VTS49-9.3.1.1
(VTS48-9.3.1.1)

Introduction of VTS-INS Product Specification

VTS47 WG2. Technology

Presenter : Seongsang YU(KR)

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Agenda

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- **Background**
- **VTS-INS product specification(PS) development direction**
- **VTS-INS PS development**
  - VTS-INS PS development process
  - VTS-INS PS user need(reference)
  - Roadmap of VTS-INS PS development
  - VTS-INS PS Scenario development
  - VTS-INS PS Scenario
  - VTS-INS PS detail scenario
  - VTS-INS PS data model
- **Result and Future work**

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Background

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- **Requirement of VTS-INS product specification (PS)**
  - IMO's proposed MS(maritime service) and product specification
    - IMO proposed 16 MS for maritime safety and suggested that the product specification based on S-100 standard is required for harmonized data exchange
    - VTS (INS, NAS, TOS) is defined as MS 1,2,3 services
  - VTS committee is developing the MS 1,2,3 Guideline and identifying data of MS 1,2,3.
    - VTS committee is defining items such as definition, scope, objective in MS Guideline
    - VTS Committee is identifying data that needs to be exchanged in the VTS
    - However, the development of the product specification for the VTS has not proceeded.

- **Proposal for development of product specification**
  - Development team decided to participate in the development work of INS product specification to promote the development of IMO MS 1
  - Development team proposed the development of VTS-INS product specification based on scenario at the VTS 46

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VTS-INS PS development direction

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- **VTS-INS product specification development direction**
  - Development team think [The important thing about product specification is 5W1H]
  - We tried to the answer **5W1H** using VTS rules, the output documents of the VTS committee, discussions with VTS Operator, etc.
  - Using the 5W1H concept, the development team have drafted a VTS-INS product specification

What	*What data is exchanged in VTS?*
Who	*Who is data sender? Who is data receiver?*
When	*When do vessels send this data?*
Where	*Where do vessels send this data?*
Why	*Why this data is sent?*
How	*How do vessel and VTS exchange this data?*

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VTS-INS PS development process

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1. VTS user needs

VTS46-13.3.9 - Annex A - VTS Digital Services

Type	CATEGORY	FEATURE	ATTRIBUTE
	vessel information	identification	Vessel identity (ship's name, MMSI , call sign, IMO, owner, ...)
		static information	e.g. vessel measurements (length, width, dead weight, (maximum) number of passengers ...), type of vessel (container, bulk, ...)
		dynamic information	e.g. speed, direction, number of passengers, number of crew, flag, agent, captain, draught, ...
		certification information	
	Voyage information	identification	Voyage ID, type, ...
		sailing plan	e.g. departure, arrival, route, waypoints, timing, ...
		status	e.g. planned, confirmed, estimated, active, ...
		position	e.g. current, last waypoint, next waypoint, ...
		specific voyage information	e.g. trip remarks, towage information, pilot information, convoy information, vessel activity (fishing, dredging, ...), piracy, ...
		warnings	e.g. ISPS,

3.1.2 Vessels Entering VTS Area

When a vessel enters the VTS Area procedures for the following actions should be considered:

- Procedures for establishing communications and verifying vessel identity and position;
- Requirements for initial information exchange, which may include:
  - Confirm reporting requirements;
  - Provide relevant traffic information;
  - Provide navigational / fairway information;
  - Establish compliance with IMO requirements (charts and publications, passage plan, mechanical defects, personnel shortfalls).
- Procedures for updating information with allied services.

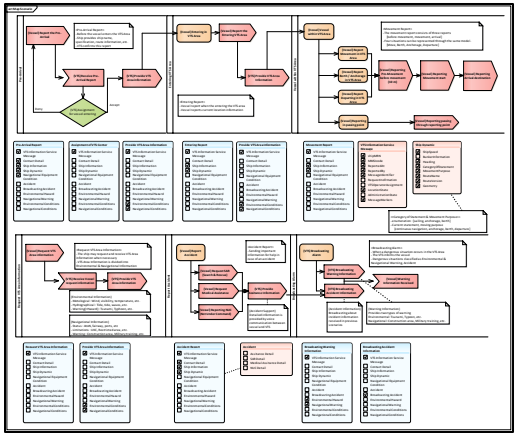
IALA V-127

Time	Vessel Action	VTS Action	Information category
01:00	Provides pre-arrival information	Replying with information on weather	Environmental
02:00	Enters VTS area, provides sailing route	Traffic information to vessel	Traffic and Route information
02:30	Passes reporting point line	Provides information on current, wave height, etc..	Hydrographical information
03:00	Requires port information	Provides quay details	Traffic and Route information
03:30	Passes second reporting point	Provides operational information on AtoNs	Navigation Hazards
04:00	Vessel along side	Gives information on wind speeds, visibility	

MS Guideline

Researching about product specification requirement(=need)
- VTS46 result, MS Guideline, VTS Guideline, VTS operator's comment, SMCP

2. Define data exchange scenario



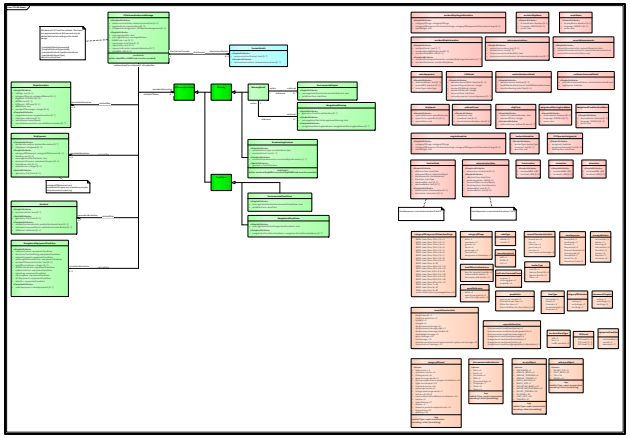
Define data exchange scenario based on requirements

3. Define Features & Attributes

Attribute			CamelCase	Registry Checks/Definitions: New Definitions: White; Registry Existing Definitions: Gray	mxRepicity	type	Value
Source MRN of Vessel			shipMRN	MRN is a naming scheme that can uniquely identify any maritime resource on a global scale. shipMRN is the unique value given to the ship.	0..1	URN	
MMSI Code			MMSICode	The Maritime Mobile Service Identity (MMSI) Code is formed of a series of nineteigits which are transmitted over the radio path in order to uniquely identify ship stations, ship earth stations,coast stations, coast earth stations, and group calls. These identities are formed in such a way that theidentity or part thereof can be used by telephone and telex subscribers connected to the generaltelecommunications network principally to call ships automatically. (Adapted from Appendix 43 of theInternational Telecommunications Union Radio Regulations).	0..1	text	
Message Identifier			messageIdentifier	A unique identifier distinguishing one message from another	1..1	text	
Message Markers			messageMarkers	The purpose of a message used to facilitate communication between ships.	1..1	enum	1: Instruction 2: Advice 3: Warning 4: Information 5: Question 6: Answer 7: Request 8: Intention

Analysis another standard(S-101, 124, 127, 211, 412, 421)
New feature for VTS determined

4. Product specification



Finally, development VTS-INS Product Specification

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VTS-INS PS User Need(Reference)

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VTS INS product specification & user need

Service Scenario

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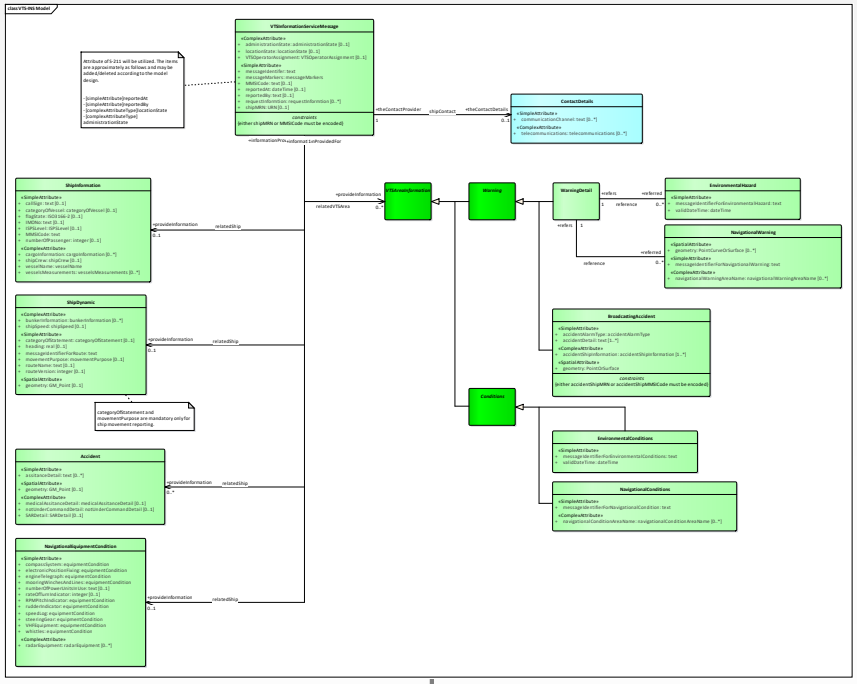
- Reporting procedure for ships at VTS center
- Identify scenario that VTS center provides information to vessels

MS Guideline(VTS 46)

- Action of vessels and VTS center in VTS area

VTS flag rule

- Reporting procedure for ships at VTS center



Data

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- Identify information included in the ship's report
- Identify information VTS center provide to ship

VTS46-13.3.9

- Identify data category, feature and attribute requirement by VTS

MS Guideline(VTS 46) Annex 1

- Identify data type requirement by VTS

When, Where, Why and Who

What and How

Other Reference

IMO SMCP

- Information exchange procedure & data in voice communication

VTS Operator's comment

- VTS Operator share the actions actually performed in the VTS Center

Online VTS Reporting System

- Information on Pre-Arrival Report when entering VTS Center

Other Product Specification

- Reference data model defined by other product specification

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Roadmap of VTS-INS PS development

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Date	Work	Detailed work	Revision	
			Scenario	Data
'19.01~02	Requirement analysis	Analysis VTS Standard, Guideline Data model development status of IALA VTS Committee	-	
'19.03	Development draft VTS scenario	Development draft scenario based on IALA V-127, VTS46 result	- Definition 8 Situation* & Exchanged Data**	
'19.05	VTS Scenario revision based on VTS manual	Add reporting and data items based on the manual	- Add reporting on passing point - Add before movement report(10m)	- Add vessel's communication info. - Add VTS Area's communication info. - Add bunker info.(oil type, quantity, etc.)
'19.06	Reflect the VTS Operator comment	Meeting with VTS operator, check up scenario and exchanged data	- Expand content of Pre-arrival - Reduce information of Entering report - Delete Mandatory reporting	- Add Anchorage/Berth data in pre-arrival - Add Crew list in ship information - Add Navigational Equipment condition data
'19.06	Analysis SMCP and scenario revision	Compare the Scenario & Data of INS and SMCP Definition additional scenario	- Add accident report & assistance - SAR(search & rescue), medical, NUC(Not Under Control)	- Definition accident report data - (SAR) accident location, time, abandon ship, life boat, rescue equipment - (Medical) Medical assistance type... - (NUC) defect equipment type(engine, steering, shaft)
'19.06	Scenario Revision	Scenario revision	Definition main scenario - Pre-arrival - Entering & movement*** - Vessel accident report - Providing VTS area information	- Four situations can be represented through the same model. - Move, Berth, Anchorage, Departure
'19.07	Anaysis S-211 and scenario revision	Analysis S-211 Add additional data in INS model	- S-211 request-response Scenario and data model reference - In Pre-arrival, entering & movement, Add request - response items	
'19.07	Development data model	Fixed scenario & data Start development data model	-	

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VTS-INS PS Scenario development

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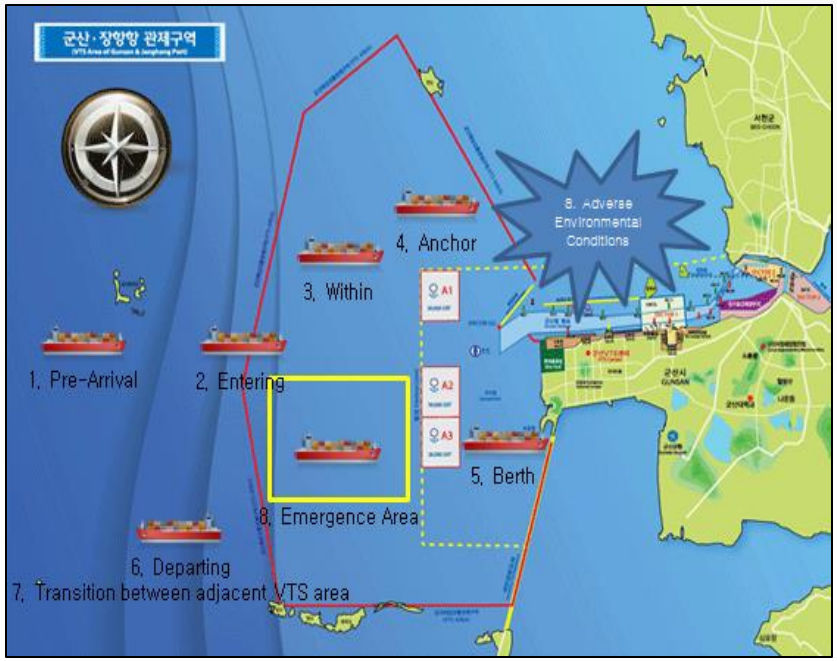
- **Development of VTS-INS PS draft scenarios**
  - Defines actions that occur in VTS Area based on V-127, MS Guideline
    - Requests and reports of vessels within the VTS area
    - Information about risks and warnings provided by the VTS Center
  - *The development team found answers about When, Where, Why and Who*



In the scenario, ship and VTS location are represented by virtual picture.

Idx	Scenario	Action	Direction
1	Pre Arrival Information	Provide ships information	Vessel → Center
2	Vessel Entering VTS Area	Procedures for establishing communications and verifying vessel identity and position	Vessel → Center
		Requirements for initial information exchange	Center → Vessel
3	Vessels within VTS Area	coast of mandatory and voluntary participation	
3-1	Mandatory Participation	Provision of relevant information to participating vessels at regular intervals or on demand or deemed necessary by the VTSO.	Center → Vessel
		Special provisions for vessels carrying hazardous dangerous or polluting cargo	Center → Vessel
		Compliance with pilotage directions and any special requirements for a pilot vessel being off station	Center → Vessel
		Procedures for non-compliance by a vessel with the requirements and procedures laid down for the VTS area	Center → Vessel
3-2	Voluntary Participation	Consideration of requirement to track/monitor and communicate with vessels not required to participate in the VTS	
4	Vessels in Anchor	Anchorage assignment	bi-direction
		Reporting requirement for vessels prior to leaving the anchorage	Vessel → Center
5	Vessels in Berth	Reporting requirements for vessels on arrival at berth	Vessel → Center
		Security requirements and/or level	Vessel → Center
		Need for restrictions for other vessels passing the berth	Center → Vessel
		Reporting requirement for a vessels prior to leaving the berth;	Vessel → Center
6	Vessels Departing the VTS Area	Reporting requirement for vessels prior to departing the area	Vessel → Center
		Handover requirements with adjacent or next VTS	Center → Center
7	Transition between Adjacent VTS area	Transfer of vessel information such as identification, cargo, destination and ETA destination;	Center → Center
8	Adverse Environmental Conditions	Restriction or prohibition on movement	Center → Vessel
		mandatory tug service, pilot service	

VTS-INS draft Scenario

	Internal VTS Procedure	External VTS Procedure
Routine	– Gathering and Recording of Information – Operational Staff – Equipment Operation, Maintenance, Calibration and Updating – Interaction with Allied Services – Public Relations – Security – Training – Watch Handover – Vessel Handover – Maintenance of Maritime Publications	– Pre Arrival Information – Vessels Entering VTS Area – Vessels within VTS Area – Mandatory Participation – Voluntary Participation – Vessels at Anchor – Vessels at Berth – Vessels Departing the VTS Area – Transition between Adjacent VTS Area – Adverse Environmental Conditions
Emergence	– System Failure – Internal emergencies(ex. file and flood) – Forced evacuation of VTS center – Personnel medical emergencies – Security incidents	– Collision, Capsize, Sinking, Grounding, Fire On Vessel, Man Overboard – Pollution – Places of Refuge – Medical Emergency – Vessel Not Under Command(NUC) – Security Incident – Protest Action – Nature Disaster

IALA V-127 Operational Procedure

Time	Vessel Action	VTS Action	Information category
01:00	Provides pre-arrival information	Replying with information on weather	Environmental
02:00	Enters VTS area, provides sailing route	Traffic information to vessel	Traffic and Route Information
02:30	Passes reporting point line	Provides information on current, wave height, etc.	Hydrographical information
03:00	Requires port information	Provides quay details	Traffic and Route Information
03:30	Passes second reporting point	Provides operational information on AtoNs	Navigation Hazards
04:00	Vessel along side	Gives information on wind speeds, visibility	Environmental

IALA MS Guideline

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VTS-INS PS Scenario development

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- **Mapping between draft scenarios and data**
  - Define the data exchanged for each action based on V-127 and VTS46-13.3.9
    - Identifies the data reported by the ship in V-127
    - Mapping between scenarios and data list (VTS46-13.3.9)
  - *The development team found answer about what and how(partially)*

Idx	Scenario	Action	Direction	Feature		Attribute	Reference
1	Pre Arrival Information	Provide ships information	Vessel → Center	Route plan		departure, arrival, route, waypoints, timing	V-127 VTS46
				ETA		time	V-127
				Vessel Identity		IMO-no, MMSI, call sign	V-127
						owner, voyage ID, type,	V-127 VTS46
				Vessel Draft		draft	V-127
				Vessel Static information		vessel measurements (length, width, dead weight(maximum) number of passengers), type of vessel (container, bulk)	V-127 VTS46
				ISPS security level		ISPS	V-127
				Information about any vessel defects or deficiencies;		defects, deficiencies	V-127
				Hazardous, dangerous or polluting cargo details		IMDG code, proper name	VTS46
				detailed cargo information		position on board, detailed product information	V-127 VTS46
2	Vessel Entering VTS Area	Procedures for establishing communications and verifying vessel identity and position	Vessel → Center	Vessel Identity		IMO-no, MMSI, call sign	V-127
						owner, voyage ID, type,	V-127 VTS46
				Vessel Dynamic information		speed, direction, number of passengers, number of crew, flag, agent, captain, draught	V-127 VTS46
				Voyage information	Identification	Voyage ID, type	V-127 VTS46
					sailing plan	departure, arrival, route, waypoints, timing	
					status	planned, confirmed, estimated, active	
					position	current, last waypoint, next waypoint	
					specific voyage information	trip remarks, towage information, pilot information, convoy information, vessel activity (fishing, dredging), piracy	
2	Vessel Entering VTS Area	Procedures for establishing communications and verifying vessel identity and position	Center → Vessel	Confirm reporting requirement		reporting confirm result	V-127 VTS46
				relevant traffic information (=traffic image)		CPA, TCPA, ship position and time stamps, large / special vessel movements, vessel meeting / passing	V-127
				Navigational conditions	identification	consist of ID, subject, type	V-127 VTS46
					warning	construction works, (Temporary) Restricted Areas, Newly Discovered Hazards (wreck, shoals, shallows), diving operations	
					limitations	air gap (bridge, cables), UKC, anchorage limitations, speed	
					status	AtoNs, locks, fairway, ports	
					geographical information	locks, fairway, port, special areas (sesitive marine habitat)	
				Establish compliance with IMO requirements		charts and publications, passage plan, mechanical defects, personnel shortfalls	V-127 VTS46

Detailed VTS INS PS Scenario(data exchange)

VTS46-13.3.9 - Annex A - VTS Digital Services			
Type	CATEGORY	FEATURE	ATTRIBUTE
	vessel information	identification	Vessel identity (ship's name, MMSI , call sign, IMO, owner, ...)
		static information	e.g. vessel measurements (length, width, dead weight, (maximum) number of passengers ...), type of vessel (container, bulk, ...)
		dynamic information	e.g. speed, direction, number of passengers, number of crew, flag, agent, captain, draught, ...
		certification information	
	Voyage information	identification	Voyage ID, type, ...
		sailing plan	e.g. departure, arrival, route, waypoints, timing ...
		status	e.g. planned, confirmed, estimated, active, ...
		position	e.g. current, last waypoint, next waypoint, ...
		specific voyage information	e.g. trip remarks, towage information, pilot information, convoy information, vessel activity (fishing, dredging, ...), piracy, ...
		warnings	e.g. ISPS,
	Cargo information	hazard information	e.g. IMDG code, propername ...
		detailed cargo information	e.g. position on board, detailed product information, ...

VTS46-13.3.9

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VTS-INS PS Scenario development

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▪ Revision of Scenario

- Verification of draft scenario.
  - Development team analyzed the draft scenarios with a Korean VTS operator
  - Development team analyzed other VTS document (rules) and systems related to VTS.
    - IMO SMCP, VTS flag rule, VTS web service(sound VTS), etc.
- Development of final version of scenario based on analysis results
  - Scenario were expanded to consist of 4 detail scenarios
  - Pre-Arrival, Entering & Movement, Report Accident and VTS Center Provide Information

Date	Work	Detailed work	Revision	
			Scenario	Data
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'19.03	Development draft VTS scenario	Development draft scenario based on IALA V-127, VTS46 result	- Definition & Situation* & Exchanged Data**	
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'19.06	Reflect the VTS Operator comment	Meeting with VTS operator, check up scenario and exchanged data	- Expand content of Pre-arrival - Reduce information of Entering report - Delete Mandatory reporting	- Add Anchorage/Berth data in pre-arrival - Add Crew list in ship information - Add Navigational Equipment condition data
'19.06	Analysis SMCP and scenario revision	Compare the Scenario & Data of INS and SMCP Definition additional scenario	- Add accident report & assistance - SAR(search & rescue), medical, NUC(Not Under Control)	- Definition accident report data - (SAR) accident location, time, abandon ship, life boat, rescue equipment - (Medical) Medical assistance type... - (NUC) defect equipment type(engine, steering, shaft)
'19.06	Scenario Revision	Scenario revision	Definition main scenario - Pre-arrival - Entering & movement*** - Vessel accident report - Providing VTS area information	- Four situations can be represented through the same model. - Move, Berth, Anchorage, Departure
'19.07	Anaysis S-211 and scenario revision	Analysis S-211 Add additional data in INS model	- S-211 request-response Scenario and data model reference - In Pre-arrival, entering & movement, Add request - response items	
'19.07	Development data model	Fixed scenario & data Start development data model	-	

VTS-INS product specification development history

Scenario	Description
Pre-Arrival	- Process about vessel request entering VTS area & VTS center's assignment
Entering & Movement	- Process about vessel reporting the entry VTS area - Process about vessel movement within VTS area - Movement : movement, berth, anchorage, departure
Accident Report	- Process of reporting vessel's emergency situation and request assistance - Emergency situation is consist of SAR, medical assistance and NUC
VTS center provide information	- Process of providing information in the VTS area - Information : environmental & navigational information, accident in VTS area

Scenario(final ver.)

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VTS-INS PS Scenario development

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- **VTS-INS PS Scenario**
  - Using the identified references, the development team created the scenario
  - Mapping the scenarios and the data list

Sceanario	Description	Action		Exchanged data
Pre-arrival report	- Before arrived VTS area, Vessel report information* and request entering VTS Area * Identify, measurements, crew list, etc. - When accept entering VTS area, VTS provides information of VTS area* * Environmental & Navigational Information	(Vessel) Request pre-arrival		Vessel identity, vessel measurements, crew list, sailing plan, ISPS, cargo info., bunker, ETA, communication info., mechanical defects
		(VTS) Response assignment result		Assignment result, deny comment
		(VTS) Provide VTS area info.		Environmental info., navigational info., traffic info., reporting areacommunication channel
Entering & movement report	- Vessels entering and moving within VTS area report to VTS - Movement report is consist of three reports* * before movement(10m) movement, arrival - When Anchorage, Berth and Departure situation, vessel use this Movement report	Entering report	(Vessel) Entering report	Vessel identity, speed, direction, position
			(VTS) Provide info.	Traffic info., Navigational info.
		(Vessel) Repport passing point		Vessel identity, position
		Movement report	(Vessel) Before movement	Vessel identity, statement(sailing, anchorage berth), arrival type(sailing, anchorage, berth), destination, ETA
			(Vessel) Movement	
			(Vessel) Arrival	Vessel identity, position, ATA
Accident report	- In emergency situation, vessel report the accident and request assistance - Accident report is information for the initial assistance, detail accident informations are made in voice communication - Accident report is consist of three report* * Search & rescue, Medical assistance, Not under command	SAR	(Vessel) request SAR	Vessel identity, vessel measurements, crew list, cargo info., position, lifeboat, rescue equiptment info.
		medical	(Vessel) request medical assistance	Vessel identity, medical assistance type(radio medical advice, boat for hospital transfer...), doctor in vessel
		NUC	(Vessel) report NUC	Vessel idneity, NUC equipment(engine, steering gear, propeller) request tug
		(VTS) Reponse		Communication channel (Channels for communication with vessel)
Provide VTS area information	- VTS provides VTS Area information in vessel's request / emergency situation - When vessels' request, VTS provide Environmental & Navigational Information - In emergency situation, VTS broadcasting Traffic Accident, Environmental & Navigational Warning	request & provide	(Vessel) Request info.	Vessel identity, request message
			(VTS) Provide info.	Environmental info., navigational info.,
		(VTS) Broadcasting info.		Environmental warning, navigational warning, traffic accident information, SAR information, NUC information

VTS-INS PS scenario(final ver.)

Data Category	Attribute	Description	Reference
vessel Identity	vessel name, IMO-no, MMSI, cassIgin	Identifier of vessel	V-127
static info.	mesasurement(length, width, dead weight...), vessel type, flag, captain	Ship's info. (not changed)	V-127, VTS 46
dynamic info.	speed, direction, number of passenger	Ship's info. (can changed)	V-127, VTS46
	Crew list		VTS operator
Voyage (sailing plan)	departure, arrival, route, waypoints, timing	Vessels' route info.	V-127 VTS46
Voyage (position)	current, next waypoint	Position info.	
Voyage (specific voyage information)	trip remarks, towage information, pilot information, convoy information, vessel activity (fishing, dredging, ...), piracy	Purpose of sailing & detail info.	
ISPS code	ISPS code	ISPS Code	V-127
cargo info.	category of cargo, IMDG code	Cargo type and detailed info.	V-127, VTS46
bunker info.	Type(FO, MDO, MGO, Other), Quantity(MT)	Remained bunker oil info.	sound VTS
pre-arrival req & resp	pre-arrival request & response	Request & response entering VTS area	S-211

Data Category	Attribute	Description	Reference
lifeboat	number of lifeboat / lifecraft	when request SAR, required information	SMCP & VTS operator
rescue equipment	EPIRB, SART, DSC		
NUC info.	NUC equipment(engine, steering gear, propeller), require tug boat	defect equipment info. & request tug	SMCP & VTS operator
medical assistance	boat for hospital transfer, radio medical advice, helicopter with doctor	detail of medical assistance info.	SMCP & VTS operator
doctor in vessel	boolean value(doctor in vessel or not)		
rendezvous in position	position, time		

VTS-INS PS data list(final ver.)

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VTS-INS PS Scenario

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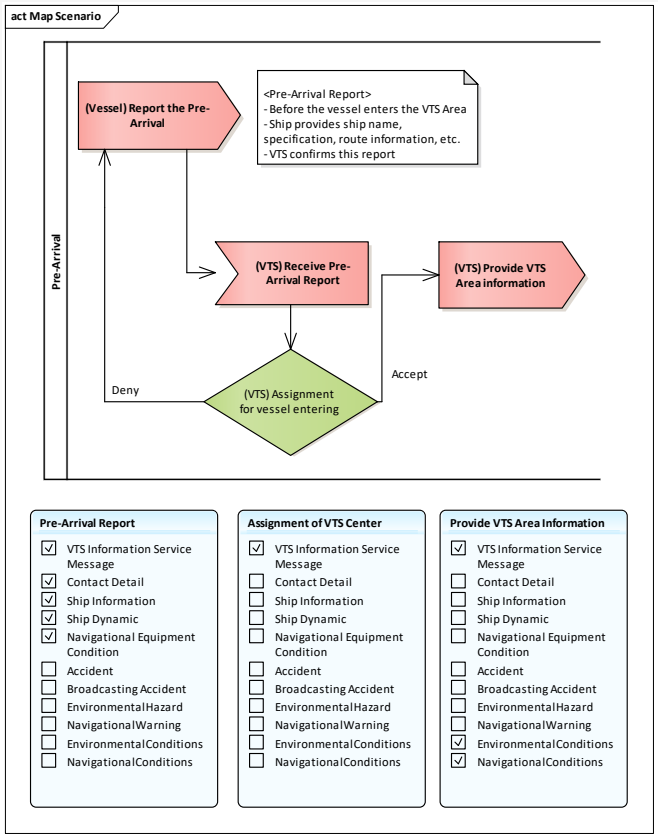
▪ VTS-INS PS Scenario & Data

- The scenario consists of four detailed scenarios.
  - Pre-arrival report, Entering & movement report, Accident report, Provide VTS area information

Sceanario	Description	Action		Exchanged data
Pre-arrival report	- Before arrived VTS area, Vessel report information* and request entering VTS Area * Identify, measurements, crew list, etc. - When accept entering VTS area, VTS provides information of VTS area* * Environmental & Navigational Information	(Vessel) Request pre-arrival		Vessel identity, vessel measurements, crew list, sailing plan, ISPS, cargo info., bunker, ETA, communication info., mechanical defects
		(VTS) Response assignment result		Assignment result, deny comment
		(VTS) Provide VTS area info.		Environmental info., navigational info., traffic info., reporting areacommunication channel
Entering & movement report	- Vessels entering and moving within VTS area report to VTS - Movement report is consist of three reports* * before movement(10m) movement, arrival - When Anchorage, Berth and Departure situation, vessel use this Movement report	Entering report	(Vessel) Entering report	Vessel identity, speed, direction, position
			(VTS) Provide info.	Traffic info., Navigational info.
		(Vessel) Repport passing point		Vessel identity, position
		Movement report	(Vessel) Before movement	Vessel identity, statement(sailing, anchorage berth), arrival type(sailing, anchorage, berth), destination, ETA
			(Vessel) Movement	
			(Vessel) Arrival	Vessel identity, position, ATA
Accident report	- In emergency situation, vessel report the accident and request assistance - Accident report is information for the initial assistance, detail accident informations are made in voice communication - Accident report is consist of three report* * Search & rescue, Medical assistance, Not under command	SAR	(Vessel) request SAR	Vessel identity, vessel measurements, crew list, cargo info., position, lifeboat, rescue equiptment info.
		medical	(Vessel) request medical assistance	Vessel identity, medical assistance type(radio medical advice, boat for hospital transfer...), doctor in vessel
		NUC	(Vessel) report NUC	Vessel idneity, NUC equipment(engine, steering gear, propeller) request tug
		(VTS) Reponse		Communication channel (Channels for communication with vessel)
Provide VTS area information	- VTS provides VTS Area information in vessel's request / emergency situation - When vessels' request, VTS provide Environmental & Navigational Information - In emergency situation, VTS broadcasting Traffic Accident, Environmental & Navigational Warning	request & provide	(Vessel) Request info.	Vessel identity, request message
			(VTS) Provide info.	Environmental info., navigational info.,
		(VTS) Broadcasting info.		Environmental warning, navigational warning, traffic accident information, SAR information, NUC information

VTS-INS PS scenario



Pre-arrival Scenario

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VTS-INS PS Scenario

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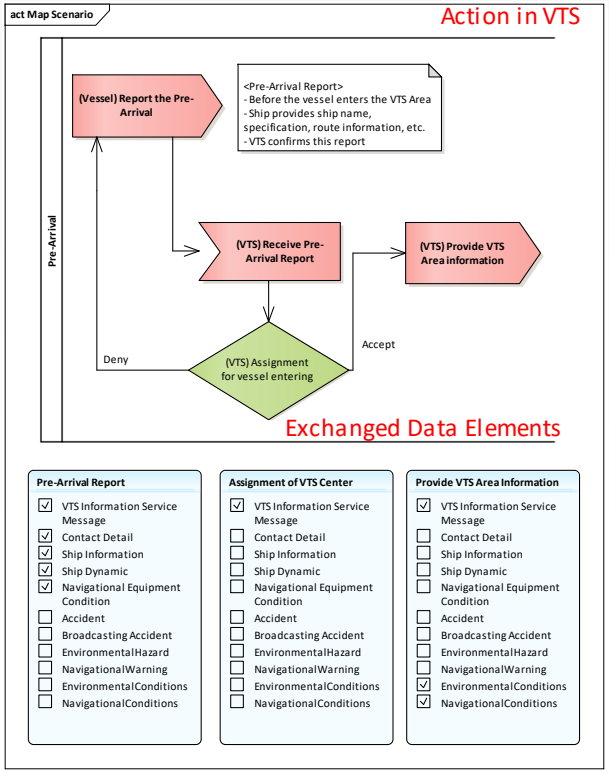
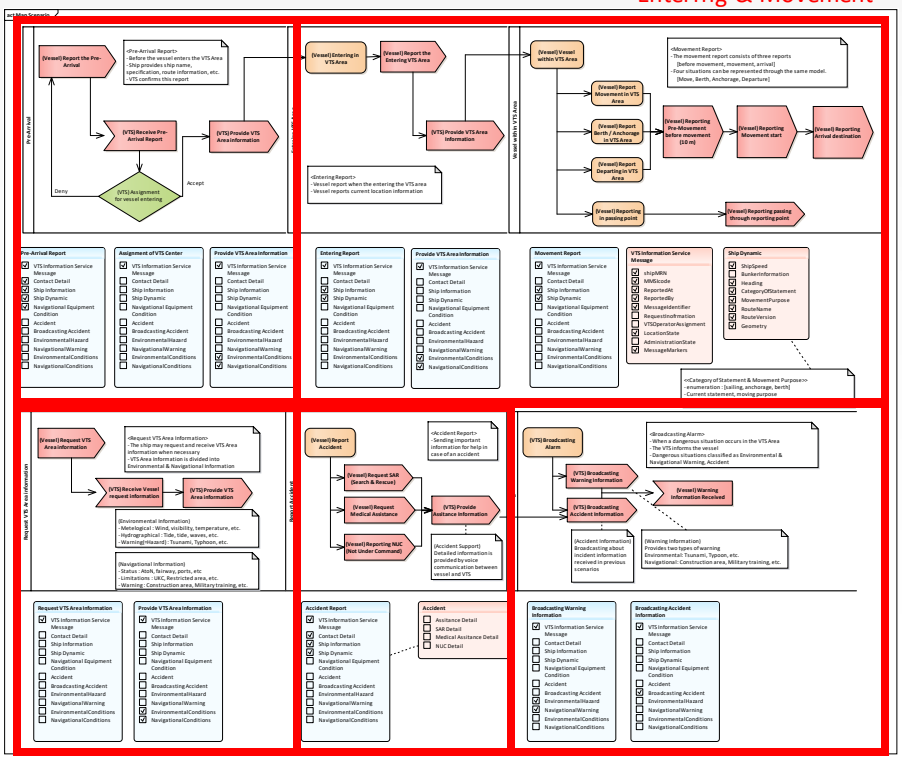
- **VTS-INS PS Scenario & Data**
  - The scenario consists of four detailed scenarios.
    - Pre-arrival report, Entering & movement report, Accident report, Provide VTS area information
  - Represent scenarios in the form of process diagrams with mapping to exchanged data at each step.





VTS-INS map scenario

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VTS-INS PS Detail Scenario

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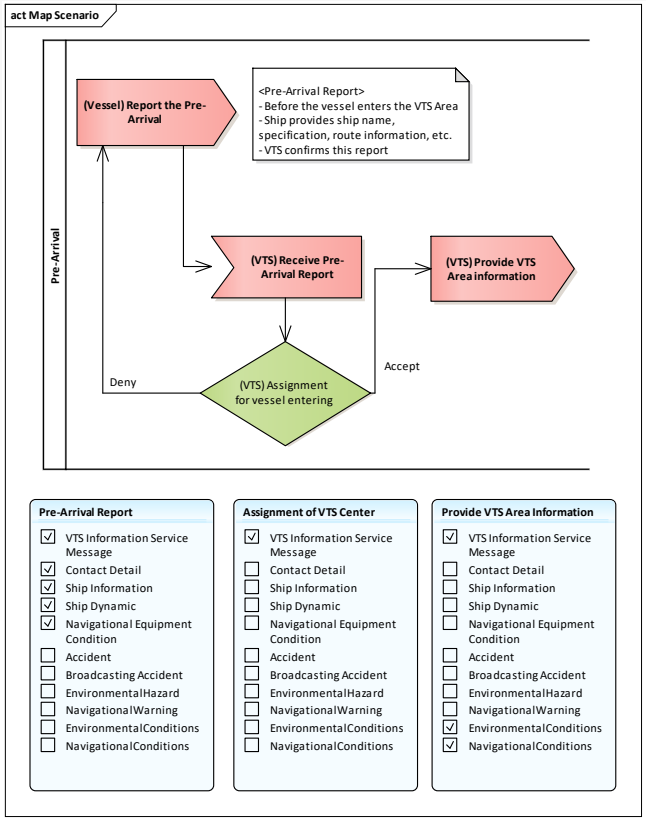
▪ Pre-Arrival Report & Request Entering VTS Area

- Before arrival to VTS area, Vessel report information and request permission to enter VTS Area
- When granted entrance to VTS area, VTS center provides information about VTS area to Vessel
  - VTS center provide Environmental & Navigational Information

Action	Feature	Data
(Vessel) Pre-Arrival Report	VTS Information Service Message	MRN, MMSI Code, Message Identifier, Message Marker, VTS Operator assignment, Reported At, Reported By, Request Information, Location State, Administrator State
	Contact Detail	Communication Channel(VHF), Telecommunications
	Ship Information	Vessel Name, IMO-No, Call Sign, MMSI code, Flat State, Vessel Measurements, Category of Vessel, ISPS Level, Cargo Information, Number of Passenger, Ship Crew
	Ship Dynamic	Bunker Information, Ship Speed, Category of Statement, Movement Purpose, Heading, Message Identifier for Route, Route Name, Route Version
	Navigational Equipment Conditions	Compass System, Electronic Position Fixing, Engine Telegraph, Mooring Winches and Lines, Number of Power Unit Units in use, Rate of Turn Indicator, RPM Pitch Indicator, Rudder Indicator, Speed Log, Steering Gear, VHF Equipment, Whistles
(VTS) Assignment of VTS Center	VTS Information Service Message	MRN, MMSI Code, Message Identifier, Message Marker, VTS Operator assignment, Reported At, Reported By, Request Information, Location State, Administrator State
(VTS) Provide VTS Area Information	VTS Information Service Message	MRN, MMSI Code, Message Identifier, Message Marker, VTS Operator assignment, Reported At, Reported By, Request Information, Location State, Administrator State
	Environmental Conditions	Valid Date Time, Message identifier for Environmental Conditions(Link to S-412), S-412
	Navigational Conditions	Valid Date Time, Message identifier for Navigational Conditions(Link to S-124), S-124



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VTS-INS PS Detail Scenario

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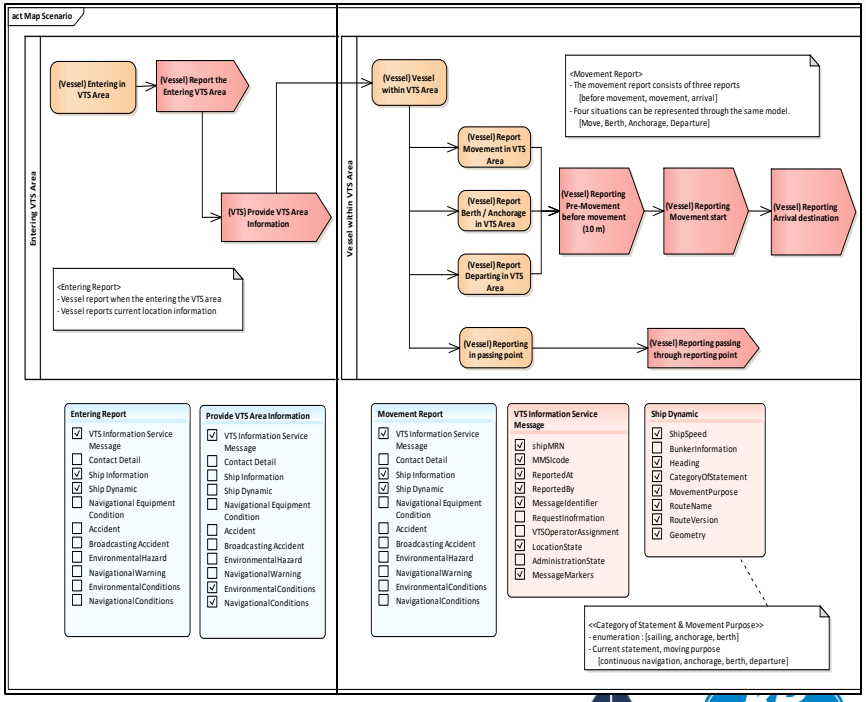
- **Vessel Entering & Movement Report**
  - Vessels entering and moving within VTS area report to VTS
  - Movement report is consist of three report
    - Prior to movement (10min), commencing movement and arrival
  - During Anchorage, Berthing and Departure, vessel use Movement report
    - Purpose of vessel's movement can be identified by [Category of Statement] and [Movement Purpose]

Action	Feature	Data
(Vessel) Entering & Movement Report	VTS Information Service Message	MRN, MMSI Code, Message Identifier, Message Marker, Reported At, Reported By, Location State, Administrator State
	Ship Information	Vessel Name, IMO-No, Call Sign, MMSI code, Flat State, Vessel Measurements, Category of Vessel, ISPS Level, Cargo Information, Number of Passenger, Ship Crew
	Ship Dynamic	Ship Speed, Category of Statement, Movement Purpose, Heading, Message Identifier for Route, Route Name, Route Version
	Category of Statement, Movement Purpose	Value : Sailing, Anchorage, Berth, Departure - Expresses the movement status and purpose of the vessel - Ex) Move to Anchorage : Statement(Sailing), Purpose(Anchorage)
(VTS) Provide VTS Area Information	VTS Information Service Message	MRN, MMSI Code, Message Identifier, Message Marker, Reported At, Reported By, Location State, Administrator State
	Environmental Conditions	Valid Date Time, Message identifier for Environmental Conditions(Link to S-412), S-412
	Navigational Conditions	Valid Date Time, Message identifier for Navigational Conditions(Link to S-124), S-124



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VTS-INS PS Detail Scenario

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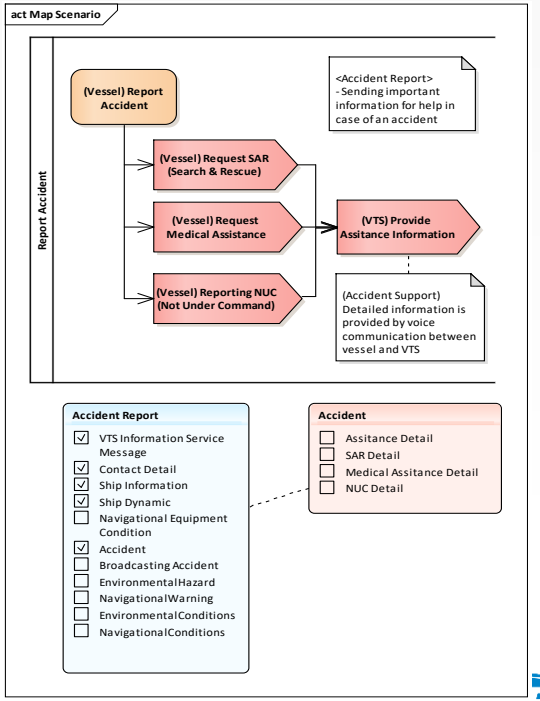
- **Accident Report**
  - In emergency situation, vessel report the accident and request assistance
  - Accident report is information for the initial request of assistance, detailed accident information is made by voice communication (outside of PS scope)
  - Accident report is consist of three report
    - Search & rescue, Medical assistance, Not under command

Action	Feature		Data
(Vessel) Accident Report	VTS Information Service Message		MRN, MMSI Code, Message Identifier, Message Marker, VTS Operator assignment, Reported At, Reported By, Request Information, Location State, Administrator State
	Contact Detail		Communication Channel(VHF), Telecommunications
	Ship Information		Vessel Name, IMO-No, Call Sign, MMSI code, Flat State, Vessel Measurements, Category of Vessel, ISPS Level, Cargo Information, Number of Passenger, Ship Crew
	Ship Dynamic		Bunker Information, Ship Speed, Category of Statement, Movement Purpose, Heading, Message Identifier for Route, Route Name, Route Version
	Accident	SAR	Occur Time, Abandon Vessel or Not, Number of Injured Person, Rescue Equipment, Number of Lifeboat, Number of Lifecraft
		Medical Assistance	Kind of Medical Assistance*, Doctor in Vessel, Time for a meeting * Request boat for hospital transfer, Radio medical advice, Helicopter with doctor
		NUC	Not Under Command Situation*, Tug Request * Engine, Steering gear, Propeller
(VTS) Assistance Information	VTS Information Service Message		MRN, MMSI Code, Message Identifier, Message Marker, VTS Operator assignment, Reported At, Reported By, Request Information, Location State, Administrator State
	Contact Detail		Communication Channel(VHF), Telecommunications



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VTS-INS PS Detail Scenario

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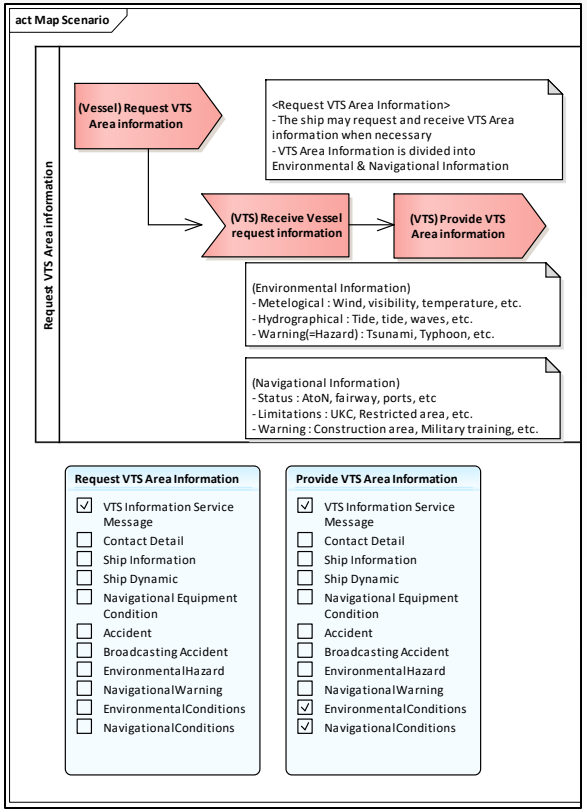
▪ Request VTS Area Information

- VTS provides VTS Area information in vessel's request / emergency situation
- When vessels' request, VTS provide Environmental & Navigational Information
- Environmental & Navigational Conditions reference other PS
  - Environmental Conditions : S-412
  - Navigational Conditions : S-124

Action	Feature	Data
(Vessel) Request VTS area Information	VTS Information Service Message	MRN, MMSI Code, Message Identifier, Message Marker, VTS Operator assignment, Reported At, Reported By, Request Information, Location State, Administrator State
(VTS) Provide VTS Area Information	VTS Information Service Message	MRN, MMSI Code, Message Identifier, Message Marker, VTS Operator assignment, Reported At, Reported By, Request Information, Location State, Administrator State
	Environmental Conditions	Valid Date Time, Message identifier for Environmental Conditions(Link to S-412), S-412
	Navigational Conditions	Valid Date Time, Message identifier for Navigational Conditions(Link to S-124), S-124



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VTS-INS PS Detail Scenario

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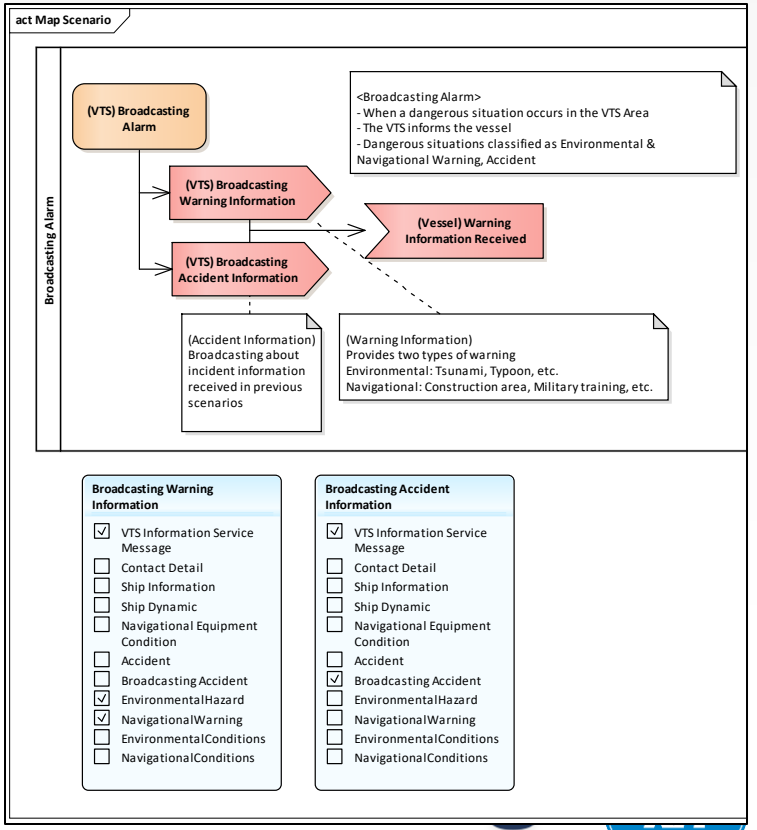
- **Broadcasting Alarm of VTS Center**
  - In emergency situation, VTS broadcast Alarms
    - Environmental Hazards, Navigational Warnings and Traffic Accident
  - Traffic Accident is a broadcast about Accident Report (Vessel)

Action	Feature	Data
(VTS) Provide VTS Area Information	VTS Information Service Message	MRN, MMSI Code, Message Identifier, Message Marker, VTS Operator assignment, Reported At, Reported By, Request Information, Location State, Administrator State
	Environmental Hazards	Valid Date Time, Message identifier for Environmental Hazards,(Link to S-412), S-412
	Navigational Warnings	Valid Date Time, Message identifier for Navigational Warnings(Link to S-124), S-124
	Traffic Accident	Accident Alarm Type(SAR, medical, NUC), Location, Accident Ship information, Accident Ship Cargo Information, Accident Detail



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VTS-INS PS Data Model

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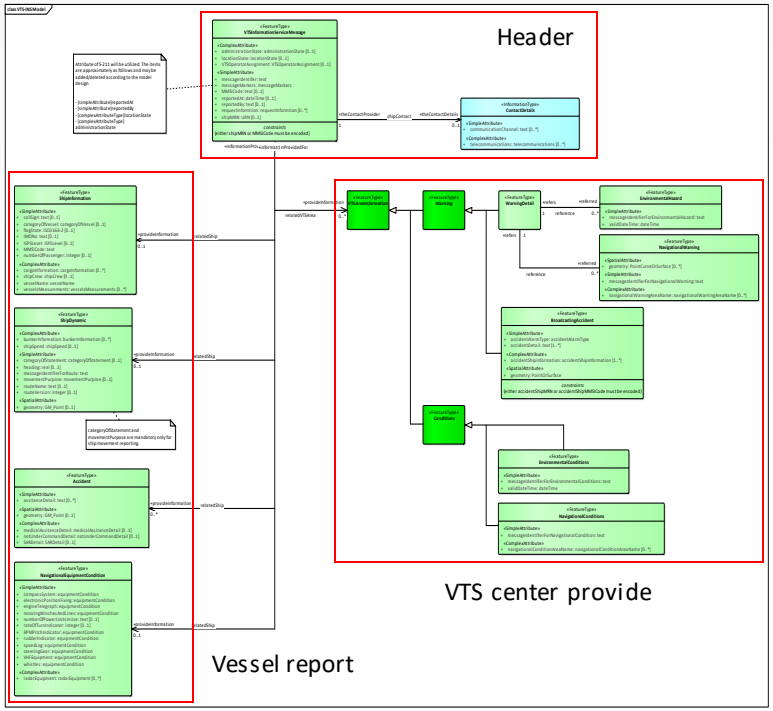
- **Development of VTS-INS PS Data Model**
  - Data model development based on Scenario (final ver.)
    - **Message Header** : Information such as sender & receiver, message purpose, current location
    - **Information of Vessel report** : Information required when the vessel reports to VTS Center
    - **Information provide by VTS center** : Environmental & Navigation Information, Accident Information



VTS-INS PS

Category	Class	Description
Message Header	VTS Information Service Message	- Classes for distinguishing information that is sent. Manage requests, responses to requests, and results of service requests, or distinguish which information is transmitted from broadcasting information
Information about vessel report	Ship Information	- Static information/information that does not change when a ship is operated in one voyage
	Ship Dynamic	- Dynamic information/information that may change or change when a ship is operated in one voyage
	Accident	- Class to communicate own vessel accident information. The purpose of this class is to provide emergency information about ship accidents prior to VTS communication
	Navigational Equipment Condition	- Mechanical defects/An item to manage the condition of items to determine whether mechanical defects that can affect the normal operation of a ship are present
Information provided by VTS center	Warning	- Information about Environmental hazards, Navigational warnings and Accident information
	Conditions	- Information about Environmental & Navigational Condition - Use S-124, S-412 to get information

VTS-INS PS detail

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VTS-INS PS Data Model

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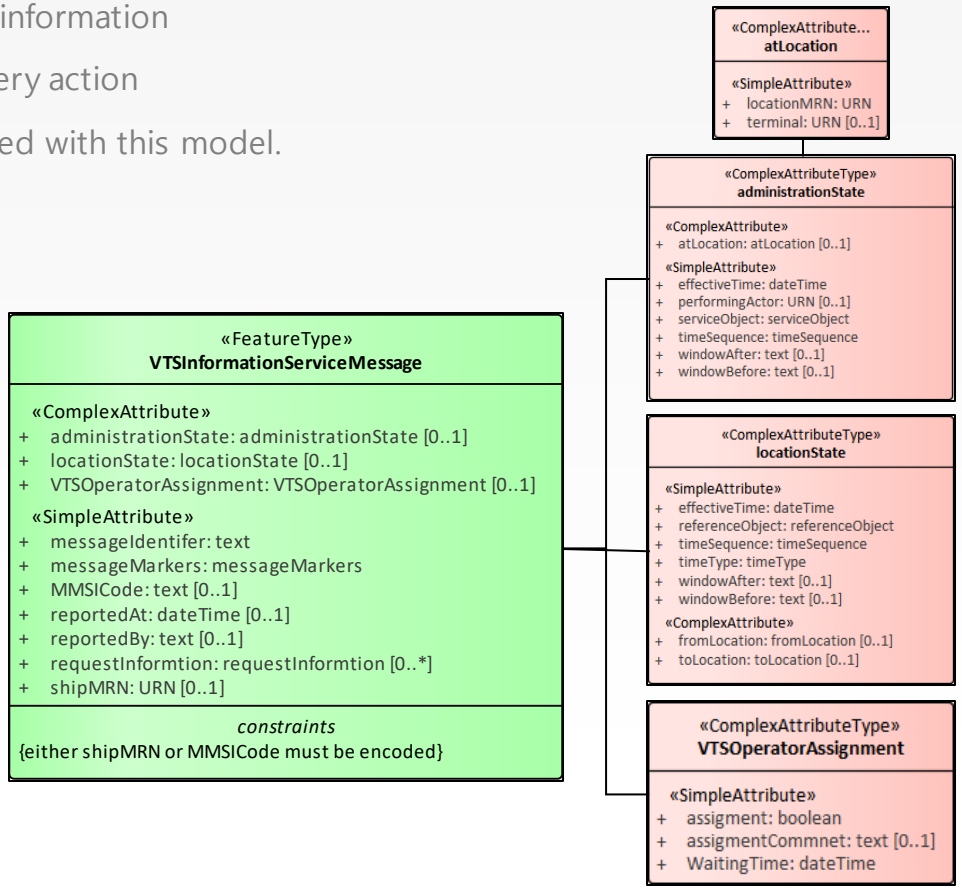
- **VTS Information Service Message(Message Header)**
  - Classes for distinguishing information that is sent (inspired by S-211)
  - Manage requests, responses to requests, and results of service requests, or distinguish which information is transmitted from broadcasting information
  - This class is always exchanged in every situation, every action
  - Ship Report class and Information class are exchanged with this model.

Feature	Description
Administration State	- Describes a time related data point for a service administration event, such as a request made, received, confirmed or denied
Location State	- Describes a time related data point for an arrival to or departure from a specified location
VTS Operator Assignment	- Results of items requested by vessel to VTS Center - Ex) request entering VTS Area, request environmental info.
Message Identifier	- A unique identifier distinguishing one message from another
Message Markers	- The purpose of a message used to facilitate communication between ships.
Reported At / Reported By	- Timestamp of report - Time and entity value of timestamp
Request Information	- The category of information used to request information within the VTS Area.
Ship MRN / MMSI Code	- Message sender's identification value



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VTS-INS PS Data Model

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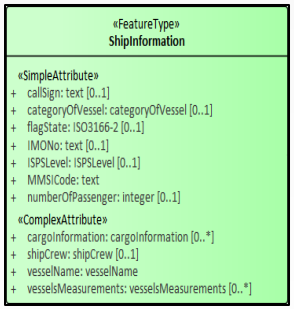
- **Information of Vessel Report**
  - The Information of Vessel Report Model deals with the items required for vessel's report
  - These classes are based on information described in VTS46-13.3.9, VTS Operator's review, SMCP, and etc.
  - Voyage Information is implemented in the form of Ship Dynamic including S-421 (RTZ)

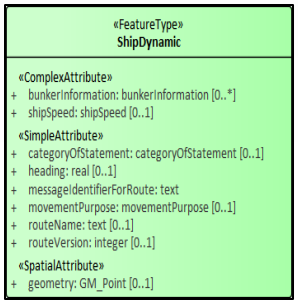
VTS46-13.3.9 - Annex A - VTS Digital Services

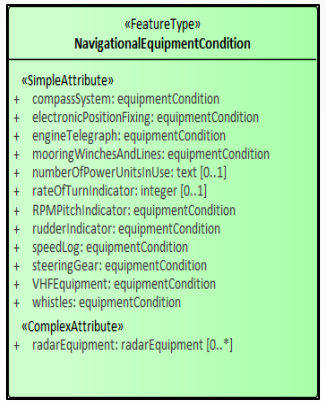
Type	CATEGORY	FEATURE	ATTRIBUTE
	vessel information	identification	Vessel identity (ship's name, MMSI , call sign, IMO, owner, …)
		static information	e.g. vessel measurements (length, width, dead weight, (maximum) number of passengers …), type of vessel (container, bulk, …)
		dynamic information	e.g. speed, direction, number of passengers, number of crew, flag, agent, captain, draught, …
		certification information	
	Voyage information	identification	Voyage ID, type, …
		sailing plan	e.g. departure, arrival, route, waypoints, timing …
		status	e.g. planned, confirmed, estimated, active, …
		position	e.g. current, last waypoint, next waypoint, …
		specific voyage information	e.g. trip remarks, towage information, pilot information, convoy information, vessel activity (fishing, dredging, …), piracy, …
		warnings	e.g. ISPS,
	Cargo information	hazard information	e.g. IMDG code, propername …
		detailed cargo information	e.g. position on board, detailed product information, …

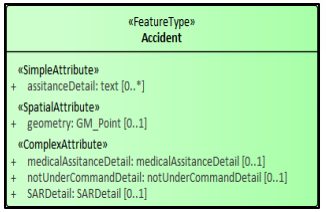
VTS46-13.3.9 Vessel's Information

Feature	Description	Ref.
Ship Information	- Static information/information that does not change when a ship is operated in one voyage	V-127, VTS46
Ship Dynamic	- Dynamic information/information that may change or change when a ship is operated in one voyage	V-127, VTS46
Accident	- Class to communicate own vessel accident information. The purpose of this class is to provide emergency information about ship accidents prior to VTS communication	VTS Operator, SMCP
Navigational Equipment Condition	- Mechanical defects/An item to manage the condition of items to determine whether mechanical defects that can affect the normal operation of a ship are present	VTS Operator









VTS-INS PS Information of Vessel Report

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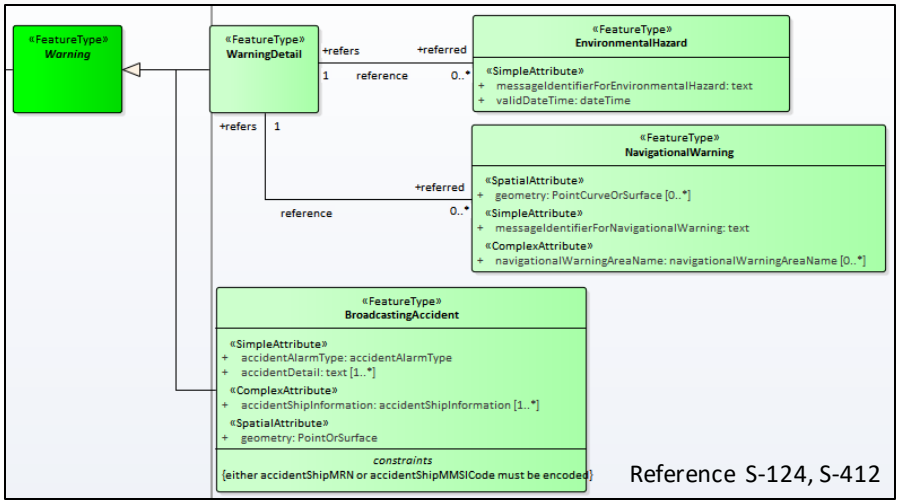
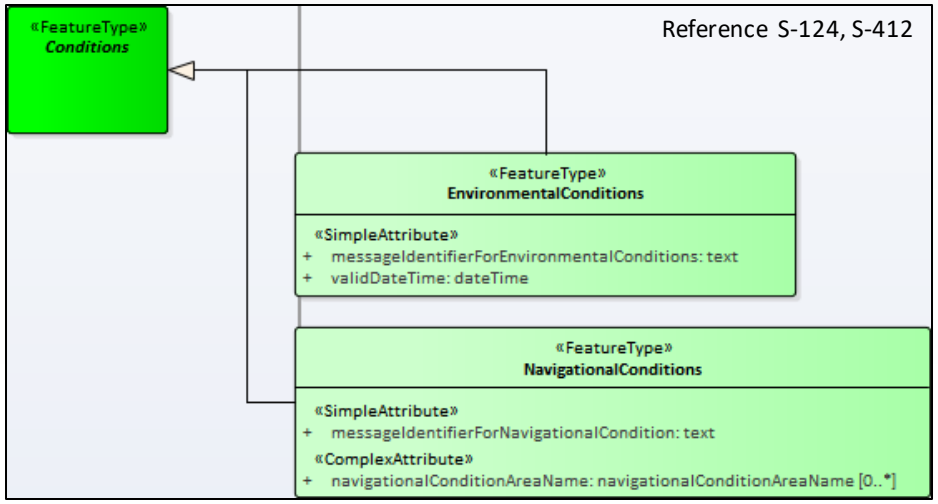
VTS-INS PS Data Model

- **Information provided by VTS center**
  - Information provided by the VTS center consists of two categories
    - Warning Information : Emergency information such as Environmental Hazard, Navigational Warning and Accident Information
    - Condition Information : Information such as Weather, navigational structures and etc.
  - Environmental, Navigational Information is transmitted including other product standards
    - Environmental Information(S-412), Navigational Information(S-124)
  - Broadcasting Accident includes information of Accident Report received from ship





Result and Future work

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- **Result**
  - Development team drafted VTS-INS Product Specification
  - VTS-INS PS is based on VTS regulations and committee outputs, but would benefit from more input from VTS experts.
  - Physical datalink for exchanging the datasets is unknown.

- **Future work**
  - Request a review of VTS experts on scenarios and data listings for VTS-INS PS.
    - Review and edit scenario, data model
    - Detailed data type(text, integer, etc.) requirements
  - Define physical link used to exchange the datasets
  - VTS-INS PS revision based on review comments (=user need)
  - We request to VTS Committee develop this product specification into an IALA Product Specification and that an S-21x number is assigned to the document.

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THANK YOU

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