



TEWG Presentation

ENC conversion

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Summary and Contents

- History
- Background
- Current Status

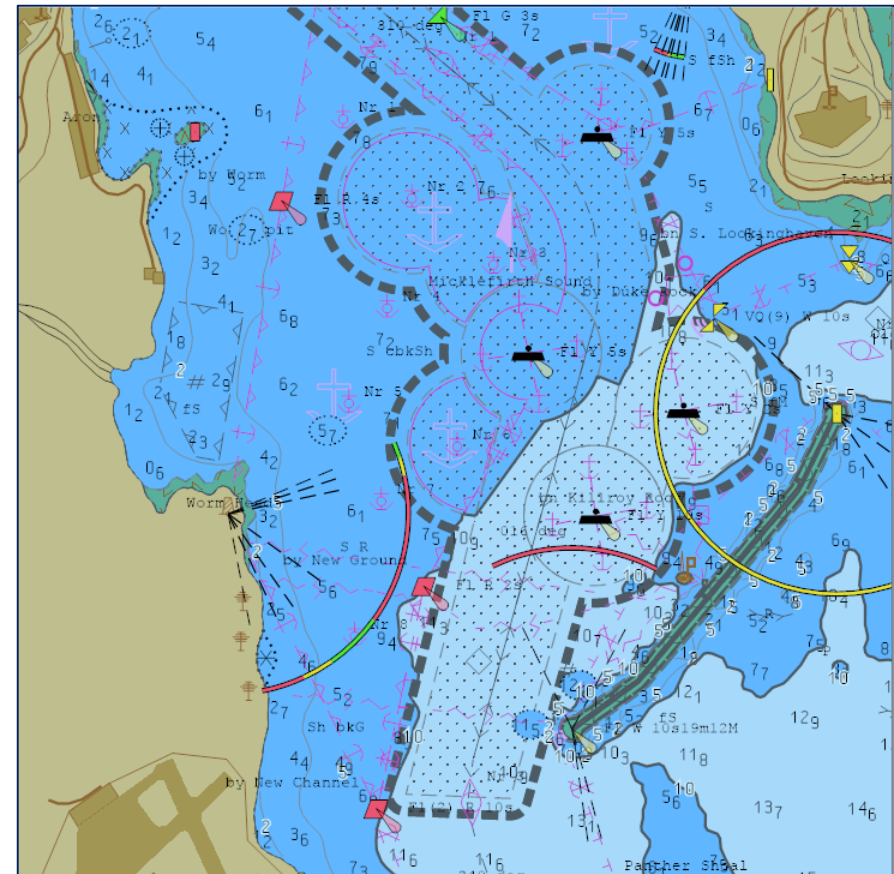
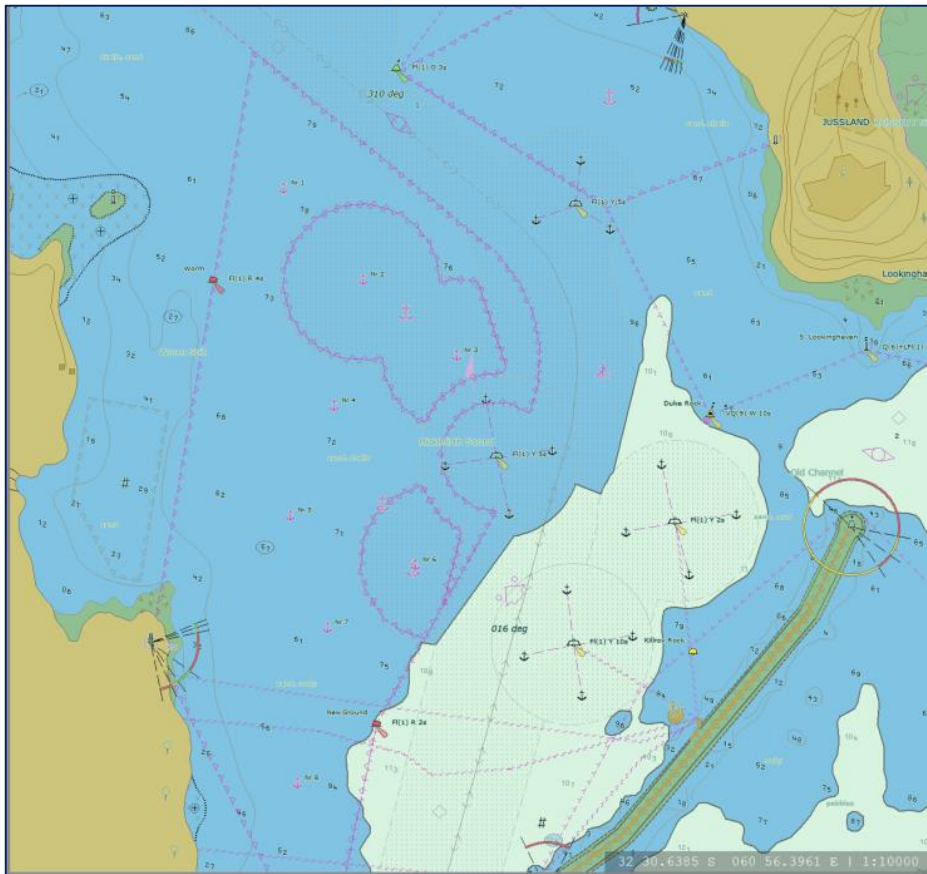
Aims – Progress up to start 2019

- Aims
 - Systematically, Look at how S-57 could be “optimised” to prepare data for conversion to S-101
 - Examine current converter, process and results
 - Report, summarise and suggest next steps
- What have we done?
 - Developed a systematic methodology
 - Carried out intensive data conversion
 - Analysis of results
 - UOC vs DCEG comparison
 - Reporting of results
- Since January 2019
 - Examined broader implications for migration “to S-101” for stakeholders
 - Looked at detailed “edge cases”
 - Compiling final summary report and lists of action items/edge cases

Methodology

- Systematic methodology
- Looked at whole of ENC “content” as defined by S-57 object and attribute catalogue and UOC encoding guidelines
- Take into account member state variations/restrictions from UOC – i.e. local encoding guides
- Test out current tools.
 - ESRI Converter, S-57 to S-101
 - SPAWAR viewer and data inspector
 - Latest S-101 feature catalogue
 - S-57 UOC, S-101 DCEG

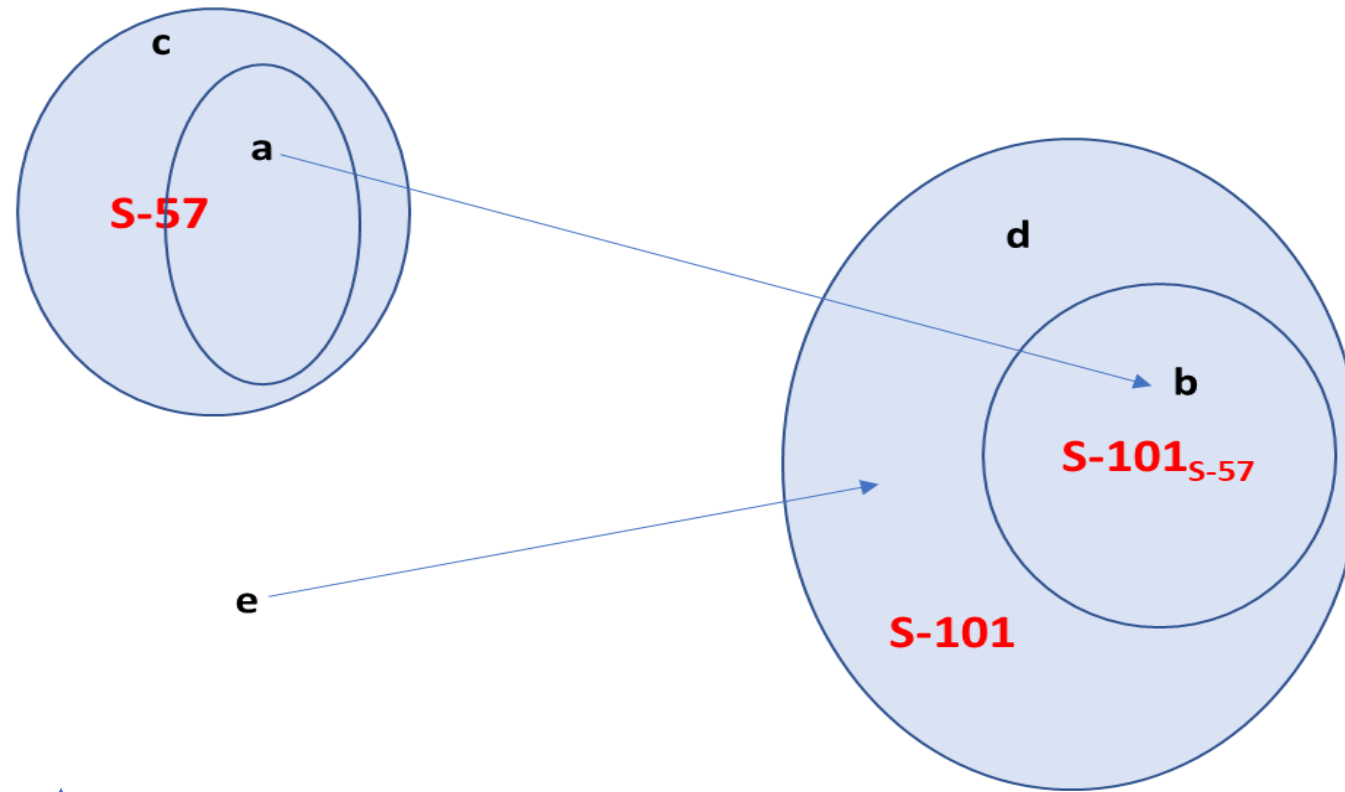
Overview.



The Short Version:

- Basic conversion and tools support S-57 to S-101 transformation
- There are complexities to get conformance with UOC/DCEG – some detail given here
- Data conversion is dependent on the capabilities of the “converter”
- No equivalent to S-58 exists to independently verify conversion

Basis of Original Study - Feature Categories



Real World Features

(a) Things in S-57 which can be translated into an S-101 equivalent without loss

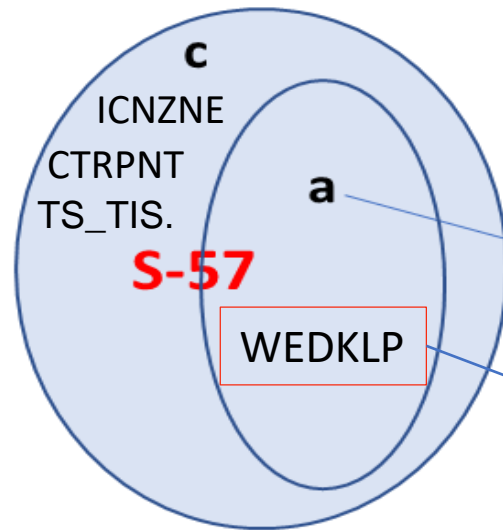
(b) The domain of features defined by the S-57 source

(c) Anything in S-57 which can't be (or doesn't need to be) translated into an S-101 equivalent

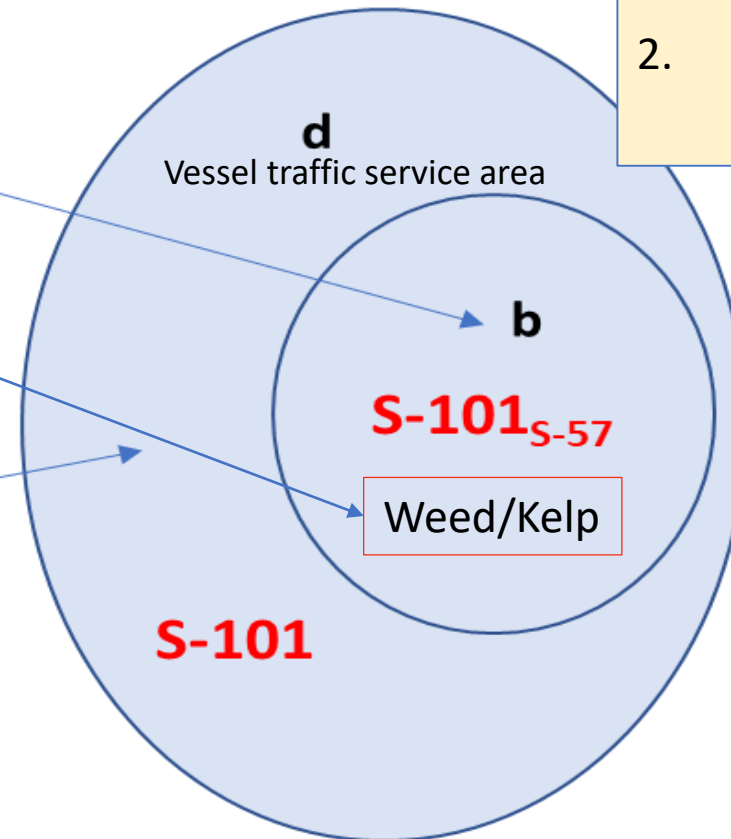
(d) Features defined in S-101 which have no complete defining mechanism in S-57

(e) Real world features which previously had no concrete representation in S-57 which are now expressible in S-101 (encoded into features (d)).

S-57/S-101 Categories



e
fibre optic cable



Note: the content of the sets here are not just Features and Attributes. Also includes:

1. Geometric Primitives
2. Feature/Attribute Combinations.

Simple transformation of a feature.

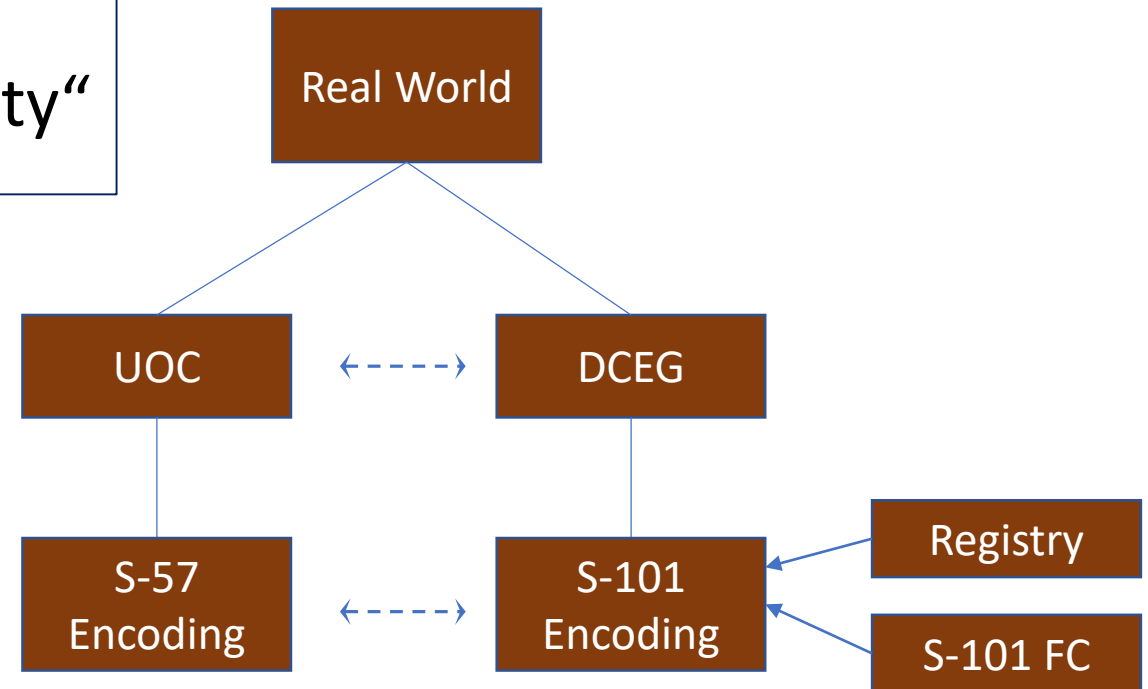
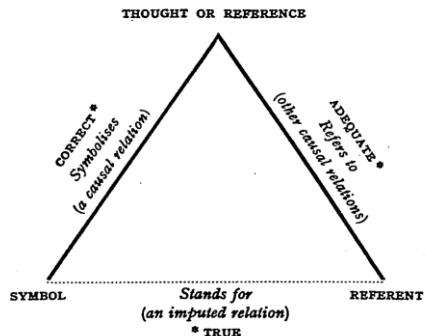
S57f ₁	S101F ₁
<pre>CANALS: { OBJNAM = Snapper Creek Canal SCAMIN = 259999 }</pre>	<pre>Canal: { featureName: { displayName=0 language=eng name=Snapper Creek Canal } scaleMinimum=259999 }</pre>

A slightly more complex transformation

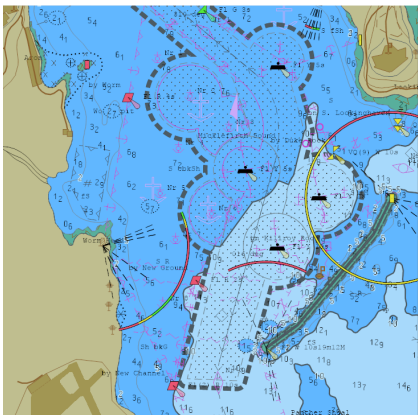
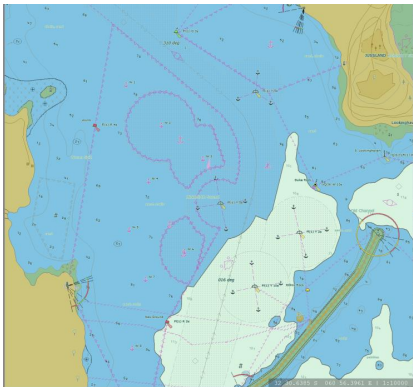
S57f ₂	S101F ₂
<pre>BOYSPP: { BOYSHP = 1 CATSPM = 27 COLOUR = 1,11 COLPAT = 1 INFORM = Danger shoal OBJNAM = Miami Springs Boat Club Shoal Buoy SORDAT = 20050628 SORIND = US,US,reprt,7thCGD,LNM 26/05 STATUS = 8 SCAMIN = 179999 }</pre>	<pre>BuoySpecialPurposeGeneral: { buoyShape=1 categoryOfSpecialPurposeMark=27 colour=1 colour=11 colourPattern=1 featureName: { displayName=0 language=eng name=Miami Springs Boat Club Shoal Buoy } status=8 scaleMinimum=179999 } additionalInformation provides { SupplementaryInformation: { language=eng text=Danger shoal } }</pre>

Why is the UOC important?

- Encodes Real world feature to PS encodings
- Sign - "something that stands for something, to someone in some capacity"



Feature and encoding comparison - Erebus



Erebus 0.9.3

File Tools Create Export Help

Obstruction ?

R958 FRID 100/210 MagneticVariation 550/951249373/12345

R959 FRID 100/204 MagneticVariation 550/605833349/12345

R960 FRID 100/211 MagneticVariation 550/312191268/17978

R961 FRID 100/187 MagneticVariation 550/811097202/17978

R962 FRID 100/188 MagneticVariation 550/607284841/17978

R963 FRID 100/13 Obstruction 550/541762174/1

R964 FRID 100/14 Obstruction 550/11804414/50

R965 FRID 100/15 Obstruction 550/11805261/50

R966 FRID 100/16 Obstruction 550/11805521/50

R967 FRID 100/17 Obstruction 550/11804573/50

R968 FRID 100/18 Obstruction 550/11804385/50

R969 FRID 100/20 Obstruction 550/140649637/12345

R970 FRID 100/21 Obstruction 550/11803111/50

R971 FRID 100/22 Obstruction 550/430984997/12345

R972 FRID 100/23 Obstruction 550/829526518/12345

R973 FRID 100/19 Obstruction 550/11805259/50

Obstruction:

{

expositionOfSounding=2

qualityOfVerticalMeasurement=9

reportedDate=1974----

valueOfSounding=2.7

waterLevelEffect=3

defaultClearanceDepth=182.8

surroundingDepth=182.8

}

geometry:

{

id = 110/199

orient = null

}

}

(150/5)

additionalInformation informationProvidedFor

{

NauticalInformation:

{

<NATC>valueOfSounding</NATC>

<ATIX>1</ATIX>

<PAIX>0</PAIX>

<ATIN>1</ATIN>

<ATVL>2.7</ATVL>

<NATC>waterLevelEffect</NATC>

<ATIX>1</ATIX>

<PAIX>0</PAIX>

<ATIN>1</ATIN>

<ATVL>3</ATVL>

<NATC>defaultClearanceDepth</NATC>

<ATIX>1</ATIX>

<PAIX>0</PAIX>

<ATIN>1</ATIN>

<ATVL>182.8</ATVL>

<NATC>surroundingDepth</NATC>

<ATIX>1</ATIX>

<PAIX>0</PAIX>

<ATIN>1</ATIN>

<ATVL>182.8</ATVL>

</ATTR>

OBSTRN ?

LNAM

R551F 100/7 COALNE 550/11801597/50

R552F 100/8 COALNE 550/11801640/50

R553F 100/9 COALNE 550/11803169/50

R554F 100/10 COALNE 550/11801099/50

R555F 100/11 COALNE 550/11801632/50

R556F 100/12 COALNE 550/11801899/50

R557F 100/14 OBSTRN 550/541762174/1

R558F 100/15 OBSTRN 550/11804414/50

R559F 100/16 OBSTRN 550/11805261/50

R560F 100/17 OBSTRN 550/11805521/50

R561F 100/18 OBSTRN 550/11804573/50

R562F 100/19 OBSTRN 550/11804385/50

R563F 100/20 OBSTRN 550/11805259/50

R564F 100/21 OBSTRN 550/140649637/12345

R565F 100/22 OBSTRN 550/11803111/50

R566F 100/23 OBSTRN 550/430984997/12345

R567F 100/24 OBSTRN 550/829526518/12345

R568F 100/25 UWTROC 550/351859814/12345

R569F 100/26 UWTROC 550/11805953/50

OBSTRN:

{

EXPSOU = 2

INFORM = Submarine volcano action

QUASOU = 9

SORDAT = 1974

SORIND = US,US.graph.Chart 526

VALSOU = 2.7

WATLEV = 3

}

geometry:

{

id = 6E02000000

ornt = null

}

<FRID>

<RCNM>100</RCNM>

<RCID>22</RCID>

<PRIM>1</PRIM>

<GRUP>2</GRUP>

<OBJL>86</OBJL>

<RVER>1</RVER>

<RUIN>1</RUIN>

</FRID>

<ATTF>

<ATTL>93</ATTL>

<ATVL>2</ATVL>

<ATTL>102</ATTL>

<ATVL>Submarine volcano action</ATVL>

<ATTL>125</ATTL>

<ATVL>9</ATVL>

<ATTL>147</ATTL>

<ATVL>1974</ATVL>

<ATTL>148</ATTL>

<ATVL>US,US.graph.Chart 526</ATVL>

<ATTL>179</ATTL>

<ATVL>2.7</ATVL>

<ATTL>187</ATTL>

<ATVL>3</ATVL>

</ATTF>

Categories of transformation

- Types of transformation
- Dictionary – where a feature or attribute acronym maps to a single equivalent
 - LNDARE -> Land Area
 - VERLEN -> Vertical Length
 - SNDWAV -> Sandwaves
- More complex dictionary – where a feature or attribute maps to more than one equivalent
 - OBJNAM ->Feature Name
- Increasing levels of complexity
 - Multi feature or multi-attribute
 - Conditional

S57f ₁	S101F ₁
<pre>CANALS: { OBJNAM = Snapper Creek Canal SCAMIN = 259999 }</pre>	<pre>Canal: { featureName: { displayName=0 language=eng name=Snapper Creek Canal } scaleMinimum=259999 }</pre>

Examples: Simple Dictionary Transformation

- Fish Havens

S57f	S101F
<pre>OBSTRN: { CATOBS=5 }</pre>	<pre>Obstruction: { categoryOfObstruction=5 }</pre>

11.9.3 Fish havens (see S-4 – B-447.5)

If it is required to encode a fish haven, it must be done using an OBSTRN object (see clause 6.2.2), with attribute CATOBS = 5 (fish haven).

13.10.2 Fish havens (see S-4 – B- 447.5)

If it is required to encode a fish haven, it must be done using an Obstruction feature (see clause X.X), with attribute category of obstruction = 5 (fish haven).

Distinction: Fishing facility; obstruction.

11.13.2 Log ponds (see S-4 – B-449.2)

If it is required to encode a log pond, it must be done using the object class LOGPON.

Geo object: Log pond (LOGPON) (P,A)
Attributes: NOBJNM OBJNAM STATUS INFORM NINFOM

INT 1 Reference: N 61

16.20.1 Log ponds (see S-4 – B-449.2)

If it is required to encode a log pond (also known as booming ground), it must be done using the feature Log Pond.

- Remarks:
- Seasonal log ponds should be encoded using the complex attribute periodic date range.
 - It is not required to separately encode any posts, piles or other log pond barrier supports.

Distinction:

If only life were always this simple....

More Complex

```
C_ASSO:
{
  OBJNAM = Los Coronados
  FFPT = 2602C6EC940BE211
  FFPT = 2602C5EC940BE211
  FFPT = 2602C8EC940BE211
  FFPT = 2602BEEC940BE211
}
LNDARE (2602C6EC940BE211):
{
  OBJNAM = North Coronado
}

LNDARE (2602C5EC940BE211):
{
  OBJNAM = Middle Coronado
}

LNDARE (2602C8EC940BE211):
{
}

LNDARE (2602BEEC940BE211):
{
  OBJNAM = South Coronado
}
```

```
IslandGroup:
{
  featureName:
  {
    displayName=0
    language=eng
    name=Los Coronados
  }
}
islandAggregation consistsOf
{
  LandArea:
  {
    featureName:
    {
      displayName=0
      language=eng
      name=North Coronado
    }
  }
}
islandAggregation consistsOf
{
  LandArea:
  {
    featureName:
    {
      displayName=0
      language=eng
      name=Middle Coronado
    }
  }
}
islandAggregation consistsOf
{
}
```

- Examples where multiple transformations are needed
- Simple -> Complex Attribution
- Associations C_ASSO -> Island Group

Creation of New Information

- New Features

11.13.5 Collision regulations

Some nations have introduced collision regulations (COLREG's) that may include demarcation lines differentiating between inland water rules and International Rules as a result of the Convention on the International Regulations for Preventing Collisions at Sea 1972. If it is required to encode COLREG's, it should be done using a narrow CTNARE object of type area (see clause 6.6) covering the demarcation line, with attribute INFORM and/or TXTDSC containing a short explanation about the regulation, (e.g. cautionary note from the paper chart). The attribute TXTDSC may be used instead of INFORM, or for longer explanations or notes.

16.26.1 Collision regulations limit (see S-4 – B-XXX)

If it is required to encode a collision regulations (COLREGs) demarcation line, it must be done using the feature Collision Regulations Limit.

Remarks:

- If it is required to encode the national regulation citation it must be done using the attribute regulation citation.

Distinction: Administration area.

- New Attribution

If it is required to encode a submarine cable, it must be done using the object class CBLSUB.

Geo object: Cable, submarine (CBLSUB) (L)
Attributes: BURDEP - if the buried depth varies along the cable, the cable must be encoded as several objects.
CATCBL - 1 - power line.
4 - telephone.
5 - telegraph.
6 - mooring cable/chain.
if encoded, the value of CATCBL must be one of the above.
CONDTN - 1 - under construction (during laying).
5 - planned construction (planned laying).
if encoded, the value of CONDTN must be one of the above.
DATEND DATSTA DRVAL1 DRVAL2 NOBJNM OBJNAM
STATUS - 4 - not in use (disused).
VERDAT- INFORM NINFOM

Remarks:

- Where a cable is disused, it should be encoded with the attribute STATUS = 4 (not in use (disused)), and the attribute CATCBL should not be encoded.

	Acronym	Value		
Buried depth	(BURDEP)		RE	0,1
Category of cable	(CATCBL)	1 : power line 6 : mooring cable/chain 7 : ferry 8 : fibre optic cable	EN	0,1
Condition	(CONDTN)	1 : under construction 5 : planned construction	EN	0,1
Feature name			C	0,*
Display name			(S) BO	0,1
Language		ISO 639-1	(S) TE	0,1
Name	(OBJNAM) (NOBJNM)		(S) TE	1,1
Fixed date range			C	0,1
Date end	(DATEND)	ISO 8601: 2004	(S) TD	0,1
Date start	(DATSTA)	ISO 8601: 2004	(S) TD	0,1
Status	(STATUS)	1 : permanent 4 : not in use 13 : historic 18 : existence doubtful	EN	0,*
Scale minimum	(SCAMIN)	See clause X.X	IN	0,1

New Attribute Types

13.2 Coastguard stations (see S-4 – B-492)

If it is required to encode a coastguard station, it must be done using the object class **CGUSTA**.

Geo object: Coastguard station (**CGUSTA**) (P)
Attributes: DATEND DATSTA NOBJNM OBJNAM PEREND PERSTA STATUS
INFORM NINFOM

Remarks:

- The **CGUSTA** must only be used to describe the function of the coastguard station, independent of the building or structure itself. If it is required to encode the building or structure in which the coastguard station operates, it must be done using an appropriate object class (e.g. **BUISGL**, **LNDMRK**).
- Maritime Rescue and Coordination Centres (MRCC) are part of a constantly manned communications watch system. If it is required to encode a MRCC, it should be done using **CGUSTA**, with attribute **INFORM** = *Maritime Rescue and Coordination Centre*. The name of the station may be populated using the attribute **OBJNAM**, e.g. *MRCC Swansea*.

stations were usually situated so as to have a commanding view and may therefore be visually prominent and make good fixing marks, the buildings may still be encoded as **Building** or **Landmark**.

- The **Coastguard Station** must only be used to describe the function of the coastguard station, independent of the building or structure itself. If it is required to encode the building or structure in which the coastguard station operates, it must be done using an appropriate feature (for example **Building**, **Landmark**).
- Maritime Rescue and Coordination Centres (MRCC) are part of a constantly manned communications watch system. If it is required to encode a MRCC, it should be done using **Coastguard Station**, with the Boolean attribute is **MRCC** = *True*. The name of the station may be populated using the complex attribute **feature name** (sub-attribute name), for example *MRCC Swansea*.
- Each VHF-channel should be indicated, using the attribute **communication channel** (see clause **X.X**).

Distinction: Building; rescue station.

Remarks:

- Each VHF-channel should be indicated, using the attribute **COMCHA**, in square brackets by 2 digits and up to 2 characters (A-Z); e.g. VHF channel 7 = *[07]*, VHF channel 16 = *[16]*. The indication of several VHF-channels is possible, with each value being separated by a semicolon; e.g. VHF channels 7 and 16 = *[07];[16]*.

Deletion of Old Information

- Some Features have been deleted
- Many feature/attribute combinations have been prohibited (after extensive consultation)
- Coincident point features – still needed?

Boatshed. If the service being provided by the structure is known, object classes **SMCFAC** (see clause 4.6.5) or **HRBFAC** (see clause 4.6.1) may also be encoded.

- If it is required to encode an offshore building, landmark or silo/tank, an ECDIS Base Display object (e.g. **PILPNT**, **LNDARE**, **PONTON**) must also be encoded coincident to ensure the feature is always displayed on the ECDIS. Where fitted, lights should be encoded as described in clause 12.8, with the **BUISGL**, **LNDMRK** or **SILTANK** being used as the structure object for the **LIGHTS** equipment object(s) (see clause 12.1.1).
- For encoding offshore windmotors, see clause 11.7.4.

Facility (see clause 4.6.1) may also be encoded.

- For buildings located in or over navigable water, the Boolean attribute **in the water** must be set to *True* to indicate that the feature is to be included in the ECDIS Base Display. Where such structures are located over the water it is not required to encode any supporting structures (for example piles, stilts).
- The complex attribute **vertical clearance fixed** must not be populated, unless the building is located over

- INFORM attribution is extensive in most member state data
- Covers many categories:
 - Structured Text as specified in UOC
 - Specified by UOC, no fixed structure
 - Determined by member state local UOC guidance (e.g. Fibre optic cables)
 - Ad Hoc.

• The text "Discoloured water" on the source indicates the probable existence of shallow water. This should be encoded using a **CTNARE** object with attribute INFORM or TXTDSC containing a cautionary note (see clause 6.6).

- Could be used as source for new features / attribution for a suitably configured converter?

Using INFORM!

- INFORM is popular! (66k attributed features on a sample of ~900 cells).
- Formatting not standardised. Sometimes recommended by UOC
- Some new S-101 content is already in INFORM. Could be parsed out and used to create new features/attributes.
- Examples:
 - COLREGS
 - Discoloured Water
 - Fibre Optic Cables
 - Attribution of Major Lights
 - Berths - Maximum Permitted draft information

e.g. Discoloured Water - now a feature in S-101

- The text "Discoloured water" on the source indicates the probable existence of shallow water. This should be encoded using a **CTNARE** object with attribute INFORM or TXTDSC containing a cautionary note (see clause 6.6).

S-57 UOC

S57CTNARE	S101DiscolouredWater
CTNARE: { INFORM = Discoloured Water }	DiscolouredWater: { }

Changes to UOC encoding

Total features	Feature	Enumeration (allowable / prohibited under UOC)	Attribute
12720	UnderwaterAwashRock.	boulder[18],rock[9],	natureOfSurface
2026	Landmark.	permanent[1],	status
1505	BeaconSpecialPurposeGeneral.	lattice beacon[4],	beaconShape
1250	Coastline.	sandy shore[3],stony shore[4],coral reef[9],	categoryOfCoastline
698	BeaconLateral.	lattice beacon[4],	beaconShape
290	CableSubmarine.	telephone[4],	categoryOfCable
290	SiloTank.	permanent[1],	status
192	Daymark.	painted[9],	natureOfConstruction
130	BuoySpecialPurposeGeneral.	private mark[13],	categoryOfSpecialPurposeMark
116	BeaconSpecialPurposeGeneral.	private mark[13],	categoryOfSpecialPurposeMark
109	River.	permanent[1],	status
84	UnderwaterAwashRock.	deeper than the range of depth of the surrounding depth area[3],	expositionOfSounding
55	Obstruction.	foul ground[7],	categoryOfObstruction
55	BuoySpecialPurposeGeneral.	other system[10],	marksNavigationalSystemOf
53	SlopeTopline.	dune[3],hill[4],	categoryOfSlope
22	Building.	permanent[1],	status
21	ProductionStorageArea.	permanent[1],private[8],	status
18	Landmark.	windmotor[19],	categoryOfLandmark

- Some UOC feature/attribute combinations are prohibited under DCEG/Feature Catalogue
- S-57 didn't "enforce" UOC combinations except through S-58
- DCEG/Feature Catalogue is much more prescriptive
- May require inspection to ensure no implications of conversion

Initial Conclusions – S-57 to S-101 feature conversion

- Conversion is a complex process involving:
 - Deleted features
 - Feature and Attribute name “dictionary translation”
 - Attribute values / Enumerations
 - Changes in allowed feature/attribute combinations (Allowed in S-57, not allowed in S-101)
 - Changes in allowed geometric primitives
 - Group 1 – Skin of the Earth components
 - Associations between features
 - Conversion of geometry model S-101->S-57
- There are varying levels of complexity of converters
 - Simple dictionary translation of feature/attributes
 - More complex rule based translation (combination of feature + attribute values)
 - Interpreting specific encoding to control Conversion – Best case is via INFORM values
 - Geometry conversion
- Need to account for member state encoding guidance and UOC interpretation

Initial Conclusions – S-57 to S-101 Geometry Conversion

- Geometry conversion
- Largely the geometry model is compatible – S-101's Level 3a topology introduces a level of further abstraction
 - Composite curves
 - Surfaces
- Geometry associations in features
 - S-57 – sequences of oriented curves
 - S-101 – Sequences of oriented surfaces, curves or composite curves
- S-101 is MUCH more efficient but is also backwards compatible with S-57
 - Isolated / Connected points have disappeared. There are only points/multipoints (sounding arrays)
 - Geometry attribution dealt with differently (via association)

Changes to Group 1 – Skin of the Earth

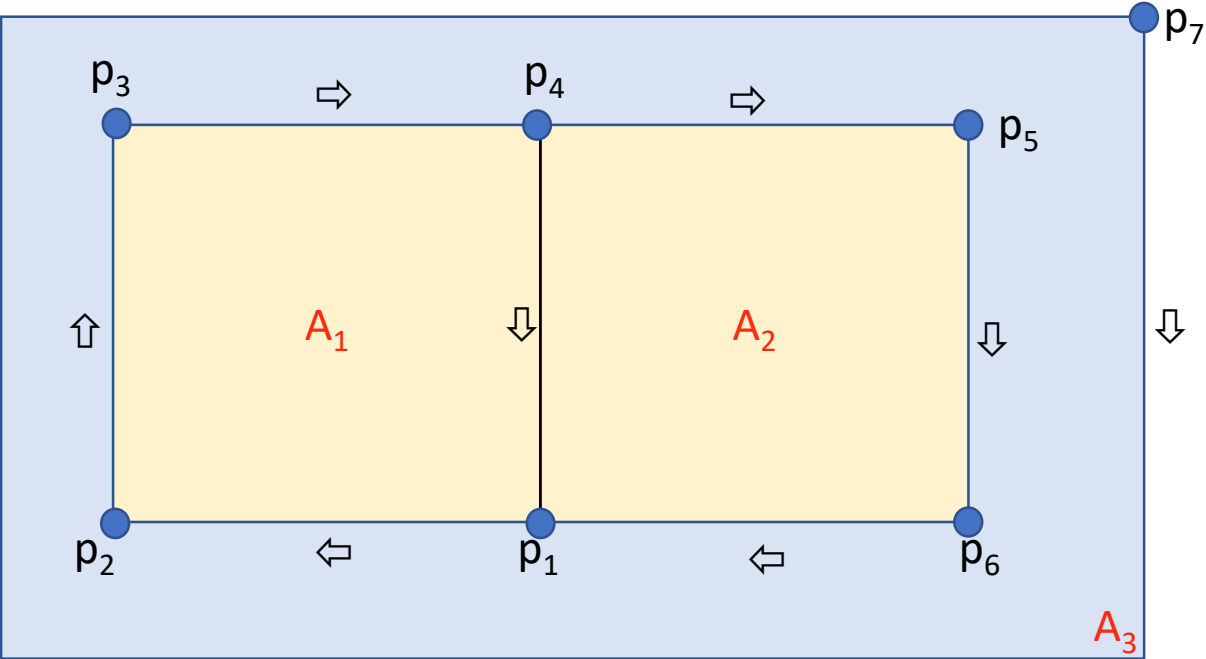


Group 1 – Skin of the Earth changes:

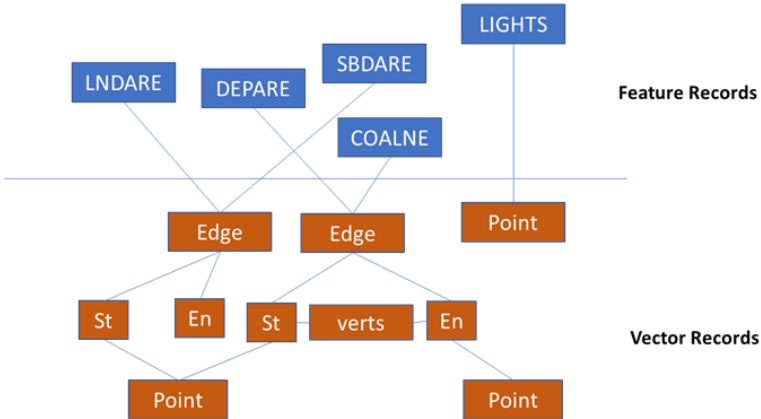
- Because the features comprising Group 1 have changed, any conversion requires new Group 1 features to be added to SOE and non-SOE features to be lifted out (and replaced with a valid SOE feature).
- Will require rules or manual inspection to get the best results on translation
- Simple translation to UNSARE/Unsurveyed Areas could be a remedy
- Needs examination and testing.
- No Safety implications.
- Complex but automation is possible (including updates). Could use INFORM attribution to control a converter
- Can optimise conversions by pre-defining replacement underlying geometry
- **Could require geometry processing for complex cases (needs study) – this could be avoided by suitable encoding (and INFORM)**



Geometry Model Differences



P = Point
E = Edge
CC = Composite Curve
Sf = Surface
A_n = Feature Polygon
↔ = Reversed

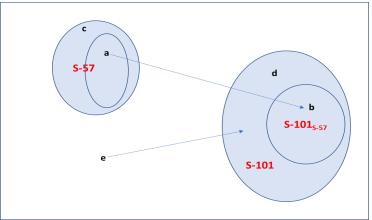


S-57	S-101
$E_0 = P_1 - P_2$ $E_1 = P_2 - P_3 - P_4$ $E_2 = P_4 - P_1$ $E_3 = P_4 - P_5 - P_6$ $E_4 = P_6 - P_1$	$E_0 = P_1 - P_2$ $E_1 = P_2 - P_3 - P_4$ $E_2 = P_4 - P_1$ $E_3 = P_4 - P_5 - P_6$ $E_4 = P_6 - P_1$
$A_1 = E_0 + E_1 + E_2$ $A_2 = E_3 + E_4 + \leftrightarrow E_2$	$CC_1 = E_0 + E_1$ $CC_2 = E_4 + \leftrightarrow E_2$
	$Sf_1 = CC_1 + E_2$ $Sf_2 = E_3 + CC_2$
	$A_1 = Sf_1$ $A_2 = Sf_2$

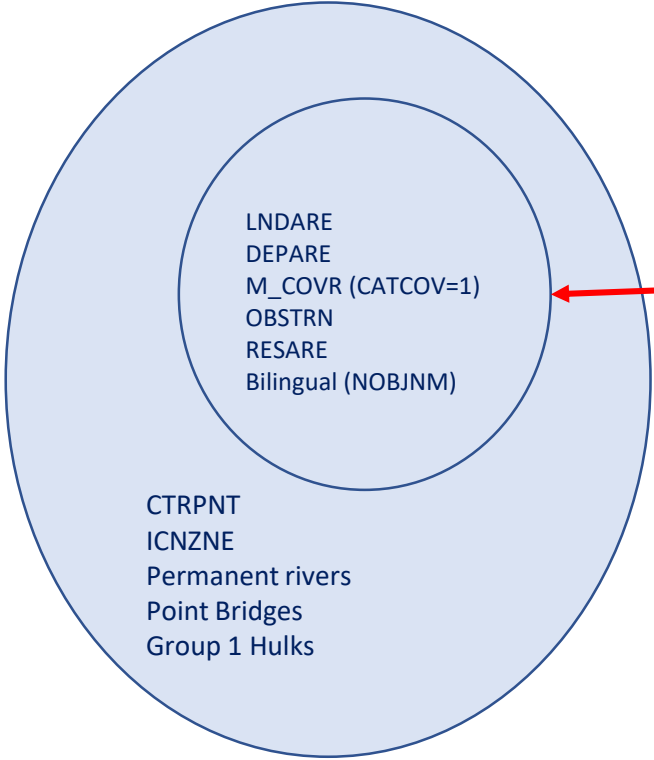
Geometry Primitives Differences

Feature	Allowable primitives (S-57)	S-101 Primitives
<u>BRIDGE</u>	Point, Line, Area	Curve, Surface
<u>DAMCON</u>	Point, Line, Area	Curve, Surface
<u>GRIDIRN</u>	Point, Area	Surface
<u>DEPARE</u>	Line, Area	Surface
<u>RECTRC</u>	Line, Area	Curve
<u>ROADWY</u>	Point, Line, Area	Curve, Surface
<u>PIPSOL</u>	Point, Line	Curve
<u>TUNNEL</u>	Point, Line, Area	Curve, Surface

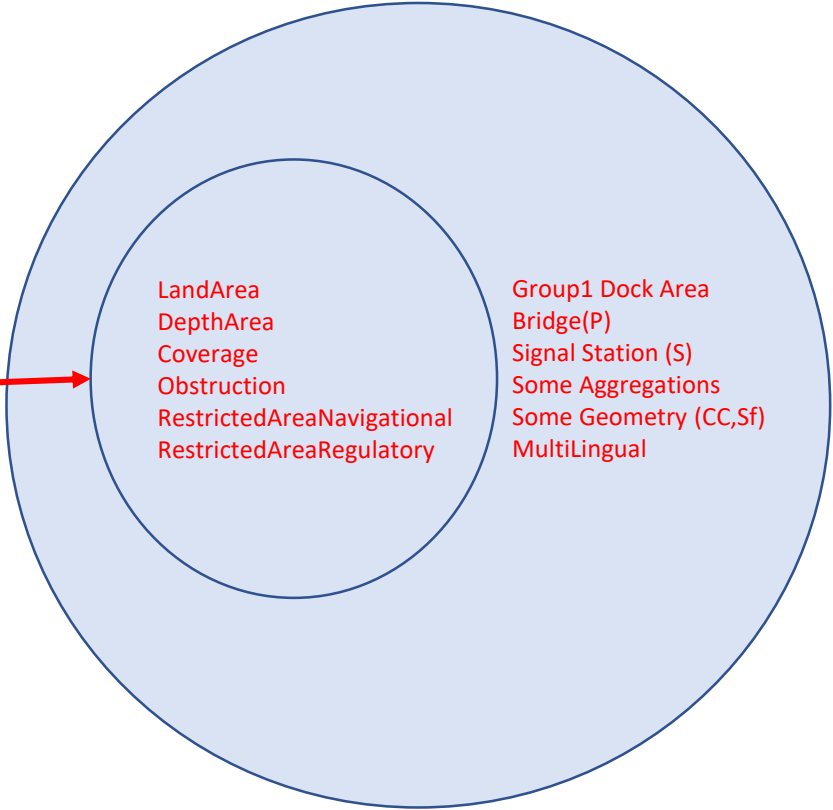
Conversion



S-57



S-101

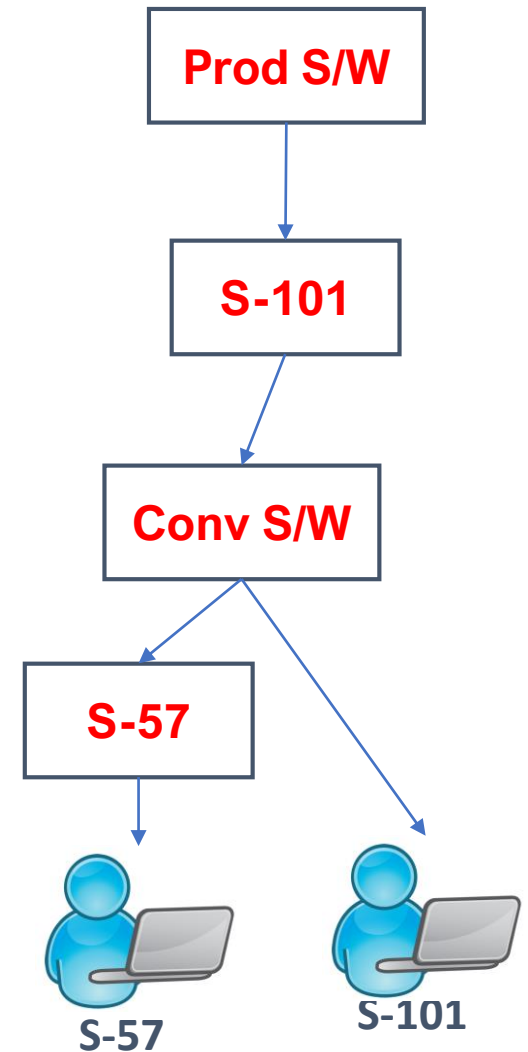
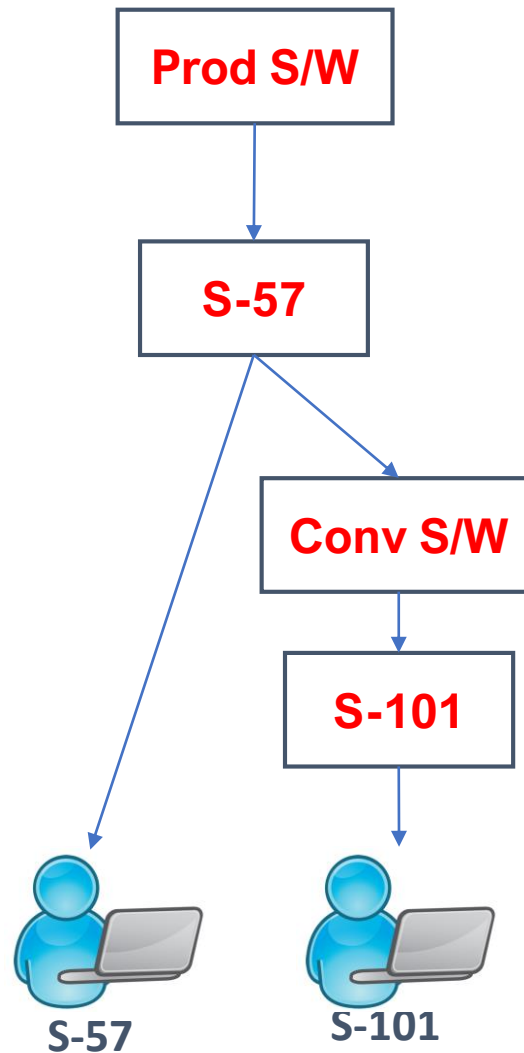


Moving on from S-57 to S-101 conversion

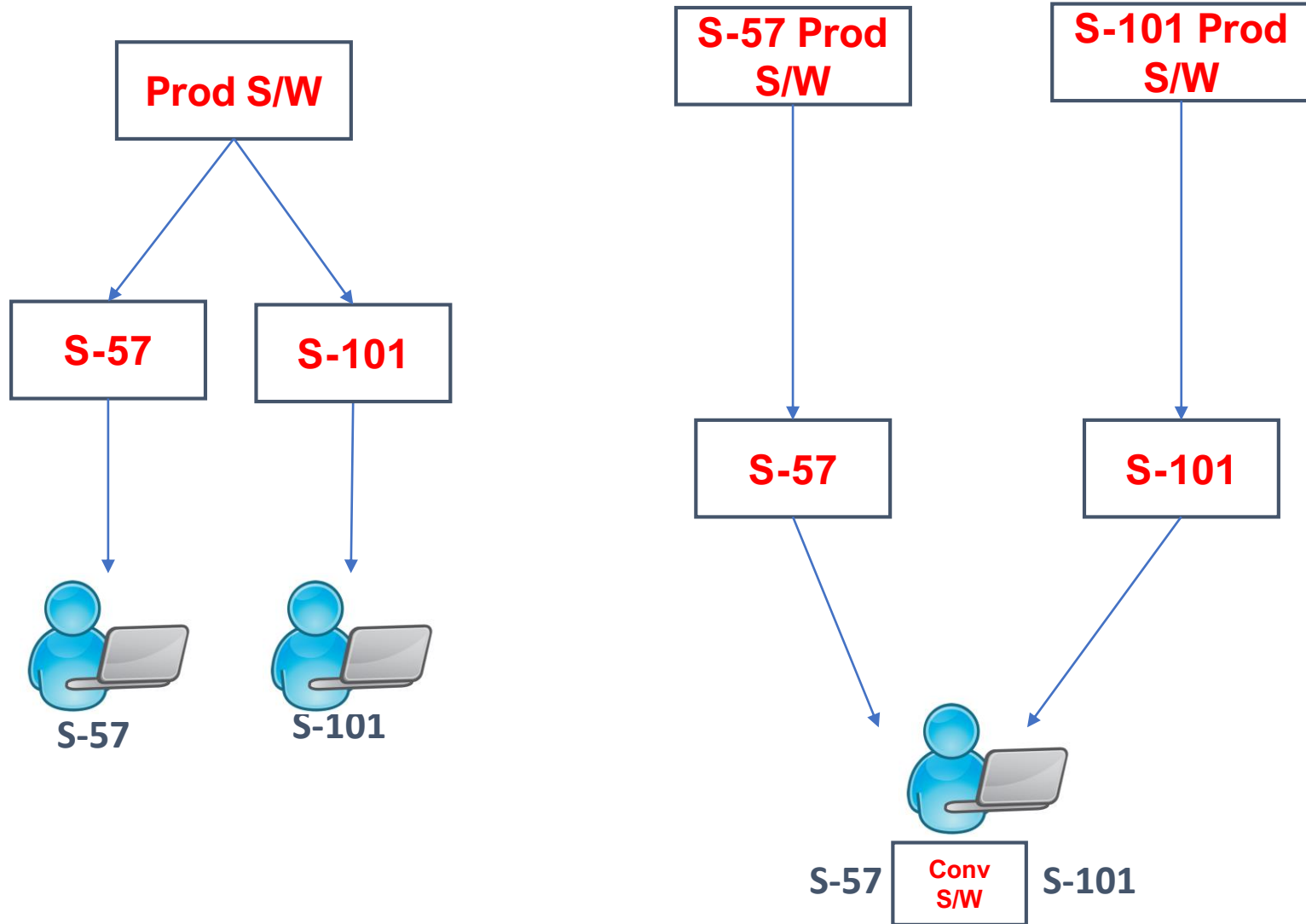
- The real issue is migration to S-101 (and S-100) for member states
- Some early ideas on how this can take place follow:
- Issues
 - How can migration of the database which drives ENC production be accomplished
 - How should the inevitable dual “production” of S-57 and S-101 be approached
 - Validation
 - Of produced S-101
 - S-101 against S-57 cells, are they “equivalent” (what does “equivalent” mean?)
 - Is it achievable via “conversion” technologies or is manual cartographic effort required and inevitable?
- Ongoing!

How will migration S57=>S-101 take place? V1.0

- Post-production conversion
- After production of ENC data conversion takes place (somewhere)
- End user systems are “single fuel”
- Users are S-101 or S-57 and migration of user base takes place over a period of time

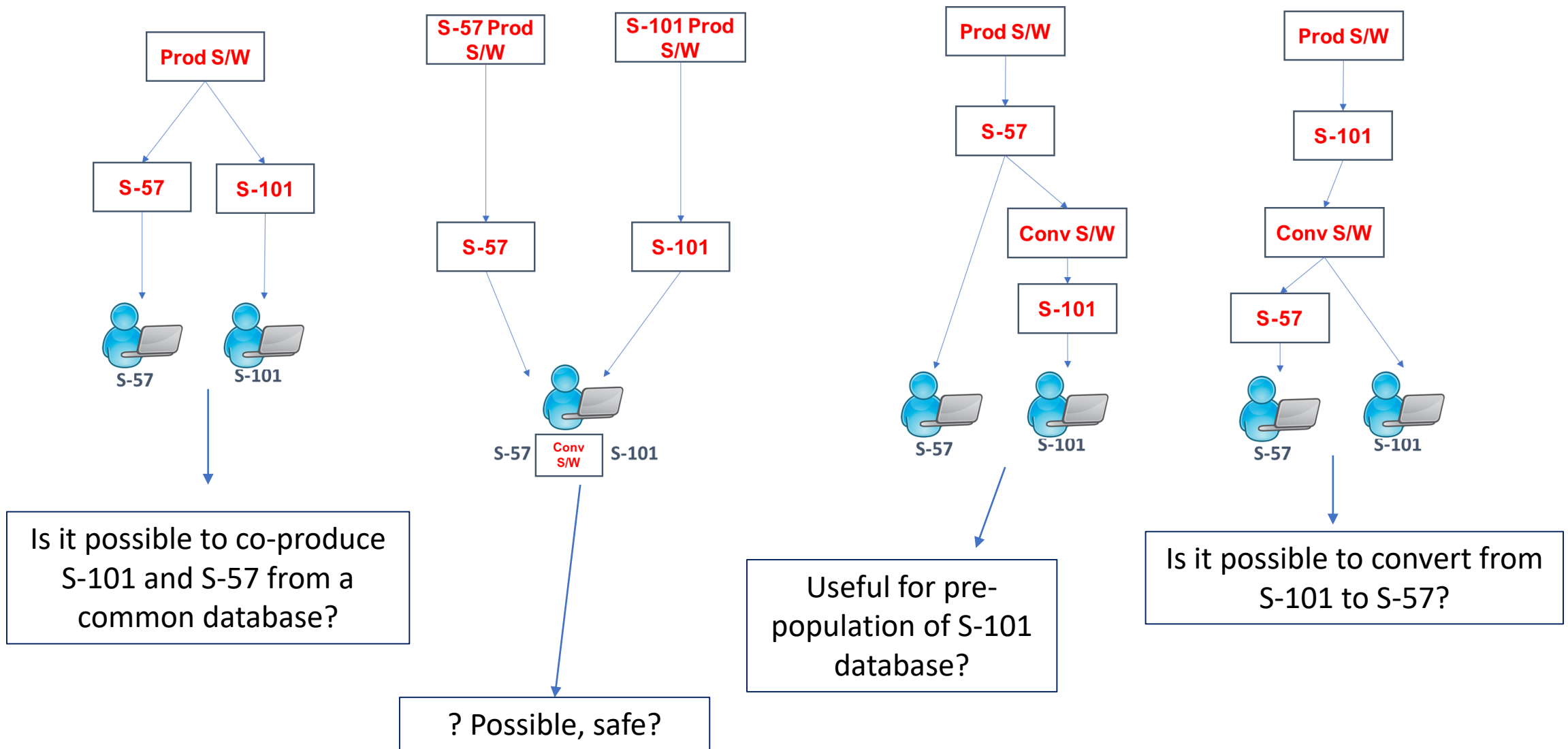


How will migration S57=>S-101 take place? V2.0



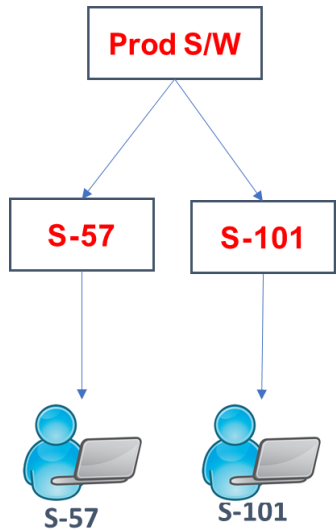
- Either:
 - Production software produces both S-57 and S-101
 - End user system (ECDIS) adds compatibility with S-101 format data ("dual fuel")

Migration strategy

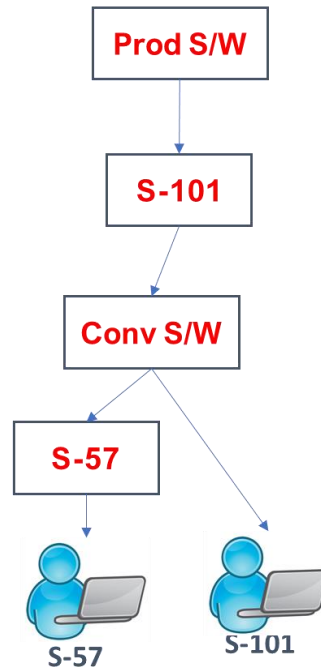


Core question: S-101 migration strategy

Co-Production



Conversion



Co-Production

- Requires more complex encoding and data model
- Requires database migration
- Can fully express all S-57/S-101 domain
- Must be supported by production system or combination of production system and transformation software
- Transition of S-57 features when migration complete

Conversion

- Much simpler – only produces S-101
- May have unintended conversion behaviour, requires validation
- Requires initial migration and validation
- May need customisation/migration for “good” conversion
- No need to migrate when transition over.

Retro-Converter and Comparison Development.

Erebus 0.9.3

File Tools Create Export Help

Obstruction ?

... ☐ expand associations ☐ expand geometry

about

R958 FRID 100/210 MagneticVariation 550/951249373/12345 ^
R959 FRID 100/204 MagneticVariation 550/605833349/12345
R960 FRID 100/211 MagneticVariation 550/312191268/17978
R961 FRID 100/187 MagneticVariation 550/811097202/17978
R962 FRID 100/188 MagneticVariation 550/607284841/17978
R963 FRID 100/13 Obstruction 550/541762174/1
R964 FRID 100/14 Obstruction 550/11804414/50
R965 FRID 100/15 Obstruction 550/11805261/50
R966 FRID 100/16 Obstruction 550/11805521/50
R967 FRID 100/17 Obstruction 550/11804573/50
R968 FRID 100/18 Obstruction 550/11804385/50
R969 FRID 100/20 Obstruction 550/140649637/12345
R970 FRID 100/21 Obstruction 550/11803111/50
R971 FRID 100/22 Obstruction 550/430984997/12345
R972 FRID 100/23 Obstruction 550/829526518/12345
R973 FRID 100/19 Obstruction 550/11805259/50

Obstruction:

```
{  
  expositionOfSounding=2  
  qualityOfVerticalMeasurement=9  
  reportedDate=1974----  
  valueOfSounding=2.7  
  waterLevelEffect=3  
  defaultClearanceDepth=182.8  
  surroundingDepth=182.8  
}
```

(150/5)
additionalInformation informationProvidedFor
{
 NauticalInformation:
 {
 geometry:
 {
 id = 110/199
 orient = null
 }
 }
}

OBSTRN ?

LNAM

R551F 100/7 COALNE 550/11801597/50
R552F 100/8 COALNE 550/11801640/50
R553F 100/9 COALNE 550/11803169/50
R554F 100/10 COALNE 550/11801099/50
R555F 100/11 COALNE 550/11801632/50
R556F 100/12 COALNE 550/11801899/50
R557F 100/14 OBSTRN 550/541762174/1
R558F 100/15 OBSTRN 550/11804414/50
R559F 100/16 OBSTRN 550/11805261/50
R560F 100/17 OBSTRN 550/11805521/50
R561F 100/18 OBSTRN 550/11804573/50
R562F 100/19 OBSTRN 550/11804385/50
R563F 100/20 OBSTRN 550/11805259/50
R564F 100/21 OBSTRN 550/140649637/12345
R565F 100/22 OBSTRN 550/11803111/50
R566F 100/23 OBSTRN 550/430984997/12345
R567F 100/24 OBSTRN 550/829526518/12345
R568F 100/25 UWTRC 550/351859814/12345
R569F 100/26 UWTRC 550/11805953/50

OBSTRN:

```
{  
  EXPSOU = 2  
  INFORM = Submarine volcano action  
  QUASOU = 9  
  SORDAT = 1974  
  SORIND = US,US_graph,Chart 526  
  VALSOU = 2.7  
  WATLEV = 3  
}  
geometry:  
{  
  id = 6E02000000  
  ornt = null  
}
```

Config

Go Save As Done Cancel

<NATC>valueOfSounding</NATC>
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<PAIX>0</PAIX>

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[550/571106361/17978] - DepthContour [125/96] -> DEPCNT
[550/2051475/17978] - DepthContour [125/97] -> DEPCNT
[550/294527280/17978] - DepthContour [R120/142] -> DEPCNT
[550/395572416/17978] - DepthContour [125/129] -> DEPCNT
[550/135697061/1] - ExclusiveEconomicZone [130/83] -> EXEZNE
[550/396919282/1] - ExclusiveEconomicZone [130/82] -> EXEZNE
[550/606611150/17978] - InformationArea [130/37] ->
[550/11803928/50] - LandArea [130/52] -> LNDARE
[550/11803976/50] - LandArea [130/51] -> LNDARE
[550/11803502/50] - LandArea [130/58] -> LNDARE
[550/11803906/50] - LandArea [130/53] -> LNDARE

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<ATTL>179</ATTL>
<ATVL>2.7</ATVL>
<ATTL>187</ATTL>
<ATVL>3</ATVL>
</ATTF>



Thank You.

Questions?

jonathan.pritchard@iictechnologies.com