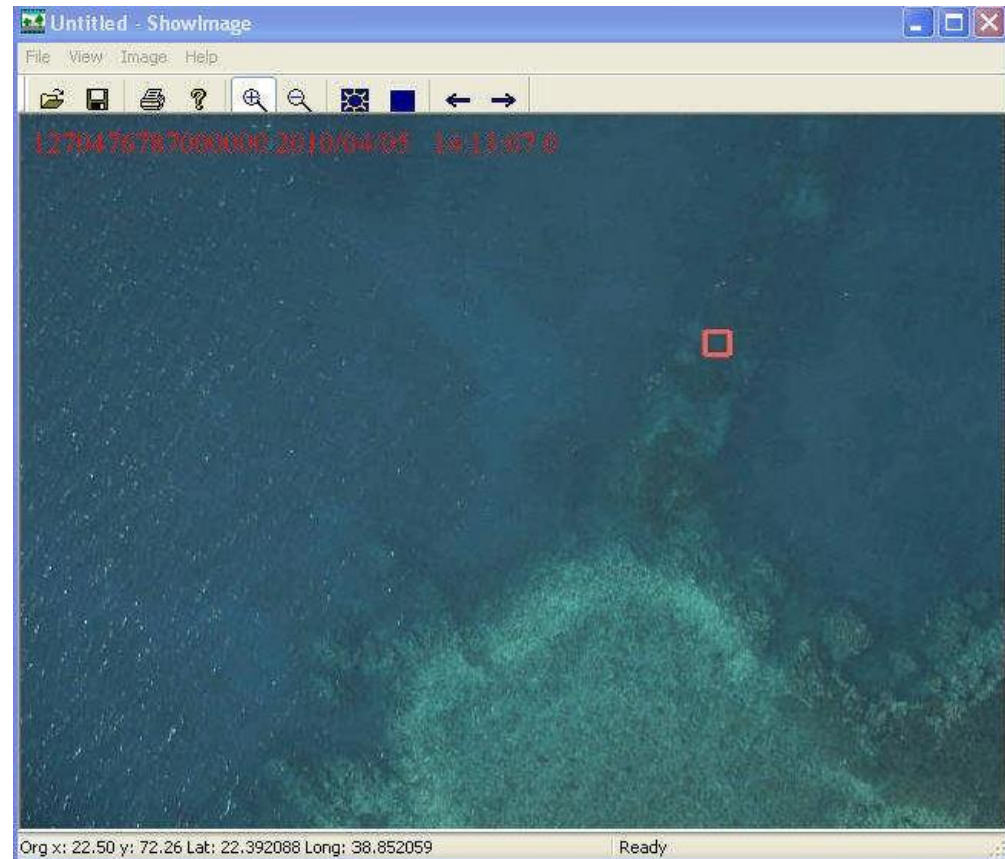
Active sensors might include:

- 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



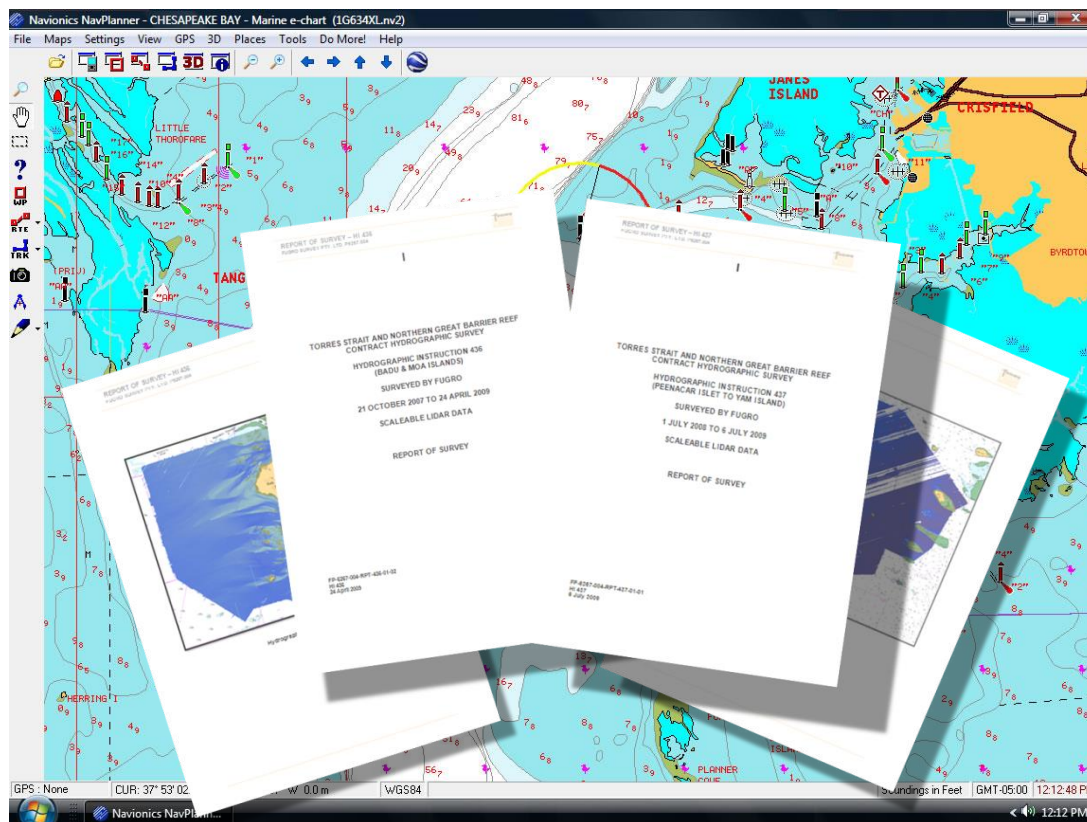
Passive sensors might include but are not limited to the following:

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



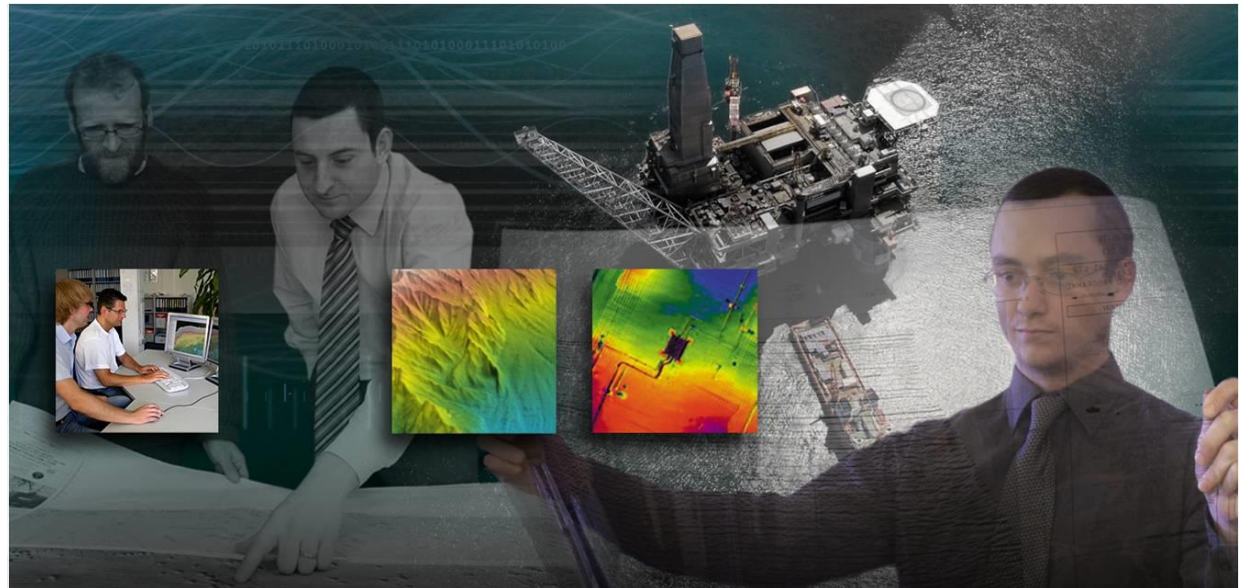
Data Layers - Present And Near-Future

- **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 been employed to provide structure to hydrographic tasking for surveyors**
- **This does not address the needs of a number of interested secondary stakeholders**



Data Layers - Present And Near-Future

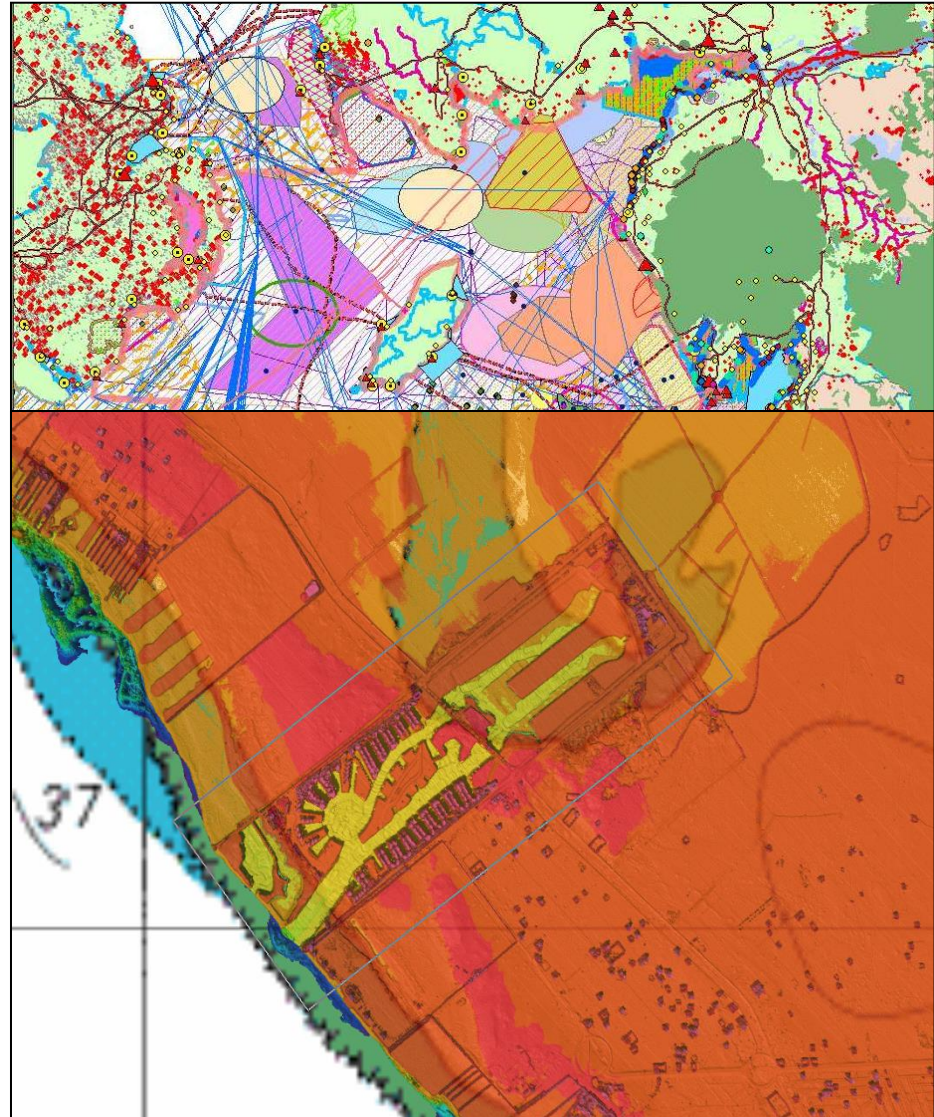
- **It is necessary to try and implement a more holistic survey budget plan (smart procurement techniques; survey once provide to many)**
- **Inclusion of a number of additional stakeholders during the planning and consulting phase will adjust the initial survey area and data collection parameters**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



- **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