S-100 TSM7 Working Group

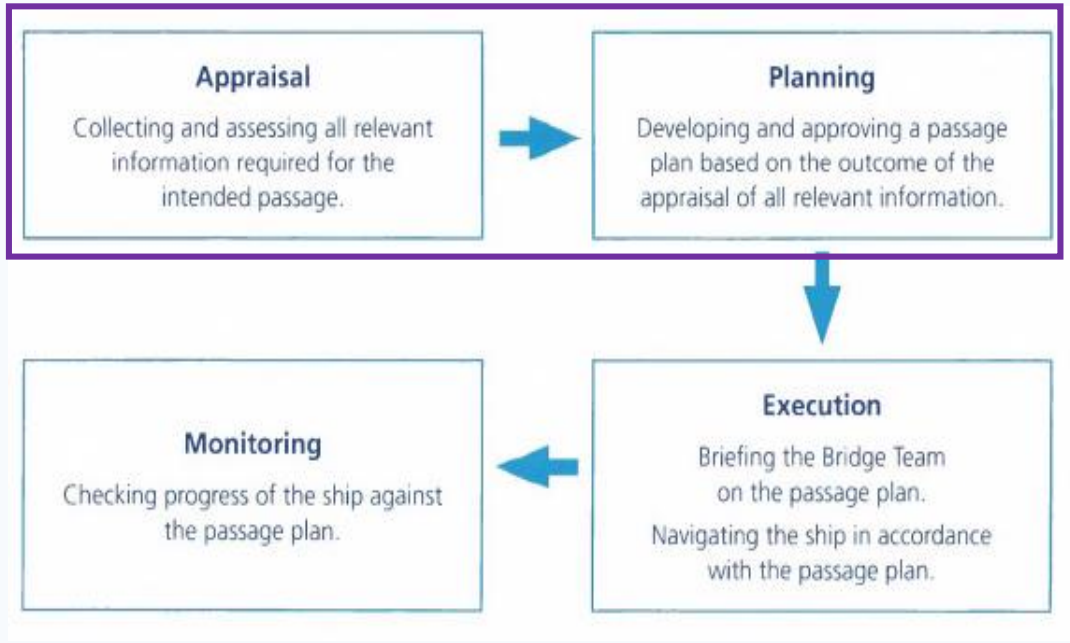
Agenda Item 4.2 & 4.8

Paper HSSC11-04.8A

- S-98: in-depth technical concepts. No principle of S-100 products can be identified and specifically, on how S-100 products are used in S-100 ECDIS
- Define use cases of the S-100 based products: because the interoperability rules are situational dependant, the context in which each product will be used should be defined
- Define framework and functional analysis of the S-100 products: which products should have to be considered in priority

Use cases

- Use cases of the officer of watch on bridge: **voyage planning**



Ocean routes

Coastal routes

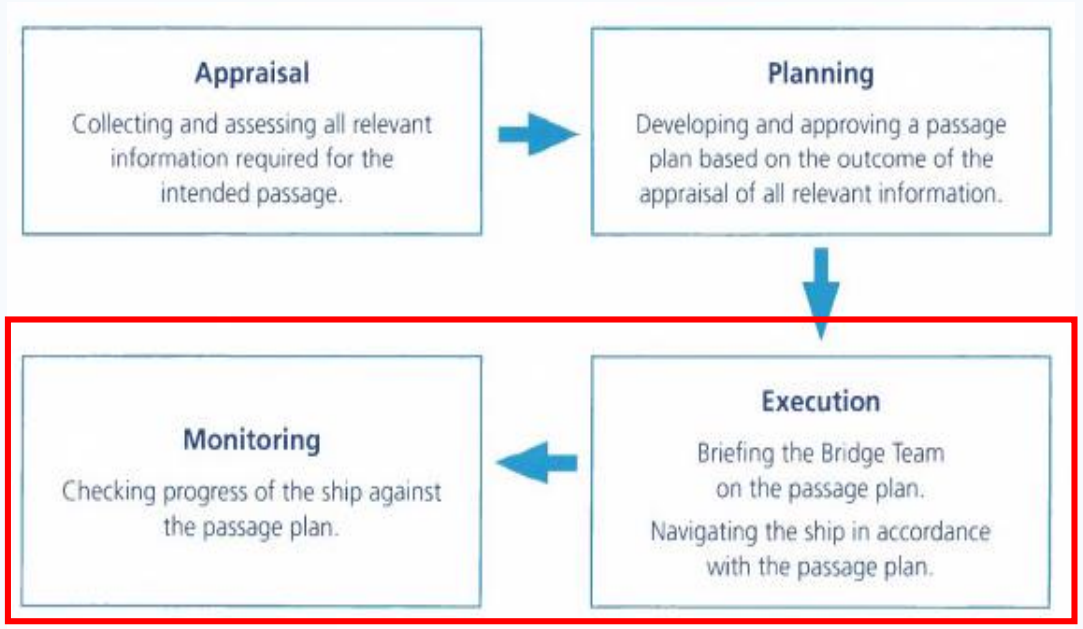
Berthing / pilotage

- Done ahead of departure or can be conducted during long ocean passage.
- Information : various in formats, relevance and frequency of updating.

Ref: International chamber of shipping (2016), Bridge procedures guide

Use cases

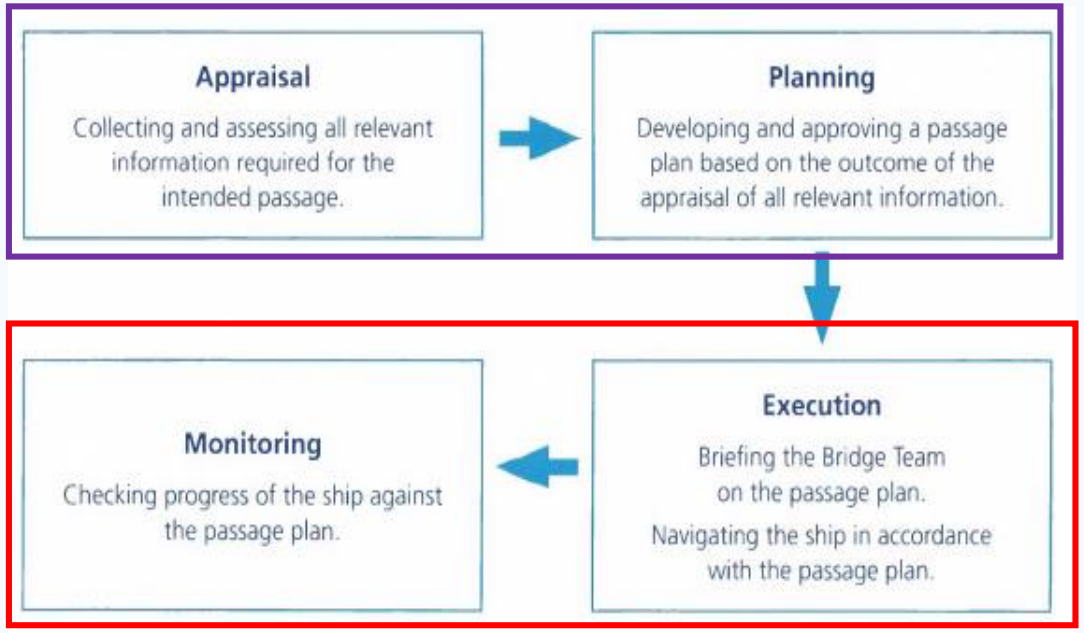
- Use cases of the officer of watch on bridge : monitoring / execution of the voyage plan



- Follow the passage plan and monitor the progress of the Ship
- Make a full appraisal of the risk of collision with other vessels
- Identify navigational hazards (wrecks, floating objects, ice and uncharted hazards)
- Determine the risk of grounding or stranding (UKC)
- Detect and respond as appropriate to any significant change in the weather, visibility or sea state
- Identify navigational marks
- Position fixing of the ship by all appropriate means
- Take action to avoid collision
- Amend the passage plan
  - permanently (the passage planning phase is repeated) - Causes : weather routeing developments – change of destination – SAR response
  - deviation – causes: COLREG, variations of weather conditions, advice received from VTS – NWs, dectected hazards.
- GMDSS watchkeeping (radio, emergency, MSI, routine and general comm)

Use cases

- Use cases of the officer of watch on bridge :



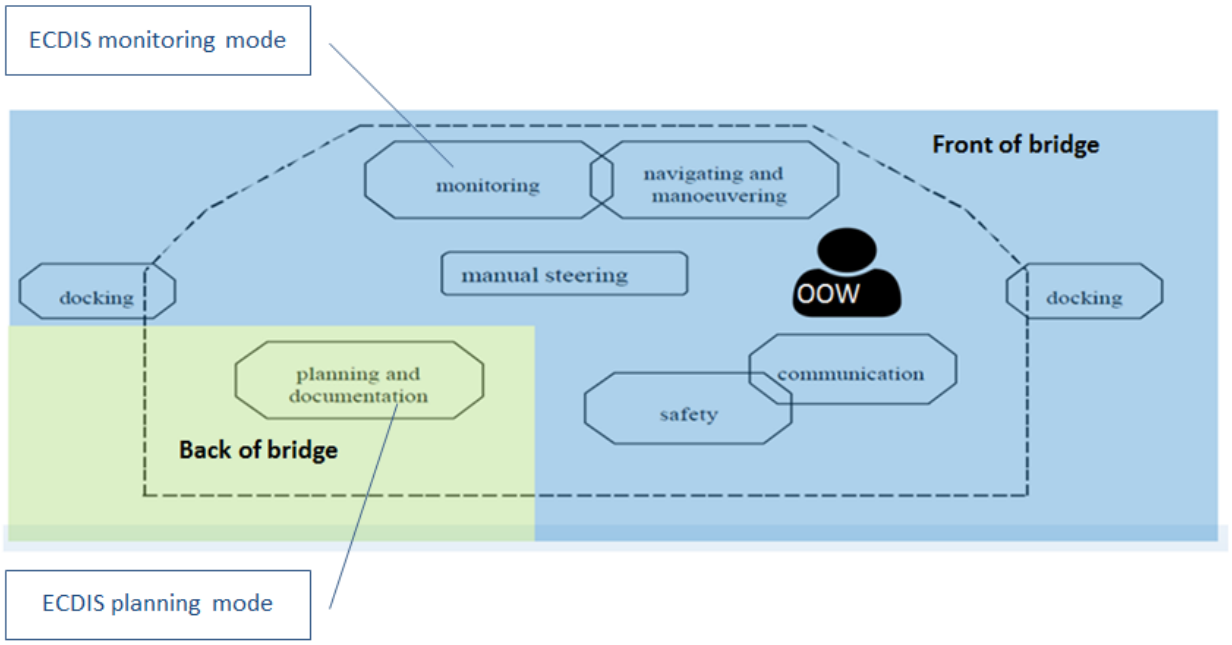
Requirements based on the use cases

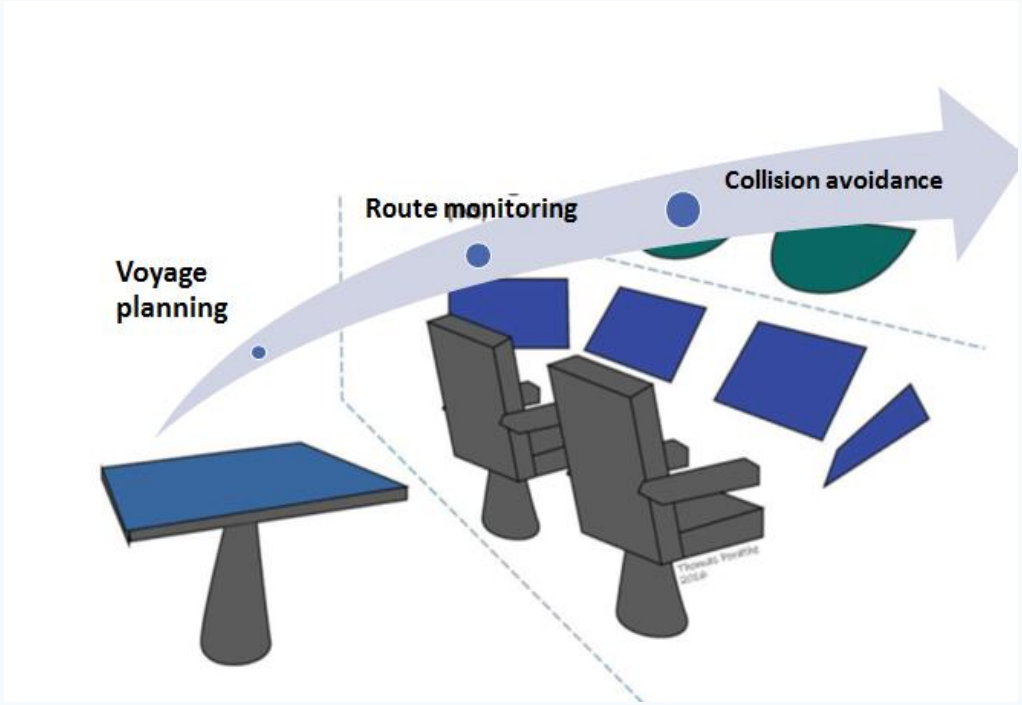
OOW is normally available to spend a reasonable amount of time to understand information at his disposal to prepare his route: sorting, analysis, selection of a travel planning scenario, reading, cross-reference between different information.
With S-100 products, most of the information becomes georeferenced-information. Cross-reference process is more efficient.

- need of synthetic, unambiguous and clear information, as its decision-making needs to be rapid in the face of any events that may occur (anti-collision, anti-grouding).
- reduce the number of manipulations to be carried out on the system (ECDIS)
- reduce its mental workload as much as possible.

Concept of front of bridge / back of bridge

- Ergonomic considerations (ref. IMO MSC/Circ929)





- Quiet area
- Large overview of the chart
- Merging and layering of digital nautical information
- Improve cross-reference analysis

- Requested attention
- Reduce mental workload on the system

Ref: European project EfficienSea2, D6.8, report on human factors aspects of e-Nav Services.

Matrix Tasks / S-100 products in front of bridge

Tasks of OOW in front of bridge	Information	S-100 products
Follow the passage plan and monitor the progress of the Ship	Route, GNSS, chart, voyage plan	S-101
Make a full appraisal of the risk of collision with other vessels	GNSS, AIS, radar	/
Identify navigational hazards such as wrecks, floating objects, ice and uncharted hazards;	Chart, navigational warning, sea ice observations	S-101 S-124 S-411
Determine the risk of grounding or stranding (UKC);	Chart, high density bathymetry, UKC, voyage plan	S-101 S-102 S-104 S-129
Detect and respond as appropriate to any significant change in the weather, visibility or sea state	Weather forecasts	S-412
Identify navigational marks	Chart, voyage plan	S-101
Position fixing of the ship by all appropriate means	Chart, radar	S-101
Take action to avoid collision	GNSS, chart, voyage plan	S-101
Amend the passage plan permanently (the passage planning phase is repeated) - Causes : weather routeing developments, change of destination, SAR response deviation, COLREG, variations of weather conditions, advice received from VTS, NWs, dectected hazards.	Chart, SAR information, weather forecast, NW, VTS information	S-101 S-111, S-112, S-124, S-411, S-412 …
GMDSS watchkeeping (radio, emergency, MSI, routine and general comm)	Chart, voyage plan	S-101

Products and services implied in front of bridge

S-101 : **full synthetic product** showing almost-permanent (static) geo-information for navigation that eases dissemination and reduces the workload on bridge.
Products dealing with dynamic information, often issued locally by authorities, in a very short notice or even in real-time.

- **Real-time hydro and environmental information**:

S-104: water level information
S-111: surface currents
S-112: dynamic water level data
S-124: navigational warnings
S-411: sea ice overlay
S-412: weather overlay (forecasts)

- **Go-No Go areas and other information** provided by local UKCM dynamic system

S-129: UKCM derived from S-104 and S-102

- **High density bathymetry:**

S-102: bathymetric surface

	Static	Dynamic	
		Prediction, forecasting	Observation
S-101	X		
S-104		X	X
S-111	X (in competition with S-101)		X
S-112			X
S-124			X
S-411		X	X
S-412		X	
S-129		X	X
S-102			X

Considerations

- **It is proposed that TSM WG:**
  - discuss the use cases
  - discuss the list of products implied in front of bridge
  - study in priority how S-100 products implied in front of bridge should interact together on ECDIS.

- **In front of bridge: a global harmonized display of data in ECDIS should be reached.**
  - how the different S-100 PS (combination to be defined according to the use cases) can be displayed together, and what the end-user needs to see :
  - which information should be visually differentiated (in relation to S-101 portrayal): prediction vs observation vs ENC information
  - is it useful to display the full coverage or the entire content of the S-100 product, or only the added value of the product?
  - a cognitive approach should be used for a better understanding by the end-user of the information displayed on an ECDIS.

- **The complex use of S-100 products in back of bridge**
  - High number of products → exponential number of combinations in interoperability
  - Synthetic product (ex: sailing directions) vs full variety of data