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4th Meeting of S-130PT

Report of the Schema Sub-Group

**SSG Leader
(Schema Sub Group)**

24 October 2022 / VTC Event

- Results of SSG1 meeting
  - Requirements for the application schema
    - Feature type name: Spatial Extent of Oceans and Seas, Global Sea Area and Outer limit of Sea Area
    - Maximum Display Scale / Minimum Display Scale
    - Spatial: Point/Curve/Polygon/NoGeometry
    - Numerical ID: MRN or URI
    - Source (optional)
    - Version and Date
    - Additional Spatial Information (optional)

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• Draft application schema

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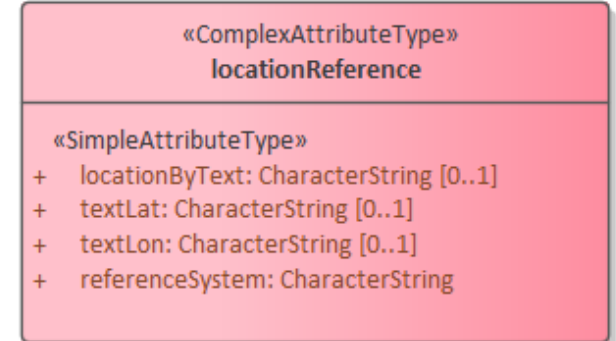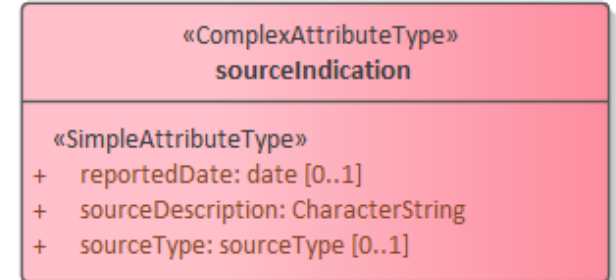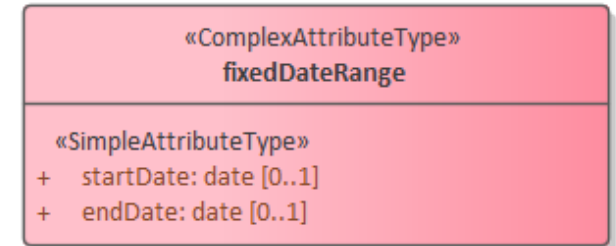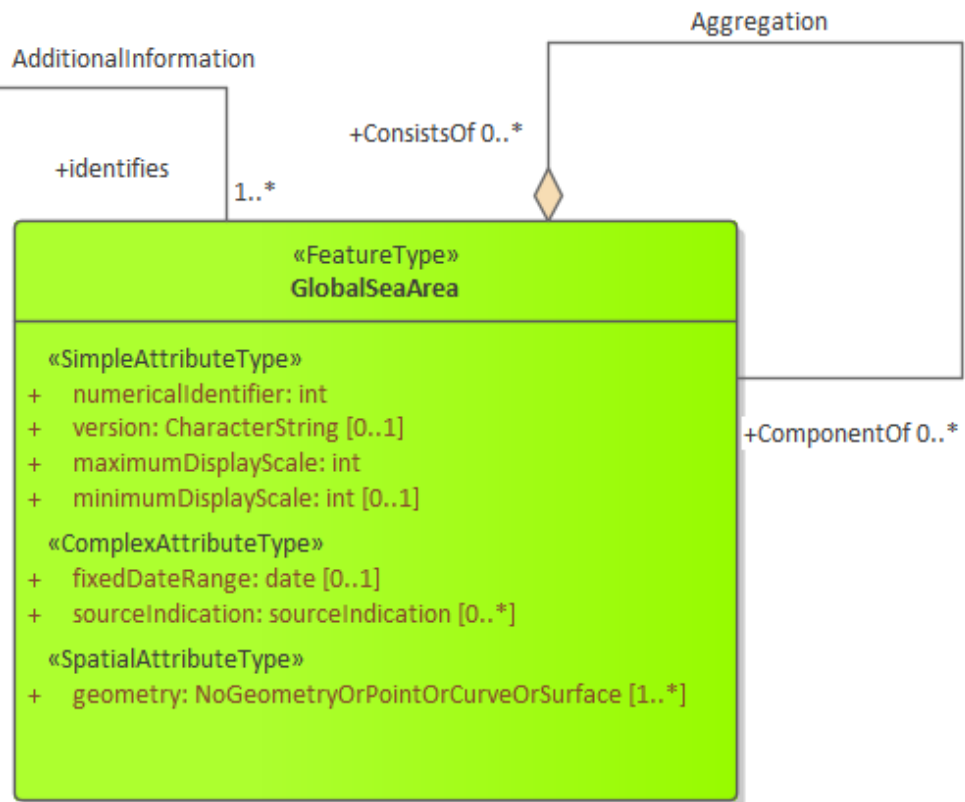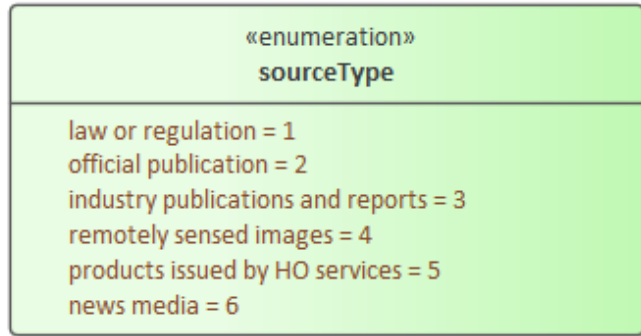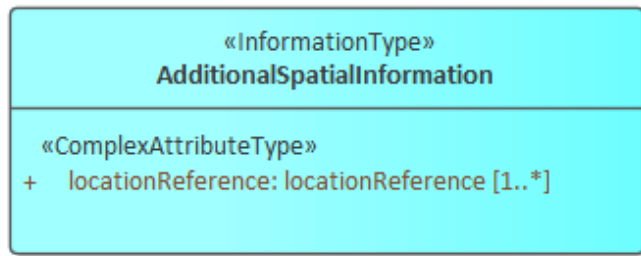
a. Present the MRN identifier concept

- URI (Uniform Resource Identifier)
  - String identifier that refers to the identity of a resource on the internet using either a location, name, or both

- URL (Uniform Resource Locator)
  - location of a resource on the internet. It contains the reference and also the way to access the resource

- URN (Uniform Resource Name)
  - subset of URI. It refers to a resource on the internet without actually specifying its location or existence
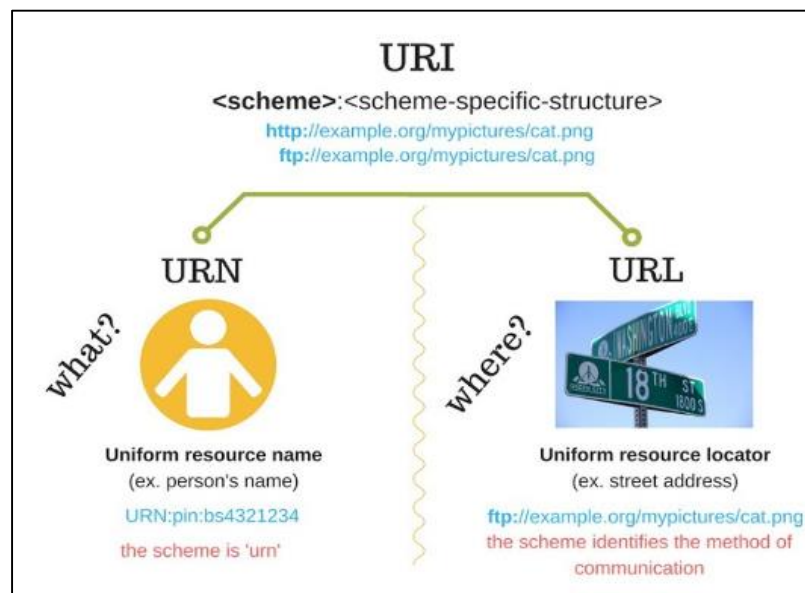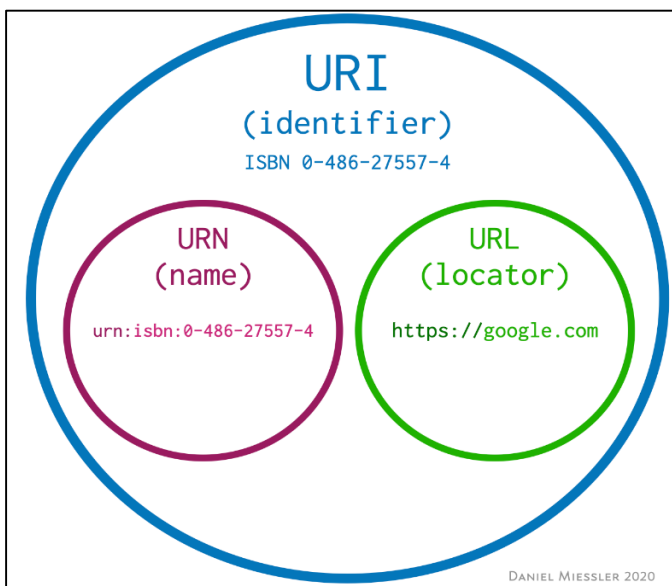
- Background of MRN development
  - IALA developed the MRN for e-Navigation and MCP.
  - ENAV Committee discussed the MRN Guideline.
  - IALA approved the MRN Guideline as G1143 (19.6)

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- Example of URN (https://en.wikipedia.org/wiki/Uniform_Resource_Name)

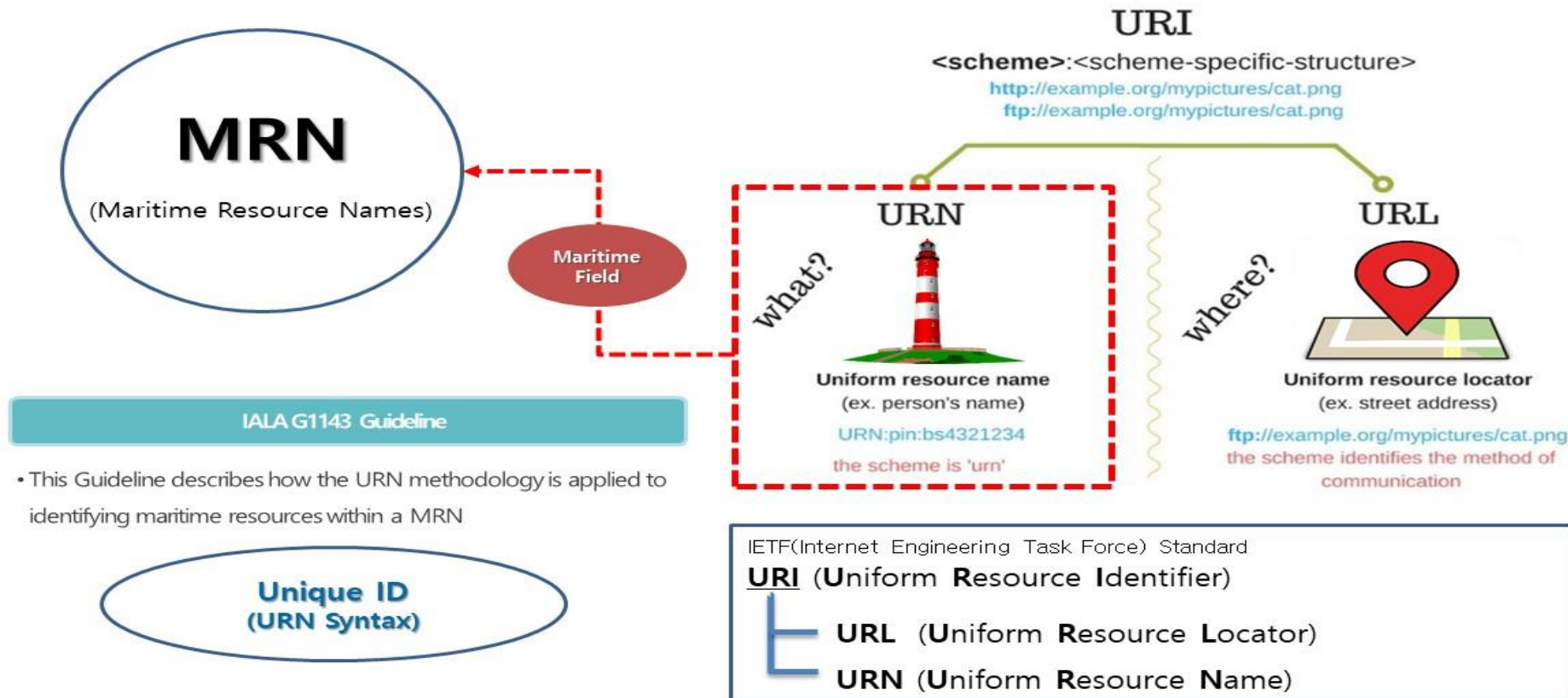| URN	corresponds to
urn:isbn:0451450523	The 1968 book *The Last Unicorn*, identified by its book number.
urn:isan:0000-0000-2CEA-0000-1-0000-0000-Y	The 2002 film *Spider-Man*, identified by its audiovisual number.
urn:ISSN:0167-6423	The scientific journal *Science of Computer Programming*, identified by its serial number.
urn:ietf:rfc:2648	The IETF's RFC 2648.
urn:mpeg:mpeg7:schema:2001	The default namespace rules for MPEG-7 video metadata.
urn:oid:2.16.840	The OID for the United States.
urn:uuid:6e8bc430-9c3a-11d9-9669-0800200c9a66	A version 1 UUID.
urn:nbn:de:bvb:19-146642	A National Bibliography Number for a document, indicating country (de), regional network (bvb = *Bibliotheksverbund Bayern*), library number (19) and document number.
urn:lex:eu:council:directive:2010-03-09;2010-19-UE	A directive of the European Union, using the proposed Lex URN namespace.
urn:lsid:zoobank.org:pub:CDC8D258-8F57-41DC-B560-247E17D3DC8C	A Life Science Identifiers that may be resolved to http://zoobank.org/urn:lsid:zoobank.org:pub:CDC8D258-8F57-41DC-B560-247E17D3DC8C .
urn:epc:class:lgtin:4012345.012345.998877	Global Trade Item Number with lot/batch number. As defined by Tag Data Standard[11] (TDS). See more examples at EPC Identification Keys.
urn:epc:id:sgtin:0614141.112345.400	Global Trade Item Number with an individual serial number
urn:epc:id:sscc:0614141.1234567890	Serial Shipping Container Code
urn:epc:id:sgln:0614141.12345.400	Global Location Number with extension
urn:epc:id:bic:CSQU3054383	BIC Intermodal Container Code as per ISO 6346
urn:epc:id:imovn:9176187	IMO Vessel Number of marine vessels
urn:epc:id:gdti:0614141.12345.400	Global Document Type Identifier of a document instance
urn:mrn:iala:aton:us:1234.5	Identifier for Marine Aids to Navigation
urn:mrn:iala:vts:ca:ecareg	Identifier for Vessel Traffic Services
urn:mrn:iala:wwy:us:atl:chba:potri	Identifier for Waterways
urn:mrn:iala:pub:g1143	Identifier for IALA publications
urn:microsoft:adfs:claimsxray	Identifier for federated identity; this example is from Claims X-Ray[12]

iana Internet Assigned Numbers Authority

Date:

2017-08-24

Registrant:

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On behalf of

International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)

IALA

liberty		[RFC3622]
mace		[RFC3613]
mef		[RFC7818]
mpeg		[RFC3614]
mrn	[mrn-template]	[International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)]
nato		[RFC7467]
nbn	[nbn-template]	[RFC8458]

- Essential properties
  - **Uniqueness** : never assigned to more than one resource
  - **Decentralization** : create IDs without relying on a single global source
  - **Forward compatibility** : enabling the addition of new naming schemes for new maritime domains
  - **Flexibility** : allow for identifying any type of resource such as documents, routes, equipment, ships and mariners
  - **Human readability** : naming scheme should be readable by humans
  - **Contextual** : provide information on the type of resource
  - **Backward compatibility** : allows for integration with these existing schemes

urn:mrn:iho:hydro:OOOO:12345678

Organization ID   Domain   Agency code   Unique number

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- Top level name space is urn:mrn
- IALA developed based on uniform resource identifier (URI) is defined in RFC 3986 (http://tools.ietf.org/html/rfc3986)
- Governed by IALA through mrnregistry.org
- MRN added to S-100 4.0.0 (3-10 & 11-7.4) as the recommended Globally Unique Identifier (GUID).
- IHO has been granted **urn:mrn:iho**, and should define management rules.
- Two levels of guidance
  - IHO level
  - Member State level

- 6th Test Strategy Meeting (TSM), September 2018
  - MRN guideline research was started funded by NOAA
  - IHO Level Guidance on how to manage the urn:mrn:iho namespace
- 4th S-100WG, March 2019
  - MRN Guidelines for IHO was presented
  - More details were introduced
- 7th Test Strategy Meeting (TSM), September 2019
  - Draft guidance for the use of Maritime Resource Name (MRN) in IHO documents, products and S-100 based product specifications
  - Proposed the MRN guidance for inclusion into S-97 as guidance for anyone wishing to use MRN identifiers

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- ## MRN Guidance and Example (Drafted in 2019)

6. Product Specification developer guidance

Product Specification developers should include guidance describing how to use MRN Persistent Unique Identifiers when creating compliant data products. It is further recommended that the producer code is specified as the first namespace after the '<type>' namespace.

urn:mrn:iho: '<type>':'<type-specific-part>'

<type> ::= 'pub', 'prod', 'hydro', or 'npub'

<type-specific-part> ::= '<S62>':'<producer namespace>'

For harmonization purposes a common structure should be considered for MRN identifiers for object instances. This enables a predictable upper level MRN Persistent Unique Identifier namespace (which predictability can be leveraged for reducing total data volume) that can be defined for each IHO Product Specification. Moreover, the producers of data are given flexibility over how they wish to manage their producer namespaces and how to assign MRN identifiers to the data objects under their remit. The structure provides a clear delineation between the fixed upper level (urn:mrn:iho) and flexible (Product Specification developer defined) lower level of the MRN identifier. Further, each namespace component in the MRN (between successive ":" characters) unambiguously indicates the naming convention that applies to the following portion (normally only the immediately following component, but this is not a hard requirement). A drawback with the flexibility given to the producer namespace is that applications cannot depend on a uniform structure of the MRN below the S-62 namespace. Product Specification developers should consider this during the development process.

It is important to note that some data formats that use URI namespaces (GML, XML, RDF, OWL) may give specific meaning to parts of the MRN ID, such as GML where the colon has special significance. MRNs therefore cannot be used verbatim for GML identifiers ("gml:id") or tags. Instead, for GML formats, either MRNs should be used as values for an attribute designed to carry identifiers, or translated into a format compatible with GML, or rules for mapping GML identifiers to MRNs should be

defined (the Product Specification should pick one method and define the mapping to MRNs for all compliant datasets). Product specifications that use another encoding with limitations similar to GML must define sufficient guidance to link MRN IDs to objects.

Example of one method of translating a URN identifier into a GML accepted identifier;

URN ID example	GML acceptable ID version
urn:mrn:iho:hydro:DK:DMA:NW:C:034.17	DK.DMA.NW.C.034.17

The ':' (colon) character has been translated into a '.' (punctuation), and the urn:mrn:iho:hydro part has been omitted as this part would always be fixed in the product. Additional parts of the URN ID could be omitted, but the retained parts yield an ID that is still human readable as well as machine-processable in the same way as the original MRN.

6.1. Object instances in data products

A structure like urn:mrn:iho:<type>:<S62>:<producer namespace> gives predictability to the fixed part of the MRN Persistent Unique Identifier, permitting byte saving schemes, such as having the fixed part stated in metadata or as a namespace within the Product Specification. If a byte saving scheme is implemented in a Product Specification, a function for re-creating MRN Persistent Unique Identifiers is needed in user and production software to permit systems to identify objects (for example feature instances) across products.

A Product Specification should also include rules for how to preserve MRN Persistent Unique Identifiers of objects that originate elsewhere, for example checks can validate if an MRN Persistent Unique Identifier that has an origin elsewhere[1] from the producer, is from a permitted source by checking the MRN structure against permitted sources. In all other cases the MRN Persistent Unique Identifier should begin with the code of the dataset producer. These rules can be configured with a list of permitted MRN name spaces to ensure that only permitted inputs are used and help identify erroneous MRNs. It is also recommended to create rules for the preservation of MRN Persistent Unique Identifiers of objects that originate elsewhere.

Annex A - Example

Examples of how MRN Persistent Unique Identifiers from another domain may look when included among the MRN IDs generated by the product producer;

Feature: Recommended Track
 Attribute: category of recommended track: Based on a system of fixed marks
 Attribute: orientation: 270 degrees
 Attribute: MRN: urn:mrn:iho:hydro:jsho:12345678
Feature: Navigational Line
 Attribute: category of navigation line: leading line bearing a recommended track
 Attribute: orientation: 270 degrees
 Attribute: MRN: urn:mrn:iho:hydro:jsho:87654321
Feature: Landmark
 Attribute: category of landmark: tower
 Attribute: function: light support
 Attribute: MRN: urn:mrn:iala:aton:jscg:54321678
Feature: Light
 Attribute: category of light: leading light
 Attribute: colour: white
 Attribute: MRN: urn:mrn:iala:aton:jscg:45678123
Feature: Range System
 Attribute: name: Micklefirth approach range
 Attribute: MRN: urn:mrn:iho:hydro:jsho:23456781
 Aggregation: Range System Aggregation
 Consists of: MRN: urn:mrn:iho:hydro:jsho:12345678
 Consists of: MRN: urn:mrn:iho:hydro:jsho:87654321
 Consists of: MRN: urn:mrn:iala:aton:jscg:54321678
 Consists of: MRN: urn:mrn:iala:aton:jscg:45678123

## b. Propose general rationale and purpose of S-130PT

- General rationale and purpose proposed by JP (IIC)
  - A fully conformant S-100 product specification for describing a polygonal demarcation of global sea areas (PDGSA).
  - The purpose of the product specification is to encode the extent of global sea areas using a system of unique numerical identifiers only.
  - This is in order to enable the production of datasets, compatible with the S-100 Universal Hydrographic Data Model, representing the limits of oceans and seas for use in compatible geographic information systems.

e. Presentation of draft Feature Catalogue and GML schema (and potentially sample dataset) proposed by JP(IIC)
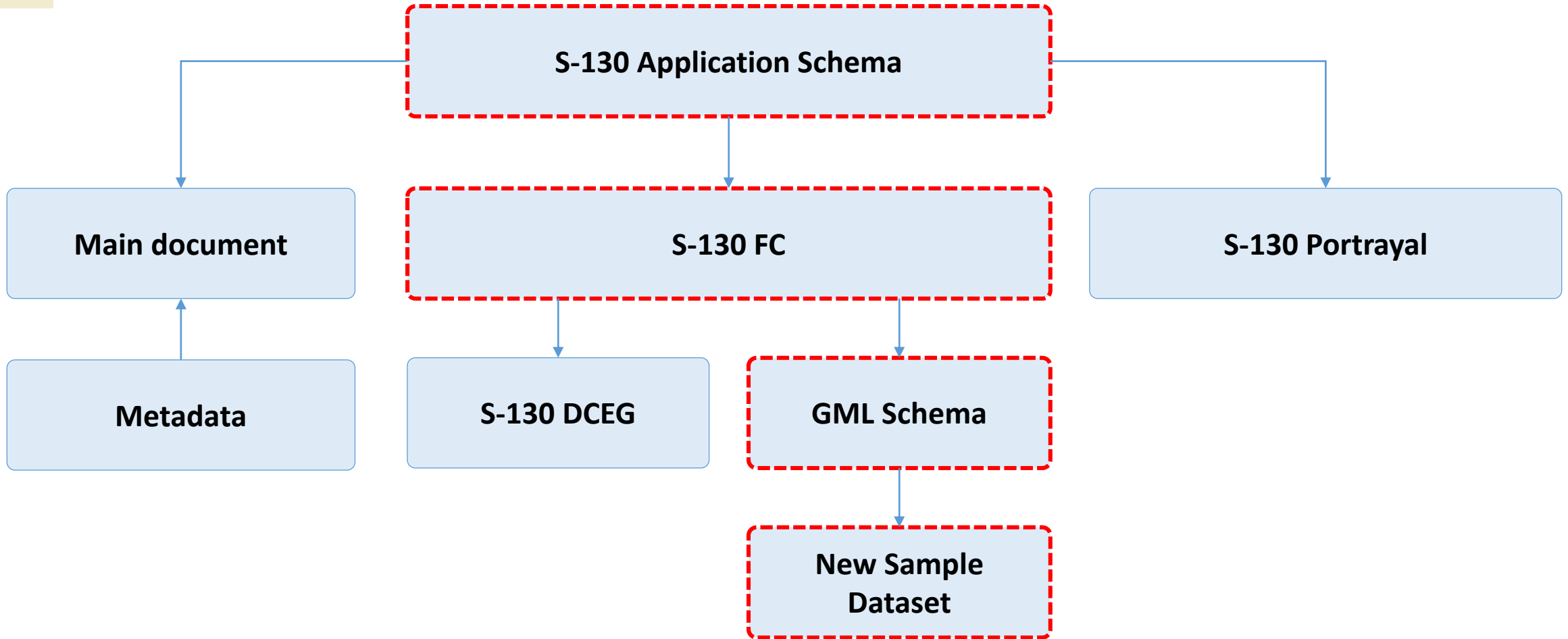
FC, GML SCHEMA AND SAMPLE DATASET

- S-130 FC, GML schema and sample dataset as follows
  - FC : S-130-10_ed5.xml
  - GML schema : S130-Draft-Schema-18102022.xsd
  - Sample dataset : S-130-sample1-v2.gml

S-130 Feature Catalogue

S-130 GML Schema

S-130 Sample dataset

- Explanatory note

  - Draft S-130 feature catalogue - autogenerated from the data model

  - GML Schema - autogenerated from the Feature Catalogue

  - Sample dataset - data of the UK Bristol Channel. This is approximate but the data refers to the S-23 definition of the Bristol channel and the S-23 coordinates are in an informationType for reference. This was made using the S-100 edition 5.0.0 tool, featureBuilder.

- Discussion topics proposed by JP (IIC)
  - The polygon is very approximate along the coastline. It would need ENC and River/Bay closing lines to be accurate
  - We can see how inaccurate S-23 is (the North point is miles out from where it should be - the reference in the information type contains the textual location of the North of the closing line)
  - A random integer value - in practice S-130 id numbers should probably be issued (probably by IHO) in order to be unique.
  - It might be good to allow a single locationReference in GlobalSeaArea as an inline attribute to avoid lots of references like S-121.
  - Need to use GI registry definitions and define any that don't currently exist. They will need to be submitted by the PT.
  - Everything is S-100 edition 5.0.0

• S-130 Sample dataset in QGIS