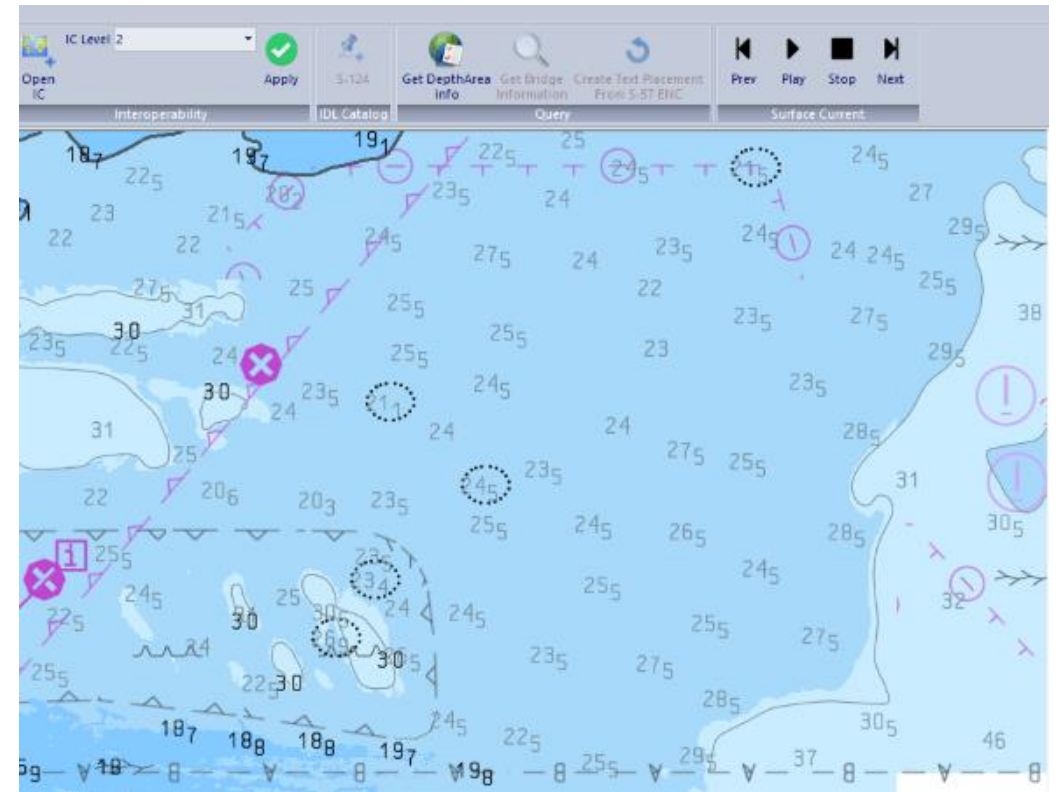# ROK-US Joint Project Agreement - Interoperability use cases

Contents

- Interoperability Use Case definitions, definition and testing

- Definition of use cases to support testing of interoperability according to IMO ECDIS use.

- Product Specifications and Features examined

- Testing on the KHOA S-100 Viewer

- Status, Plans and questions

IIC TECHNOLOGIES

Driving the Use Cases

- In order to be realistic we should drive use cases for interoperability from the uses cases for ECDIS itself

- A lot of work has already been done experimenting with interoperability between data layers and use within ECDIS, e.g. KHOA Sea Trials and S-100 ECDIS initiatives

- We have tried to define use cases from ECDIS "use" instead of purely from display standards

- Primary driver is IMO regulations for use of ECDIS for primary navigation

IIC TECHNOLOGIES

Use of ECDIS for primary navigation
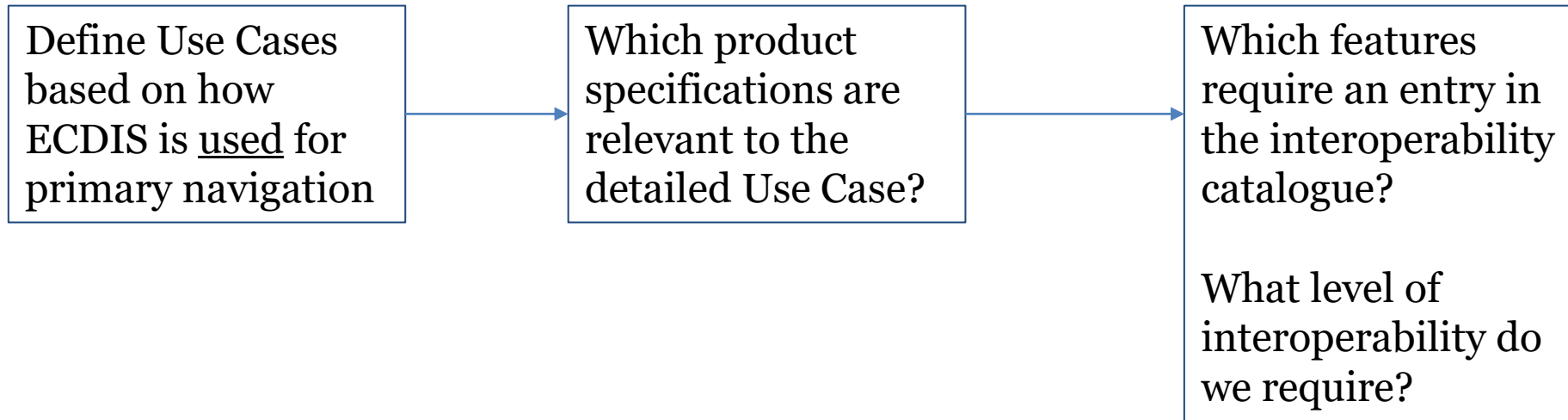
IMO
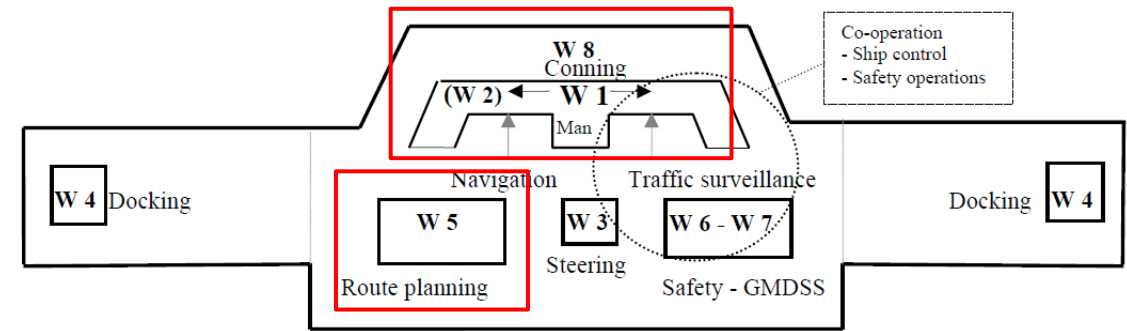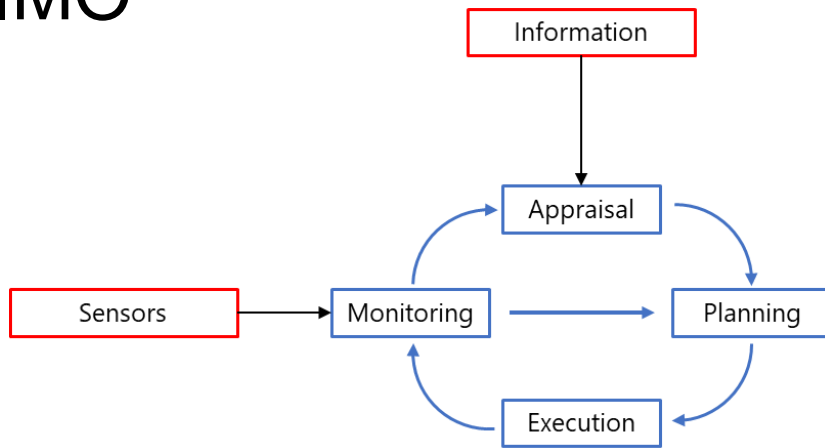
Design principles – *Example of location of workstations for effective bridge team management during different operating conditions*
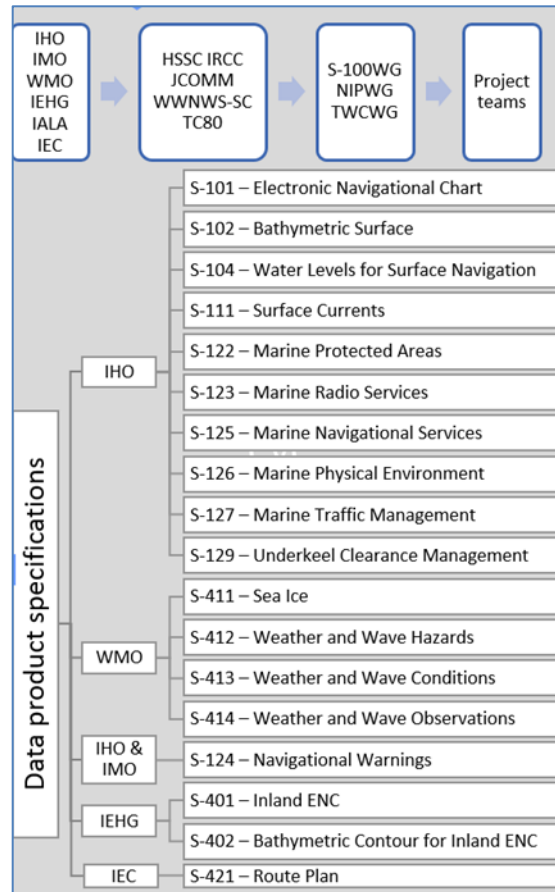
- Use Cases stem from IMO process for passage planning and bridge layout during monitoring during execution/monitoring

- The planning/re-planning process is continuous on the vessel bridge

- Plan updates are communicated through the INS: Conning/monitoring and planning ECDIS <u>will</u> have different settings

IIC TECHNOLOGIES

Process followed

Define Use Cases based on how ECDIS is <u>used</u> for primary navigation → Which product specifications are relevant to the detailed Use Case? → Which features require an entry in the interoperability catalogue?

What level of interoperability do we require?

IIC TECHNOLOGIES

S-100 Data products to use

From Interoperability Specification and considering publication status
- S-101 – Electronic Navigational Charts
- S-102 – Dense Bathymetry
- S-104 – Water Levels
- S-111 - Currents
- S-122 – MPA
- S-123 – Radio Signals data.
- S-124 – RNW/MSI
- S-127 – Traffic Management
- S-129 - UKC
- S-421 – Route planning

Others that could be considered
- S-128 Service catalogues.
- S-401 Inland ENC – this would be useful to test interoperability if overlapping data exists but most of our use cases areas are either open water or port-based and therefore may not be covered by IENC areas.
- S-4XX meteorological information – these are mostly concerned with weather effects and more of an "overlay" rather than data requiring true interoperability. It may be possible to bring these in as part of some of the use cases
- S-131 – Marine Harbour infrastructure. This product specification is under construction currently within NIPWG and represents the "port's" view of the infrastructure including routing, services, critical depths and restrictions. This will be crucial for port entry/exit considerations

The Process to follow

Define Use Cases based on how ECDIS is <u>used</u> for primary navigation

→

Which product specifications are relevant to the detailed Use Case?

→

Which features require an entry in the interoperability catalogue?

What level of interoperability do we require?

Appraisal and Planning
Information Required (IMO A.893(21)):

1. Permissible draft at sea in fairways and ports
2. Appropriate scale and up to date charts, relevant permanent and temporary NtMs, existing RNW
3. Sailing Directions, Lists of Lights, Lists of Aids to Radio Navigation
4. "up to date additional information",
   a. routing guides and passage planning charts
   b. current and tide atlases and tables
   c. "hydrographical" data
   d. Weather routing
   e. Ships' reporting and routeing systems, VTS and marine environmental protection measures
   f. Traffic volumes
   g. Pilotage and embarkation, including master/pilot exchange
   h. Port information including emergency response arrangements and equipment
5. Clear indications of all areas of danger
6. Safe speed in regard to navigational hazards
7. Clearance required under keel
8. Turning (and tide/current)
9. Proximity to coast (for position fixing)
10. Environmental protection
11. Contingency planning
12. Timespans (for night passage)

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1. Permissible draft at sea in fairways and ports **S-101, S-131**
2. Appropriate scale and up to date charts, relevant permanent and temporary NtMs, existing RNW (**S-101, S-124**)
3. Sailing Directions, Lists of Lights, Lists of Aids to Radio Navigation (**S-123, S-127**)
4. "up to date additional information",
   a. routing guides and passage planning charts
   b. current and tide atlases and tables (**S-104/S-111 (if applicable)**)
   c. "hydrographical" data
   d. Weather routing
   e. Ships' reporting and routeing systems, VTS and marine environmental protection measures (**S-127**)
   f. Traffic volumes
   g. Pilotage and embarkation, including master/pilot exchange (**S-131**)
   h. Port information including emergency response arrangements and equipment (**S-131**)
5. Clear indications of all areas of danger (**S-101, S-122**)
6. Safe speed in regard to navigational hazards (**S-101, S-129**)
7. Clearance required under keel (**S-129**)
8. Turning (and tide/current) (**S-104/S-111**)
9. Proximity to coast (for position fixing) (**S-101**)
10. Environmental protection (**S-122**)
11. Contingency planning (**S-101**)
12. Timespans (for night passage) (**S-101**)

IIC TECHNOLOGIES

- We have worked through all the candidate feature catalogues
- Candidates for IC Level 2 identified, initially from identical features
- Inspection of feature catalogues and inspection of existing S-98
- Identified candidates implemented in an IHO conformant interoperability catalogue
- Tested in viewer.

Prod	Feature	Code	Level	Viewing Group	Viewing Group Layer	Drawing Priority[1]	Comment
F	Restricted area navigational	RestrictedAreaNavigational	2	26010			S-101, S-127
F	Restricted area regulatory	RestrictedAreaRegulatory					No portrayal (no group in S-101)
F	Vessel Traffic Service Area	VesselTrafficServiceArea	1	28030			Also in S-101 and S-127. S-98 Standard display
F	Data coverage	DataCoverage					Data Coverage area. See S-98
F	Quality of NonBathymetric Data	QualityOfNonBathymetricData					
F	Text Placement	TextPlacement					
S-123							
F	Building						
F	Coastguard sta						
F	GMDSS area						
F	Inmarsat ocea						
F	Indeterminate						
F	Landmark						
F	NAVAREA/META						
F	NAVTEX station						
F	Radio service a						
F	Radio station						
F	Weather foreca						
F	Forecast area						
F	Radio service a						
S-124							
F	S124_Navigatio						
F	S124_Text Plac						

| Prod	Feature	Code	Level	Viewing Group	Viewing Group Layer	Drawing Priority[1]	Comment
	S-126 Physical Environment						
F	Caution Tidal Stream	CautionTidalStream					
F	Caution Sea Fog	CautionSeaFog					
F	Caution Eddy	CautionEddy					
S-127							
F	Caution area	CautionArea	2	26150			S-101
F	Concentration of shipping hazard area	ConcentrationOfShippingHazardArea	1	26000		[5,6,7]	
F	ISPS code security level	IspsCodeSecurityLevel	1	35100		[5,6,7]	
F	Local Port Service Area	LocalPortServiceArea	1	35100		[5,6,7]	
F	Military practice area	MilitaryPracticeArea	2	26040			S-101
F	Pilot boarding place	PilotBoardingPlace	2	28040 / 28010			S-101
F	Pilot service	PilotService	1	28040		[5,6,7]	
F	Pilotage district	PilotageDistrict	2	28040 / 28010			S-101
F	Piracy risk area	PiracyRiskArea	1	35100		[5,6,7]	
F	Place of refuge	PlaceOfRefuge	1	35100		[5,6,7]	
F	Radar range	RadarRange	1	35100		[5,6,7]	
F	Radio calling-in point	RadioCallingInPoint	2	25060			S-101
F	Restricted area navigational	RestrictedAreaNavigational	2	26010		[5,6,7]	S-101, S-122
F	Restricted area regulatory	RestrictedAreaRegulatory					
F	Routeing measure	RouteingMeasure	1	35100		[5,6,7]	
F	Ship Reporting Service Area	ShipReportingServiceArea	1	35100		[5,6,7]	
F	Signal Station Warning	SignalStationWarning	2	28020			S-101
F	Signal Station Traffic	SignalStationTraffic	2	28020			S-101
F	Underkeel clearance allowance area	UnderkeelClearanceAllowanceArea	1	36200			Also in S-129
F	Underkeel clearance management area	UnderkeelClearanceManagementArea	1	36200			Also in S-129

IIC TECHNOLOGIES

IC Details

The project interoperability catalogue includes
- IC Level 1 implementations in line with those specified in S-98 Annex C
- Some suggested IC Level 2 implementations
  - These are based on features likely to be suppressed due to more authoritative versions in other S-100 product specs.
  - Those considered.
    - S-101 + S-102, S-104, S-111, S-122, S-123, S-127, S-128 and S-129
  - Examples
    - S-101/S-102, Suppress DepthArea/DredgedArea
    - S-101/S-123, CoastguardStation, RadioStation
    - S-101/S-122, MarineProtectedArea, RestrictedAreaNavigational

- Some questions
  - Who defines, issues, signs and is responsible for IC creation, IHO, MS, IEC?
  - Does IC level 2 suppress everything on screen or just features coincident with the extent of the PDC coverage
  - What advice is necessary for data producers to implement against IC Level 2?
    - Is coincident coverage necessary for features?
    - IC Level 2 might require double encoding to ensure important information is preserved?

IIC TECHNOLOGIES

KHOA S-100 Viewer testing

S-102
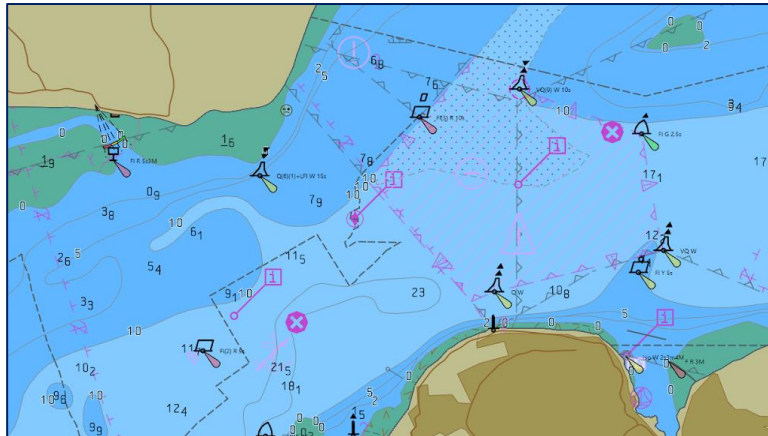
S-101

S-101 + S-102 (IC2) – Should interoperability suppress all DepthAreas on screen or just those within the extent of both S-101 and S-102 (the defined PDC)? We presume the latter….

IIC TECHNOLOGIES

Current Status

We are drawing together:
- The use cases defined
- The component product specifications
- S-98 Annex C portrayal
- Suggesting some IC level 2 configurations
- Experimenting with test data

Experiences to date:
- Interoperability is complex to define and implement without an efficient and streamlined test cycle. Viewers and test data are indispensable
- KHOA S-100 Viewer being tested now
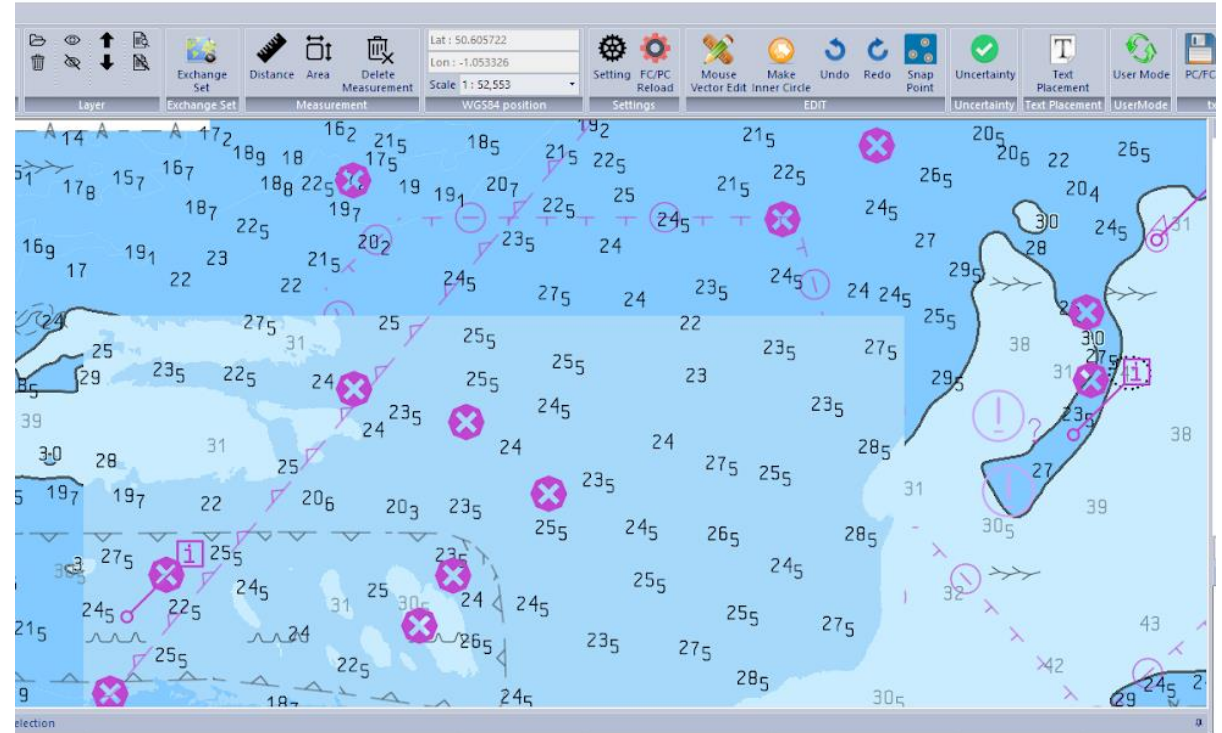
Plan
- Continue to test IC Level 1 using S-98 Annex C as starting point
- Look at candidates for IC Level 2,

IIC TECHNOLOGIES