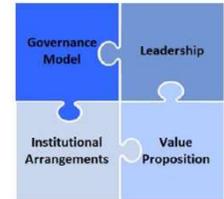


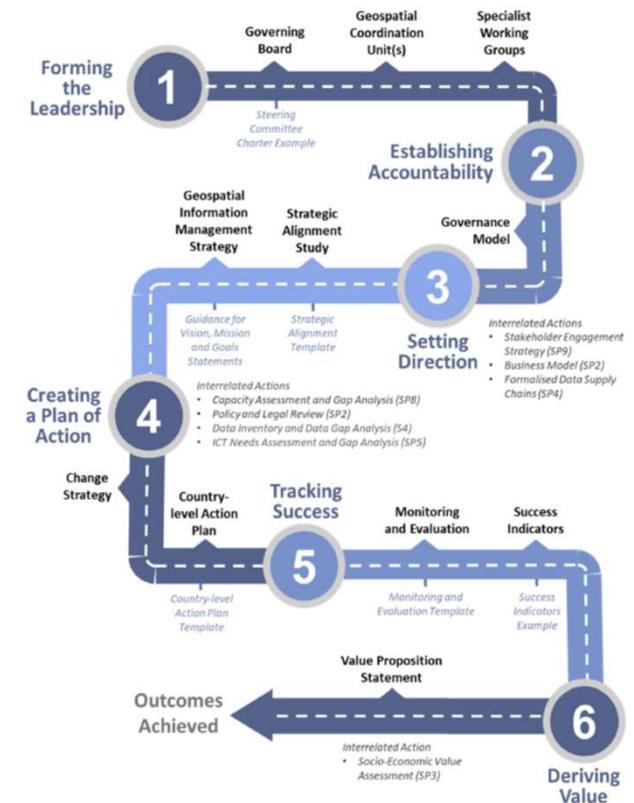
“the case for change – integrate,  
integrate, integrate”.



# Introduction



- The Case for Change – is there one?
- “Integrate” – should we?
- Definitions and applicability of integration
- The case for integration
- The relationship between “value”, “integration” and “reuse”
- The connection with the operational framework



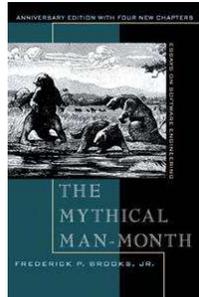
# What is “integrate” and why should we care?

- The operational framework itself represents the sum view of best practices for building infrastructure across many axes
- Integration is a core element.
- Integration only exists in relation “to something” – the thing(s) you integrate
  - Between sectors
  - Across different data models (“interoperability”)
  - Geographic domains, Land and Sea
- Integration enables multiple uses in different contexts, it is “re-use”

VISION								
The efficient use of geospatial information by all countries to effectively measure, monitor and achieve sustainable social, economic and environmental development – leaving no one behind								
MISSION								
To promote and support innovation and provide the leadership, coordination and standards necessary to deliver integrated geospatial information that can be leveraged to find sustainable solutions for social, economic and environmental development.								
STRATEGIC DRIVERS								
National Development Agenda • National Strategic Priorities • National Transformation Programme • Community Expectations • Multilateral trade agreements • Transforming our World: 2030 Agenda for Sustainable Development • New Urban Agenda • Sendai Framework for Disaster Risk Reduction 2015–2030 • Addis Ababa Action Agenda • Small Island Developing States Accelerated Modalities of Action (SAMOA Pathway) • United Nations Framework Convention on Climate Change (Paris Agreement) • United Nations Ocean Conference: Call for Action								
UNDERPINNING PRINCIPLES								
Strategic Enablement	Transparent and Accountable	Reliable, Accessible and Easily Used	Collaboration and Cooperation	Integrative Solution	Sustainable and Valued	Leadership and Commitment		
GOALS								
Effective Geospatial Information Management		Increased Capacity, Capability and Knowledge Transfer		Integrated Geospatial Information Systems and Services		Economic Return on Investment		
Sustainable Education and Training Programs		International Cooperation and Partnerships Leveraged		Enhanced National Engagement and Communication		Enriched Societal Value and Benefits		
STRATEGIC PATHWAYS								
<b>Governance and Institutions</b> Value proposition	<b>Legal and Policy</b> Data protection and licensing	<b>Financial</b> Benefits realization	<b>Data</b> Data curation and delivery	<b>Innovation</b> Bridging the digital divide	<b>Standards</b> Technical interoperability	<b>Partnerships</b> International collaboration	<b>Capacity and Education</b> Professional workplace training	<b>Communication and Engagement</b> Monitoring and evaluation
Governance model Institutional structures Leadership	Legislation Implementation and accountability Norms, policies and indices	Business model Investment Partnerships and opportunities	Fundamental data themes Data supply chain interlinkages Custodianship, acquisition and management	Technological advances Promoting innovation and creativity Process improvement	Legal interoperability Semantic interoperability Data interoperability	Community participation Industry partnerships and joint ventures	Awareness raising Entrepreneurship Formal education	Stakeholder identification Planning and execution Integrated engagement strategies Monitoring and evaluation
Knowledge   Decisions   Development   Society   Economy   Environment   Users   Citizens   Access   Technology   Applications   Value								

# The Parallel with Software Engineering

- From an engineering standpoint – reuse has its roots in the complexities which emerged with technology development
  - “Programmers have always reused sections of code, templates, functions, and procedures. Software reuse as a recognized area of study in software engineering, however, dates only from 1968 when Douglas McIlroy of Bell Laboratories proposed basing the software industry on reusable components.”
  - “standardisation results in creation of interoperable parts that can be then reused in many contexts”
- Whether you integrate is profoundly connected with the value of effecting such integration.
- Economically, we know that engineering re-use costs more. In software >9x single-use costs.

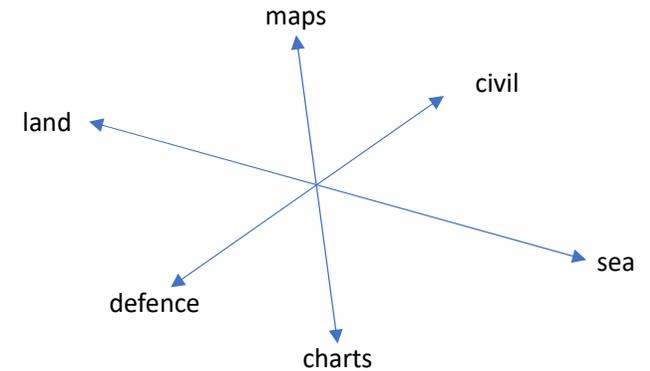


"No scene from prehistory is quite so vivid as that of the mortal struggles of great beasts in the tar pits. ***The fiercer the struggle, the more entangling the tar, and no beast is so strong or so skillful but that he ultimately sinks.***"



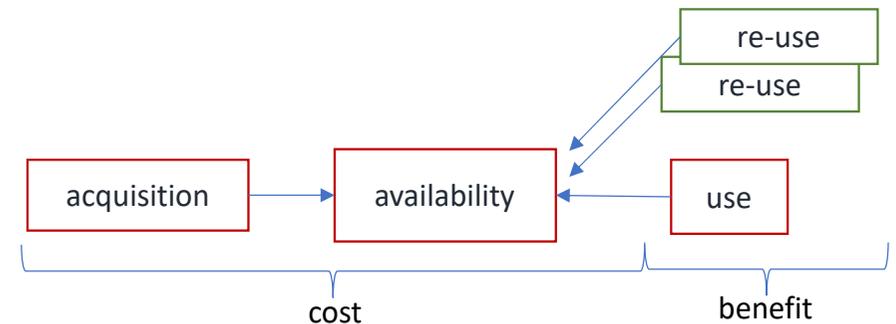
# The Axes of Integration

- There are many...
  - Between sectors
  - Across different data models (“interoperability”)
  - Geographic domains, Land and Sea
  - Institutional arrangements
- Integration in the IGIF context is not just integration of data, but an “integrative approach” to EVERYTHING
- Whether to integrate connects with value of integration, value and amount of re-use and utility of such reuse.
- “If you were only making charts, reuse isn’t important” – few people only make charts.
- There are numerous other factors which affect value and an integrated view of them all is required to make the right decisions
- These are not purely technical issues, often they are economic
- There are domain-specific considerations



## Domain specific considerations

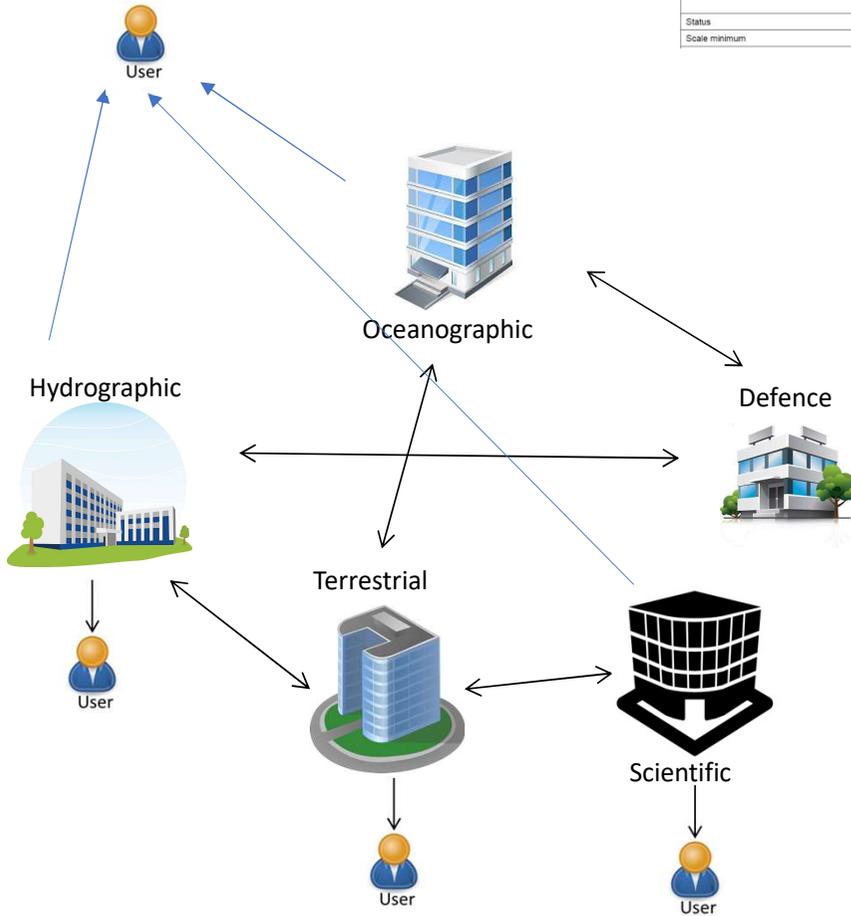
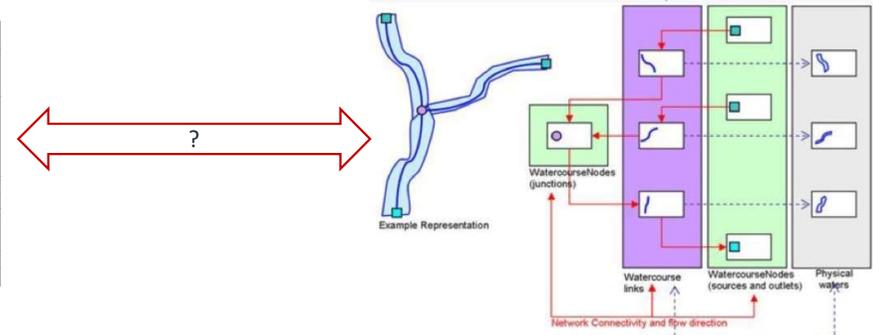
- Cost of data acquisition is high
- Dynamic nature of our medium
- Delimited boundaries and limits
- International vs National priorities
- Specialised nature of domain
- Land / Sea interfaces



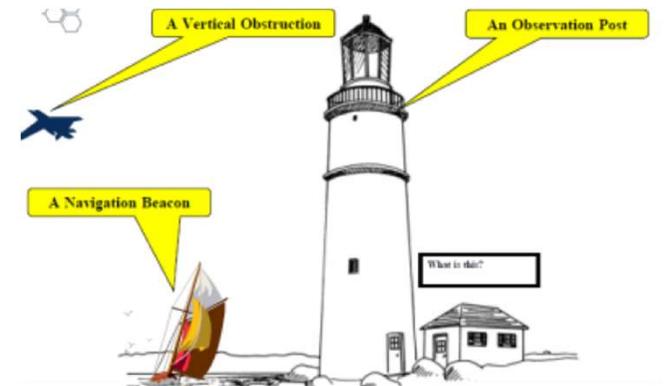
**Integration of marine geospatial data:**

- Founded on interoperability between entities
- Coherent models
- Data sharing partnerships
- Compatible standards
- Authoritative, curated datasets
- Custodianship
- Persistent, unique identifiers

IHO Definition: RIVER. A relatively large natural stream of water. (IHO Dictionary – S-32)				
S-101 Geo Feature: River (RIVERS)				
Primitives: Curve, Surface				
Real World		Paper Chart Symbol	ECDIS Symbol	
S-101 Attribute	S-57 Acronym	Allowable Encoding Value	Type	Multiplicity
Feature name			C	0..*
Display name			(S) BO	0..1
Language		ISO 639-1	(S) TE	0..1
Name	(OBJNAM) (NOBJNAM)		(S) TE	1..1
Status	(STATUS)	S : periodic/intermittent	EN	0..1
Scale minimum	(SCAMIN)	See clause X.X	IN	0..1



Looking at integration purely in the context of data ignores the bigger picture of the other axes

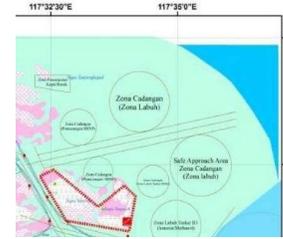
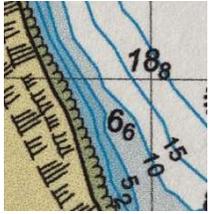


# IGIF-H and Value

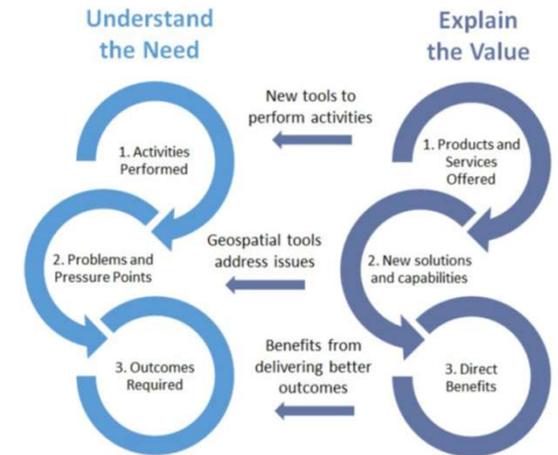
- Drives the case for creating re-usable data
- Establish a concept of “value”- “In economics, economic value is a measure of the benefit provided by a good or service to an agent.”
- “the value of an asset calculated according to its ability to produce income in the future”
- What are we trying to achieve with the IGIF-H?
  - Put forward guiding principles
  - Offer re-usable value propositions because there are common elements of value in most implementations
  - Our considered value propositions are in IGIF-H
  - Each implementation will require further adaptation

Value Propositions demand considerations broader than financial and technical. The *value* is the progress towards the achievement of the sustainable development goals.

Software systems have limited lifespans, geospatial data is persistent (because the world is) – so the payback is “when, not if”

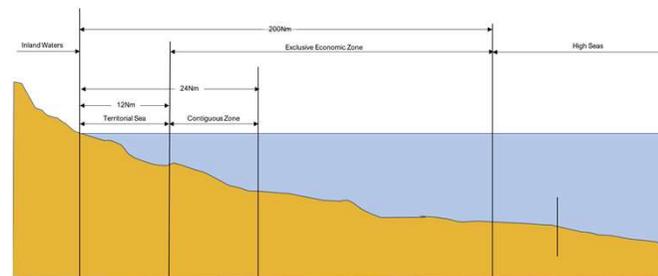
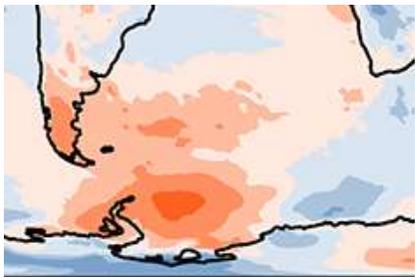


1. Nautical Charting and Transportation
2. Support for Resource Management and Planning
3. Establishing Maritime Boundaries
4. Subsistence
5. Emergency Response, Disaster Management and Response
6. Integrated Marine Cadastral Systems
7. Energy
8. Environmental Protection
9. Climate Change
10. Scientific Research



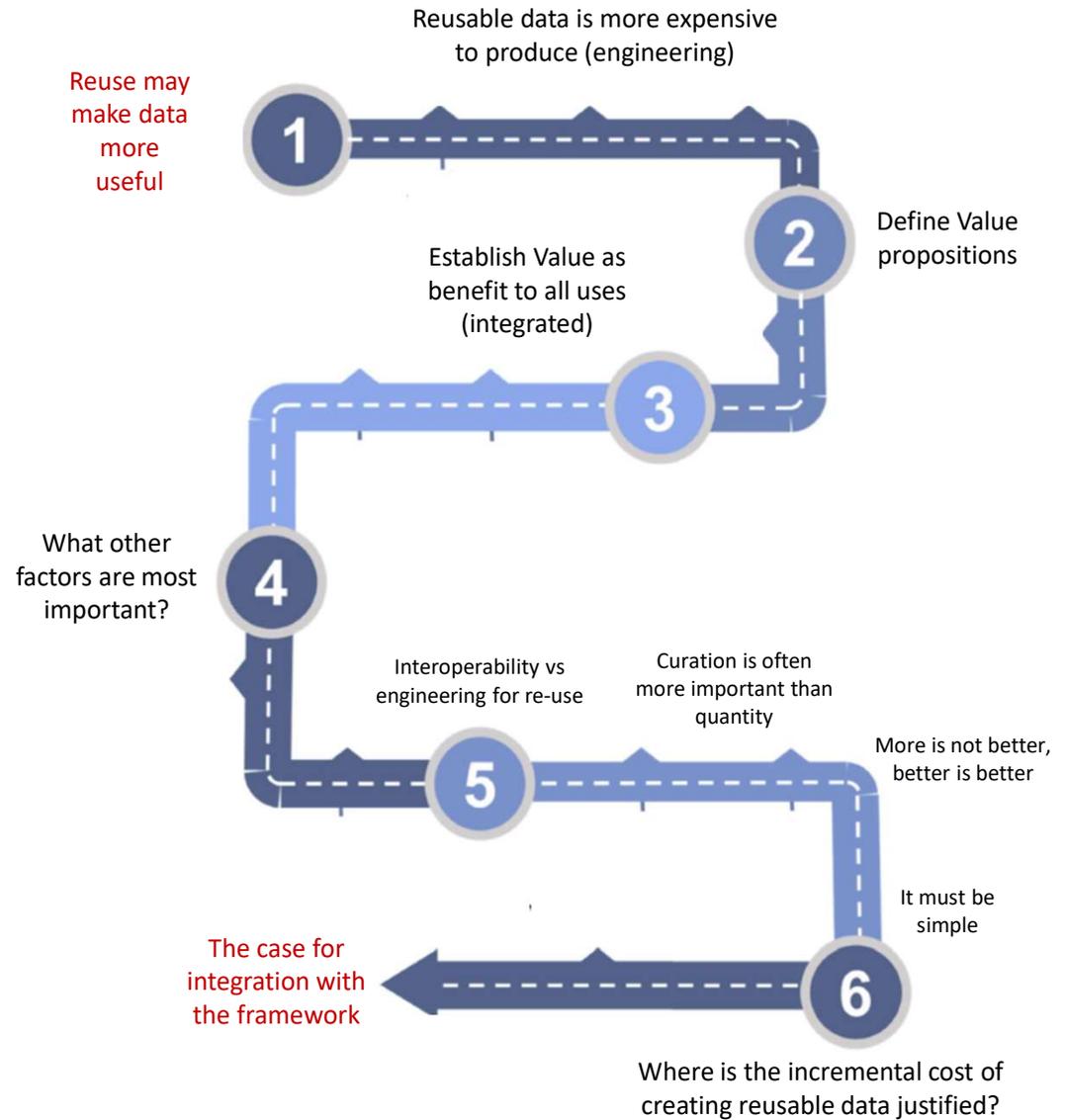
Step 3: Create the Value Proposition Statement:

*"Satellite remote sensing is used to monitor change in the environment, and this capability is used to inform government policy on the management of the environment, so that best practices land management techniques are adopted to preserve the environment for future generations."*



The journey, making the case for change...

- All implementers make their own case for integration of marine geospatial data
- Integration is present in MANY other considerations during implementation
- The reason we reuse is because of its value (however you measure it)
- Value propositions quantify the benefits of all data
- Marine geospatial data has many common elements across all participants so value propositions can be reused and adapted
- Each case is individual and there are always other considerations
- The ultimate integration is the approach itself.



# So what?

- We must recognise and accept different interpretations of “integrate”
- Integration is both the overall approach as well as many of the tactics
- But tactics must be adapted for the individual situation
- Remember other factors, curation, quality, simplicity
- Reflect best practices and simple steps for implementers
- Strengthen the implementation aspects of highest priority
  - Value Propositions and their role in defining tactics
  - Simple guides to achieving interoperability
  - Open Standards, open source technologies
  - Persistent unique identifiers and their importance for custodianship
  - Themes