PASSAGE PLANNING IN THE ERA OF BIG DATA

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Contents:

AMPI: Who are we?

- Represent Marine Pilots in Australia
- Member of IMPA
- Continuous Professional Development Program
- Mentoring Program
- Peer Support Network
- Organise conferences and workshops
- Produce safe passage magazine
- Formulate Policy papers
- Lobbying regulators / politicians on behalf of pilots

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What is Big Data?

Big data refers to **massive, complex data sets that are rapidly generated** and **transmitted from a wide variety of sources**. Big data sets can be structured, semi-structured and unstructured, and they are **frequently analyzed to discover applicable patterns and insights about user and machine activity**. Big Data includes texts, audios, videos, and real-time information.

Big Data attributes:

1. **Volume:** The huge amounts of data being stored.
2. **Velocity:** The lightning speed at which data streams must be processed and analyzed.
3. **Variety:** The different sources and forms from which data is collected, such as numbers, text, video, images, audio and text.

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Big Data in pilotage

SYSTEMS APPROACH RESULTING IN:

1. MAXIMUM SITUATIONAL AWARENESS
2. ENHANCED MONITORING

No longer anonymous - unaccountable

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Big Data in pilotage

MAXIMUM SITUATIONAL AWARENESS

LEVEL 1: PERCEPTION OF THE ELEMENTS IN THE ENVIRONMENT
LEVEL 2: COMPREHENSION OF THE CURRENT SITUATION
LEVEL 3: PROJECTION OF FUTURE STATUS

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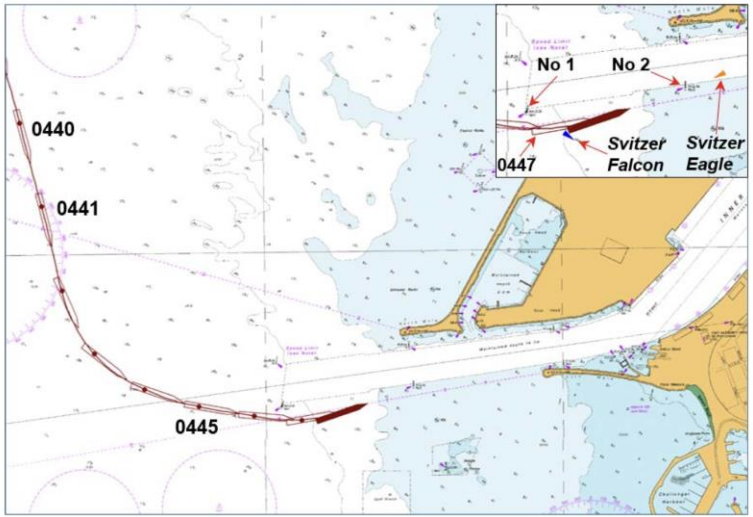
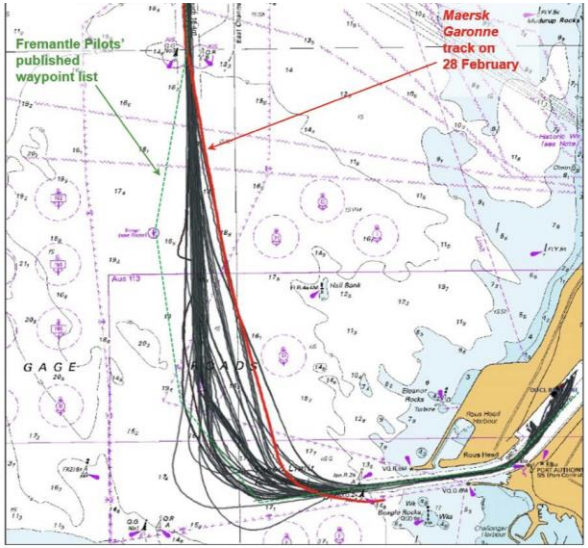
Enhanced monitoring: accidents and big data



Source: Australian Hydrographic Service (annotated by ATSB)



Source: Australian Hydrographic Service (annotated by ATSB)

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Recent accidents and big data

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Big Data in pilotage:

How is big data applied to passage plans?

- Maximum situational awareness for pilot and bridge team
- Enables the planning and execution to be monitored in real time by stakeholders (shipping companies, terminals, pilotage companies and authorities)
- Ensures the pilotage act is conducted within established parameters ensuring safety, accountability, optimization, and overall improving safety, efficiency and profitability.
- Invaluable for debriefing, training and conducting incident investigation

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Big Data in pilotage: Passage planning

The ideal passage plan route:

Identifies critical elements	Vessel characteristics Under keel clearance Environmental conditions (wind, tide, visibility) Regulatory compliance Contingency planning
Determines safety parameters	UKC Speed Wind and tide parameters Pilotage parameters (ETAs, passing) Trim
Sharing of pilotage plans	Building a shared mental model Electronic MPX
Other considerations	Ship specifics Efficiency (Commercial) considerations

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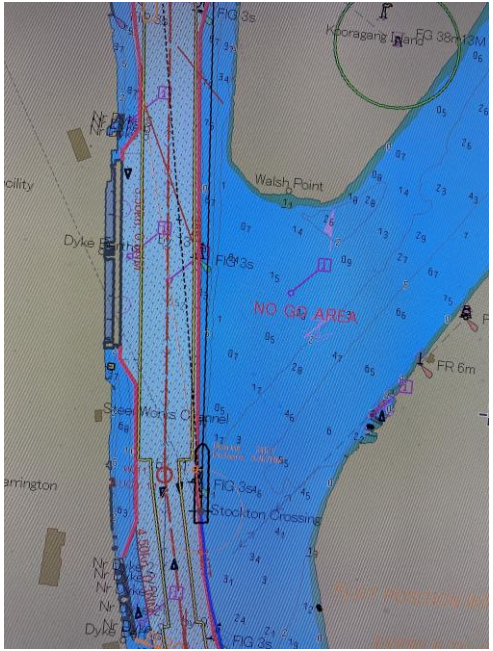
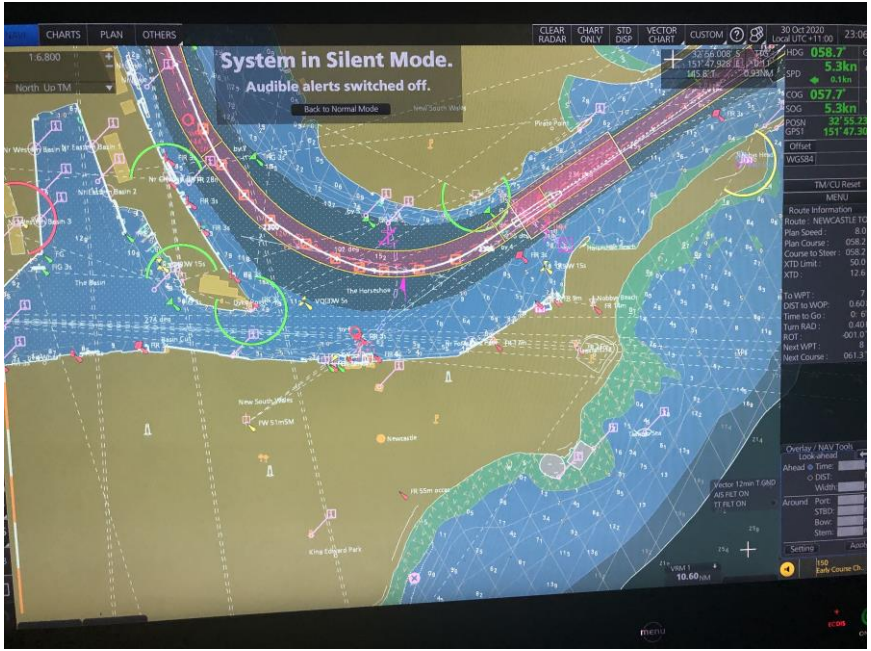
What is a port provided passage plan?





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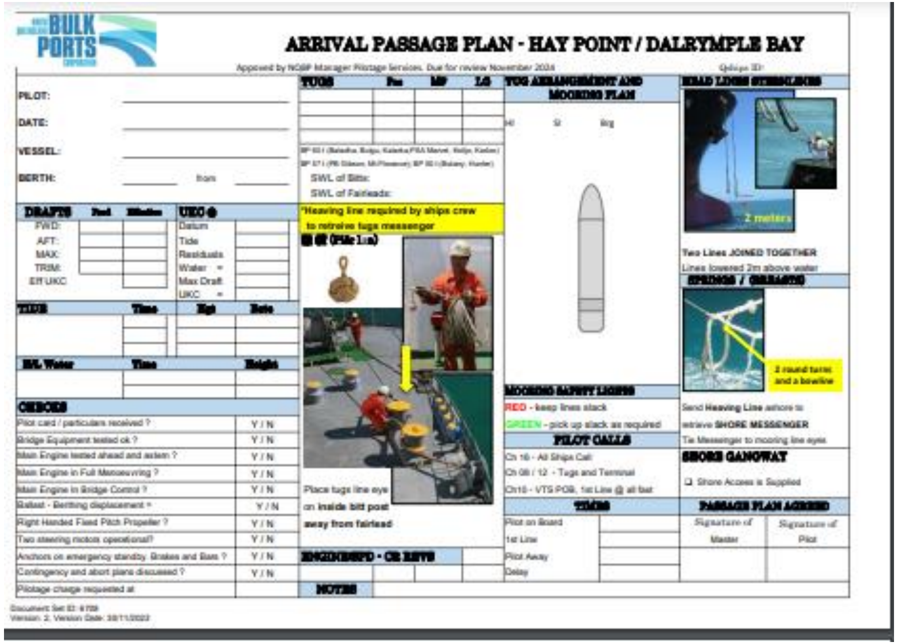
Hay Point - Australia

Case Study : Hay Point, Australia heightened SA


ARRIVAL PASSAGE PLAN - HAY POINT / DALRYMPLE BAY

PILOT:	
DATE:	
VESSEL:	
BERTH:	from

TUGS

SWL of Bitts:

SWL of Fairleads:

Heaving line required by ships crew to retrieve tugs messenger

TUG ARRANGEMENT AND MOORING PLAN

HEAD LINES STERNLINES

2 meters

Two Lines JOINED TOGETHER

Lines lowered 2m above water

SPRINGS / BREASTS

2 round turns and a bowline

DRAFTS

FWD:

AFT:

MAX:

TRIM:

Eff UKC

UKC @

Datum

Tide

Residuals

Water

Max Draft

UKC

TIDE | Time | Hgt | Rate

H/L Water | Time | Height

CHECKS

Check	
Pilot card / particulars received ?	Y / N
Bridge Equipment tested ok ?	Y / N
Main Engine tested ahead and astern ?	Y / N
Main Engine in Full Manoeuvring ?	Y / N
Main Engine in Bridge Control ?	Y / N
Ballast - Berthing displacement =	Y / N
Right Handed Fixed Pitch Propeller ?	Y / N
Two steering motors operational?	Y / N
Anchors on emergency standby. Brakes and Bars ?	Y / N
Contingency and abort plans discussed ?	Y / N
Pilotage charge requested at	

Place tugs line eye on inside bitt post away from fairlead

MOORING SAFETY LIGHTS

RED - keep lines slack

GREEN - pick up slack as required

Send Heaving Line ashore to retrieve SHORE MESSENGER

Tie Messenger to mooring line eyes

PILOT CALLS

Ch 16 - All Ships Call

Ch 06 / 12 - Tugs and Terminal

Ch15 - VTS POB, 1st Line @ all fast

SHORE GANGWAY

Shore Access is Supplied

TIMES

Pilot on Board

1st Line

Pilot Away

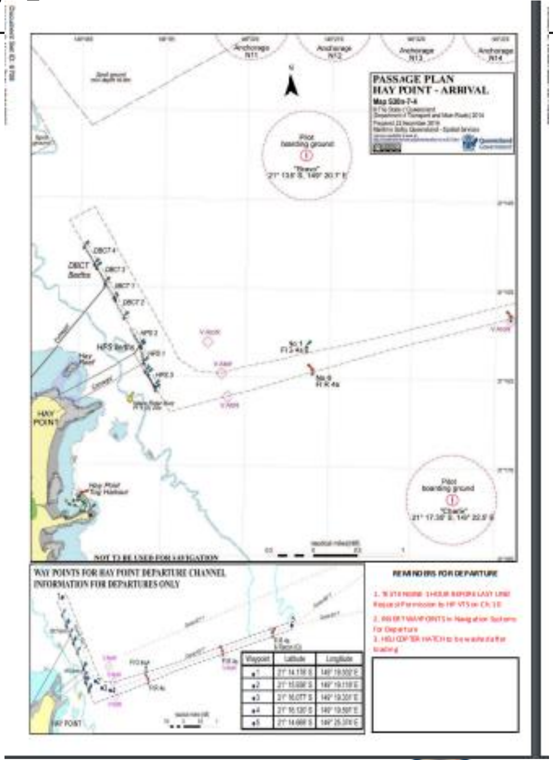
Delay

PASSAGE PLAN AGREED

Signature of Master | Signature of Pilot

ENGINE SPD - CR REVS

NOTES



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APPROVED Plan 68321.7 for NSU KEYSTONE

Calculated: 11Dec2022 0705 (3 hour forecast)

Transit Description: DBCT4 STBD SIDE TO (CHANNEL)

Sailing Draft: 17.95 m

Passage commencement window: **11Dec2022 1017 to 11Dec2022 1323**

Commencement time: **11Dec2022 1030**

Stage II Window: No Window

Vessel		Stability Data		Environmental Conditions			
IMO:	9641883	Draft F:	18.00 m	TIDES		WAVES	
Type:	BULK CARRIER	Draft M:	18.00 m	HalfTide	1.89 m (-0.01m) 11/0700	DWRB	Sea 0.36 m, 3.7 s
MMSI:	431977000	Draft A:	18.00 m	Beacon2Tide	1.88 m (-0.03m) 11/0700	11/0700	Swell 0.07 m, 7.7 s
Call Sign:	7KBP	KM:	-			BMA Miros	Sea 0.40 m, 4.0 s
Beam:	50.05 m	KG:	13.63 m			11/0700	Swell 0.08 m, 11.8 s
LBP:	291.40 m	GMs:	-				
LOA:	299.90 m	FSC:	-				
DWT:	207,684 t	GMf:	7.56 m				
Flag:	JAPAN	Displ:	231,911 t				
Summer Draft:	18.27 m	Water dens:	1.025 t/m3				
		Cb:	0.862				

Window Open: 11Dec2022 1017

SLOW				AVERAGE				FAST			
UKC Limits	UKC	Time	Loc (nm)	UKC Limits	UKC	Time	Loc (nm)	UKC Limits	UKC	Time	Loc (nm)
BC 0.25	0.71	1019	0.08	BC 0.25	0.71	1019	0.08	BC 0.25	0.71	1019	0.08
MM 0.90	0.90	1019	0.08	MM 0.90	0.90	1019	0.08	MM 0.90	0.90	1019	0.08

WP	ETA (AEST)	SOG (kn)	Depth (m)	Tide (m)	BC (m)	MM (m)	GR (m)
DBCT4	1017	1.0	14.77	4.53	1.18	1.38	1.25
Bcn1	1111	6.5	14.88	5.16	1.60	1.96	1.99
Bcn4	1132	6.5	14.97	5.33	1.81	2.18	2.26
Bcn2	1147	6.5	15.06	5.42	1.98	2.43	2.43
Sea	1155	6.5	15.00	5.46	1.96	2.42	2.41

WP	ETA (AEST)	SOG (kn)	Depth (m)	Tide (m)	BC (m)	MM (m)	GR (m)
DBCT4	1017	1.0	14.77	4.53	1.18	1.38	1.25
Bcn1	1105	7.5	14.88	5.10	1.43	1.80	1.93
Bcn4	1123	7.5	14.97	5.27	1.63	1.99	2.19
Bcn2	1136	7.5	15.06	5.36	1.79	2.24	2.36
Sea	1143	7.5	15.00	5.40	1.78	2.24	2.35

WP	ETA (AEST)	SOG (kn)	Depth (m)	Tide (m)	BC (m)	MM (m)	GR (m)
DBCT4	1017	1.0	14.77	4.53	1.18	1.38	1.25
Bcn1	1101	8.5	14.88	5.05	1.25	1.62	1.88
Bcn4	1117	8.5	14.97	5.21	1.42	1.79	2.13
Bcn2	1128	8.5	15.06	5.30	1.59	2.04	2.31
Sea	1134	8.5	15.00	5.34	1.57	2.04	2.29

Window Close: 11Dec2022 1323

SLOW				AVERAGE				FAST			
UKC Limits	UKC	Time	Loc (nm)	UKC Limits	UKC	Time	Loc (nm)	UKC Limits	UKC	Time	Loc (nm)
BC 0.25	0.43	1459	7.96	BC 0.25	0.46	1448	7.96	BC 0.25	0.42	1439	7.96
MM 0.90	0.91	1459	7.96	MM 0.90	0.94	1448	7.96	MM 0.90	0.90	1439	7.96

WP	ETA (AEST)	SOG (kn)	Depth (m)	Tide (m)	BC (m)	MM (m)	GR (m)
DBCT4	1323	1.0	14.77	5.32	1.96	2.16	2.04
Bcn1	1417	6.5	14.88	4.75	1.16	1.53	1.58
Bcn4	1438	6.5	14.97	4.49	0.93	1.30	1.41
Bcn2	1453	6.5	15.06	4.29	0.80	1.27	1.30
Sea	1501	6.5	15.00	4.19	0.63	1.11	1.13

WP	ETA (AEST)	SOG (kn)	Depth (m)	Tide (m)	BC (m)	MM (m)	GR (m)
DBCT4	1323	1.0	14.77	5.32	1.96	2.16	2.04
Bcn1	1411	7.5	14.88	4.83	1.12	1.50	1.65
Bcn4	1429	7.5	14.97	4.60	0.91	1.29	1.52
Bcn2	1442	7.5	15.06	4.44	0.82	1.28	1.44
Sea	1449	7.5	15.00	4.35	0.67	1.15	1.29

WP	ETA (AEST)	SOG (kn)	Depth (m)	Tide (m)	BC (m)	MM (m)	GR (m)
DBCT4	1323	1.0	14.77	5.32	1.96	2.16	2.04
Bcn1	1407	8.5	14.88	4.88	1.04	1.42	1.71
Bcn4	1423	8.5	14.97	4.69	0.85	1.23	1.61
Bcn2	1434	8.5	15.06	4.55	0.78	1.24	1.55
Sea	1440	8.5	15.00	4.47	0.64	1.12	1.41

Passage Commencement: 11Dec2022 1030

SLOW				AVERAGE				FAST			
UKC Limits	UKC	Time	Loc (nm)	UKC Limits	UKC	Time	Loc (nm)	UKC Limits	UKC	Time	Loc (nm)
BC 0.25	0.88	1032	0.08	BC 0.25	0.88	1032	0.08	BC 0.25	0.88	1032	0.08
MM 0.90	1.07	1032	0.08	MM 0.90	1.07	1032	0.08	MM 0.90	1.07	1032	0.08

WP	ETA (AEST)	SOG (kn)	Depth (m)	Tide (m)	BC (m)	MM (m)	GR (m)
DBCT4	1030	1.0	14.77	4.70	1.35	1.54	1.42
Bcn1	1124	6.5	14.88	5.27	1.71	2.08	2.10
Bcn4	1145	6.5	14.97	5.42	1.89	2.26	2.34
Bcn2	1200	6.5	15.06	5.48	2.03	2.49	2.49
Sea	1208	6.5	15.00	5.51	2.00	2.47	2.46

WP	ETA (AEST)	SOG (kn)	Depth (m)	Tide (m)	BC (m)	MM (m)	GR (m)
DBCT4	1030	1.0	14.77	4.70	1.35	1.54	1.42
Bcn1	1118	7.5	14.88	5.22	1.55	1.92	2.05
Bcn4	1136	7.5	14.97	5.36	1.72	2.09	2.28
Bcn2	1149	7.5	15.06	5.44	1.87	2.32	2.44
Sea	1156	7.5	15.00	5.47	1.84	2.31	2.42

WP	ETA (AEST)	SOG (kn)	Depth (m)	Tide (m)	BC (m)	MM (m)	GR (m)
DBCT4	1030	1.0	14.77	4.70	1.35	1.54	1.42
Bcn1	1114	8.5	14.88	5.18	1.38	1.75	2.01
Bcn4	1130	8.5	14.97	5.32	1.53	1.89	2.24
Bcn2	1141	8.5	15.06	5.39	1.68	2.13	2.40
Sea	1147	8.5	15.00	5.42	1.65	2.12	2.37

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Case Study : Hay Point, Australia Heightened SA

1. Day visual
2. Night visual
3. Navigational aids (buoys – physical and virtual)
4. Radar
5. ECDIS
6. PPU

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Case Study : Hay Point, Australia Heightened SA

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Case Study : Hay Point, Australia Heightened SA

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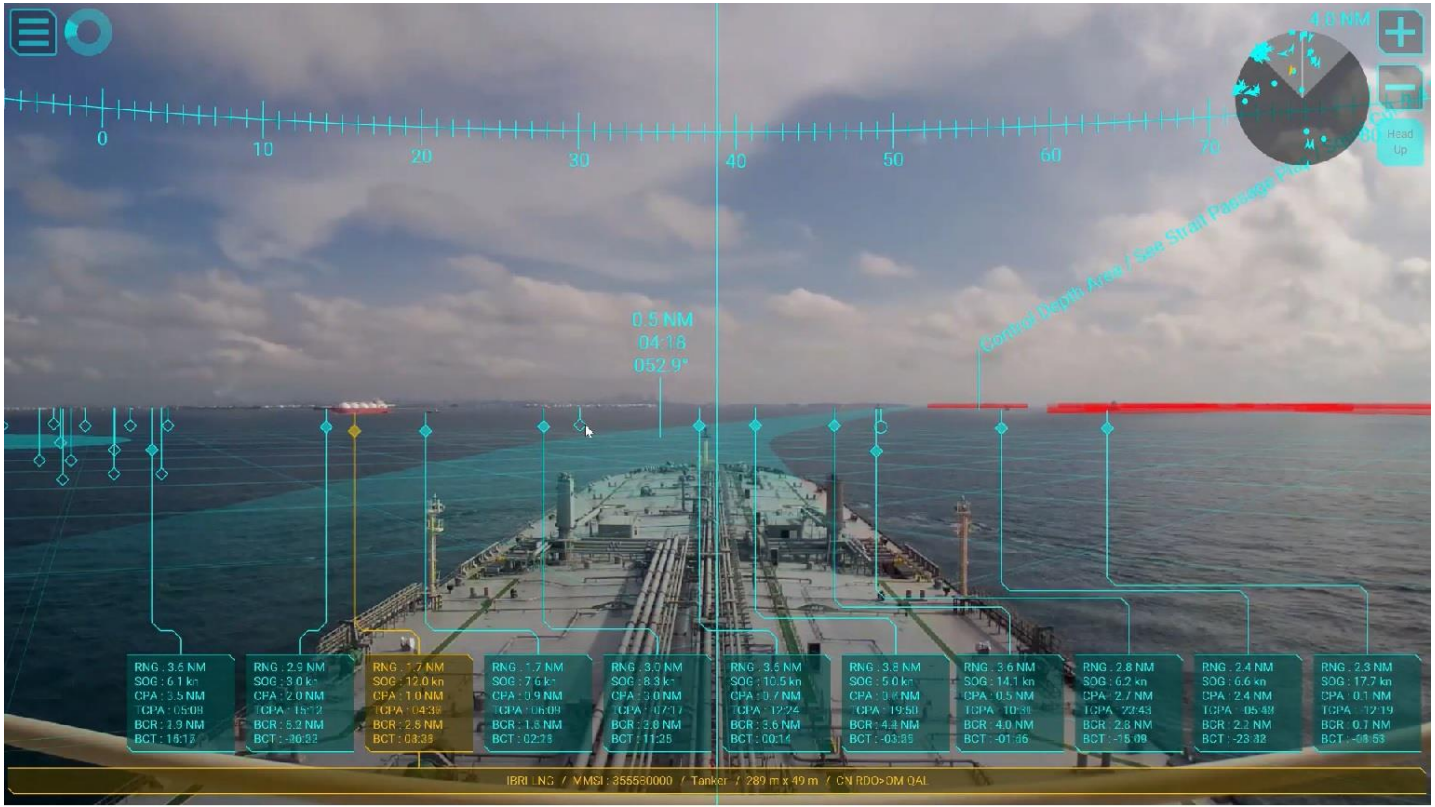
Case Study : Hay Point, Australia
Heightened SA –augmented reality



Case Study : Hay Point, Australia
EM: the regulator (MSQ)

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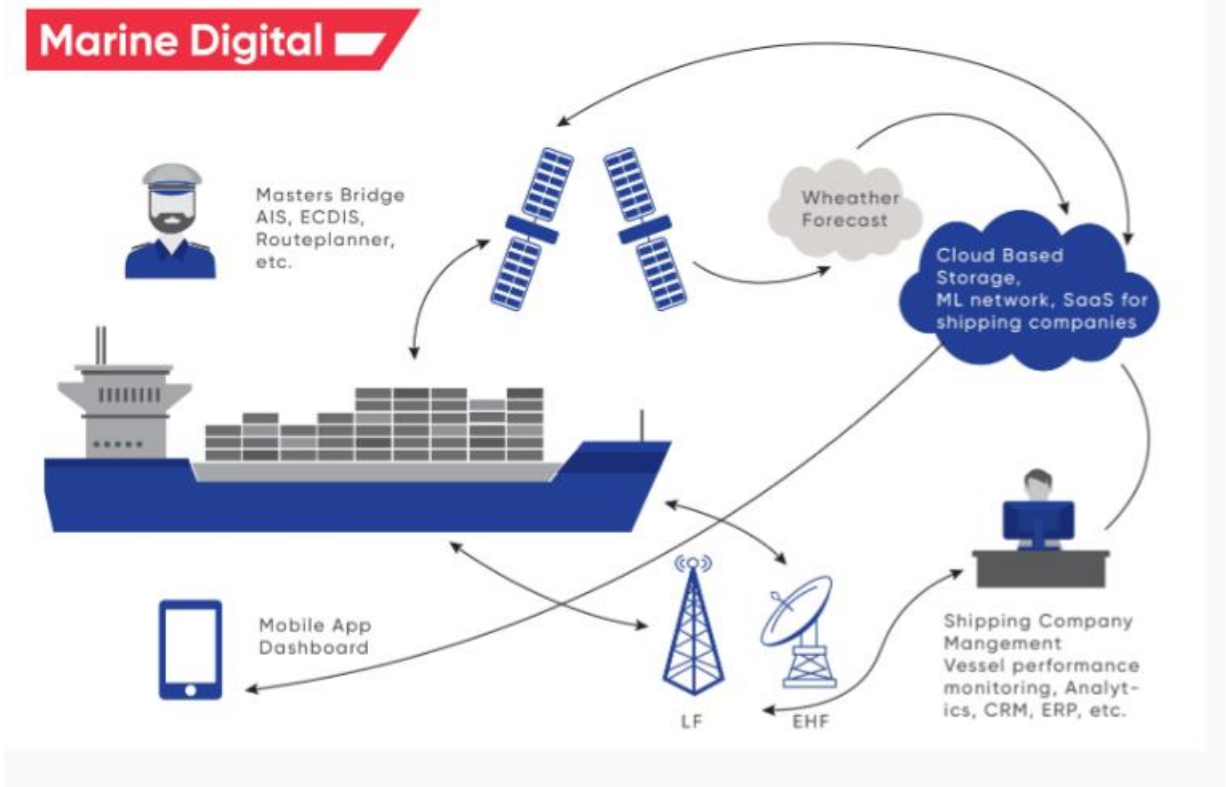
Case Study : Hay Point, Australia
EM: the shipowner



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Case Study : Hay Point, Australia
EM: third parties

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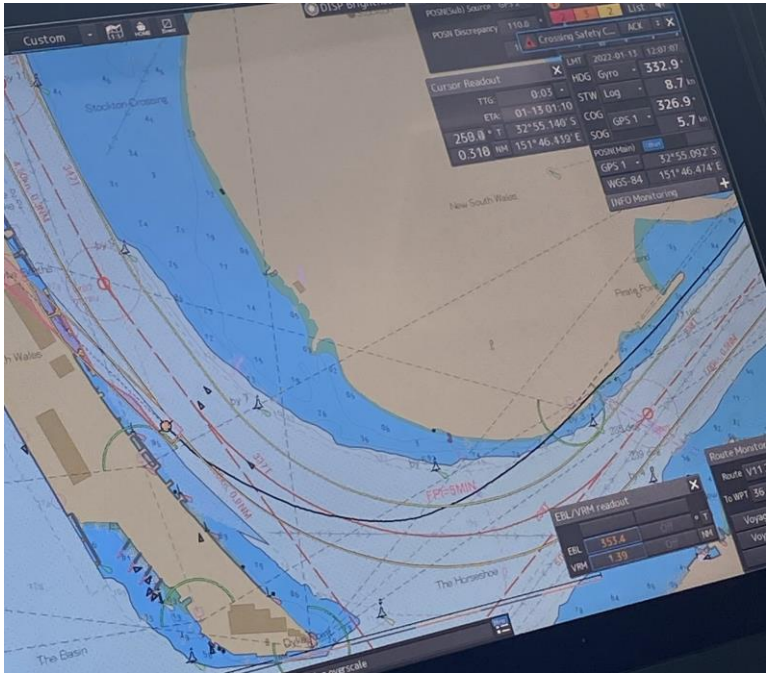
Challenges



Route Exchange

- RTZ Format – IEC 61174:2015
- S100 / S421 route exchange format
- Cyber Security
- Performance standards & manufacturer differences

Connectivity

Legal issues

Proprietary Data

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Acknowledgements

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2023

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MAXIMISING SITUATIONAL AWARENESS

Crown Towers Hotel
Perth, Western Australia

1 - 5 October 2023

01.10.2023 - 05.10.2023

Perth, Australia