

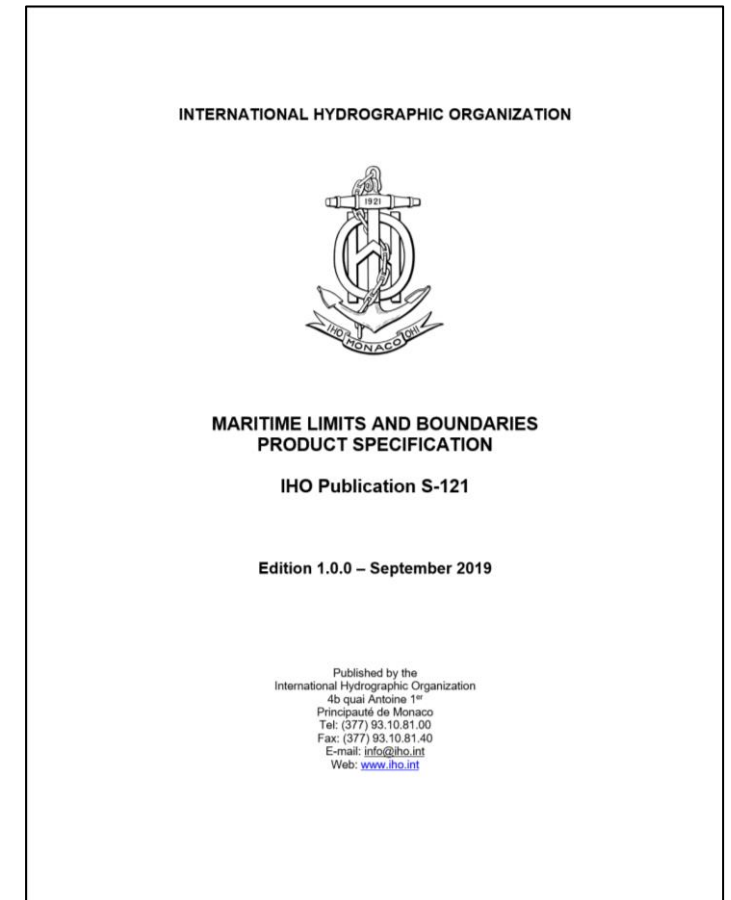


IHO S-121 Maritime Limits and Boundaries

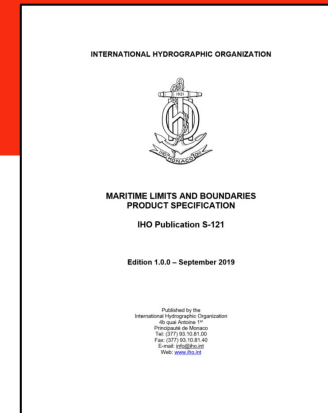
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Contents

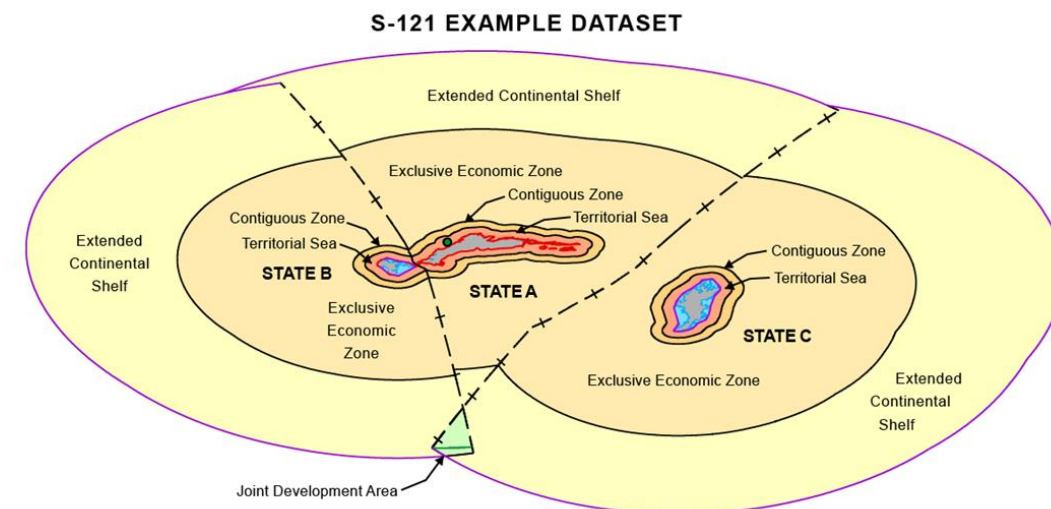
- Maritime Limits and Boundaries Status
- Fundamental role within MSDI
- The challenges of digital boundaries
- How S-121 helps to overcome them
- The way forward



S-121 status



- Representation, Exchange and deposit of data reflecting the core elements within the United Nations Convention on the Law of the Sea.
- "...paragraph 6 of United Nations, General Assembly resolution 59/24 of 17 November 2004 "requests the Secretary-General to **improve the existing geographic information system for the deposit by States of charts and geographical coordinates** concerning maritime zones, including lines of delimitation in particular by implementing, **in cooperation with relevant international organizations, technical standards** for the collection, storage and dissemination of the information deposited, in order to **ensure compatibility among the Geographic Information System, electronic nautical charts, and other systems** developed by these organizations."
- "improve" wasn't defined.... - this is taken to mean
 - Establishing the S-100 product specification for Maritime Limits and Boundaries (MLB)
 - which is *"...to establish a framework of sourced and versioned objects for communicating in a digital form the geographic extents of some maritime zones...."*
- Development by the S-121 Project Team (within the S-100 WG) <http://www-121.com>
- Simple "Use Cases"
 - Exchange between parties
 - Facilitating deposit in accordance with the convention
- Version 1.0.0 reviewed and published End of September 2019
- Completed initiative within Open Geospatial Consortium (OGC) project
 - <https://www.ogc.org/projects/initiatives/mlbp>
- Implement, test and demonstrate standard.



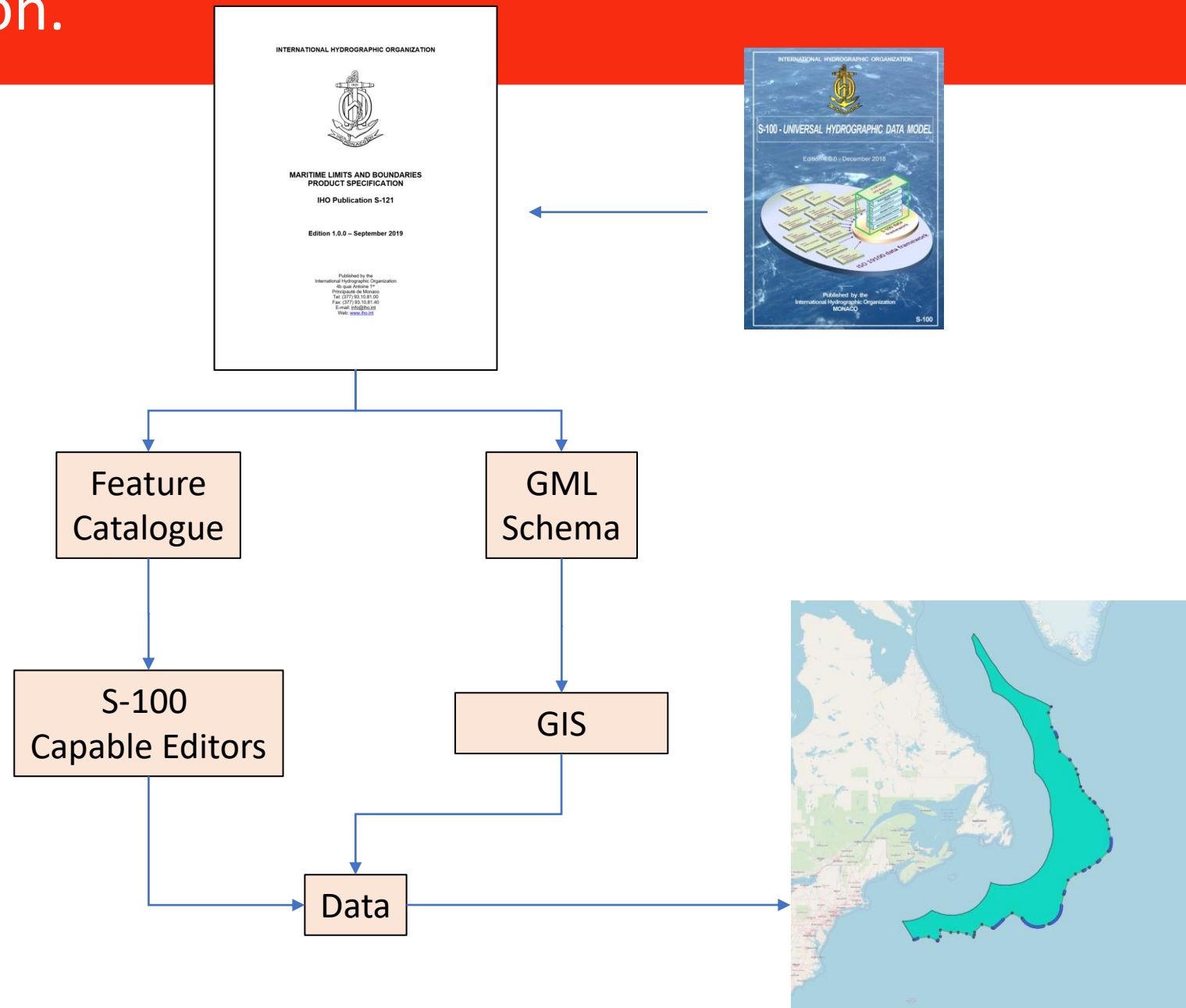
The IHO product specification.

IHO S-121 Maritime Limits and Boundaries features:

- **Points**
 - Baseline Points
 - Boundary Points
 - Limit Points
- **Baselines**
 - Normal
 - Straight
 - Archipelagic
 - Low Tide Elevation
 - River Mouth
 - Reef
 - Bay
 - Port
- **Boundaries**
 - Boundary
 - International Boundary
- **Limits**
 - Territorial Sea
 - Contiguous Zone
 - Exclusive Economic Zone
 - Continental Shelf
 - Roadstead
 - Strait

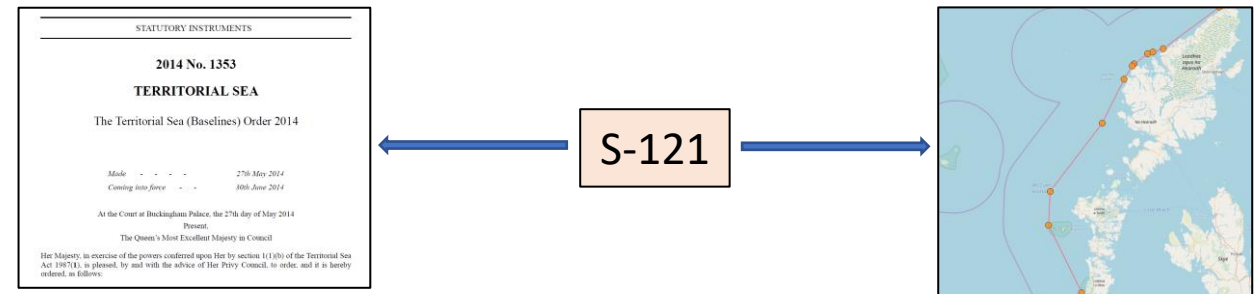
Zones:

- Internal Waters
- Archipelagic Waters
- Territorial Sea
- Contiguous Zone
- Exclusive Economic Zone
- Continental Shelf
- Roadstead
- High Sea
- The Area
- Joint Development Area



Challenges

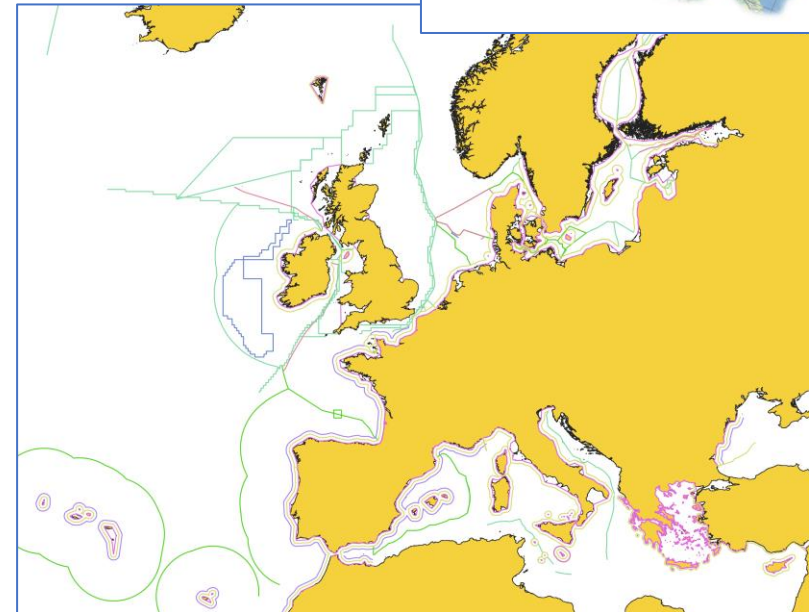
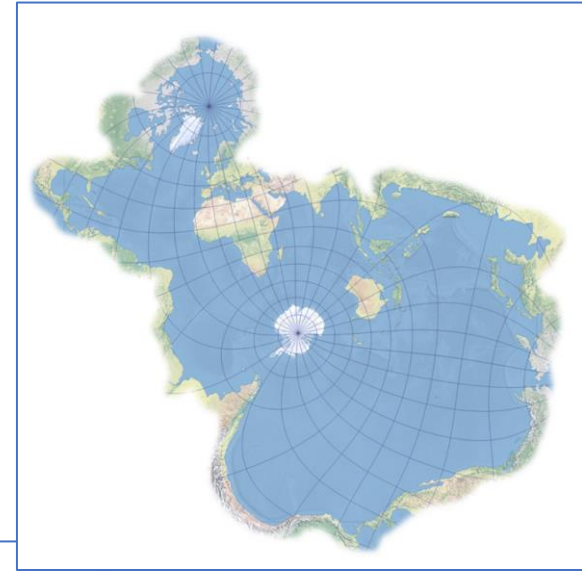
- Representing data in a politically neutral way
- Representing positions in both a legal and geospatial way
- Complex structures of rights, restrictions and responsibilities associated with features. States' different legislative regimes
- Multi-lingual features
- Interoperability and compatibility with other standards (e.g. ISO19152, Cadastral), existing Frameworks (INSPIRE) and datasets (MSP, MPA, conventions)
- Interaction between different agencies (institutional arrangements), Land and Sea data disconnects in existing SDI



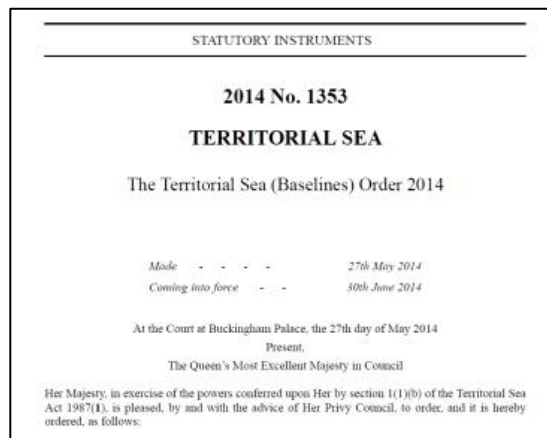
IHO S-121 bridges the gap between the legal and geospatial domains

Why is this important - MSDI

- A regional MSDI must be built on a foundation of binding legislation within member states and treaties agreeing boundaries between them.
- Many MSDI activities partition human activity in the marine space
 - Marine Spatial Planning
 - Environmental agreements
 - Fishing Zones
 - Marine Cadastre
 - Energy Production
 - Maritime transport routes and traffic flows,
 - Military training areas,
 - Marine protected areas,
 - Scientific research,
 - Submarine cable and pipeline routes,
 - Tourism,
 - Underwater cultural heritage
- These activities ALL use Maritime Limits and Boundaries features as the foundation for their legal and spatial extents.
- S-121 provides a standard to hold and exchange this data



S121 Example₁: S-121 Features – Text output



```
<s121:Source gml:id="src1">
  <s121:responsibleParty>
    <s121:responsiblePartyOrganisationName>United Kingdom Hydrographic Office
  </s121:responsibleParty>
  <s121:sourceDocumentName>The Territorial Sea (Baselines) Order 2014</s121:sourceDocumentName>
  <s121:sourceRegistryNumber>2014 No. 1353</s121:sourceRegistryNumber>
  <s121:sourceAvailabilityStatus>Document Available</s121:sourceAvailabilityStatus>
  <s121:administrativeSourceType>Domestic Legislative
Instrument</s121:administrativeSourceType>
  <s121:label>The Territorial Sea (Baselines) Order 2014</s121:label>
  <s121:sourceSubmissionDate>2019-01-01</s121:sourceSubmissionDate>
  <s121:sourceRecordationDate>2019-01-01</s121:sourceRecordationDate>
</s121:Source>
```

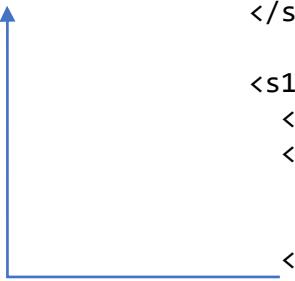


	<i>Latitude North</i>	<i>Longitude West</i>	
1	58° 37'.642	5° 00'.295	Cape Wrath

```
<s121:additionalSpatialInformation gml:id="ad1">
  <s121:locationByText>58° 37'.642 5° 00'.295</s121:locationByText>
  <s121:referenceSystem>World Geodetic System 1984 Datum (WGS84)</s121:referenceSystem>
</s121:additionalSpatialInformation>
```



```
<s121:BaselinePoint gml:id="b1">
  <s121:label>1</s121:label>
  <s121:featureName>
    <s121:language>en</s121:language>
    <s121:Name>Cape Wrath</s121:Name>
  </s121:featureName>
  <s121:source xlink:href="src1"/>
  <s121:additionalSpatialInformation xlink:href="a1"/>
  <s121:geometry>
    <gml:Point gml:id="b1g" srsName="urn:ogc:def:crs:OGC:1.3:CRS84" >
      <gml:pos>-5.004916666666665 58.627366666666667</gml:pos>
    </gml:Point>
  </s121:geometry>
</s121:BaselinePoint>
```



58.62736666666667

5.004916666666665



S121 Example₁: Graphical geospatial data

The screenshot displays the S-121 GML View and Edit interface. The main map shows the UK territorial sea with a red baseline and orange points. The interface includes a Layers panel on the left, a metadata form on the left, a feature properties window on the right, and another metadata form on the bottom right.

Layers Panel:

- S-121 data
 - straightbaseline_source
 - straightbaseline
 - source
 - dataset_members_subsetfeatures
 - dataset
 - baselinepoint_source
 - baselinepoint_featurename
 - baselinepoint
 - additionalspatialinformation
 - OpenStreetMap

Metadata Form (Left):

Responsible Party:
Source Document Name:
Source Registry Number:
Source Availability Status:
Administrative Source Type:
Spatial Source Type:
Label:
Online Resource:
Administrative Date Stamp:
Authoritative Date:
Source Document Type:
Source Type:
Source Submission Date:
Source Recordation Date:

Feature Properties Window (Right):

Points: b1: 1, b2: 2, b3: 3, b4: 4, b5: 5, b6: 6

Baselines, Limits and Boundaries: lim 1: 1

Zones:

Information Types: src1: SourceType, ad1: AdditionalSpatialInformationType

Messages: INFOLIST: selection -> 0: id=src1, typ=_int.iho.s_121.SourceType, INFOLIST: selection -> 1: id=ad1

Feature Properties Window (Bottom Right):

Type:
Label:
Geometry:
Identifier:
Name(s):
Language: en, Feature Name: Cape Wrath
Associations:
Geo:
Feature:
Additional Info:
Source:

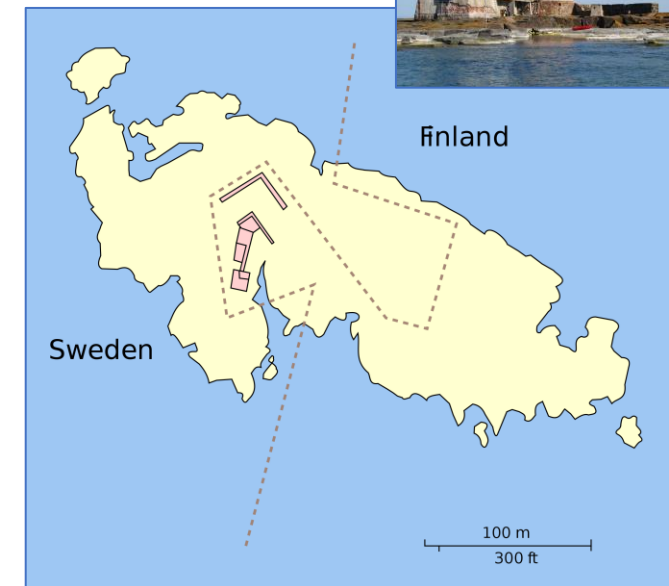
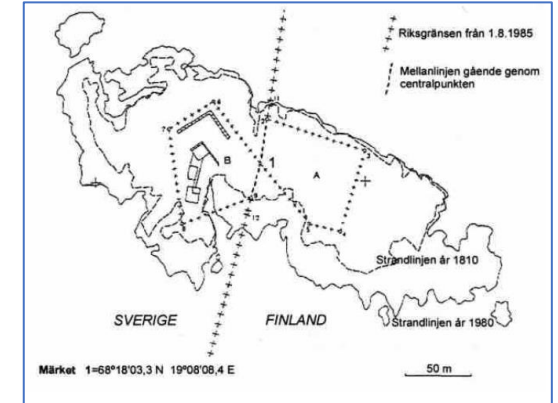
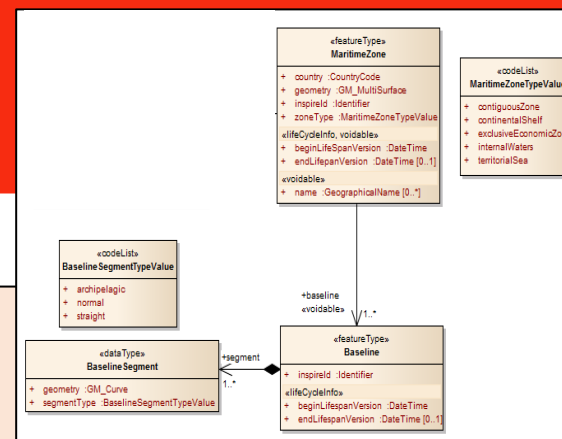
The Way Forward.

What can we do now?

- Represent UNCLOS objects as S-100 features
- Datasets for exchange and deposit
- Implement a database for cadastral management conformant with ISO19152
- Exchange data between the hydrographic, legal and MSDI communities
- Interoperability with web services, INSPIRE content, other IHO formats
- Represent other datasets alongside with references to S-121 features.
- Compatible with all modern GIS and Hydro technology

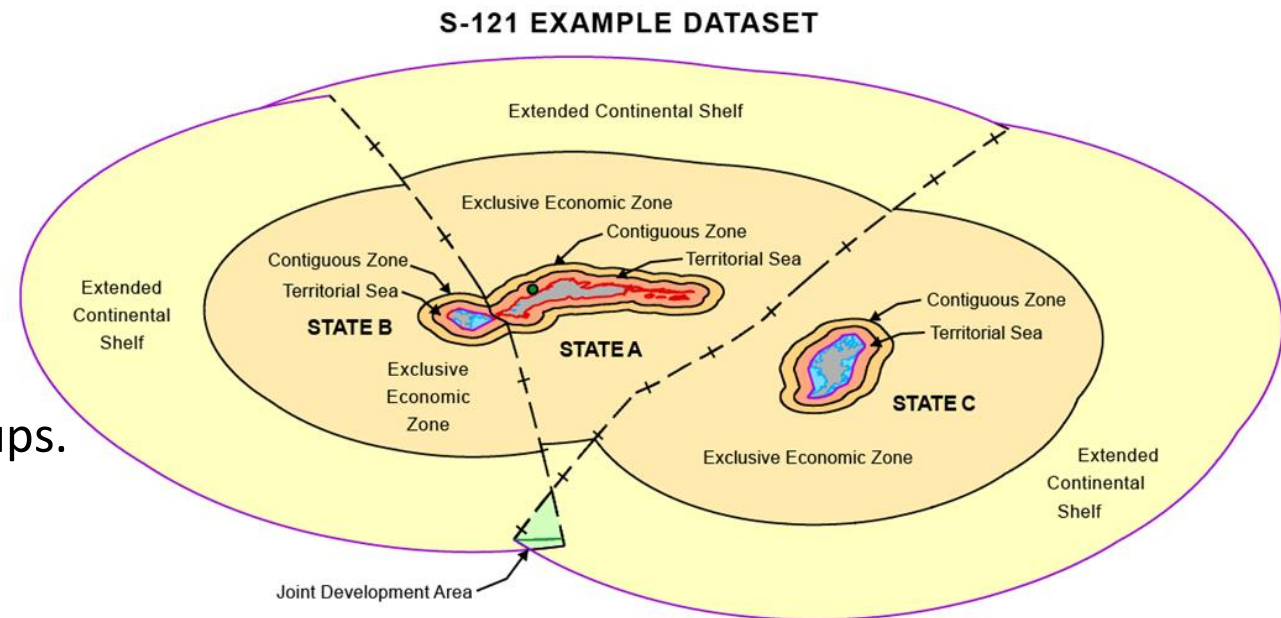
The Future

- Concentrate on implementation with states and regions
- A standard is no use if it's not implemented
- We're interested in:
 - Doing reference implementations based on real use cases.
 - National, regional and transboundary interoperability
 - Expanding scope to other domains (MSP, energy, environmental)
 - Producing data for testing and onward use
 - Testing software
 - Feeding back to the standard and the community



Some Reflections on Standards:

- “Clarity is infectious” – if you make one part of a complex ecosystem clear it accentuates the contrast with other parts. e.g. duplication which now exists in the geospatial registry with charting, e.g. Territorial Sea Areas...
- A standard is no good if no one uses it. So..... Interoperability
 - Of Software
 - Of Data.
- “but what does it do?” – the difficulties of communication...
- Pick your tools well. Reuse where you can
 - Geometry and topology
 - Multi-Lingual Naming
 - Metadata and Source information
- What Next?
- Work within IHO – feedback to S-100 and other groups.





**Any Questions?
Thank You**

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