National Marine and Coastal SDI Perspective

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Presentation Overview

• Introduction
• Marine/Coastal SDI Foundational Issues
  • MSDI – NSDI – NII
  • Challenges
• Developments Globally – selected examples
  • Australia, USA, Canada, Global (IHO MSDIWG, IOC ICAN)
SDI Background

• Working with development of Spatial Data Infrastructure since 1994 as full time expert to
the European Commission (1989-2000), including drafting the proposal for first pan-

• External Expert and Technical Reviewer to the EC on projects relating to implementation of
the EU INSPIRE Directive (Infrastructure for Spatial Information in the European
Community) - 12 to date.

• Advised national and regional governments on SDI strategy and implementation in Ireland
(NSDI), UK (marine SDI), Turkey (NSDI), Egypt (rural cadastre SDI), Spain (Catalonia regional
SDI), Taiwan (NSDI and open government data) and Namibia NSDI (2015).

• Secretary-General of the Global SDI Association since October 2014 (gsdiassociation.org)
and co-leader of the GSDI Marine/Coastal SDI Best Practice Project.

• Former editor of GeoConnexion International magazine and SDI News online magazine
(2007-2012)
Marine/Coastal SDI Background

- Marine/coastal SDI work for **UNESCO Intergovernmental Oceanographic Commission (IOC)** IODE: International Coastal Atlas Network (**ICAN**) Project (Steering Group), IOC Ocean Teacher Academy (Marine SDI), and the **International Hydrographic Organization (IHO)** Marine SDI Working Group (external expert and WG member).


- Co-lead on EU-funded MOTIIVE Project (**Marine Overlays on Topography**) on merging land-based and coastal/marine information (2005-2007).

- Currently reviewer of EU-funded **AtlantOS (Atlantic Ocean Observing System)** Project – 20+ million euro, 62 partners from 18 countries (including CSIR, S.A.) - [https://www.atlantos-h2020.eu/](https://www.atlantos-h2020.eu/)
Global Spatial Data Infrastructure (GSDI) Association

• Created in 2004 to continue the GSDI World Conferences that started in 1996 in Bonn, Germany.
• Currently has 38 Organisational Members, including UN ECA and EIS-Africa, and over 400 Individual Members (85% from developing nations).
• Held GSDI 14 World Conference jointly with AfricaGIS Conference in 2013 in Addis Ababa, Ethiopia.
• Published one of the first SDI Cookbooks in 2004, online, via an updated Wiki.
• ‘SDI Africa: An Implementation Guide’ was developed by GSDI, EIS-Africa, UN-ECA, with the support of GSDI Member ITC (Netherlands) based partly on the GSDI SDI Cookbook.
• Have MoUs with FIG, ISPRS, ICA and ISDE for joint promotional activities plus support OSGeo Foundation.
• Awarded official Observer status at the UN (from ECOSOC) in May 2014.
• Partner organisation in the UN Global Geospatial Information Management (UN-GGIM) initiative.
• Official Observer on the UN-GGIM Regional Committees for the Americas, Europe, and Asia-Pacific (in October 2016) and GSDI Member UN-ECA are hosts for UN-GGIM Africa.
• Current chair of the Joint Board of Geographic Information Societies (JBGIS), a member of the UN-GGIM Extended Bureau.
• Co-fund various Strategic Projects, including **SDI Marine Best Practice** Project (Nov 2015 – October 2017)
Implementing a national SDI: Key challenges & opportunities for the marine community

NII – NSDI – Coastal/Marine SDI

The premise: *Government establishes policies for information use at national level (NII) based on perceived needs of government, of businesses, and of civil society.*

Rationale: *To link up the disparate parts of our society more efficiently.*
NII versus NSDI

NII is all encompassing - embracing and/or impacting upon ALL of society:

• government performance (increase efficiency in executing public tasks),

• economic performance (efficiency of business operations, innovation, employment, ...)

• providing benefits to civil society (quality of life, security, welfare of citizens, ...)

Key point is that NII principles and policies apply to ALL forms of data, sector neutral.

Development of the NII supports e-Government goals and objectives.
National Spatial Data Infrastructure (NSDI)

- SDI is an Information Infrastructure first, and spatial second – existing within an NII.
- SDI is not only about content and technology (spatial data, IT, geoportals, etc.)
- SDI includes: governance, data policies & principles, legislation, monitoring, enforcement, technical standards & infrastructure, capacity building, stakeholder engagement – and people!
- There may be no ‘best’ way to implement an SDI – what works best depends upon existing NII objectives, principles, policies - and local information culture.
SDI Objectives

• The key objectives for SDI are **data sharing and interoperability** (between systems & organizations).

• But ... data sharing has a cost (people + time + ICT)

• Integrated information infrastructure **helps** reduce that cost (proven by numerous studies)

• ... and increases the value of geospatial information to business, government and society in general (also proven by studies).

• Some successful SDIs start ‘bottom up’ – but ‘top down’ goals, principles and standards help – and are mandatory to achieve national scope at least cost.
SDI Components

- **Governance**: gives direction, oversees ownership, plans for sustainability, monitors operational implementation.

- **Data policies & principles**: standards, quality, access, sharing, publishing, charging, re-use of data, ownership rules, licensing, restrictions.

- **Legislation**: monitoring and enforcement of data policies, intellectual property rights (IPR), liability issues, privacy rules.

- **Implementation**: creating and managing the infrastructure, monitoring progress, managing technology evolution.

- **Capacity building**: human resource development, training & professional education, educating institutional users.

- **People!**
What is Marine/Coastal SDI?

• **A subset of NII** - developed under the umbrella principles & policies of the NII.

• **A subset of NSDI** - involving many different sectors and disciplines where ‘location’ in respect of the marine/coastal environment is especially important or essential – and usually **complex** (coastal).

• **NSDI component** affecting specific sector(s) – **ocean resources**, **coastal planning and management**, marine environment, marine transport, etc.

• **A key ‘People’ question** – **who leads** and how do multiple sectors work together effectively in creating what is a complex, multi-sector SDI?
Marine SDI Challenges – the Big Four!

• **Consultation**
  • Who are the stakeholders – and ‘champions’?
  • What do they need?
  • Why should they be interested in participating?

• **Cooperation**
  • Requires support – funding and resources – an appropriate mindset/willingness.

• **Collaboration**
  • Requires PEOPLE to understand why SDI is important and a valuable national asset.
  • Stakeholder engagement is critical to success.
  • Managing expectations is key.

• **Coordination**
  • Requires a formal structure - and funding.
  • Voluntary versus mandatory – enforcement?
  • Coordinate MSDI with NSDI with NII (and eGovernment)
SDI / Marine SDI Policy Drivers

• Increase operational efficiency in creating, managing and using data of value to the marine sector(s).
• Share services underpinned by shared data.
• Support national information society and e-Government goals.
• Help the information economy grow by increasing market size.
• Enable better, quicker, more reliable decision making.
‘Information Policy’ is a very broad term – interpreted differently by different people for different purposes.

Key data policies for SDI are:

• **Creating and publishing metadata** describing information resources held by organisations.

• **Access to data** (IPR, data protection, privacy, open data ‘by default’, ‘open data’ definitions?)

• **Use and re-use of data** (the above + competition, 3rd party considerations, potential liability issues, monitoring)

• **Charging or not for government data** - the debate on ‘free or for a fee’ (where philosophy meets economics!)
Other SDI /Marine SDI Policy Issues

- **Custodianship** of key reference data sources – topography, geology, hydrography, marine cadastre, ocean resources, etc.
- **Voluntary** or **mandatory participation** in the SDI & Marine SDI.
- **Enforcement** measures – ‘light touch’ or strong (legislation).
- Providing **financial support** or other incentives (the SDI is creating a ‘public good’).  
- Enabling **private participation** (non-governmental) in the SDI and effective ‘Public-Private Partnerships’.
Challenges in the SDI Process

- **Consultation, Cooperation, Collaboration and Coordination** – the “4 C’s” for successful SDI implementation.

- Raising **awareness** of benefits, at all levels - continuously.

- Overcoming **skills shortages** among data owners, creators, and users - at all levels of government, businesses and citizens.

- **Convincing stakeholders** that **harmonized geospatial data** has greater value due to its ability to support interoperable services – and new services.

- **Managing expectations** of all stakeholders in a process that will take many years to complete.

- **Measuring success** (identifying early ‘win-win’ cases & using performance indicators) - to combat concerns over cost.

- **Adapting to change** – nothing stands still in the information world!
Why the Challenges exist?

- **capacity building** issues – lack of human resources with the right skills and knowledge, lack of adequate ICT infrastructure, lack of funding...
- **conflicts** with other departmental or government policies (prioritize SDI?),
- **lack of incentives** to managers and high-level decision makers to make the changes,
- concern over **data quality** – mistakes & inaccuracies in ‘my’ data,
- **data hoarding** – retaining control over ‘my’ data, and
- ... **institutional inertia** – change of any kind does not come easily!
Strategies to meet the Challenges

- From the UK ACIL Tasman Geovalue study - ‘top barriers’:
  - lack of awareness of benefits,
  - resistance to change among users,
  - implementation costs – or fear of them!
  - inappropriate data pricing,
  - restrictions on access, use and re-use of data.

- Implementation strategies need to define ways to meet and overcome these challenges...
  - ... within budgets and human resources capabilities.
Strategy Recommendations

- **NSDI development strategy** should be tied to e-Government initiatives – and NII goals.
- Marine/Coastal SDI strategy needs to be fully aligned with NSDI.
- Strategy also sets the timelines for implementation – defining parallel actions and serial actions, e.g. ...
  - harmonized metadata cannot be created until standards have been agreed,
  - but once agreed, metadata creation can proceed independent of, for example, licensing policy development.
- Implementing early ‘win-win’ scenarios is important - keeps stakeholders engaged in the process – addresses, cadastre, reduce road congestion, disaster mitigation?
- Provide for continuous awareness raising, training and related capacity building initiatives.
Identified Good Practice in Marine/Coastal SDI

Australian Marine SDI (AMSIS)

- Elevation and depth are in the national Foundation Spatial Data Framework, under custodianship of the Intergovernmental Committee on Surveying and Mapping (ICSM).
- Bathymetry dataset includes a 50m multibeam dataset of Australia to provide an understanding of the nature of the seafloor plus various representations of the coast, ranging from lowest to highest tide, to aid in coastal planning and monitoring.
- This data underpins safe hydrographic navigation, definition of maritime and administrative boundaries, emergency management, natural hazard risk assessment, water management, natural resource exploration and exploitation and national security.
- Started ‘bottom up’ in early 2000’s – now supported from within NSDI.
Australian Marine Spatial Information System (AMSIS)

- AMSIS is embedded in the Australian NSDI that is directed by Geoscience Australia.
- Web based interactive mapping and decision support system that improves access to integrated government and non-government information in the Australian Marine Jurisdiction.
- Contains many layers of information displayed in themes of Maritime Boundaries, Petroleum, Fisheries, Regulatory, Environment, Native Title and Offshore Minerals.
- Data is sourced from Geoscience Australia, other Australian government agencies and some industry sources.
- Contains offshore mineral locations data that was used to create the Offshore Minerals Map.
- Legacy AMSIS contains data from 2006-2014 that is being migrated to the current AMSIS.
- Interactive Maps is a discovery and exploration view of Geoscience Australia's geospatial services. Each map has queries and functions with linked access to OGC web services and metadata.
- Visit AMSIS Interactive Maps here:
  
Australian Marine Spatial Information System (AMSIS)

Legacy AMSIS data

Australian Ocean Governance and Related Legislation

<<<- Fisheries Act(s) Related ->>>>

Seas and Submerged Lands Act

17/10/2016

O&C IMS Data Advisory Group Workshop, Cape Town
Good Practice in Marine/Coastal SDI – some examples

USA Coastal SDI

• The Coastal Services Center of NOAA (now the Office for Coastal Management) published in 1999 definitions and goals for the Coastal National Spatial Data Infrastructure within the US NSDI.

• Coastal SDI supported establishing metadata standards within remit of the Federal Geographic Data Committee (FGDC) work on the national Content Standard for Digital Geospatial Metadata (CSDGM) - first published in 1998.

• Today, Coastal/Marine SDI developments are under the FGDC Marine and Coastal Spatial Data Subcommittee. Visit:

  https://www.fgdc.gov/organization/working-groups-subcommittees/mcsdsc/index_html
USA Coastal SDI

• “The vision of the US Marine and Coastal NSDI is that current and accurate geospatial coastal and ocean data will be readily available to contribute locally, nationally, and globally to economic growth, environmental quality and stability, and social progress.”

• NOAA’s DigitalCoast is one of the most-used resources in the US marine and coastal management community.

• Visit: http://coast.noaa.gov/digitalcoast/
USA DigitalCoast

- **Topics** — This section provides quick links to the top Digital Coast holdings communities use to address common coastal management issues.

- **Stories from the Field** — See how communities throughout the coastal zone use Digital Coast products.

- **Digital Coast in Your State** — These reports showcase usage statistics and top products for each state. The **Return on Investment** report is also helpful. Digital Coast costs are compared to the efficiencies gained by the user community.

- **Top Products** — Top data sets include lidar, economic, and land cover data. Most used tools include the Sea Level Riser Viewer, Land Cover Atlas, and a do-it-yourself visualization tool.

- Have a look at **Contributing Partners (450+ !)** at: [https://coast.noaa.gov/digitalcoast/contributing-partners/](https://coast.noaa.gov/digitalcoast/contributing-partners/)
Canadian Marine GDI

- Canadian Marine Geospatial Data Infrastructure (MGDI) published in 1999.
- One of the MGDI challenges noted 15 years ago was:
  - “Capacity building (training) will be needed to create demand for MGDI and to create the capacity to use MGDI to the fullest” - a challenge that remains today.
- Marine SDI work in Canada now focuses mainly on marine cadastre and fisheries within the NSDI programme (GeoConnections) and development of the Arctic SDI, which involves many nations with Arctic connections.
- SDI work in eastern Canada is led by the Coastal and Ocean Information Network Atlantic (COINAtlantic), a hub for coastal and ocean information in Atlantic Canada for ACZISC, the Atlantic Coastal Zone Information Steering Committee.
The Coastal and Ocean Information Network Atlantic (COINAtlantic) is the ACZISC's (Atlantic Coastal Zone Information Steering Committee) website, a hub for Coastal and Ocean Information in Atlantic Canada. This includes the geospatial tools:

- COINAtlantic Search Utility
- COINAtlantic GeoContent Generator
- COINAtlantic Data Accessibility Self-Assessment Tool

The ACZISC is working to provide open access to data, information and applications relevant to Atlantic Canada through COINAtlantic. COINAtlantic promotes: Reliable Access, Best Information, and Informed Decisions.
Developing a Coastal Characterization Information Service for the Island of Newfoundland
The Irish SDI is implementing the INSPIRE Directive for a pan-European SDI.

The **Irish Spatial Data Exchange (ISDE)** is a data discovery tool allowing you to find spatial data and services hosted across multiple government and academic organisations.

**Online data access options** are available.

Is used to assess whether data exist that are suitable for your purpose through the **detailed metadata**.

The ISDE was developed by the Marine Institute with partners Geological Survey of Ireland, EPA, Department of Environment, Community and Local Government (DECLG) and Coastal and Marine Research Centre (UCC), with initial funding from multiple sources.

Ireland still has **no published NSDI Strategy** or Action Plan!
Irish Spatial Data Exchange (ISDE) in Irish SDI (ISDI)

The Data Exchange takes metadata feeds from ISDE partners and other organisations that have contributed metadata to Irish Spatial Data Infrastructure (ISDI) catalogue including:

- Coastal and Marine Research Centre
- Department of Agriculture, Food and the Marine
- Marine Institute
- Geological Survey of Ireland
- Department of Environment, Community and Local Government
- Environmental Protection Agency
- Ordnance Survey Ireland
- National Transport Authority
- Petroleum Affairs Division
- All Island Research Observatory NUI Maynooth
- Department of the Arts, Heritage and Gaeltacht
- Local Authorities
- Property Registration Authority of Ireland
(New) S-100 Framework Data Structure for Hydrographic and Related Data

- broad geospatial framework structure
- not specific to navigation or charting
- capable of accommodating other requirements
- based on ISO 19100 series of geographic information standards
- will support development of Marine SDIs globally
- marine cadastre is one of the first sub-components to be developed
IHO Marine Data Standards
IHO Marine Data Standards
Good Practice & Lessons Learned

• Marine/Coastal SDI development takes place within existing national SDI (and NII) initiatives/programmes, not in isolation – be represented on NSDI committees, councils and implementing bodies.
  • Marine/Coastal SDI implementers need to be fully aware of these initiatives (and existing legislation) and the requirements these place on MSDI development plans.

• Identify a key organisation (or consortium) to be the MSDI leader(s)
  • Not easy in the marine/coastal world where there are many disparate sectors involved, typically led by many different government departments.
  • Many departments do not see the need to cooperate as part of their mandated ‘public tasks’.
  • Requires compromise, cooperation and collaboration at all stages!

• Adopt international standards wherever possible (ISO or national profiles).

• Prepare to adapt to change from the outset – nothing stands still over the periods of time it will take to implement an SDI.
Thank you for your attention!

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