

- 7.3.1.1. All contractual documentation (e.g. change proposals, invoices, etc.) shall be delivered in both paper and electronic format.
- 7.3.1.2. All project management documentation (e.g. plans, schedules, reports, etc.) shall be delivered as electronic copies in MS Office.
- 7.3.1.3. The rest of the deliverables shall be furnished as an electronic copy in a format which is best suited for review and maintenance by the Purchaser (e.g. Project Master Schedule in MS Project format, Project Highlight Reports in MS Word).
- 7.3.1.4. The Contractor shall use the same MS Office version as the Purchaser is using.
- 7.3.1.5. In general the following guidelines shall be used:
- MS Word for generating text documents
 - MS Excel for tabular or matrix data
 - MS Visio or MS PowerPoint for drawings
 - MS Project for schedule
 - MS PowerPoint for briefings.
- 7.3.1.6. Drawing files shall be provided together with the text documents.
- 7.3.1.7. The final versions of documents shall be converted into PDF file.
- 7.3.1.8. The rest of the deliverables shall be furnished as electronic copy of the agreed tools/media used.
- 7.3.1.9. Documentation shall be distributed as follows:
- One paper and electronic copy to the Purchaser's Project Manager.
 - One paper and electronic copy to the identified IV&V Contractor.
 - An electronic copy (MS Office file, drawing file and PDF file) to the Project Website.
- 7.3.1.10. Each document shall contain the following information for identification:
- Version of the document and version history
 - Due date
 - Delivery date
 - CLIN number
 - Status (e.g. Accepted/Approved/Draft).

7.4. Document Reviews

- 7.4.1. The Contractor shall submit all documentation for Purchaser review as described below. At each review cycle, the Purchaser will state if the document is likely to be accepted in its Final version.
- 7.4.2. During the development of a document, the Contractor may be required to provide subsequent versions of the documents (starting with version 0.1) for the Purchaser review.
- 7.4.3. The Contractor shall review any sub-contractor documents before submitting for Purchaser's formal review.

- 7.4.4. The Contractor shall provide the last Draft version (identified as version 0.9) of each deliverable for Purchaser review.
- 7.4.5. If the review is organized within a Build Process, the Contractor shall provide documents for the review at least two (2) weeks before the review date, and four (4) weeks otherwise, unless specified differently in the Work Package or SSS.
- 7.4.6. Attached to the documents to be reviewed, the Contractor shall send the invitation, including:
 - Agenda
 - List of Participant
 - Date, time, location of the review
- 7.4.7. The Purchaser will provide comments, corrections, and suggested changes to the Contractor within two (2) weeks of receipt for deliverables being submitted part of the Build Process and four (4) weeks otherwise. The reports or other time-bounded documents may be reviewed in shorter duration.
- 7.4.8. The Contractor shall not rely on the Purchaser review process to fill in deficiencies or obtain missing parts from Purchaser.
- 7.4.9. In order to gain time, partial review may be applied for long documents.
- 7.4.10. The Purchaser will inform the Contractor about each delivery of document(s) with the state “Accepted” for internal review. The acceptance date can be used as a delivery date.
- 7.4.11. The Purchaser may “Reject” a document without competing a review if it is deemed to have significant deficiencies.
- 7.4.12. The Final version (1.0) shall be substantially complete and correct, and the delivery dates specified in the SSS will assume this.
- 7.4.13. The Contractor shall provide the Final version (version 1.0) of the document, for approval, within two (2) weeks after the review. The reports or other time-bounded documents may require shorter duration.
- 7.4.14. The Purchaser may “Approve” the Final version of a document and inform the Contractor. This document shall then be baselined.
- 7.4.15. Until FSA, the Contractor shall remain responsible for updating all the deliverable documents to reflect all the necessary changes (e.g. updating SDS according to a change implemented during OT&E).
- 7.4.16. The Contractor or the Purchaser may agree on new approaches and techniques to increase the efficiency of review process.

7.5. Contract Documentation Requirements List

- 7.5.1. The Contract Documentation Requirements List (CDRL) identifies the documents to be delivered under this Contract and the applicable quality standards by which they will be reviewed for acceptance.
- 7.5.2. The CDRL for this Contract is provided in [Table 7-1](#)~~Table 7-1~~. For each item, the table identifies the following:
 - Cross-reference to the SOW paragraph requiring the document

- Document title
- Document acceptance requirements, where:
 - “A” (Approve) means the Purchaser must review and approve the initial submission and subsequent changes.
 - “I” (Information) means the item is provided to the Purchaser for information purposes only and the Purchaser will only request changes if it finds errors or omissions.
- Applicable quality standard against which the document will be reviewed for acceptance. If this SOW is the indicated Quality Standard, the term “SOW” is used.

Table 7-1 – Contract Documentation Requirements List

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
MANAGEMENT						
3.7	Project Management Plan	PMP	Plan	A	PMR	SOW
3.8	Project Product Breakdown Structure	PPBS	Annex to PMP	A	PMR	SOW
3.9	Project Work Breakdown Structure	PWBS	Annex to PMP	A	PMR	A Guide to the Project Management Body of Knowledge (PMBOK Guide) Practice Standard for Work Breakdown Structures
3.10	Project Master Schedule	PMS	Annex to PMP	A	PMR	SOW
3.12.4	Risk Management Plan	RMP	Plan	A	PMR	SOW
3.13.2	Quality Plan	QP	Plan	A	PMR	AQAP-2110, 2120, 2210
3.17	Project Highlight Report	PHR	Report	I	Monthly	PRINCE2
0	Project Management Review Report	PMR-R	Report	A	After PMR	SOW
3.16.3.6	Project Checkpoint Review Report	PCR-R	Report	I	Monthly	PRINCE2
3.12.6	Issue Register	IReg	Register	I	PMR	PRINCE2
3.12.5	Risk Register	RReg	Register	I	PMR	PRINCE2
3.13.5	Quality Register	QReg	Register	I	PMR	PRINCE2
3.3.8	Lessons Log	LLog	Register	I	PMR	PRINCE2
3.3.8	Lessons Report	LR	Report	I	At each milestone aligned to CP	PRINCE2
3.15	Minutes of Meeting	MoM	Report	A	3 days after meetings	SOW
4.6	System Development Plan	SDP	Plan	A	PMR	SOW
4.6.3	Requirements Implementation Schedule	RIS	Plan Annex to SDP	A	PMR	ISO 9241:2010 SOW
4.6.4	Usability Engineering Plan	UEP	Plan Annex to SDP	A	PMR	ISO 13407:1999 <u>ISO 9241:2010</u>

NATO UNCLASSIFIED

IFB-CO-13859-TRITON, Amd.2

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
4.6.5	Security Accreditation Plan	SAP	Plan Annex to SDP	A	PMR	AC/35-D/2005-REV3 AC/35-D-1021-REV3
4.12.2	Test Management Plan	TMP	Plan	A	CDR, TRR	SOW
4.12.2.15	Security Test and Verification Plan	STVP	Plan Annex to TMP	A	CDR, TRR	AC/35-D/2005-REV3
4.12.2.16	System Validation Plan	SVP	Plan Annex to TMP	A	CDR, TRR	SOW
5.2	Integrated Support Plan	ISP	Plan	A	PMR, PDR, CDR, SQR	SOW
5.9.2	Transportation Plan	TransP	Plan Annex to ISP	A	CDR	SOW
5.10.7.3	Warranty Report	WR	Report	A	FSA	SOW
CONFIGURATION MANAGEMENT						
4.7.5	Configuration Management Plan	CMP	Plan	A	PMR	STANAG-4427
4.7.11.4	Configuration Audit Report	CAuR	Report	A	TRR, SiAR	SOW
SYSTEM REQUIREMENTS ANALYSIS						
4.8.3	System Requirements Specification	SyRS	Specification	A	SRR	AC/35-D/1015-REV3
4.8.5.1	Security Risk Assessment Report	SRA-R	Report	A	SRR	SOW
4.8.6	System Specific Security Requirement Statement	SSRS	Statement	A	SRR	AC/35-D/1015-REV3
4.8.6.1	Community Security Requirement Statement	CSRS	Statement	A	SRR	AC/35-D/1015-REV3
4.8.6.2	System Interconnection Security Requirement Statement	SISRS	Statement	A	SRR	[AC/35-D/1015-REV3
4.8.8.5	System Requirements Review Report	SRR-R	Report	A	After SRR	SOW
SYSTEM DESIGN						
4.9.2	System Design Specification	SDS	Description	A	CDR	IEEE/EIA 12207
4.9.2.16	Requirements Traceability Matrix	RTM	Annex to SDS	A	CDR	SOW

NATO UNCLASSIFIED

NATO UNCLASSIFIED

IFB-CO-13859-TRITON, Amd.2

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
4.9.2.12	System Security Design Specification	SSDS	Annex to SDS	A	CDR	SOW
4.9.3.7	Preliminary Design Review Report	PDR-R	Report	A	After PDR	SOW
4.9.4.8	Critical Design Review Report	CDR-R	Report	A	After CDR	SOW
SOFTWARE IMPLEMENTATION						
4.10.2.4.4	Software Requirements Specification	SRS	Specification	A	SwRR	IEEE/EIA 12207
4.10.2.5.5	Software Architecture Description	SAD	Description	A	SwDR	IEEE/EIA 12207
4.10.2.6.6	Software Design Description	SDD	Description	I	SwDR	IEEE/EIA 12207
4.10.2.5.6	Database Design Description	DDD	Description	I	SwDR	IEEE/EIA 12207
4.9.2.16	Requirements Traceability Matrix	RTM	Annex to SDS	I	SwDR	SOW
4.9.2.17	TRITON Interface Control Description (NS and NU)	ICD	Description	A	CDR, SwDR-1,2,3	SOW
4.10.2.11	Software Version Description	SVD	Description	A	After each release	SOW
4.10.2.4.6.4	Software Requirements Review Report	SwRR-R	Report	A	After SwRR	SOW
4.10.2.6.8.4	Software Design Review Report	SwDR-R	Report	A	After SwDR	SOW
4.10.2.9.2	Software Test Description	STD	Description	I	TRR	SOW
4.10.2.9.3	Internal System Test Report	IST-R	Report	A	TRR	SOW
4.10.2.7.5	Source Code Review Report	SCR-R	Report	A	TRR	SOW
4.12.12.2	Security Test and Evaluation Report	ST&E-R	Report	A	TRR	SOW
HARDWARE IMPLEMENTATION						
4.10.3.2.2	Hardware Requirements Specification	HRS	Specification	A	HwRR	SOW
4.10.3.3.2	Hardware Design Description	HDD	Description	A	HwDR	SOW
4.9.2.17	TDK Interface Control Description	ICD	Description	A	HwDR, SwDR-4	SOW
4.10.3.6.2.4	First Article Acceptance Test Procedure	FAAT-P	Procedure	A	FAAT	SOW
4.10.3.8.2	Hardware Factory Acceptance Test Procedure	HwFAT-P	Procedure	A	HwTRR	SOW

NATO UNCLASSIFIED

NATO UNCLASSIFIED

IFB-CO-13859-TRITON, Amd.2

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
4.10.3.2.3	Hardware Requirements Review Report	HwRR-R	Report	A	After HwRR	SOW
4.10.3.3.4	Hardware Design Review Report	HwDR-R	Report	A	After HwDR	SOW
4.10.3.7.1	Production Readiness Review Report	PRR-R	Report	A	After PRR	SOW
4.10.3.8.1	Hardware Test Readiness Review Report	HwTRR-R	Report	A	Before HwTRR	SOW
4.10.3.8.3	Sea Acceptance Test Procedure	SeAT-P	Procedure	A	Before SeAT	SOW
4.10.3.8.3.5	Sea Acceptance Test Report	SeAT-R	Report	A	After SeAT	SOW
SYSTEM INTEGRATION						
4.12.5	Test Readiness Review Report	TRR-R	Report	A	After TRR	SOW
4.12.4	Factory Acceptance Test Procedure	FAT-P	Procedure	A	Before each TRR	SOW
4.12.12.3	System Integration Test Procedure	SIT-P	Procedure	A	TRR	SOW
SYSTEM VERIFICATION						
4.12.12.2.5	Security Operating Procedures	SecOp	Procedure	A	TRR	AC/35-D/1014-REV2
4.12.12.2.6	Security Implementation Verification Procedures	SIVP	Procedure	A	TRR	SOW
4.12.12.5.5	User Assessment Test Procedure	UAT-P	Procedure	A	TRR	SOW
4.12.12.4.6	System Supportability and Maintenance Acceptance Test Procedure	SSMAT-P	Procedure	A	TRR	SOW
4.12.12.4.11	System Supportability and Maintenance Acceptance Test Report	SSMAT-R	Report	A	After SSMAT	SOW
4.12.12.6	Regression Test Procedure	RegT-P	Procedure	A	Before RegT	SOW
4.12.13.3	System Verification Review Report	SVerR-R	Report	A	After SVerR	SOW
SYSTEM TRANSITION						
4.13.2	System Transition Plan	STrP	Plan	A	CDR	SOW, AAP-48
4.12.12.4.3	Software Installation Guide	SIG	Manual	A	TRR	SOW, SRS
4.13.3.8	Site Survey Report	SiSR	Report	A	After Site Survey	SOW

NATO UNCLASSIFIED

NATO UNCLASSIFIED

IFB-CO-13859-TRITON, Amd.2

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
5.6.6.3	Release and Deployment Plan	RDP	Plan	A	SQR	SOW
5.8.3	Training Plan	TrP	Plan	A	CDR, TrRR	SOW
5.8.4	Training Programme	TrPrg	Included in TrP	A	TrRR	SOW
5.8.2	Training Needs Analysis Report	TNA-R	Report	A	After TNA	SOW
5.8.4.7	Training Materials			A	TrRR	SOW
5.8.12	Training Course Evaluation Reports	TCER	Report	A	One week after each training	SOW
5.8.1.1	System User Manual Quick User Guide Briefing Manual System Administrator Manual	SUM	Manuals	I	TRR, SQR	SOW, SRS
4.13.4	Sustainment Qualification Review Report	SQR-R	Report	A	After SQR	SOW
4.13.6.1	Pre-Installation Check Procedure	PIC-P	Procedure	A	SQR	SOW
4.13.6.6	Site Activation Test Procedure	SiAT-P	Procedure	A	SQR	SOW
4.13.6.7.15	On-site UAT Report	UAT-R	Report	A	After On-site UAT	SOW
4.13.6.7.7	Organizational Node Activation Review Report	ONAR-R	Report	A	After each activation	SOW
4.13.6.9	Software Distribution List	SWDL	List	A	SQR	SOW
4.13.8.2	Site Acceptance Review Report	SiAR-R	Report	A	After each SiAR	SOW
4.13.9	Operational Test Readiness Review Report	OTRR-R	Report	A	After OTRR	SOW
4.13.11	Multi-Site Operation Test Procedure	MSOT-P	Procedure	A	Before the last SiAR	SOW
4.13.11.7	Multi-Site Operation Test Report	MSOT-R	Report	A	After MSOT	SOW
4.15.6.4	System Transition Readiness Review Report	STRR-R	Report	A	After STR	SOW
SYSTEM VALIDATION						
4.14.3	System Validation Test Procedure	SVT-P	Procedure	A	OTRR-2	

NATO UNCLASSIFIED

NATO UNCLASSIFIED

IFB-CO-13859-TRITON, Amd.2

SOW Ref.	Title	Abbrev.	Type	A/I	When	Quality Standard
4.14.4.5	System Validation Test Report	SVT-R	Report	A	After SVT	SOW
4.14.6.6	System Validation Review Report	SVR-R	Report	A	After SVR	SOW
4.14.7.3	Final System Acceptance Report	FSA-R	Report	A	After FSA	SOW
SYSTEM OPERATION						
5.3, 5.11.1.4	In-Service Support Plan	ISSP	Plan	A	Before PSA	SOW
4.14.2.5	Operational Testing and Evaluation Report	OTER	Report	A	Before FSA	SOW
4.7.9	Deficiency Report	DR	Report	I	Anytime	SOW
SYSTEM MAINTENANCE						
5.3.2	System Maintenance Plan	SMP	Plan Annex to ISSP	A	SQR-2 and FSA	SOW
5.3.3	Obsolescence Management Plan	OMP	Plan Annex to ISSP	A	SQR-2 and FSA	SOW
4.16.3.3	Monthly Maintenance Review Report	MMR-R	Report	A	Monthly	SOW
5.4.4	System Maintenance Manuals (Software Maintenance Manual, Hardware Maintenance Manual)	SMM	Manual	A	SQR-2 and FSA	SOW
SOFTWARE TRANSITION						
4.17.2	Software Transition Plan	SwTrP	Plan	A	PSA	SOW
4.17.3.6	Computer Programming Manual	CPM	Manual	A	Before SwTrRR	SOW
4.17.4	Software Transition Readiness Review Report	SwTrRR-R	Report	A	SwTRR	SOW
4.17.6	Software Transition Readiness Test Report	SwTrVT-R	Report	A	SwTRVT	SOW
4.17.7	Software Transition Validation Review Report	SwTrVR-R	Report	A	SwTRVT	SOW

NATO UNCLASSIFIED

NATO UNCLASSIFIED

IFB-CO-13859-TRITON, Amd.2

NATO UNCLASSIFIED

NATO UNCLASSIFIED



NATO Communications and Information Agency
Agence OTAN d'information et de communication

IFB-CO-13859-TRITON

FUNCTIONAL SERVICES FOR COMMAND AND CONTROL OF MARITIME OPERATIONS (TRITON)

INCREMENT 1

PROJECT SERIAL 2011/OIS03081



BOOK II – PART IV SOW ANNEX A SYSTEM REQUIREMENTS SPECIFICATION (SRS)

Version 1.~~1~~2

~~June~~July 2016



NATO UNCLASSIFIED

Document History

Edition	Date	Description
1.0	20/04/2016	Release for IFB
1.1	27/06/2016	Replies to Clarification Requests as AMD1.
<u>1.2</u>	<u>25/07/2016</u>	<u>Replies to Clarification Requests as AMD2.</u>

Table of Contents

1. INTRODUCTION13

1.1. Document Purpose 13

1.2. Content 13

1.3. Document Overview 13

1.4. Abbreviations, Acronyms and Definitions 13

1.5. Common Definitions 13

1.6. SRS Conventions 15

1.6.1. Heading 15

1.6.2. Description 16

1.6.3. Requirement 16

1.7. Qualification Provisions 17

1.7.1. Test 17

1.7.2. Demonstration 17

1.7.3. Analysis 17

1.7.4. Inspection 17

2. REFERENCES18

2.1. STANAGs 18

2.2. Allied Publications 18

2.3. Bi-SC Documents 19

2.4. Military Committee Documents 19

2.5. Other NATO Documents 19

2.5.1. Security 19

2.5.2. Interface Descriptions 20

2.5.3. Architecture 21

2.5.4. Procedures 22

2.5.5. Project Documents 22

2.6. Non-NATO Documents 22

2.7. Non-NATO Standards 22

3. GENERAL DESCRIPTION26

3.1. System Perspective 26

3.1.1. Business Process Basis for TRITON 26

3.1.2. Purpose of TRITON 30

3.1.3. Functionality 31

3.1.4. Security Domains 32

3.1.5. System Approach 33

3.1.6. Naming Convention 33

3.1.7. Identification 34

3.1.8. Users of TRITON 34

3.2. Constraints 35

3.2.1. General Constraints 35

3.2.2. Relationship with Other NATO Projects/Programs 36

3.2.2.1. MCCIS 36

3.2.2.2. MSA Demonstrator Fielded Prototype 36

3.2.2.3. NIRIS 37

3.2.2.4. Other Bi-SC AIS Functional Services 37

3.2.2.5. BI-SC AIS Programme Management and Integration Capability 37

3.2.2.6. NATO General Purpose Communications Systems 37

3.2.2.7. IT Modernisation Project 37

3.2.3. Solution Constraints 38

3.2.3.1. NATO Network Infrastructure 38

3.2.3.2. Client and Server 40

3.2.3.3. Physical Architecture 41

3.2.4. Implementation Environment 42

- 3.2.5. Anticipated Workplace Environment 42
- 3.3. Assumptions 43
 - 3.3.1. Organization 43
 - 3.3.2. Infrastructure..... 43
 - 3.3.3. Other Systems 43
 - 3.3.4. Test Environment 44
 - 3.3.5. Build Processes and Baselines 44
- 4. FUNCTIONAL REQUIREMENTS 45**
 - 4.1. Required States and Modes 45
 - 4.1.1. Operational Modes..... 45
 - 4.1.1.1. Servers and Clients 45
 - 4.1.1.2. Mode Definitions..... 45
 - 4.1.1.3. Mode Settings 46
 - 4.1.2. Operational States 47
 - 4.1.2.1. Server States 47
 - 4.1.2.1.1. State Definitions 47
 - 4.1.2.1.2. State Transitions 47
 - 4.1.2.2. Client States 50
 - 4.1.2.2.1. State Definitions 50
 - 4.1.2.2.2. State Transitions 50
 - 4.2. TRITON Functional Service Requirements 51
 - 4.2.1. Maritime Operational Objects 52
 - 4.2.2. Maritime Operation Management 52
 - 4.2.3. Maritime Situational Awareness 58
 - 4.2.3.1. Maritime Vessel Management 59
 - 4.2.3.1.1. Vessel Definition 60
 - 4.2.3.1.2. Vessel Database Management 62
 - 4.2.3.1.3. Vessel Number Management 64
 - 4.2.3.1.4. Vessel Identity Management 64
 - 4.2.3.1.5. Vessel Management 65
 - 4.2.3.1.6. Vessel List Management 66
 - 4.2.3.2. Maritime Track Management 68
 - 4.2.3.2.1. Track Definition..... 70
 - 4.2.3.2.2. Track Database Management 72
 - 4.2.3.2.3. Track Source Management 73
 - 4.2.3.2.4. Track Number Management 75
 - 4.2.3.2.5. Track Identity Management 76
 - 4.2.3.2.6. Track Life Cycle Management 78
 - 4.2.3.2.7. Track Initiation, Update and Deletion..... 80
 - 4.2.3.2.8. Track Correlation 84
 - 4.2.3.2.9. Track and Vessel Association 89
 - 4.2.3.2.10. Simulated Track Handling 91
 - 4.2.3.2.11. Track Interface Handling..... 92
 - 4.2.3.3. Maritime Reference Object Management 96
 - 4.2.3.3.1. Reference Object Definition 96
 - 4.2.3.3.2. Reference Object Database Management..... 98
 - 4.2.3.3.3. Reference Object Number Management 99
 - 4.2.3.3.4. Reference Object Life Cycle Management..... 99
 - 4.2.3.3.5. Reference Object Creation, Update and Deletion 100
 - 4.2.3.3.6. Reference Object Association 102
 - 4.2.3.4. Maritime Picture Management..... 103
 - 4.2.3.4.1. Operational Display 105
 - 4.2.3.4.2. Maritime Operational Picture Management 111
 - 4.2.3.4.3. Military Picture Management..... 112
 - 4.2.3.4.4. White Picture Management 113
 - 4.2.3.4.5. Recognised Maritime Picture Management 117

4.2.3.4.6.	Operational Object Search.....	123
4.2.3.4.7.	Operational Object Animation.....	125
4.2.3.4.8.	NATO Common Operational Picture Handling	125
4.2.3.5.	Maritime Information Management.....	126
4.2.3.5.1.	Reference Data Source Management.....	126
4.2.3.5.2.	Order of Battle Information Management	141
4.2.3.5.3.	Environmental Information Management.....	142
4.2.3.5.4.	CBRN Defence Information Management	143
4.2.3.5.5.	Intelligence Information Management.....	143
4.2.4.	Maritime Operational Support	144
4.2.4.1.	Maritime Alerts Management.....	145
4.2.4.1.1.	Operational Alerts.....	145
4.2.4.1.2.	Manual Alerts	148
4.2.4.2.	Maritime Decision Support	149
4.2.4.2.1.	Track Statistics	149
4.2.4.2.2.	Furthest on Circle.....	150
4.2.4.2.3.	Status Board.....	151
4.2.4.3.	Maritime Analysis Management	152
4.2.4.3.1.	Track Information Analysis	152
4.2.4.3.2.	Maritime Incident Recording.....	155
4.2.4.3.3.	Maritime Anomaly Detection	157
4.2.4.4.	Geospatial Drawing Management.....	165
4.2.4.4.1.	C2 Drawing Handling	166
4.2.4.4.2.	C2 Area Handling	167
4.2.4.5.	Tools	170
4.2.4.5.1.	Unit Converter	170
4.2.4.5.2.	Coordinate Converter	170
4.2.4.5.3.	Logbook	171
4.2.5.	Maritime Operational Planning and Execution	173
4.2.5.1.	Maritime Task Organization Management	173
4.2.5.2.	Area of Interest Management.....	176
4.2.5.3.	Rules of Engagement Management	179
4.2.5.4.	Maritime Planning Aids	181
4.2.5.4.1.	Disposition Management.....	181
4.2.5.4.2.	Position and Intended Movement.....	183
4.2.5.4.3.	Q-Route Management	185
4.2.5.4.4.	Navigational Area Management.....	187
4.2.5.5.	Subsurface Mission Space Management.....	188
4.2.5.5.1.	WSM/PMI Area Definition	189
4.2.5.5.2.	Interference Check	191
4.2.5.5.3.	Prevention of Mutual Interference.....	194
4.2.5.5.4.	Water Space Management	194
4.2.6.	Maritime Messaging and Communication	195
4.2.6.1.	Message Database Management.....	195
4.2.6.2.	Receiving Messages.....	196
4.2.6.3.	Sending Messages	197
4.2.6.4.	Handling ADatP-3 Messages	198
4.2.6.4.1.	Processing ADatP-3 Formatted Messages	200
4.2.6.4.2.	Generating ADatP-3 Messages	203
4.2.6.5.	Handling OTH-T GOLD Messages	204
4.2.6.5.1.	Processing OTH-T GOLD Messages	204
4.2.6.5.2.	Generating OTH-T GOLD Messages	206
4.2.6.6.	Handling Format Alfa Messages.....	206
4.2.6.6.1.	Processing Format Alfa Messages	207
4.2.7.	System Management.....	208
4.2.7.1.	User Management.....	208

4.2.7.1.1.	User Groups	208
4.2.7.1.2.	User Roles	209
4.2.7.1.3.	Users	211
4.2.7.1.4.	Privileges and Access Rights	211
4.2.7.1.5.	Identity and Session Handling.....	214
4.2.7.1.6.	Workspaces.....	217
4.2.7.2.	System Technical Management	218
4.2.7.2.1.	System Administration.....	218
4.2.7.2.2.	System Configuration Management	218
4.2.7.2.3.	System Interface Management	220
4.2.7.2.4.	System Technical Status Management	224
4.2.7.2.5.	System Error Reporting.....	225
4.2.7.2.6.	Client Monitoring and Control.....	226
4.2.7.2.7.	Multi-Site Operation Management	227
4.2.7.3.	Data Management	232
4.2.7.3.1.	Data Import and Export	232
4.2.7.3.2.	Databases	233
4.2.7.3.3.	Off-line Reference Data Management.....	237
4.2.7.3.4.	Own Ship Data Management.....	238
4.2.8.	Maritime Training and Exercise	239
4.2.8.1.	Training.....	239
4.2.8.2.	Data Source Simulation	241
4.2.8.2.1.	Track Simulation	241
4.2.8.2.2.	Nation RMP Stream Simulation	244
4.2.8.2.3.	Nation RMP Report Simulation.....	244
4.2.8.2.4.	Nation WP Stream Simulation	245
4.2.8.2.5.	AIS Data Source Simulation	245
4.2.8.2.6.	ACP Stream Simulation	246
4.2.8.3.	Interface Simulation	246
4.2.8.3.1.	System Interface Simulator.....	246
4.2.8.3.2.	TRITON Simulator	247
4.2.8.4.	Exercise	248
4.2.9.	System Infrastructure	248
4.2.9.1.	Service Oriented Architecture Platform.....	249
4.2.9.2.	Message Oriented Middleware.....	253
4.2.9.3.	Core Enterprise Services.....	255
4.2.9.4.	TRITON Clients.....	255
4.2.9.4.1.	Human-Machine Interface.....	255
4.2.9.4.2.	Web Browser Standards	256
4.2.9.4.3.	Visualisation.....	256
4.2.9.4.4.	Application View.....	257
4.2.9.4.5.	Geospatial View	260
4.2.9.5.	User Support	261
4.2.9.5.1.	On-line Help	261
4.2.9.5.2.	Computer-Based Training.....	265
4.2.9.5.3.	On-line Tutorials	267
4.2.9.5.4.	Frequently Asked Questions.....	268
4.2.9.5.5.	Printing	269
4.2.9.6.	User Notification Management.....	270
4.2.9.6.1.	Warnings.....	270
4.2.9.6.2.	Alerts.....	272
4.3.	C4ISR Visualisation Component Requirements	273
4.3.1.	General Architecture	273
4.3.1.1.	TRITON Architecture	275
4.3.1.2.	Operational Modes	275
4.3.1.2.1.	Integrated Mode.....	276

4.3.1.2.2.	Standalone Mode	278
4.3.2.	C4ISR Visualisation Component Elements	278
4.3.2.1.	Symbology Service	279
4.3.2.2.	Viewer Server	283
4.3.2.3.	GeoView	284
4.3.2.4.	GeoView User Interface Components	285
4.3.2.4.1.	Header	286
4.3.2.4.2.	Map Panel	287
4.3.2.4.3.	Control Panel	304
4.3.2.4.4.	Footer	310
4.3.3.	User Interface Layout	314
4.3.4.	Handling Geospatial Objects	315
4.3.4.1.	Displaying C4ISR Objects	315
4.3.4.1.1.	Object Display	315
4.3.4.1.2.	Symbology	317
4.3.4.1.3.	Object Labels	318
4.3.4.1.4.	Clustering	320
4.3.4.1.5.	Object Grouping	321
4.3.4.1.6.	Object History	323
4.3.4.1.7.	Label De-confliction	323
4.3.4.1.8.	Tinting	324
4.3.4.1.9.	Object Information Display	325
4.3.4.1.10.	Tooltips	328
4.3.4.2.	Managing Spatial Extent	328
4.3.4.3.	Displaying Geo-Information	330
4.3.4.4.	Displaying KML and KMZ	331
4.3.4.5.	Displaying NVG	332
4.3.4.6.	Displaying Media	333
4.3.4.7.	Animating C4ISR Objects	334
4.3.5.	Handling Geospatial Drawings	334
4.3.5.1.	C2 Drawings	335
4.3.5.1.1.	C2 Drawing Primitives	335
4.3.5.1.2.	C2 Drawing Properties	338
4.3.5.1.3.	Handling C2 Drawings	338
4.3.5.2.	C2 Areas	340
4.3.5.2.1.	C2 Area Templates	340
4.3.5.2.2.	User-based C2 Areas	341
4.3.5.2.3.	Application-based C2 Areas	342
4.3.5.2.4.	Displaying C2 Areas	342
4.3.6.	Handling Geospatial Information	342
4.3.6.1.	Gazetteer	342
4.3.6.2.	Search	344
4.3.6.3.	Geo-Data Export and Import	344
4.3.6.4.	Screenshot	346
4.3.6.5.	Printing	346
4.3.6.6.	Presentation Support	348
4.3.7.	Geo Processing Tools	348
4.3.7.1.	Distance Measurement	348
4.3.7.2.	Area Measurement	350
4.3.7.3.	Line of Sight Analysis	351
4.3.7.4.	Depth Analysis	352
4.3.7.5.	Height Analysis	353
4.3.7.6.	Range Rings	355
4.3.8.	3D Visualisation	356
4.3.8.1.	3D Display Framework	357
4.3.8.2.	Navigation	359

4.3.8.3.	Animation	362
4.3.9.	User Settings.....	362
4.3.9.1.	Theme Selection	362
4.3.9.2.	Most Used Functions.....	363
4.3.9.3.	Own Position	364
4.3.9.4.	Display Settings	364
4.3.10.	Security.....	365
4.3.11.	Error Handling.....	365
4.3.12.	On-line Help.....	366
4.3.13.	External Interfaces.....	369
4.3.13.1.	Application Programming Interface	370
4.3.13.1.1.	NATO Map API	370
4.3.13.1.2.	Application Framework	371
4.3.13.2.	Map Interface	371
4.3.13.2.1.	Web Map Service	372 371
4.3.13.2.2.	Web Map Tile Service	373
4.3.13.2.3.	Web Processing Service	373
4.3.13.3.	Geo Services Interfaces	374
4.3.13.4.	Symbology Service Interface	375 374
4.3.13.5.	Interface Control Description	375
4.3.13.6.	Conformance Test Kit	376 375
4.4.	TRITON Deployable Kit Requirements	376
4.4.1.	TDK Hardware.....	376
4.4.1.1.	TDK Case.....	377
4.4.1.2.	Carrying Case.....	378
4.4.1.3.	Uninterruptible Power Supply.....	379
4.4.1.4.	Central Control Unit	380 379
4.4.1.5.	Monitor Keyboard Unit	381
4.4.1.6.	Installation Kit	381
4.4.1.7.	Computing Hardware	383 382
4.4.1.7.1.	Server Unit	383 382
4.4.1.7.2.	Storage Unit	384 383
4.4.1.7.3.	Network Elements	385 384
4.4.1.7.4.	IEG-Data Diode	385
4.4.1.7.5.	Client Workstations	386 385
4.4.2.	TDK Software	387
4.4.2.1.	Infrastructure Software	387
4.4.2.2.	Local Geospatial Services	388
4.4.2.3.	TRITON Operational Software.....	390 389
4.5.	TRITON Support Systems Requirements	390
4.5.1.	TRITON Test Systems.....	390
4.5.1.1.	Operational Software	391
4.5.1.2.	Infrastructure	391
4.5.2.	TRITON Reference Systems	392 391
4.5.2.1.	Operational Software	392
4.5.2.2.	Infrastructure	393 392
4.5.3.	TRITON Training Systems.....	393
4.5.3.1.	Operational Software	393
4.5.3.2.	Infrastructure	394 393
5.	NON-FUNCTIONAL REQUIREMENTS.....	395
5.1.	Quality Requirements.....	395
5.1.1.	Performance Efficiency.....	395
5.1.1.1.	Performance by Time Behaviour	395
5.1.1.2.	Performance by Bandwidth Efficiency	396
5.1.1.3.	Performance by Network Status	397
5.1.1.4.	Resource Utilisation	398

- 5.1.1.5. Capacity 398
- 5.1.2. Compatibility 399
 - 5.1.2.1. Co-existence 400
 - 5.1.2.2. Interoperability 400
- 5.1.3. Usability 401
 - 5.1.3.1. Appropriateness Recognisability 401
 - 5.1.3.2. Learnability 401
 - 5.1.3.3. Operability 402
 - 5.1.3.4. User Error Protection 402
 - 5.1.3.5. User Interface Aesthetics 403
 - 5.1.3.5.1. User Friendliness 403
 - 5.1.3.5.2. Ease of Navigation 405
 - 5.1.3.5.3. Appearance 407
 - 5.1.3.5.4. Menus, Pointing Device Actions and Shortcuts 408
 - 5.1.3.5.5. Role-based Presentation 410
 - 5.1.3.5.6. Data Entry 410
 - 5.1.3.5.7. Real-Estate Management 412
 - 5.1.3.5.8. Time Display 413
 - 5.1.3.5.9. Standard Functionality 414
 - 5.1.3.5.10. Defaults 416
 - 5.1.3.5.11. User Feedback 416
 - 5.1.3.5.12. Tooltips 417
 - 5.1.3.6. Accessibility 418
 - 5.1.3.7. Language 418
- 5.1.4. Reliability 419
 - 5.1.4.1. Maturity 420
 - 5.1.4.2. Availability 421
 - 5.1.4.3. Accuracy 423
 - 5.1.4.4. Fault Tolerance 423
 - 5.1.4.5. Recoverability 426
 - 5.1.4.6. Survivability 426
- 5.1.5. Maintainability and Supportability 427
 - 5.1.5.1. Installation 427
 - 5.1.5.2. Uninstallation 431
 - 5.1.5.3. Co-existence 431
 - 5.1.5.4. Configuration Data 432
 - 5.1.5.5. Remote Automated Deployment and Reporting 432
 - 5.1.5.6. Usage Scope and Limitations 433
 - 5.1.5.7. Supportability 433
- 5.1.6. Portability 434
 - 5.1.6.1. Environment 434
 - 5.1.6.2. Customisability 435
 - 5.1.6.3. Adaptability 435
 - 5.1.6.4. Replaceability 435
- 5.1.7. Modularity 436
- 5.1.8. Reusability 436
- 5.1.9. Analysability 436
- 5.1.10. Modifiability 437
- 5.1.11. Testability 437
- 5.1.12. Scalability 438
- 5.2. Security Requirements 439
 - 5.2.1. General 439
 - 5.2.2. Compliance with Bi-SC AIS Security Requirements 440
 - 5.2.2.1. Bi-SC AIS Security Settings 441
 - 5.2.2.2. Cross-Domain Support 442
 - 5.2.2.2.1. Data Labelling 443

- 5.2.2.2.2. IEG..... 444
- 5.2.2.3. Web Security Features 446
 - 5.2.2.3.1. Validation of Input 446
 - 5.2.2.3.2. Enforcement of Access Control 446
 - 5.2.2.3.3. Authentication and Session Management..... 447
 - 5.2.2.3.4. Cross-Site Scripting 449
 - 5.2.2.3.5. Injection Flows 450
 - 5.2.2.3.6. Buffer Overflow 451
 - 5.2.2.3.7. Improper Error Handling..... 451
 - 5.2.2.3.8. Unsecured Storage 451
 - 5.2.2.3.9. Application Denial of Service 452
 - 5.2.2.3.10. Unsecured Configuration Management 452
- 5.2.2.4. File System 453
- 5.2.3. Accountability, Auditability and Non-Repudiation 453
 - 5.2.3.1. Audit Logging..... 454
 - 5.2.3.2. User Auditing..... 455
 - 5.2.3.3. System Monitoring..... 456
- 5.2.4. Authenticity 459
- 5.2.5. Authorisation 459
- 5.2.6. Confidentiality 460
- 5.2.7. Data Protection Policy 461
 - 5.2.7.1. Protection of System and Maritime Information 461
 - 5.2.7.2. Protection of Licensed Information 462
 - 5.2.7.3. Protection of Personal Information 463
- 5.3. Safety Requirements 463
 - 5.3.1. Safety at Static Deployment 463
 - 5.3.2. Safety at Afloat Deployment 463
- 5.4. Computer Resource Requirements 464
 - 5.4.1. Virtualised Environment..... 466
 - 5.4.2. Operating System 468
 - 5.4.3. Virtualised Servers..... 468
 - 5.4.4. Virtualised Data Storage..... 470
 - 5.4.5. Third-Party COTS Software 470
 - 5.4.6. Network Configuration 471
 - 5.4.7. Client Environment..... 472
- 5.5. Design and Construction Constraints 473
 - 5.5.1. Reference Architecture 473
 - 5.5.1.1. User Applications 473
 - 5.5.1.2. Technical Services 473
 - 5.5.1.3. Information Products 474
 - 5.5.2. Architectural Views..... 474
 - 5.5.3. Browser-based Functionality..... 475
 - 5.5.4. Component-Based Development 476
 - 5.5.5. Implementation Constraints..... 478
 - 5.5.6. Programming Languages 478
 - 5.5.7. Code Documentation..... 480
 - 5.5.8. Coding Standards..... 481
 - 5.5.9. Free and Open Source Software..... 481
 - 5.5.10. Code Refactoring 482
 - 5.5.11. Data Modelling 482
 - 5.5.12. Registry Settings 484
 - 5.5.13. Time Management 484
- 5.6. System Environment Requirements 486
- 5.7. Training-Related Requirements..... 487
- 5.8. Logistic-Related Requirements..... 487
 - 5.8.1. Spares 487

5.8.2. Operating Documentation 488

5.8.2.1. System User Manuals 488

5.8.2.2. Quick User Guide 489

5.8.2.3. Briefing Manual 489

5.8.2.4. System Administrator Manual 489

6. INTERFACE REQUIREMENTS 491

6.1. Interfaces 491

6.1.1. System Interface Services 491

6.1.2. Interface Control Description 491

6.1.3. Interface Mechanisms 492

6.1.3.1. Network Communication 492

6.1.3.2. Web Services 493

6.1.3.2.1. Web Service Standards 495

6.1.3.2.2. Web Service - Service Level Agreement 498

6.1.3.2.3. Web Service Performance 499

6.1.3.2.4. Web Service Security 499

6.1.3.2.5. TRITON as a Service Consumer 501

6.1.3.2.6. TRITON as a Service Provider 501

6.1.3.3. File Exchange 503

6.1.3.4. Direct Database Access 503

6.1.3.5. Multi-lateral Interoperability Program Data Exchange Mechanism Information Exchange
504

6.1.3.6. Application Programming Interface 504

6.1.4. Information Products 505

6.2. External Interface Requirements 506

6.2.1. NATO Systems and Services 506

6.2.1.1. NATO Bi-SC AIS Core Services 506

6.2.1.1.1. Windows Domain Services 506

6.2.1.1.2. SOA Platform Information Assurance Services 508

6.2.1.1.3. Directory Storage Services 509

6.2.1.1.4. Enterprise Management System 510

6.2.1.1.5. E-mail Services 510

6.2.1.1.6. NATO Information Portal 511

6.2.1.1.7. Metadata Repository Services 511

6.2.1.1.8. Service Discovery Services 512

6.2.1.1.9. Malware Detection Services 512

6.2.1.1.10. Generic Security Services Application Programming Interface 513

6.2.1.2. NATO Bi-SC AIS Enabling Services 513

6.2.1.2.1. NIRIS 513

6.2.1.3. NATO Bi-SC AIS Functional Services 515

6.2.1.3.1. Environmental FS 515

6.2.1.3.2. CBRN Defence FS 516

6.2.1.3.3. Intelligence FS 517

6.2.1.4. NATO Systems and Capabilities 518

6.2.1.4.1. Message Handling System 518

6.2.1.4.2. NCOP 519

6.2.1.4.3. MCCIS 520

6.2.1.4.4. Alliance Ground Surveillance System 521

6.2.2. Non-NATO Systems and Services 522

6.2.2.1. AIS Data Source 522

6.2.2.2. MSSIS 523

6.2.2.3. AIS Data Services 524

6.2.2.4. LRIT Data Centre 525

6.2.2.5. Space-Based Asset Source 527

6.2.2.6. Generic Track Source 528

6.2.3. Nation Interfaces 529

- 6.2.3.1. Nation Interface - NS 529
- 6.2.3.2. Nation Interface - NU 532
- 6.2.4. Afloat Command Platform Interfaces 534
 - 6.2.4.1. ACP Interface - NS 534
 - 6.2.4.2. ACP Interface - NU 536
 - 6.2.4.3. Message Handling System Interface 538
- 6.2.5. TRITON External Interfaces 538
 - 6.2.5.1. RMP Service 538
 - 6.2.5.2. WP Service 541
 - 6.2.5.3. Information of Common Interest Service 542
- 6.3. TRITON Internal Interface Requirements 544
 - 6.3.1. TRITON Internal Interfaces 545
 - 6.3.2. TRITON-to-TRITON Interfaces 545

1. INTRODUCTION

1.1. Document Purpose

This System Requirement Specification (SRS) describes the external behaviour of the services to be delivered under the Maritime Command and Control Information Services (short name: TRITON) Project. It also describes non-functional requirements, design constraints, and other factors necessary to provide a comprehensive description of the requirements for the Functional Service.

1.2. Content

"Project TRITON" is the name given to all implementation activities associated with the delivery of services in support of Maritime Command and Control contained within the Bi-Strategic Command Capability Package 9C0107 "Functional Services for Command & Control of Operations". The name "TRITON" was chosen by Allied Command Transformation (ACT) and the NCI Agency (former NC3A) in 2009 to simplify the way in which the acquisition activities associated with this project are described.

The full scope of capabilities will be achieved through an incremental approach. The **TRITON Increment 1 Project**, authorised as an NSIP project with code 2011/OIS03081, will deliver services to provide the users with Maritime Capabilities primarily the Maritime Situational Awareness (MSA) to replace the existing MSA Operational Prototype (MSA/BRITE) as well as to provide for a replacement of Maritime Command and Control Information System (MCCIS) functionality at the operational headquarters and centres. There will be other Increments in the future to support the Planning and Execution services for supporting C2 of maritime operations as the Maritime Headquarters.

This SRS covers the scope of the Project TRITON Increment 1 only. This SRS, as stored in the requirement management tool (DOORS), contains the currently identified set of requirements for the Project TRITON Increment 1.

The acronym "SRS" will be replaced with "SyRS" during the Contract execution.

1.3. Document Overview

This document consists of 5 sections:

- Section 1 provides an introduction and the use of this document.
- Section 2 gives a list of references used in the document.
- Section 3 provides a general description of TRITON as a product.
- Section 4 contains the functional requirements comprising the required functionality and their associated requirement attributes.
- Section 5 contains non-functional requirements.
- Section 6 provides the interface requirements.

1.4. Abbreviations, Acronyms and Definitions

Commonly used abbreviations, acronyms and definitions are given in Annex-D of the SOW.

1.5. Common Definitions

Organizational Node:

An Organizational Node provides an integrated set of TRITON functionality and a virtual repository for NATO Headquarters or Centres. An Organizational Node provides a logical structuring of users, functionality and information, and may be independent of the physical node structure (e.g. a physical node may support more than one Organizational Node).

User:

A User is an authenticated, standard user of TRITON who can access general functions on a particular type of information object (e.g. Track, Vessel Information, Person Data), usually with read-only privileges, based on assigned roles.

Authorised User:

An Authorised User is an authenticated, privileged user of TRITON who is authorised to perform a management (e.g. create, read, modify, approve, release, delete) on a particular type of information object (e.g. Track, Vessel Information, Person Data) based on assigned roles and privileges. A single user or a role or a user group can be designated as authorised user.

Information Product:

An Information Product is specific C2 information approved by the authorised user and represented as a data entity or a document by TRITON. An ADatP-3 Formatted Message is an example.

Information Object:

An Information Object is any kind of information flowing within the modules of TRITON.

Maritime Information Entity:

A Maritime Information Entity is a collection of Maritime Information Elements which holds the actual operational content, Information Products or Information Objects.

Classification:

NATO information falls into three categories:

- Classified
- Unclassified (within NATO, the marking UNCLASSIFIED, combined with an ownership marking, indicates that the information does not require security protection but is to be used for official purposes. The combined marking constitutes a proprietary marking and carries no security connotation).
- Public.

All NATO classified and unclassified information should carry a marking indicating its classification. Selection of the correct classification level is based upon the definitions and guidance provided by NATO Security Policy with regard to classified information and by the Policy on the Management of NATO non-Classified Information [C-M(2002)60] with regard to unclassified information.

Classification Markings:

NATO Security Policy [C-M(2002)49] requires that access to and release of NATO classified information be controlled. NATO classified information should be clearly marked to identify the required level of protection and to indicate releasability where appropriate. The available classification markings for TRITON are given below (The words are shortened for this document only):

- NATO UNCLASSIFIED (NU)
- NATO RESTRCTD (NR)
- NATO CONFIDNTL (NC)
- NATO SECR (NS)
- UNCLASSIFIED (UC)
- RESTRCTD
- CONFIDNTL
- SECR

The markings to be applied to NATO information are composed of four elements which have a specific purpose and an appropriate usage:

- Ownership

- Classification
- Releasability/Dissemination Limitation
- Administrative/Category.

In addition, data exchanged between differing security classifications needs to be labelled.

Client:

A user environment which consists of a workstation, operating system with a Web browser.

Server:

A computation environment on a virtualised platform.

TRITON Client:

The TRITON User Applications and Visualisation Capability running in Web Browsers on a Standard NATO Bi-SC AIS Workstation.

TRITON Server:

The standard NATO Bi-SC AIS virtualised server environment for TRITON which consists of Application Server, management and security software, and data storage.

Recognised File Formats:

TRITON will be able export and import data using files with recognised format. These format are defined here to provide reference for the requirements in this SRS. Following formats are identified:

Recognised Graphics File Format:

- Joint Photographic Experts Group, JPG/JPEG [ISO/IEC 10918]
- Portable Network Graphics (PNG) [RFC 2083]
- Graphics Interchange Format (GIF) [GIF]
- Bitmap (BMP)

Recognised Import File Format:

- Office Open XML Workbook (xlsx) [ISO/IEC 29500]
- Comma-Separated Value (csv) [ISO/IEC 29500]
- Extensible Markup Language (XML) [XML]

Recognised Export File Formats:

- Office Open XML Workbook (xlsx) [ISO/IEC 29500]
- Office Open XML Presentation (pptx) [ISO/IEC 29500]
- csv
- XML
- Portable Document Format (PDF) [ISO 32000-1]
- Image files in Recognised Graphics File Format.

1.6. SRS Conventions

This SRS is structured to functionally decompose the system into several layers. Each function is defined with a set of Heading, Description and Requirements. These terms are also used as Object Type in the Requirements Management Tool.

1.6.1. Heading

Each level of function has its own Heading with a brief Description. The lowest level of Headings contains the applicable Requirements.

1.6.2. Description

Each Heading is followed by a Description which includes descriptive text, definitions, explanatory diagrams, figures and examples. The text explains the key functionality and gives the definitions of specific terms used in the requirements. The diagrams used in this SRS are for illustrative purposes. The descriptive text will be used to refine the system-level requirements into relevant software or hardware requirements during the System Requirements Analysis Phase. The information given in the Description is complementary to the information given in the requirements. They are used to amplify the requirement statement.

1.6.3. Requirement

Each requirement addresses only one function or sub-function where that function and the relevant key terms are defined in the Description. Although the use cases and definition of terms are not repeated inside a requirement statement, it must be accepted that the requirement is bound to the functionality explained in the Description and the definition of the terms explicitly defined (a name or a term explained in the Description).

The requirements are individually identified by a unique number which are used at all times as the specific reference for each.

Types of Requirements:

The use of "shall", "should" and "will" in requirement statements is defined as follows:

- **Shall:** This requirement is mandatory and must be implemented.
- **Should:** This requirement is not mandatory; but in case several options are available, this one is the preferred solution. If it fits into the budget the implementation is highly desired.
- **Will:** This requirement is neither mandatory nor optional for this Increment, but will be mandatory in future Increments. As such it should be considered in design and architecture solutions of the current Increment as well.

User:

If a requirement indicates a user interaction, it also tells about the type of user. There may be as many users as needed. However, since the system interacts with only one person at a time, the definite article "the" is used. The user types referred in the requirements are defined below:

- **The user:** "The user" implies a person who is already authenticated to use the system with general read-only access rights. For example, "General TRITON User" is a role which can only view the RMP without applying any change on it.
- **The authorised user:** "The authorised user" implies a person who is already authenticated to use the system with special privileges. For example, "RMP Manager" is a role having all access rights to modify the RMP, but not the Operation Plan. System Administrator is another type of authorised user who can manage the system at low level.

User Interaction:

System requirements are stated from the perspective of both the system and the user. A requirement with the phrase "TRITON shall ..." means that the system must perform a certain function described in the requirement. A requirement with the phrase "TRITON shall allow the user to ..." means that a user interaction (e.g GUI window) is necessary to invoke a functionality and view the output.

Requirement Properties:

Each requirement has the Purchaser-filled properties (attributes) to emphasise its implementation. These are given below:

- **Object Type** : Requirement
- **Domain for Static** : NS / NU / Both / Not Applicable

- **Domain for Afloat** : NS / NU / Both / Not Applicable
- **Baseline** : BL 1 / BL 2 / BL 3 / BL 4
- **Qualification Method** : Test / Demonstration / Analysis / Inspection
- **Comment** : An explanation or clarification for a requirement.

1.7. Qualification Provisions

The requirements will be verified through qualification, herein defined as an endorsement with a guarantee and supporting documentation that the item being qualified satisfies the specified requirement(s). Each requirement is annotated with the method(s) to be used. The basic Qualification Methods are described in the following paragraphs. Further verification methods may also be used if necessary.

Note: In some cases, more than one verification method might be required in order to verify fulfilment of a requirement.

1.7.1. Test

Test (or testing) is the operation of the system/services, or a part of it, under controlled and specified real or simulated conditions, generally using instrumentation, other special test equipment or specific test patterns to collect data for later analysis. This verification method usually requires recorded results to verify that the requirements have been satisfied. Input data and results are provided in the test procedures.

1.7.2. Demonstration

The operation of the system, or a part of the system/services, that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis. It is a qualitative exhibition of functional performance, usually accomplished with no or minimal instrumentation or test equipment.

1.7.3. Analysis

Analysis is the review and processing of design products (documentation, drawings, presentations, etc.) or accumulated data obtained from other qualification methods, such as manufacturer's tests of a product to be mass-produced, to verify that the system/component design meets required design criteria. It may use analytical data or simulations under defined conditions to show theoretical compliance. Modelling and simulation may be used.

1.7.4. Inspection

Inspection is an examination of the item against applicable documentation to confirm compliance with requirements. It is the visual examination of a hardware item and associated descriptive documentation. Verification is based on the human senses (sight, touch) or other means that use simple measurement and handling methods. No stimulus is necessary. Passive resources such as metre rule or gauge may be used. For software, traceable documentation and code inspection can be used.

For Non-Developmental Items (NDI), Modified NDI and Developmental Items, hardware inspection is used to determine if physical constraints are met, and hardware and/or software, inspection is used to determine if physical quantity lists are met.

2. REFERENCES

This section provides as list of references used in the document. The abbreviated document titles given in square brackets "[...]" are used to refer to documents in this list.

2.1. STANAGs

[STANAG 1059]	STANAG 1059 Letter Codes for Geographical Entities (NU)
[STANAG 1177]	STANAG 1177 Dormant Q Message Publications - AHP-7(B), Ed.5, 2011 (NU)
[STANAG 1241]	STANAG 1241 NATO Standard Identity Description Structure for Tactical Use (NU)
[STANAG 2019]	STANAG 2019 Joint Symbology - APP-6(C), Edition 6, 24 May 2011 (NU)
[STANAG 2211]	STANAG 2211 IGEO (Edition 6) Geodetic Datums, Projections, Grids and Grid References, 16 May 2001 (NU)
[STANAG 2586]	STANAG 2586 NATO Geospatial Metadata Profile, 2013 (NU)
[STANAG 3809]	STANAG 3809 Digital Terrain Elevation Data (DTED) Exchange Format Ed.4 2004 (NU)
[STANAG 4668]	STANAG 4668 Warship - Automatic Identification System (W-AIS) Ed.2 (NU)
[STANAG 4669]	STANAG 4669 Automatic Identification System (AIS) on Warships Ed.2 (NU)
[STANAG 5511]	STANAG 5511 Tactical Data Exchange - Link 11/11B (NU)
[STANAG 5516]	STANAG 5516 Tactical Data Exchange - Link 16 (NU)
[STANAG 5522]	STANAG 5522 Tactical Data Exchange - Link 22 (NU)
[STANAG 5500]	STANAG 5500 Concept of NATO Message Text Formatting System (CONFORMETS) ADatP-3, Ed.7, 2 November 2010 (NU)
[STANAG 7074]	STANAG 7074 Digital Geographic Information Exchange Standard (NU)
[STANAG 7149]	STANAG 7149 NATO Message Catalogue - APP-11(D), Edition 6, 25 March 2015 (NU)
[STANAG 7170]	STANAG 7170 Additional Military Layers (AML) – Digital Geospatial Data Products, 2010 (NU)

2.2. Allied Publications

[AAP-6]	AAP-6 Ed.2014 Ver.1, NATO Glossary of Terms and Definitions (NU)
[ACP-133]	ACP-133 Allied Directory Services
[ACP-200]	ACP-200 (D) Vol 2 Maritime and Mobile Tactical Wide Area Networking (MTWAN) Technical Guidance, March 2015 (NU)
[ADatP-3]	ADatP-3 (A) NATO Message Text Formatting System (FORMETS) Concept of FORMETS (NU)
[ADatP-34]	ADatP-34 NATO Interoperability Standards and Profiles (NISP) (NU)
[ADatP-4774]	ADatP-4774 Confidentiality Metadata Label Syntax, Ed. A, February 2016 (NU)
[ADatP-4778]	ADatP-4778 Metadata Binding Mechanism for Information Sharing, Ed.A, February 2015 (NU)
<u>[AHP-1]</u>	<u>AHP-1 Allied Worldwide Navigation and Information System (AWNIS), Ed.E V.1 October 2015 (NU)</u>
[AHP-7]	AHP-7 Volumes - Dormant "Q" Message Publications (NS)

[AJP 3.1]	AJP 3.1 Allied Joint Maritime Operations (NU)
[APP-6]	APP-6 (C) NATO Joint Military Symbology, 24 May 2011 (NU)
[APP-11]	APP-11 (D) NATO Message Catalogue, 1 December 2015 (NU)
[APP-15]	APP-15 Ed.A, Ver.1 NATO Information Exchange Requirement Specification Process, June 2013 (NU)
[APP-20]	APP-20 Ed. A Ver.2 Standard Ship Designator System (NU)
[ATP-01]	ATP-01 Allied Maritime Tactical Instructions and Procedures (NC)
[ATP-2]	ATP-2 Vol.II Naval Cooperation and Guidance for Shipping (NCAGS) Manual (NU)
[ATP-18]	ATP-18 (G) (Navy) - Allied Submarine Operations (NC)
[AUIDP-1]	AUIDP-1 NATO Guidance on Unique Identification (UID) of Items, July 2010 (NU)

2.3. Bi-SC Documents

[AFPL]	AFPL - Approved Fielded Product List (NU)
[Bi-SCD 75-2]	Bi-SC Directive 75-2, "Education, Training, Exercise and Evaluation Directive (ETEED)", 18 February 2010 (NU)
[Bi-SCD 75-7]	Bi-SC Directive 75-7, "Education & Individual Training (E&IT)", 10 September 2015 (NU)

2.4. Military Committee Documents

[MC0367/2]	MC 0367/2 NATO Maritime Surveillance and Coordination Concept, 20 August 2013 (NR)
[MC0195/9]	MC 0195/9 NATO Minimum Interoperability Fitting Standards for Communications and Information Systems (CIS) Equipment Onboard Maritime Platforms, 6 March 2012 (NR)
[MC458/2]	MC 458-02, NATO Training, Exercise and Evaluation Policy, 28 July 2009 (NU)
[MC0593]	MC 0593, Minimum Level of Command and Control (C2) Service Capabilities in Support of Combined Joint NATO Led Operations, 20 February 2015 (NU)
[MCM0106]	MCM-0106-2014 NATO Federated Mission Networking Implementation Plan v3.0, 08 July 2014 (NU)

2.5. Other NATO Documents

2.5.1. Security

[C-M (2002)49]	North Atlantic Council, "Security within the North Atlantic Treaty Organization", 17 June 2002 (NU)
[ACO-70-1]	ACO Security Directive 70-1, 25 March 2009 (NU)
[AC/35-D/2004-REV3]	NSC/NC3B, "Primary Directive on CIS Security", 15 November 2015 (NU)
[AC/35-D/2005-REV3]	NSC/NC3B, "Management Directive on CIS Security", 12 October 2015 (NU)
[AC/35-D/1014-REV2]	

Guidelines for the Structure and Content of Security Operating Procedures (SecOps) for Communication and Information Systems (CIS), 19 October 2006 (NU)

[AC/35-D-1015-REV3]

Guidelines for the Development of Security Requirement Statements (SRS), 31 January 2012 (NR)

[AC/35-D-1021-REV3]

Guidelines for the Security Approval or Security Accreditation of Communication and Information Systems (CIS), 31 January 2012 (NR)

[AC/322-D(2004)0019]

INFOSEC Technical and Implementation Guidance for the Protection of CIS from Malicious Software, 9 March 2004 (NU)

[AC/322-D(2004)0024]

NATO Public Key Infrastructure (NPKI) Certificate Policy (CertP) Rev.2, 18 January 2008 (NU)

NATO Public Key Infrastructure (NPKI) Certificate Policy (CertP) Rev.2 Add.1, 10 November 2009 (NU)

[AC/322-D(2004)0030]

INFOSEC Technical and Implementation Directive on the requirement for, and the selection, approval and implementation of, Security Tools (ST), 17 May 2004 (NR)

[AC/322-D/0030]

AC/322-D/0030-REV5 - INFOSEC Technical and Implementation Directive for the Interconnection of CIS (NR)

[AC/324-D(2014)0008]

AC/324-D(2014)0008 - Archives Committee, Directive on the Preservation of NATO Digital Information of Permanent Value

[AM-86-1-1]

AM-86-1-1 ACO Manual Number 86-1-1, ACO CIMIC Tactics, Techniques and Procedures (NU)

2.5.2. Interface Descriptions

[CBRN-FS ICD]

To be defined.

[Core GIS SIP]

NCI Agency Technical Instruction, AI TECH 06.02.14 Service Interface Profile for Geospatial Services - Map Rendering Service, 2016 (NU)

[ENV-FS ICD]

To be defined.

[INTEL-FS ICD]

Interface Control Document for the INTEL-FS Project, Ver. 1.1 (NU)

[JOCWatch ~~ICD~~WSS]

NATO C3 Agency JOCWatch OIR Web Services Specification Operations Incident Reporting Standard Model Ver. 1.0, September 2011 (NU)

[NCIA-06.02.01]

NCI Agency Instruction, INSTR TECH 06.02.01 Service Interface Profile for Security Services, 4 February 2015 (NU)

[NCIA-06.02.02]

NCI Agency Instruction, INSTR TECH 06.02.02 Service Interface Profile for REST Security Services, 4 February 2015 (NU)

[NCIA-06.02.03]

NCI Agency Instruction, INSTR TECH 06.02.03 Service Interface Profile for Security Token Services, 4 February 2015 (NU)

- [NCIA-06.02.04] NCI Agency Instruction, INSTR TECH 06.02.04 Service Interface Profile for Policy Enforcement Points, 4 February 2015 (NU)
- [NCIA-06.02.05] NCI Agency Instruction, INSTR TECH 06.02.05 Service Interface Profile for Enterprise Directory Services, 4 February 2015 (NU)
- [NCIA-06.02.06] NCI Agency Instruction, INSTR TECH 06.02.06 Service Interface Profile for Messaging, 4 February 2015 (NU)
- [NCIA-06.02.07] NCI Agency Instruction, INSTR TECH 06.02.07 Service Interface Profile for REST Messaging, 4 February 2015 (NU)
- [NCIA-06.02.08] NCI Agency Instruction, INSTR TECH 06.02.08 Service Interface Profile for Publish-Subscribe Services, 4 February 2015 (NU)
- [NCIA-06.02.09] NCI Agency Instruction, INSTR TECH 06.02.09 Service Interface Profile for a Publish-Subscribe Notification Broker with Subscription Manager, 4 February 2015 (NU)
- [NCIA-06.02.10] NCI Agency Instruction, INSTR TECH 06.02.10 Service Interface Profile for a Publish-Subscribe Notification Consumer, 4 February 2015 (NU)
- [NCIA-06.02.11] NCI Agency Instruction, INSTR TECH 06.02.10 Service Interface Profile for a Notification Cache Service, 4 February 2015 (NU)
- [NCOP ICD] Interface Control Document for the NCOP Project, Ver. 1.4 (NU)
- [NIRIS ICD] NIRIS Java API Specification, Ver. 0.2 (NU)
NIRIS Streaming ICD, Ver. 0.2 (NU)
NIRIS TITO SDK Ver. 3.7.0 (NU)
- [NVG] NATO Vector Graphics (NVG) Ver. 2.0, November 2012 (NU)

2.5.3. Architecture

- [AC/322-D(2004)039] North Atlantic Council Document AC/322-D(2004)039, "NATO C3 Systems Interoperability Policy", 13 September 2004 (NU)
- [AC/322-D(2006)0007] North Atlantic Council Document AC/322-D(2006)0007, "Guidance on the use of Metadata Element Descriptions for Use in the NATO Discovery Metadata Specification (NDMS)", 14 February 2006 (NU)
- [AC/322-D(2014)0010] North Atlantic Council Document AC/322-D(2014)0010, "NATO Core Metadata Specification (NCMS)", 18 December 2014 (NU)
- [AC/322-D/0033] North Atlantic Council Document AC/322-D/0033, "NATO Training Concept for Communications and Information Systems", 26 October 2000 (NU)
- [AC/322-D(2005)0037] North Atlantic Council Document AC/322-D(2005)0037, "Bi-SC AIS Reference Architecture (RA), Version 2", 27 September 2005 (NR)
- [AC/322-D(2007)0048] North Atlantic Council Document AC/322-D(2007)0048, "NATO Architecture Framework Version 3", 23 November 2007 (NU)

- [AC/322-D(2005)0053] North Atlantic Council Document AC/322-D(2005)0053-REV1-COR1, "NNEC Data Strategy", 13 May 2009 (NU)
- [AC/322-D(2009)0015] North Atlantic Council Document AC/322-D(2009)0015, "Strategy for the use of Open Source Software in NATO Systems", 27 April 2009 (NU)
- [C3TAXO] C3 Taxonomy Perspective, Baseline 2.0, 10 November 2015 (NU) (endorsed on 11 February 2016)
- [EAPC(AC/322-SC/5)N(2010)0011] Euro-Atlantic Partnership Council Document EAPC(AC/322-SC/5)N(2010)0011, "NNEC Data Strategy Implementation Guidance", 31 May 2010 (NU)
- [EAPC(AC/322-SC/5)EP(2005)0005] Euro-Atlantic Partnership Council Document EAPC(AC/322-SC/5)EP(2005)0005, "NATO Policy for Data Management", 10 February 2005 (NU)
- [EAPC(AC/322-SC/5-WG/4)N(2008)0004] Euro-Atlantic Partnership Council Document EAPC(AC/322-SC/5-WG/4)N(2008)0004, "Guidance for XML Naming & Design", 9 April 2008 (NU)

2.5.4. Procedures

- [RMP-SOP] HQ, Allied maritime Command, NATO Recognised Maritime Picture Standard Operating Procedures (last promulgation: 10 October 2014 and Change 1 dated 09 October 2015) (NU)

2.5.5. Project Documents

- [TBCE] Type "B" Cost Estimate: Provide Functional Services (FS) for Command and Control (C2) of Maritime Operations (NU)

2.6. Non-NATO Documents

- [OTHTGOLD-2000] Operational Specification for Over-the-Horizon Targeting Gold Rev.D (2000)
- [OTHTGOLD-2007] Operational Specification for Over-the-Horizon Targeting Gold (2007)
- [IEC62320] IEC 62320-2 Maritime navigation and radiocommunication equipment and systems - Automatic identification system (AIS)
- [MIL-STD-2525D] MIL-STD-2525D Department of Defence Interface Standard-Joint Military Symbolology, 10 June 2014 (no classification)

2.7. Non-NATO Standards

- [CMAPI] Common Map Application Programming Interface (CMAP) 1.3.0, Source: www.cmapi.org
- [DTED] Digital Terrain Elevation Data (DTED) Geographic Information Exchange Standard, Ed.3
- [ECMA-262] Standard ECMA-262, "ECMAScript Language Specification", Source: www.ecma-international.org
- [FDIS 25010] ISO/IEC FDIS 25010:2010(E) Systems and software engineering - Systems and software Quality Requirements

[GeoTIFF]	Geographic Tagged Image File Format, Ver. 1.8.2 28 December 2000
[GIF]	CompuServe - Graphics Interchange Format (sm), Version 89a, GIF Version 89a
[HTML5]	Hypertext Mark-up Language, Version 5 (HTML 5), W3C Candidate Recommendation, Aug 2013
[IBSTPI]	International Board of Standards for Training, Performance and Instruction, Source: http://www.ibstpi.org/
[IEC 62320]	IEC 62320:2015 Maritime navigation and radiocommunication equipment and systems - Automatic identification system (AIS)
[IHO S-4 INT]	International Hydrographic Organization (IHO) Regulations of the IHO for International (INT) Charts and Chart Specifications of the IHO, Ed. 4.5.0, October 2014
[IHO S-52]	International Hydrographic Organization (IHO) Specifications for Chart Content and Display Aspects of ECDIS, Ed. 6.1(.1), October 2014
[ISO 3166]	ISO 3166:2013, Codes for the representation of names of countries and their subdivisions, Part-1,2,3
[ISO 8601]	ISO 8601 Data elements and interchange formats - Information interchange – Representation of dates and times
[ISO 9241-110]	ISO 9241 Ergonomics of human-system interaction - Part 110: Dialogue principle, 2006
[ISO 9241-210]	ISO 9241 Ergonomics of human-system interaction - Part 210: Human-centred design for interactive systems, 2010
[ISO 19117]	ISO/FDIS 19117:2012 Geographical information - Portrayal
[ISO 32000-1]	ISO 32000-1:2008 Document management -- Portable document format -- Part 1: PDF 1.7
[ISO/IEC 8211]	Information technology -- Specification for a data descriptive file for information interchange 1994
[ISO/IEC 9075]	ISO-9075 Information technology -- Database languages -- SQL (Parts)
[ISO/IEC 9834]	ISO/IEC 9834-8:2005 Information technology -- Open Systems Interconnection - - Procedures for the operation of OSI Registration Authorities: Generation and registration of Universally Unique Identifiers (UUIDs) and their use as ASN.1 Object Identifier components
[ISO/IEC 10918]	ISO/IEC 10918-1:1994 Information technology -- Digital compression and coding of continuous-tone still images: Requirements and guidelines
[ISO/IEC 14882]	ISO/IEC 14882:2003 Programming languages -- C++, 28 August 2007
[ISO/IEC 15445]	ISO/IEC 15445:2000 Information technology (Document description and processing languages -- Hypertext Mark-up Language (HTML)
[ISO/IEC 19757]	ISO/IEC 19757-3:2006 Information technology -- Document Schema Definition Languages (DSDL) -- Part 3: Rule-based validation -- Schematron
[ISO/IEC 23270]	ISO/IEC 23270:2006(E) Information technology - Programming languages - C#, Edition 2, 1 September 2006
[ISO/IEC 23271]	ISO/IEC 23271:2006 Information technology -- Common Language Infrastructure (CLI) Partitions I to VI, 27 September 2006

- [ISO/IEC 23272] ISO/IEC TR 23272:2006 Information technology -- Common Language Infrastructure (CLI) -- Technical Report on Information Derived from Partition IV XML File, 7 August 2006
- [ISO/IEC 29148] ISO/IEC 29148:2011 Systems and software engineering - Life cycle processes – Requirements engineering
- [ISO/IEC 29500] ISO/IEC 29500-4:2012 Information technology -- Document description and processing languages -- Office Open XML File Formats
- ~~[JSR 270] Java Specification Request 270, "Java SE 6 Release Contents", 18 October 2006~~
- [NMEA 0183] National Marine Electronics Association (NMEA) 0183 Protocol
- [OASIS-SOA] Organization for the Advancement of Structured Information Standards (OASIS) Reference Model for Service-Oriented Architecture, v. 1.0, 1996. Source: <http://docs.oasis-open.org/soa-rm/v1.0/>
- [OASIS-UDDI] OASIS Universal Description, Discovery, and Integration Specification (UDDI v 3.0) Spec Technical Committee Draft, 19 October 2004, Source: http://uddi.org/pubs/uddi_v3.htm
- [OASIS-RPS] OASIS Web Services for Remote Portlets Specification v2.0, 7 June 2006
- [OASIS-BPEL] OASIS Web Services Business Process Execution Language Version 2.0 , 11 April 2007
- [OGC KML] Open Geospatial Consortium (OGC), Keyhole Markup Language (KML) Version 2.2.0, 2008
- [OGC WFS] OGC Web Feature Service (WFS) Standard Version 2.0.0, 2010
- [OGC WMS] OGC Web Map Service (WMS) Standard Version 1.3.0, 2006
- [OGC WMTS] OGC Web Map Tile Service (WMTS) Standard Version 1.0.0, 2010
- [OGC WPS] OGC Web Processing Service (WPS) Standard Version 1.0.0, 2010
- [OGC WSCom] OGC Web Services Common (WSCom) Standard Version 2.0.0, 2010
- [OpenSearch] OpenSearch Specification v1.1, Source: <http://www.opensearch.org>
- [RFC 1738] Network Working Group, Uniform Resource Locators (URL), December 1994
- [RFC 2078] Network Working Group, Generic Security Service Application Program Interface, Version 2, January 1997, Source: <http://tools.ietf.org> [RFC 2083]
Network Working Group, PNG (Portable Network Graphics) Specification Version 1.0, March 1997
- [RFC 3875] Network Working Group, The Common Gateway Interface (CGI) Version 1.1, October 2006
- [RFC 3986] Network Working Group, Uniform Resource Identifier (URI): Generic syntax, January 2005
- [RFC 4122] Network Working Group, A Universally Unique Identifier URN Namespace, July 2005
- [RFC 4287] Network Working Group, The Atom Syndication Format, December 2005
- [RFC 4510] Network Working Group, Light-Weight Directory Access Protocol-Technical Specification Roadmap, June 2006
- [RFC 5023] Network Working Group, The Atom Publishing Protocol, October 2007
- [RFC 5905] Internet Engineering Task Force, Network Time Protocol version 4 (NTPv4), June 2010

- [RFC 7159] Internet Engineering Task Force, The JavaScript Object Notation (JSON) Data Interchange Format, 2014
- [SoaML] OMG, Service Oriented Architecture Modelling Language Specification 1.0.1, May 2012
- [SPARQL] SPARQL 1.1 Query Language, W3C Recommendation, 21 March 2013, Source: <http://www.w3.org/TR/sparql11-query/>
- [SVG] Scalable Vector Graphics (SVG) 1.1 (Second Edition), W3C Recommendation, 16 August 2011
- ~~[TOGAF] Open Group, The Open Group Architecture Framework (TOGAF), Source: <http://www.opengroup.org>~~
- [XML] Extensible Markup Language (XML) 1.1 (Second Edition) W3C Recommendation 16 August 2006
- [W3C MWBP] World-Wide Web Consortium, Mobile Web Best Practices 1.0, 29 July 2008, Source: <http://www.w3.org/TR/mobile-bp/>
- [W3C OWL-2] World-Wide Web Consortium (W3C), "OWL 2 Web Ontology Language Document Overview", 27 October 2009
- [W3C SOAPv11] W3C, Simple Access Object Protocol (SOAP) v. 1.1, 8 May 2000, Source: <http://www.w3.org/TR/2000/NOTE-SOAP-20000508/>
- [W3C SOAPv12] W3C, SOAP Version 1.2 Part 1: Messaging Framework (Second Edition), 27 April 2007, Source: <http://www.w3.org/TR/soap12-part1/>
- [W3C WCAG] W3C, Web Content Accessibility Guidelines (WCAG) 2.0, 11 December 2008, Source: <http://www.w3.org/TR/2008/REC-WCAG20-20081211/>
- [W3C WS-SAML] W3C, Web Services Security: SAML Token Profile 1.1, 1 February 2006, Source: <http://www.oasis-open.org/committees/download.php/16768/wss-v1.1-spec-os-SAMLSecurity.pdf>
- [W3C WS-Security] W3C, Web Services Security: SOAP Message Security 1.1, 1 February 2006, Source: <http://www.oasis-open.org/committees/download.php/16790/wss-v1.1-spec-os-SOAPMessageSecurity.pdf>.
- [W3C WS-X509] W3C, Web Services Security: X509 Certificate Token Profile 1.1, 1 February 2006, Source: <http://docs.oasis-open.org/wss/v1.1/wss-v1.1-spec-os-x509TokenProfile.pdf>
- [W3C WSDLv11] W3C, Web Services Description Language v. 1.1, 15 March 2001, Source: <http://www.w3.org/TR/wsdl>
- [W3C XML-DigSig] W3C, XML Signature Syntax and Processing, 10 June 2008, Source: <http://www.w3.org/TR/xmlsig-core/>.

3. GENERAL DESCRIPTION

3.1. System Perspective

3.1.1. Business Process Basis for TRITON

Maritime Operations are the set of military activities that are conducted by maritime air, surface, sub-surface and amphibious forces to attain and maintain a desired degree of control of the surface, sub-surface, and air above the sea, influence events ashore, and, as required, support land, air and space operations. NATO ACO operations staff requires automated command and control information services to effectively plan, execute, monitor and assess Maritime Operations in responsive and timely manner.

Situated at the Operational Level, the Headquarters Allied Maritime Command (HQ MARCOM), located at Northwood - UK, is to be prepared to deliver command and control of the full spectrum of joint maritime capabilities, and to act as NATO's principal maritime advisor. From its static location, it must plan, conduct and support joint maritime operations in order to contribute to Deterrence and Defence, Crisis Management, Cooperative, and Maritime Security within and beyond NATO's Area of Responsibility. It is to maintain comprehensive situational awareness throughout NATO's maritime area of interest and be ready to exercise C2 of a Small Joint Operation (SJO) (maritime heavy) and act as the Component Commander to support up to a Major Joint Operation (MJO), within a comprehensive approach.

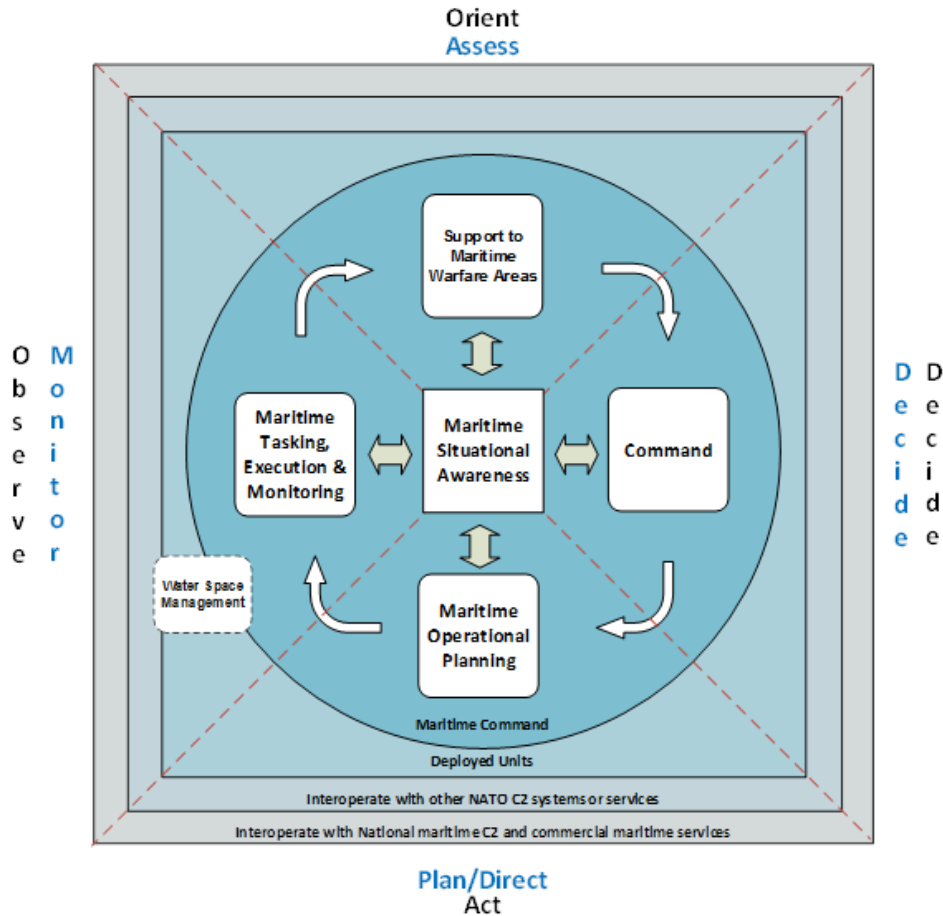
At sea, MARCOM is commanding all four Standing Maritime Groups which make up the Maritime Component of the NATO Response Force (NRF). MARCOM provides the four groups flagships with CIS support through established Deployable Kits and the necessary support during their deployments.

To ensure that these forces comply with the highest standard of readiness, MARCOM is also the leading headquarters for the organization and conduct of naval exercises within NATO. These exercises, whether maritime or joint (i.e. involving land and air components) focus on the operational certification of the units participating in the NRF, but also of the different headquarters commanding them.

HQ MARCOM operational activities follow a battle rhythm of staff functions that "specifically designed for an operations conducting process organization with a medium term decision cycle speed", with the exception of current operations using a short term daily cycle. MARCOM Battle Rhythm SOP 100 describes uses three interrelated decision cycles for short term current situations, medium term emerging situations and long term future situations (i.e. "What's next?").

Observe, Orient, Decide and Act (OODA) loop is usually drawn with arrows implying the actions are completed as a serial chain of events, with most early examples described at the tactical level. The OODA loop in higher command situations has also been referred to as a MADD diagram involving Monitor, Assess, Decide and (Plan) Direct functionality. The author of the OODA (MADD) process (by Col USAF John Boyd) actually went to great lengths to point out that it involves a continuous interaction checking between all components to produce what is effectively a set of parallel efforts. The rate at which each component is updated implies the limit on how fast a specific OODA loop can self-synchronize.

The OODA-loop diagram illustrates that TRITON needs to support command decisions by converting them using operational planning into actionable tasks for execution and monitoring the plans to assess when the outcomes justify further command decisions. The figure below illustrates the top level maritime operational relationships of five main C2 functions that TRITON must support.

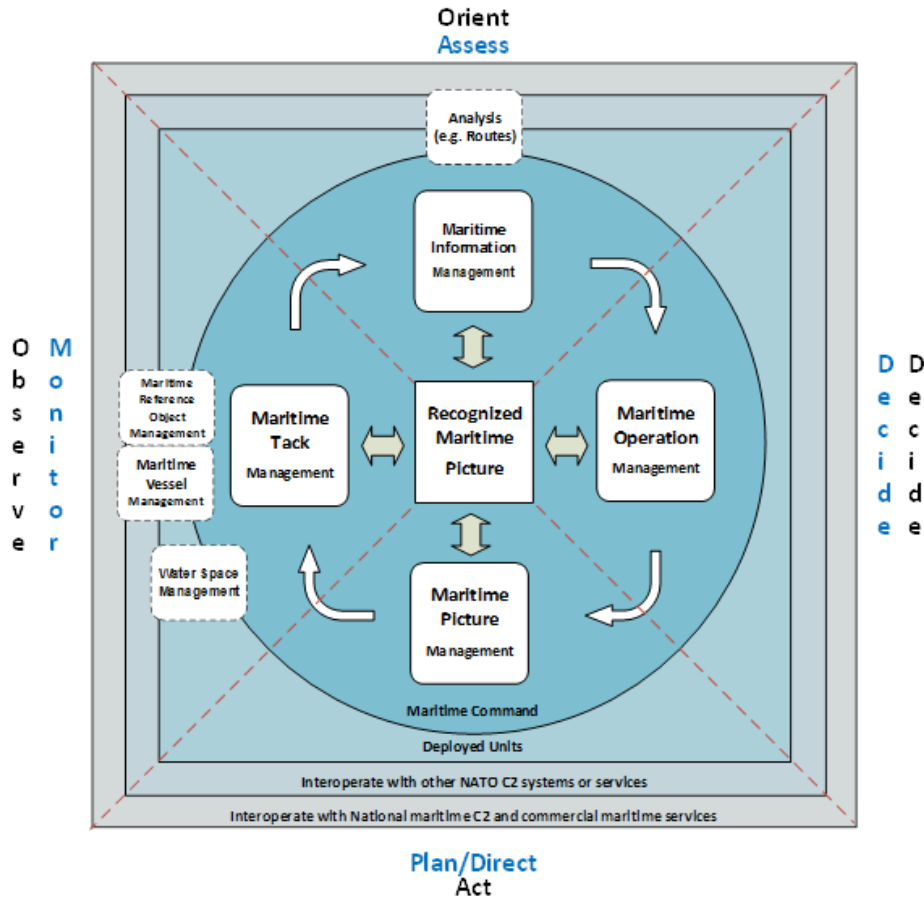


This top level OODA-loop diagram differs from most classical in that it also shows how the four components are kept informed and synchronized by Maritime Situational Awareness (MSA). This is because MSA is the key "... enabling capability which seeks to deliver the required information superiority in the maritime environment to achieve a common understanding of the maritime situation in order to increase effectiveness in the planning and conduct of operations". The need to ensure a common understanding by all participants means that MSA must be conducted at a much faster cadence than the other staff functions to ensure its products are available for the OODA loop to apply.

The diagram also illustrates how C2 activities at the heart of Maritime Command must enable direct interaction with its deployed units while also being able to interoperate with other NATO C2 systems or services, as well as National maritime C2 and commercial maritime services. Water Space Management (WSM) is shown here because, although it exists within the overall operational construct as the rest of MARCOM C2, it relies upon a distinct process to handle the special considerations for the way sub-surface traffic must be managed.

Due to asymmetric threats in the 21st Century, the realm of MSA transcends both the military and non-military realms and involves interoperability and/or collaboration with a wide variety of non-traditional data sources, organizations and actors. While this profile is unclassified, comprehensive MSA includes other architectural elements such as classified intelligence and locations of warships to provide the full Recognised Maritime Picture (RMP) upon which MSA is based.

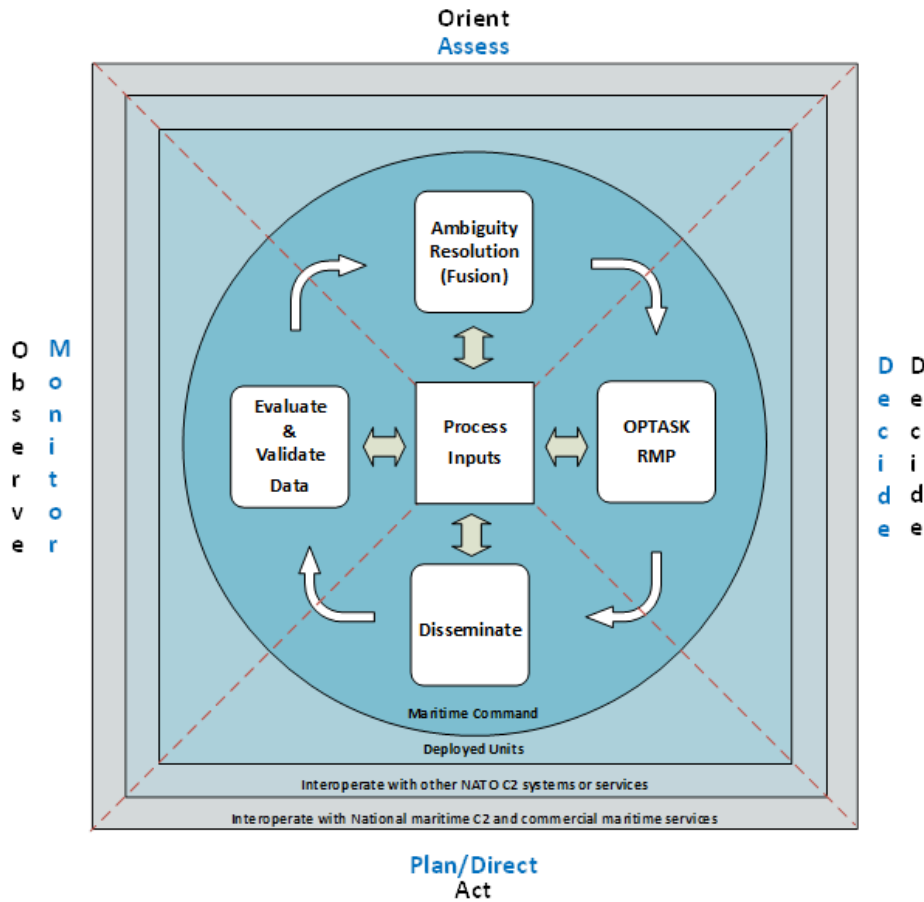
The figure below illustrates how internal MSA functions mimic the high level OODA-loop relationships, in terms of their orientation and the type of functionality they perform. The major difference is that the MSA business processes are focused on building and consuming the RMP that is the central enabling capability to conduct MSA.



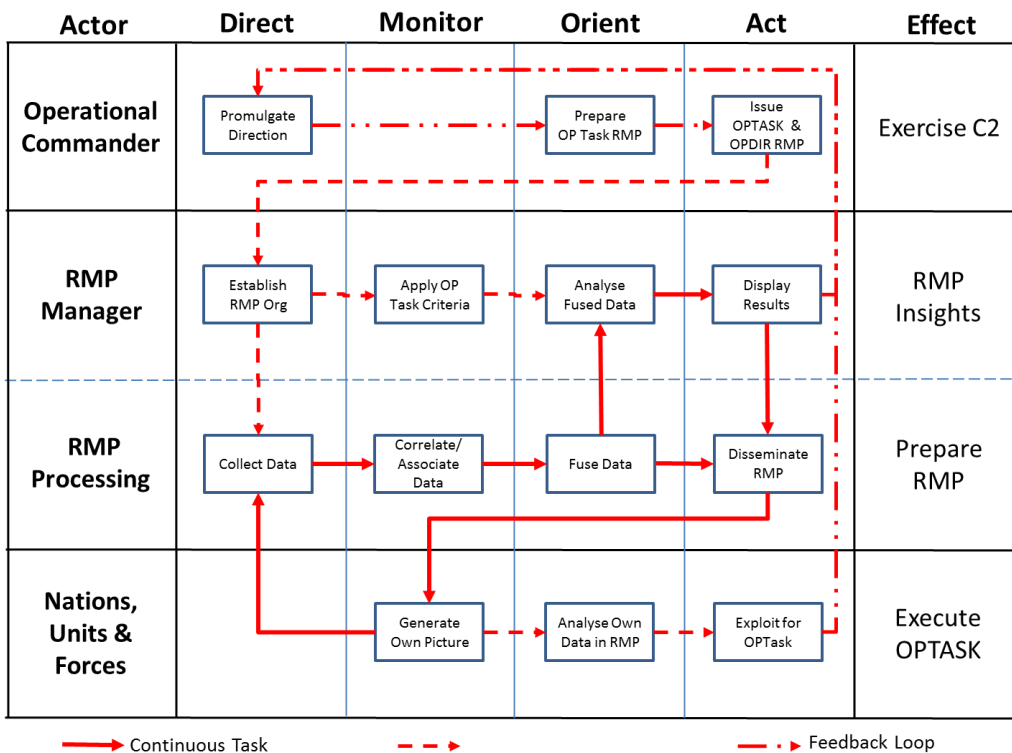
The RMP is an electronically produced display compiled from active and passive sensors covering a three-dimensional volume of interest in which all detected maritime contacts have been evaluated against threat parameters and assigned a recognition category and track number [AJP 3.1]. The RMP consists of all contacts in the maritime environment, both surface and subsurface, commercial, military and government platforms and vessels. The RMP is similar to the MSA process in that it must be updated more frequently than the surrounding OODA-loop processes.

The MSA process employs a wide range of management aspects used to build the RMP. Their positions in the OODA-loop diagram are nominal because the RMP that is accessed for MSA purposes is the product of a lower level RMP process described below.

The figure below illustrates the RMP process using OODA-loop functionality that is organized around the enabling capability of processing input data. The other four processes then refine and update data. The evaluation and validation of inputs and the dissemination of RMP updates to be highly automated and conducted continuously using the automated rules from OPTASK RMP. The ambiguity resolution of data using fusion techniques are also an ongoing activity but may require operator assessments to deal with complex cases. The RMP compilation task also includes a need to conduct detailed analysis, such as route assessments, that involve significant amount of time to complete. The intent of these is to use the results as a means to help automate portions of the fusion process.



The swim-lane version of the RMP diagram is presented below. It covers the same basic features but more clearly shows the process involves a continuous set of recurring concurrent activities involving many actors instead of a simple series of consecutive steps as implied by the OODA loop diagram. The figure below shows the RMP Process as Swim-lane OODA Loop.



The RMP swim-lane illustrates key relationships between the major actors from an OODA loop perspective. It avoids the usual tendency to describe the detailed business procedures already documented elsewhere and instead seeks to expose the major effects achieved from the RMP process. The four major swim-lanes are:

- The Operational Commander promulgating direction,
- The RMP Manager using organizational assets to seek RMP insights and automated technology to prepare the RMP,
- The RMP Processing to collect, correlate/associate, fuse and analyse the data,
- The Nations, units and forces both contribute data to and consume the RMP.

The backbone of the RMP swim-lane is the continuous task of processing to collect, aggregate (correlate/associate), fuse and analyse the data from units and forces in order to disseminate the RMP back to the units and forces for their use. That work is based on standing guidance from the Operational Commander as implemented by the RMP Manager. The process includes a feedback loop to amend operational commander direction based on insights gained while preparing the RMP or from units and forces exploiting it to pursue the OPTASK.

3.1.2. Purpose of TRITON

The purpose of the Project TRITON is to provide Functional Services for Command and Control of Maritime Operations, which will allow NATO and its Alliance members to conduct Maritime Security Operations (MSO). The services to be delivered for the entire capabilities of TRITON will provide the tools for the NATO operational user to plan and execute the full spectrum of maritime missions in a joint environment. They enable the operators to share and leverage the services provided by the Core Services implementation, as well as tools and capabilities offered through the other NATO Functional Services in order to facilitate a seamless operating environment for the users.

Currently, at the Strategic and Operational command levels, Maritime C2 processes are carried out using Maritime Command and Control Information System (MCCIS). In addition, MSA Demonstrator Prototype (MSA/BRITE) developed by ACT is used for White Shipping Monitoring. The future Maritime C2 and Information Services provide a flexible and agile command and control services for NATO operational use. At the delivery of its final Increment (possibly Increment 3), it will provide the following main capabilities for both static and afloat NATO Commands:

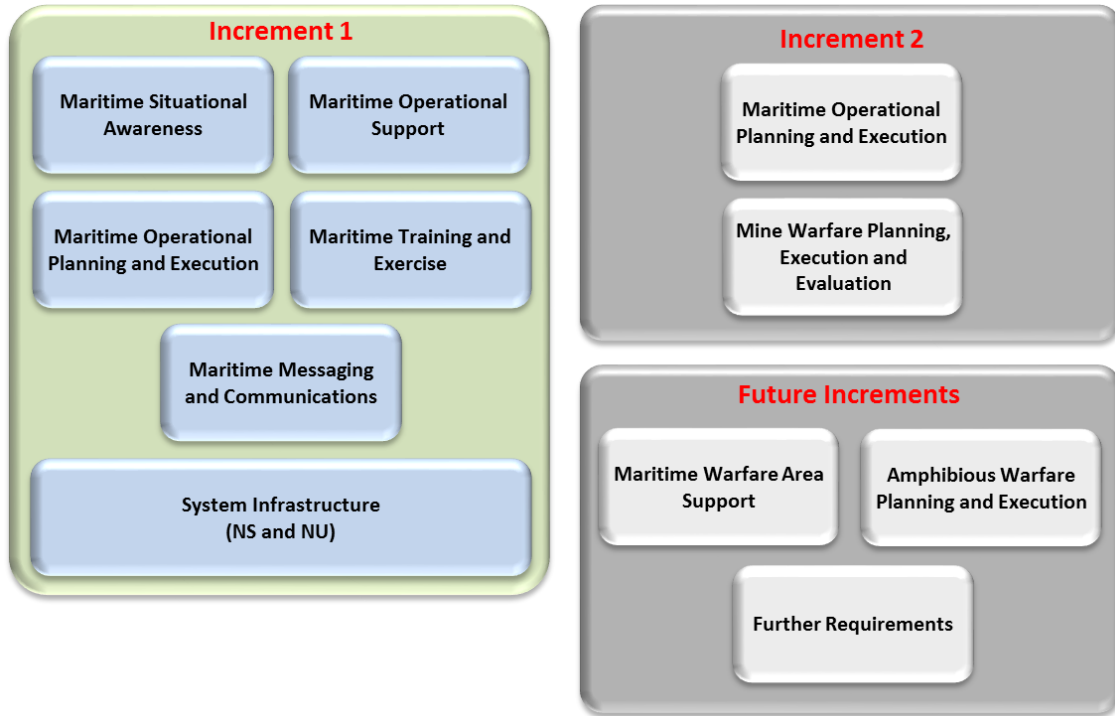
- Maritime Situational Awareness
- Maritime Operational Support
- Maritime Operational Planning and Execution
- Maritime Training and Exercise
- Information exchange with other NATO Systems or Services
- Information exchange with National maritime C2 systems and commercial maritime services.

The services delivered by the TRITON Increment 1 Project will cover a subset of overall capabilities and provide a foundation to build on for future Increments. The key capabilities to be provided through Increment 1 are:

- Replacement of MCCIS functionality that supports operational-level Maritime C2 and MSA
- Replacement of White Shipping part of the MSA functionality currently supported by the MSA/BRITE
- Utilising information received from National maritime C2 systems and commercial maritime services to build the White Picture and RMP
- Building and dissemination of RMP
- Building and dissemination of White Picture
- The basic information management of Maritime Operational Planning and Execution as a foundation for future build on

- The Water Space Management and Prevention of Mutual Interference (WSM/PMI)
- Interoperability with other NATO systems, capabilities and Functional Services
- Providing deployed functionality at sea with Deployable Kits for Afloat Command Platforms (ACP).

Future Increments will deliver the other Maritime C2 Capabilities as notionally depicted below:



3.1.3. Functionality

The objective of the Bi-SC AIS is to provide NATO commands with effective and integrated core (common to all users) and functional (specific to staff functions) services within both static and deployed contexts. The range of functional services for supporting the operational commanders includes the C2 capabilities for Air, Land, Maritime, Special Operations Forces (SOF), Joint Operations, Logistics and Intelligence.

TRITON, as the Maritime Functional Services within the Bi-SC AIS capabilities, enables users to collect, process, present and distribute information that supports the major functions of maritime operations. These services will support NATO Headquarters and Centres at both static and afloat locations. TRITON Functional Services will be operational at deployed sites, Afloat Command Platforms (ACP) in NATO-led task forces/groups basically Standing NATO Maritime Group (SNMG) and Standing NATO Mine Counter Measures Group (SNMCMG).

TRITON will be used in peacetime, exercises, and time of crisis (operations) throughout the static and deployed environments. TRITON will be used at both static and afloat NATO Command Structure to provide commanders with the required level of maritime information in order to make informed operational decisions. Nations will also be able to access TRITON functions, send their maritime information and receive RMP in various methods of information exchange.

The first Increment of the project will provide the key capabilities for both static and afloat sites. It is inferred that as NATO does not own maritime assets, Nations should be able to interoperate with TRITON from their national maritime C2 Information Systems.

TRITON will be installed only at the Authorised Locations, static or afloat sites. While static sites provide services for NATO Headquarters, afloat sites will be used by Command Task Groups as ACPs.

Afloat Command Platforms:

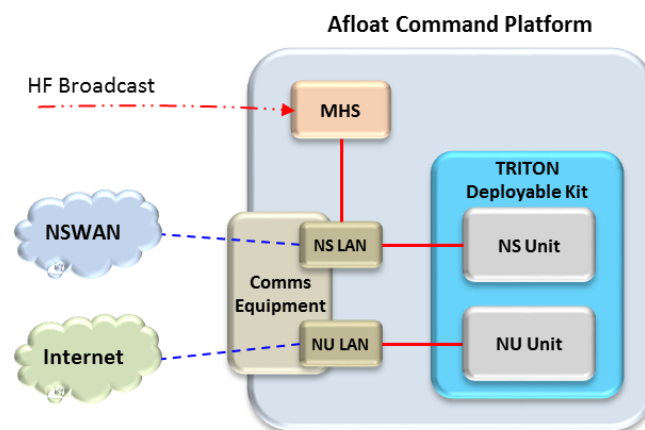
In addition static sites, "TRITON Deployable Kits" will be provided for the following platforms identified as ACPs, and installed prior to a mission:

- Standing NATO Maritime Group 1 and 2 (SNMG-1 and 2)
- Standing NATO Mine Countermeasures Group 1 and 2 (SNMCMG-1 and 2)

Other than these four instances, four spare kits will be used during task hand-over between the Command Ships.

These ACPs are expected to have the minimum CIS capabilities as defined in [MC0195/9]. The minimum level of C2 capabilities are currently described in [MC0593]. The communication methods applicable for ACPs are described in [ACP-200]. TRITON Deployable Kits will utilise the ship Local Area Network to access the NATO Wide Area Network through their communication equipment (Satellite or any other media).

ACPs will be able to exchange information with TRITON instances at static sites if communication lines are available. If no IP-level connectivity exists, ships may receive broadcasted data (e.g Formatted Messages) through the on board Message Handling System (MHS). Connecting the Deployable Kit to the ship MHS is a preference of the Nation who is providing the maritime asset. Following figure shows the possible methods of connectivity. If there is not data input from outside of the ACP, it will still be possible to enter manual data.



3.1.4. Security Domains

Maritime Functional Services will operate together with the other Bi-SC AIS Functional Services. However, some functions need to access the Internet and get information from commercial sources. Therefore, two security domains for operating TRITON are currently identified:

- NATO SECR (NS) Operational Domain on NS Wide-Area Network (NSWAN)
- NATO UNCLASSIFIED (NU) Operational Domain on NU Network having controlled access to Internet

In future, NATO RESTRICTD (NR) network will be used as the Protected Business Network at static sites. It will cover the NU Domain as well. TRITON will be able to operate in NR domain as well as NU Domain.

The NU Domain will be used to gather information from commercial sources on the Internet and build the White Picture. The NS Domain will be used for compiling the Military Picture. With additional information and contributions needing to be kept classified, the WP will be improved further. The RMP will then be extracted from the Maritime Operational Picture (MOP) which is built using all pictures on the NS Domain.

TRITON can also be deployed in a MISSION NETWORK, which is configured specifically for a mission, having MISSION SECR (MS) classification.

TRITON will provide Cross Domain Support which allows information transfer between differing security domains using the scenario-specific NATO Information Exchange Gateways (IEG). Considering the current security regulations, only one way of information transfer from low side to high side will be allowed.

TRITON will use the Confidentiality Labels for the information objects according to the NATO Directives.

There may be further requirements to transfer selected information from high-side to low-side. In that case, TRITON will allow authorised users to control the information transfer.

In case TRITON-NS needs to exchange information with another system in a MISSION NETWORK, a scenario-specific IEG will be used.

3.1.5. System Approach

TRITON is the general name given for all implementation activities to provide all Maritime Functional Services. Although TRITON is a collection of services, the term "system" will occasionally be used for preserving functional decomposition for software and hardware including external interfaces. Throughout this document the word "TRITON" will be used as the name of the "Information System" to be developed and more extensions will be added to it in order to identify separate systems.

3.1.6. Naming Convention

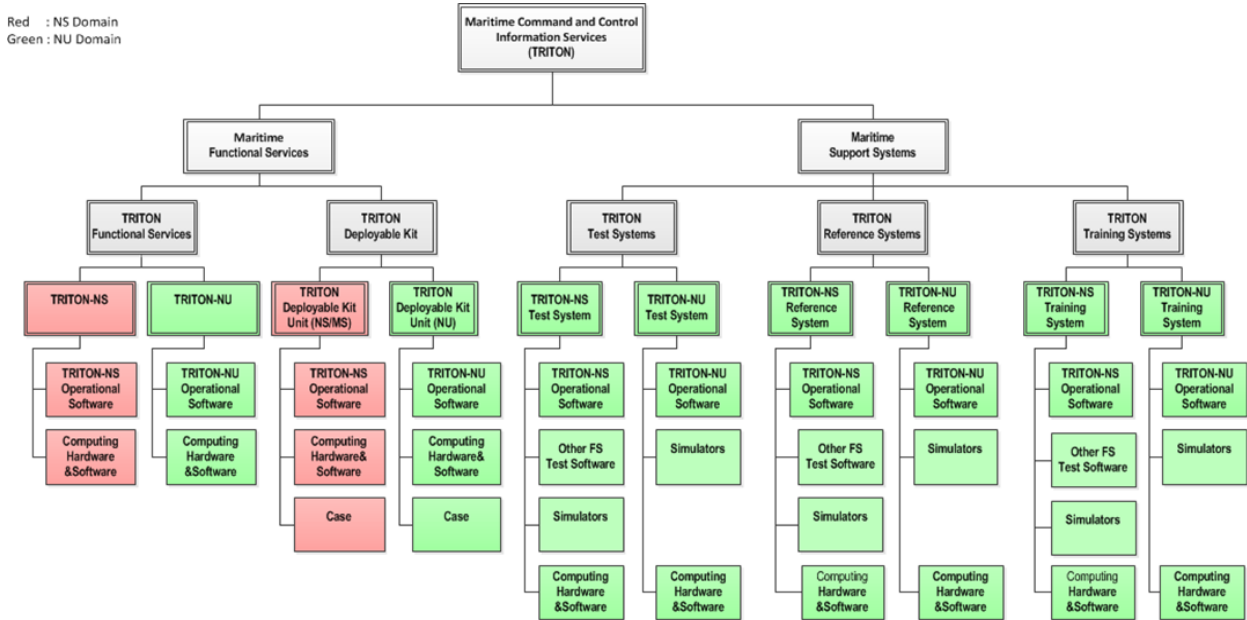
Following naming convention is used in the SRS to identify each service/system:

- TRITON : The generic name of the Maritime Command and Control Information Services.
- Maritime Functional Services: Implementation of Maritime Services within Bi-SC AIS.
- TRITON Functional Services : The name of the general Maritime Functional Services for operational use.
 - TRITON-NS : The name of the TRITON Functional Services used on the NS Domain.
 - TRITON-NU : The name of the TRITON Functional Services used on the NU Domain.
- TRITON Operational Software : The name of the overall software package to be implemented.
 - TRITON-NS Operational Software : The name of the operational software package configured for the NS Domain.
 - TRITON-NU Operational Software : The name of the operational software package configured for the NU Domain.
- TRITON Deployable Kit : The name of the system with operational software on portable hardware to be used on board ships.
- Maritime Support Systems : Implementation of support systems used for testing, maintenance and training.
 - TRITON Test System : The name of the software and hardware to be used for test purposes.
 - TRITON Reference System : The name of the software and hardware to be used for software maintenance purposes.
 - TRITON Training System : The name of the software and hardware to be used for training purposes.

The requirements in this SRS are specified as a breakdown of functions with a domain indication for each requirement. The configuration control of the operational software will allow the generation of separate software packages from the same source tree with the above-mentioned names.

3.1.7. Identification

The Functional Services and systems identified in TRITON Increment 1 Project context that form the Maritime C2 Information Services are given in the following diagram:



These services and systems with their components are described in Section 3 of this SRS.

3.1.8. Users of TRITON

The full implementation of TRITON will support the entire spectrum of NATO maritime activities, including monitoring merchant and military shipping and conducting NATO peacetime maritime operations (Operations such as Active Endeavour and Ocean Shield), as well as support for future major joint operations (Article 5) to further NATO military or political objectives.

TRITON will be used as a collection of operational-level C2 and Information Services at Maritime Headquarters and Command Centres which are called "Organizational Nodes". It is also expected that the capability will be used by the NRF HQs for Crisis Response Operations (CRO), coalition operations and other supporting activities, as authorised. Allied Command Transformation (ACT) will use TRITON capabilities for transformation experimentation related to Maritime C2 and for training and exercise purposes as well.

The maritime organizational breakdown of the Maritime Commander and subordinate Task Forces, Task Groups, and Task Elements will be using TRITON. The core of the TRITON Implementation will support the Component Commanders in planning and execution of their assigned tasks as well as providing overall situational awareness to the joint and maritime commanders.

The users at NATO Command Centres can access the TRITON services through the static systems at a centralized IT site or at other sites (Organizational Nodes). Users of Afloat Command Platforms (ACP) can also access all the TRITON services at static sites as well.

The user roles will be defined according to the current roles being used at both static and afloat command centres. In general, two groups of users will be accessing TRITON Services, and functions within those services:

- **General User:** A standard user who is capable of using the services with read-only privileges.
- **Authorised User:** A privileged user who is capable of accessing the authorised functions with privileges to manage (create, modify, delete) data.

Throughout the Command Structure, there will be roles like "General Users" who can access the general services and functions. Maritime Command (MARCOM) and selected deployed Headquarters will also have "Authorised Users" with roles like Maritime Operations Planner, RMP Manager, RMP Operator, System Technical Manager, Information Manager and Data Manager.

The role of System Administrators will be like power-user and they will be located at the Maritime Command and/or at a Central IT facility.

The non-operational installations of TRITON, as given below, will be accessed by those users having tasks in those facilities:

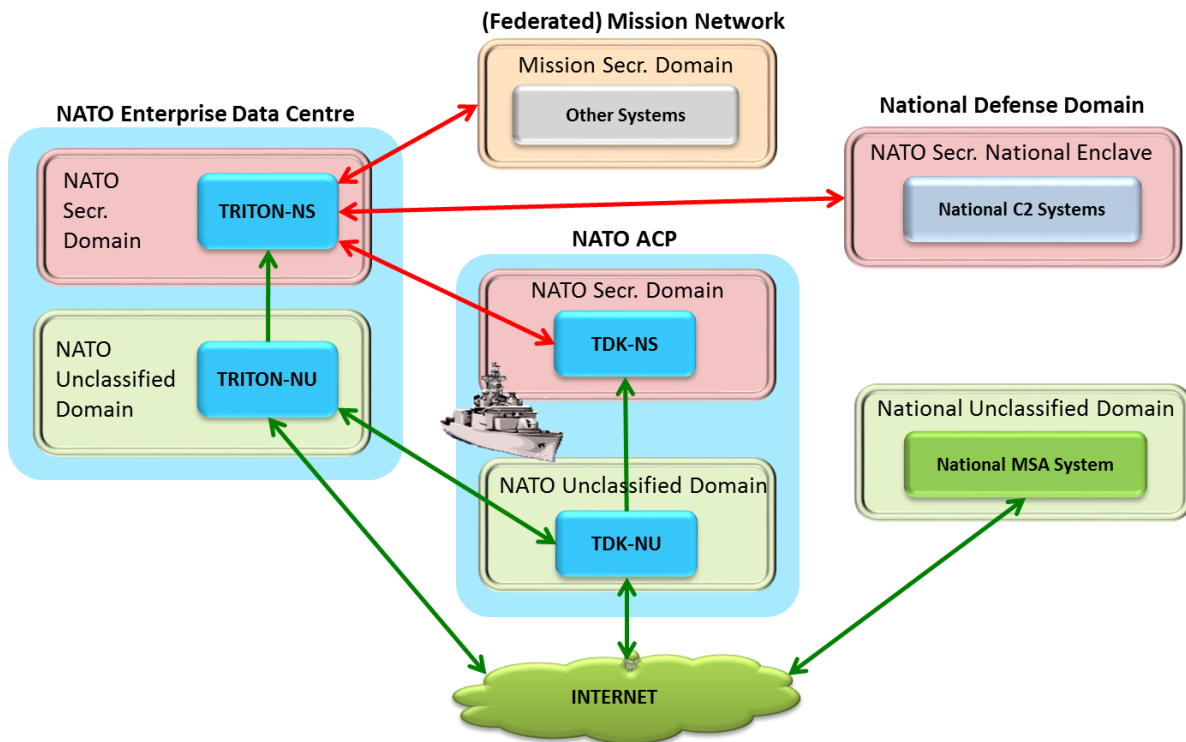
- Training System to be used for trainers and trainees (for Individual and Collective Training)
- Test System to be used by developers and maintainers at the NCI Agency
- Reference System to be used by maintainers at the NCI Agency.

3.2. Constraints

3.2.1. General Constraints

TRITON will rely on the information exchange capabilities established and maintained between NATO and non-NATO national and international information providers. TRITON will also rely on critical commercial as well as governmental transportation information and sensitive intelligence information.

Based on the Cross-Domain operation aspect of TRITON, all services will be provided for both NS and NU Domains for both static and afloat installations. TRITON operation on differing security domains is illustrated below:



Static and afloat installation of TRITON-NS can share information with other Organizational Nodes over NSWAN. The servers for each Organizational Node can also be accessed by Nations using Clients on the national side of NSWAN (National Enclave). Both static and afloat installations of TRITON-NU can

access commercial and government/non-military information resources on the Internet; it builds the White Picture and sends it to TRITON-NS over a secure connection, IEG-Data Diode.

Nations willing to share information can connect their C2 systems to the NSWAN via NATO IEG-A on National Enclave. On the other hand, Nations will continue to use MCCIS as their own national C2 system.

Nations can also access TRITON-NU over their own unclassified network. It will be Nations' responsibility to connect their systems to NSWAN.

TRITON can also exchange information with other systems on Mission Network such as MISSION SECT Domain provided that NATO IEG-C is used and the data is labelled accordingly.

In future, static headquarters will operate on Protected Business Network including the NU Domain. Therefore, NU Domain will be combined in NR Domain.

One other primary constraint of the architecture is the available bandwidth for the ships assigned as ACPs in a Task Force/Group. ACPs will have TDKs where other ships can access TRITON services over their NSWAN connections. These connections can be as low as a couple of kilobits per second depending on the ship capability. TRITON Clients should be able to function at this low bandwidth environment with defined limitations.

In case ACP loses its connectivity to the static server, it must be able to continue its function with available data sources and local services. Database synchronisation, distributed operation, and degraded operation must be considered accordingly.

3.2.2. Relationship with Other NATO Projects/Programs

The Bi-SC AIS is one of the key elements of NATO CIS Capabilities, which includes a number of strategic sub-systems and Functional Services to be implemented under a Programme.

TRITON relationship with other NATO Functional Services is very essential for successful implementation of the full capability. Networked Interoperable Real-time Information Services (NIRIS) is one of the key enablers to receive and process Tactical Data Link information.

TRITON will also be integrated with Bi-SC AIS Core Services (Directory, Registry, e-mail etc.) as much as possible. The proper interfaces will be established with other services/systems using Service Oriented Architecture (SOA) implementation and STANAG-based information exchange baselines.

Since TRITON aims to replace the existing MCCIS and MSA/BRITE functionalities, existing data exchange methods and protocols will be preserved until full transition.

3.2.2.1. MCCIS

MCCIS provides the legacy core of the maritime C2 capabilities for NATO and will continue to exchange information in various configurations for NATO and for the Nations with TRITON. Therefore its maintenance will continue until full transition is achieved. TRITON will be designed to exchange information with the MCCIS 6.x as required.

3.2.2.2. MSA Demonstrator Fielded Prototype

The Baseline for Rapid Iterative Transformational Experimentation (BRITE) is an experimentation framework that allows for the rapid implementation of new ideas and capabilities to support experimentation. A prototype for MSA capability on BRITE (MSA/BRITE) was developed by ACT, fielded at the NATO Shipping Centre (MARCOM). It is currently maintained by the NCI Agency.

MSA/BRITE receives AIS and LRIT data from MSSIS and commercial sources, provides White Shipping Monitoring with a number of analysis functions. It will continue its operation in parallel to the initial TRITON implementation with NATO and the Nations. TRITON will be designed to make use of the information stored by MSA/BRITE as required.

3.2.2.3. NIRIS

Networked Interoperable Real-time Information Services (NIRIS) provides a platform-independent application programming interface and a web-service interface to C2 systems for reading and writing tactical data and converting message types.

NIRIS is an Enabling Service ensuring proper situational awareness via the provision of a set of services to enable data collection, dissemination and transformation to information in an interoperable manner based on NATO and commercial standards (e.g. Tactical Data Links (TDL), OTH-T GOLD, Friendly Force Tracking (FFT), and Civilian Convoy).

NIRIS consists of both hardware and software components which can be dynamically configured and deployed to provide the necessary services to support each COI's business cases within different contexts, such as data dissemination, track augmentation, data forwarding and interoperability assessments in-theatre, during exercises or to support verification and validation and training events.

TRITON will utilise NIRIS to receive surface and subsurface track information provided by the following:

- Link-11/11B
- Link 16 (and Joint Range Extension)
- Link 22 (future)
- AIS (if available)

3.2.2.4. Other Bi-SC AIS Functional Services

The capability to be acquired under the Maritime C2 Functional Services Capability Package will be a fully-integrated element of the Bi-SC AIS. In this context, TRITON will co-exist with other Functional Services like Intelligence Functional Services (INTEL-FS), Logistics Functional Services (LOGFS), Air Functional Services (AirC2IS), Land Functional Services (LC2IS), NATO Common Operational Picture (NCOP), Operations Planning Functional Services (TOPFAS) and others as they become available.

TRITON Increment 1 will have interfaces to other Bi-SC AIS Functional Services such as INTEL-FS, Environmental (ENV-FS), CBRN Defence (CBRN-FS) and NCOP.

It will have Cross-Domain Support by means of Data Diode and Information Exchange Gateway (IEG) for other systems residing in differing security domains.

3.2.2.5. BI-SC AIS Programme Management and Integration Capability

The Bi-SC AIS Programme Management and Integration Capability (PMIC) will provide the Integration Test-bed for the Bi-SC AIS. The PMIC facilities play a key role in certifying the integration and interoperability of TRITON Increment 1 with the Bi-SC AIS Core Services and other Bi-SC AIS Functional Services. It will host the TRITON Test Systems.

3.2.2.6. NATO General Purpose Communications Systems

TRITON Operational Software will be hosted by the hardware installed on NS Network; consequently data exchange will be supported by the NATO General Purpose Communications Systems (NGCS). TRITON design will accommodate the existing bandwidth and Quality of Service (QoS) limitations of the NGCS. Available bandwidth will always be considered especially for the connectivity between static and afloat servers and between Task Elements and ACP.

3.2.2.7. IT Modernisation Project

The Information Technology (IT) Modernization Project (CP 9C0150) aims to increase the efficiency and effectiveness of NATO's Information Technology (IT) infrastructure by:

- Renewing obsolete IT infrastructure with standard solutions, reducing the heterogeneity of hardware and software assets;
- Quantifying and increasing the availability of service levels
- Implementing NATO-wide Business Continuity and Disaster Recovery capabilities
- Enhancing the Information Security posture
- Increasing operational agility and flexibility by enabling reallocation of resources dynamically, as dictated by the operational situation;
- Bringing new ways of working by enabling a mobile work force
- Reducing the manpower and operations and maintenance costs required to provide and maintain services.

This project will provide the infrastructure (Virtualised Environment) to run TRITON at three Data Centres and a number of Enhanced Nodes. TRITON is expected to be compatible with the infrastructure services planned to be provided by this project. TRITON operational software will be installed on the Data Centres and other Authorised Locations as described in the SOW.

Provision of the portable hardware and operational software of TRITON Deployable Kits is included in the TRITON Increment 1 Project.

3.2.3. Solution Constraints

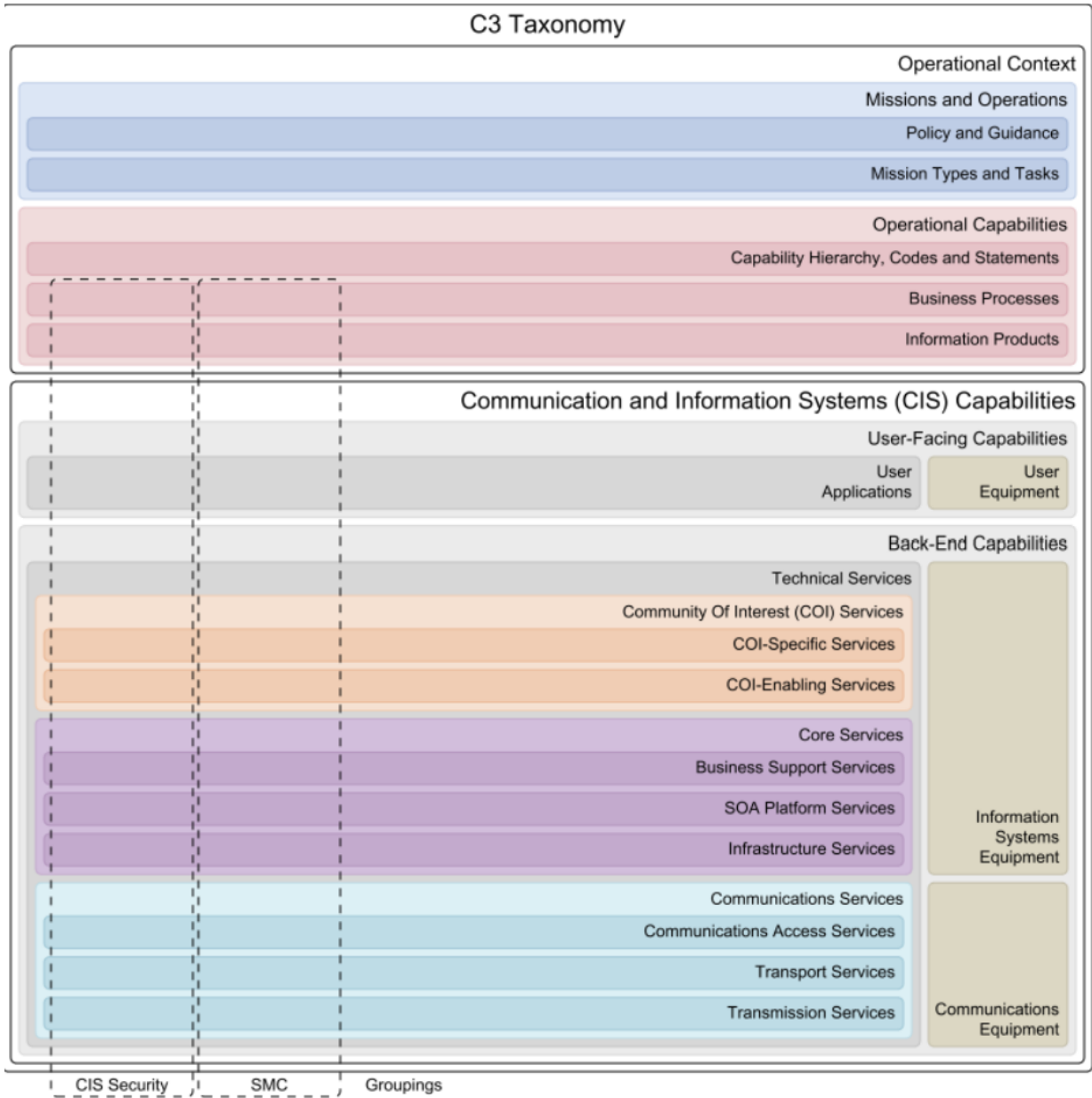
3.2.3.1. NATO Network Infrastructure

In a complex and federated enterprise like NATO there is a need for a generic structure or framework that can be used to align and synchronise various activities and projects that are on-going in parallel when the organization's CIS infrastructure transforms towards a common, network-enabled capability. TRITON will use the NATO Network Infrastructure initially defined as NATO Network Enabled Capability (NNEC) [AC/322-D(2005)0053]. This concept is being replaced with Federated Mission Network (FMN). Therefore, TRITON will use the available COI-Enabling and COI-Specific services to achieve maximum interoperability.

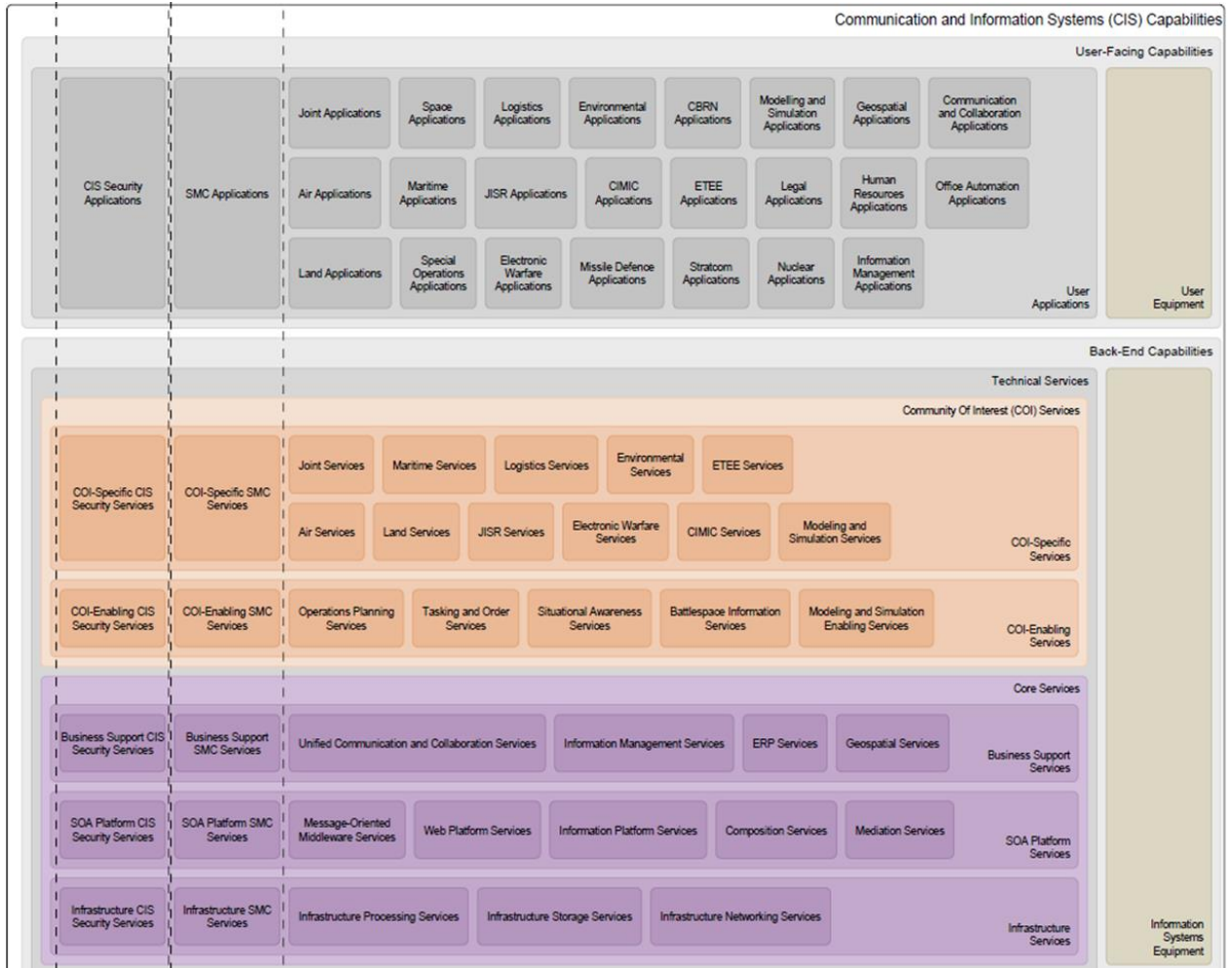
The basic services include the following but not limited to:

- Unified Communication and Collaboration Services
- Information Management Services
- Geospatial Services (Core Geographical Information System - CoreGIS)
- SOA Platform and SMC Services
- Infrastructure Services

The C3 Taxonomy [C3TAXO] provides the generic framework. The taxonomy is defined as a particular classification arranged in a hierarchical structure organised by supertype-subtype relationships. The picture below depicts the top levels of the C3 Taxonomy connecting the top-level political ambitions all the way to "the wire":



The User Facing Capabilities and Back-end Capabilities are shown below:

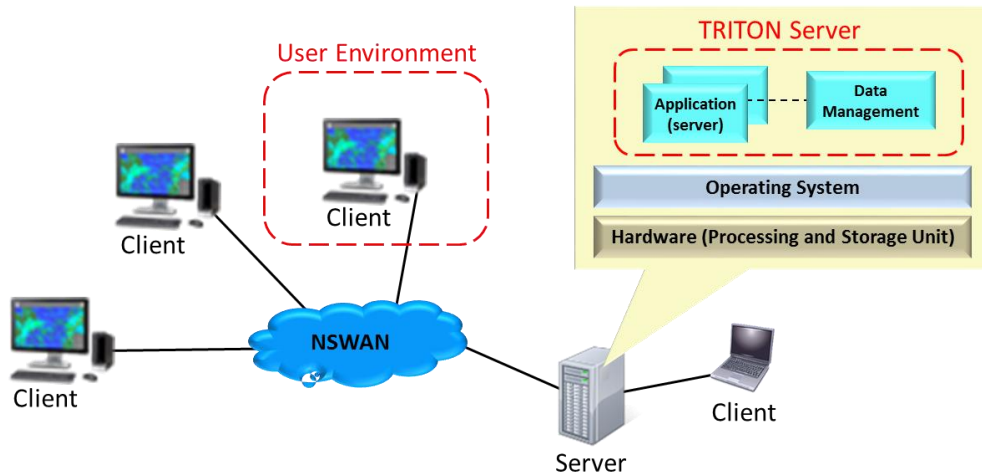


TRITON will be implemented in a SOA environment and provides the user-facing capabilities as Maritime Applications and Maritime Services.

TRITON will use the existing COI-Enabling Services and Core Services to the extent possible. The TRITON Target Architecture will take into account that some Core Enterprise Services are not entirely defined, not yet available, or will evolve. The Component-based Architecture approach will enable TRITON to leverage new Technical Services as they are implemented.

3.2.3.2. Client and Server

TRITON physical architecture consists of a "TRITON Server" which supports a high number of simultaneous users as "TRITON Clients" within the User Environment. Following figure illustrates the details of the Server running on the NS Domain.

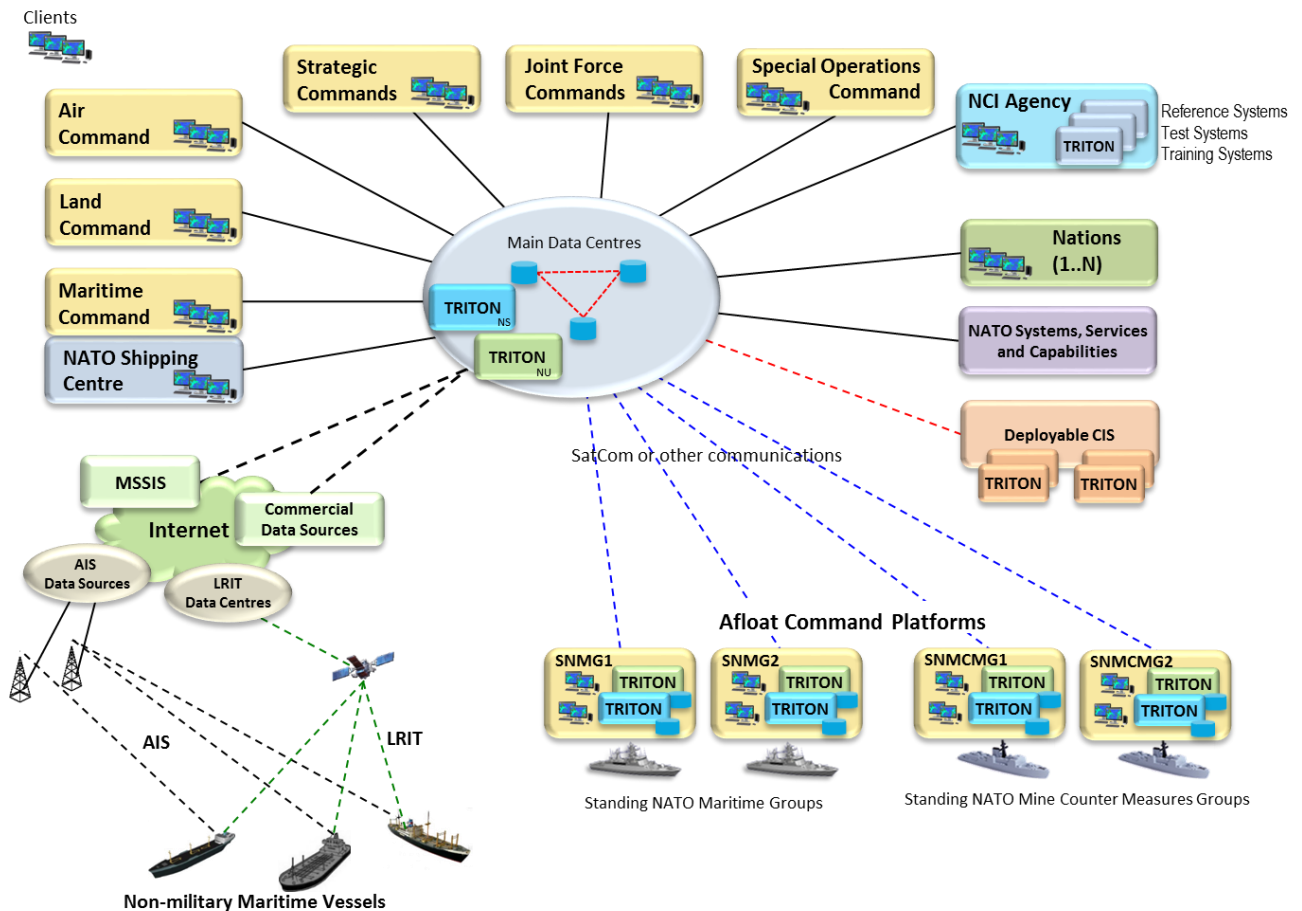


TRITON Servers will be installed on NATO Data Centres. Deployable Kits will also act as a Server. All Servers on all Instances will be synchronised in background, considering the available bandwidth and Area of Interest.

TRITON Clients provide the primary user functionality as Web-based User Applications which are accessible via standard Bi-SC AIS Web Browser (i.e. Internet Explorer).

3.2.3.3. Physical Architecture

The Physical Architecture of TRITON in operation is shown in the following picture:



TRITON will be installed on NATO Data Centres. All users from NATO commands and Nations will use "TRITON Clients" to access the services provided by the Servers. TRITON Deployable Kits will be installed on Afloat Command Platforms acting as a local server for the Task Force/Group. Afloat deployments of TRITON will have direct connection with the static servers on NSWAN allowing full functionality to be used. Allied ships not having TRITON on board will be able to access a selected TRITON Server over NSWAN using TRITON Clients.

Commercial shipping data are collected from related data centres by using Automatic Identification System (AIS) and Long Range Identification and Tracking (LRIT). AIS is a ship-borne broadcast system that operates in the VHF maritime band. The AIS system is part of an international program established to support safety at sea. The International Maritime Organization's (IMO) International Convention for the Safety of Life at Sea requires AIS to be fitted aboard international voyaging ships with gross tonnage (GT) of 300 or more, and all passenger ships regardless of size.

LRIT is a designated "International Maritime Organization" (IMO) system which is used to collect vessel position information received from ships of IMO member states that are subject to the "International Convention for the Safety of Life at Sea" (SOLAS). LRIT devices on board the vessels securely transmit the ship's identity, location and date/time of the position over long ranges (via satellite). LRIT Data Centre is then disseminates this data to registered participants.

Whereas AIS is a broadcast system, data derived through LRIT will be available only to the recipients who are entitled to receive such information and safeguards concerning the confidentiality of those data have been built into the regulatory provisions.

TRITON will not directly interface the devices, but it will utilise the sources like Maritime Information Safety and Security System (MSSIS), IHS Fairplay and the LRIT Data Centre to get vessel data and build the White Picture on the NU Domain.

The WP data will also be used to aid the operators in the detection of anomalous behaviour at sea. The WP built on the NU Domain will be transferred to the NS Domain where it is enhanced with additional sources and classified information. The RMP is then built using Military and White Pictures.

The implementation of TRITON will not be bounded to the number of deployments and number of users. However, afloat deployment will consider unavailability of external services, and provide its own services to be used when operating in stand-alone mode even under low-bandwidth communication situation.

3.2.4. Implementation Environment

The Bi-SC AIS is NATO's Automated Information System used throughout the NATO Command Structure, in NATO Command Deployments and in NATO Exercises. Since TRITON is part of the Bi-SC AIS as defined in the Bi-SC AIS Reference Architecture, the implementation will be within this environment. Both static and afloat deployments of TRITON Functional Services will have the same hardware and operating systems.

3.2.5. Anticipated Workplace Environment

TRITON will be capable of operating on Local Area Networks (LAN) and Wide Area Networks (WAN). TRITON-NS will operate on the NS Domain for C2 purposes. A similar instance of the services, TRITON-NU, will operate on the NU Domain which requires controlled access to the Internet.

Working locations will be inside offices and bunkers for static sites and naval sheltered environment for afloat platforms.

TRITON may be installed on a Deployable CIS environment running in a specific Mission Network.

3.3. Assumptions

The assumptions for the technical aspects of the project are grouped in the following paragraphs.

3.3.1. Organization

NATO Command Structure does not change from that defined as of 01 December 2012 before delivery of Increment 1 of TRITON. Therefore TRITON will be deployed only at selected static command centres and Afloat Command Platforms (ACP) which need to have Server-to-Server connectivity over Wide Area Network (WAN).

3.3.2. Infrastructure

RMP:

TRITON will collect information from external systems, services and Nations, process them and build the NATO RMP. The RMP will then be made available to all NATO Command Structure and NATO Nations. NSWAN will be the primary communications and information systems (CIS) infrastructure for information exchange. The RMP may also be made available to Coalition and/or Partner Nations through the standard NATO CIS infrastructure through appropriate Information Exchange Gateways and Web services.

Information Security:

Information security with respect to the Organizational Nodes will be provided by TRITON Servers and Clients. However, data communication security (like IP crypto) is beyond the scope of the project. It is assumed that all information is exchanged securely.

ACP Connectivity:

ACPs are assumed to have sufficient communication capabilities (as defined in [MC0195/9]) to operate TRITON for both NSWAN access and Internet access. The availability of these networks on board ACPs is outside the scope of this project. However, TRITON architecture will take the bandwidth utilisation into considered during the overall design. In addition, stand-alone operation will be supported. It is assumed that ACPs have capabilities to receive Formatted Messages.

Nations Connectivity:

Nations' own CIS connection to NSWAN is outside the scope of this project.

NATO CIS Infrastructure:

The existing NATO CIS infrastructure will be used to the maximum extent possible. It is assumed that NATO infrastructure will be ready to use when TRITON needs to. There will be no other network or infrastructure specific to the provided services.

3.3.3. Other Systems

MCCIS and MSA/BRITE will remain operational until the end of the Project TRITON Increment 1 Transition Period. The Transition Period and its activities which will be coordinated with Nations is outside the scope of this project. The historical data previously collected by these systems will be used by TRITON when necessary.

Other Bi-SC AIS Functional Services are available and provide a data exchange interface suitable for developing an interface with TRITON. Integration with the Bi-SC AIS Functional Services that are not available at the time of construction will be postponed to future TRITON Increments.

All existing interfaces of MCCIS and MSA/BRITE with other systems and Nations will be preserved to achieve backward compatibility.

3.3.4. Test Environment

There will be a Programme Management Integration Capability (PMIC) Bi-SC AIS Integration Testbed (which will include representations of Bi-SC AIS Core and Functional Services as well as MCCIS and MSA/BRITE systems). TRITON Test System will be formed in PMIC laboratories to execute System Integration Testing (SIT).

3.3.5. Build Processes and Baselines

TRITON will be developed using "Incremental Development with Multiple Deliveries" approach. Each developmental cycle will be identified as a "Build Process". The product to be delivered at the end of a Build Process is called a "Baseline (BL)".

TRITON will have four Baselines where each requirement in this SRS is initially allocated to. The Baselines and the capabilities are summarised below:

BL1:

This Baseline is named as "TRITON-NS (Partial)" and provides the following capabilities:

- System infrastructure on NS Domain
- Integration with Core Enterprise Services
- Maritime Operation Management
- Maritime Object Handling
- Maritime Picture display capability
- Interfacing with MCCIS

BL2:

This Baseline is named as "TRITON-NU (Full)" and provides the following capabilities:

- System infrastructure on NU Domain (reuse from NS Domain)
- Integration with Core Enterprise Services (NU)
- White Picture management
- Maritime Analysis functions
- Interfacing with external data sources, Nations

BL3:

This Baseline is named as "TRITON-NS (Full)" and provides the following capabilities:

- C2 support capabilities
- Operational planning (WSM/PMI)
- RMP management
- Interfacing with external data sources/services, Nations

BL4:

This Baseline is named as "TRITON-ACP" and provides the following capabilities:

- Deployable Kit production (NS and NU)
- Local system infrastructure on NS/NU
- Interfacing with external data sources

C4ISR Visualisation Component

The geospatial visualisation capabilities of TRITON Applications will be provided by a component providing the following capabilities:

- Isolation of Client and Server using Web applications
- Displaying geospatial objects on maps
- A re-usable software component with a standard interface.

4. FUNCTIONAL REQUIREMENTS

TRITON Functional Requirements are used to specify the details of the services to be developed. This section defines the requirements under the following subsections:

- The required states and modes of operation
- TRITON Functional Services Requirements (with indication of NS or NU Domains and static or afloat sites)
- C4ISR Visualisation Component Requirements
- TRITON Deployable Kit Requirements
- TRITON Support Systems Requirements.

4.1. Required States and Modes

Primary use of TRITON will be at static sites within the NATO Command Structure. TRITON will also be used as a deployed system on NATO Afloat Command Platforms (ACP) at sea to support joint and maritime operations. For afloat and deployed operation, TRITON will operate normally, however it will also provide a degraded capability for local use with limited or no connectivity.

As a Client-Server model with Web-based access capabilities, TRITON will be used over Wide Area Networks with predefined "Operational Modes" and "Operational States". The purpose of the system will determine the Operational Mode while the runtime availability status of them determines the Operational States.

4.1.1. Operational Modes

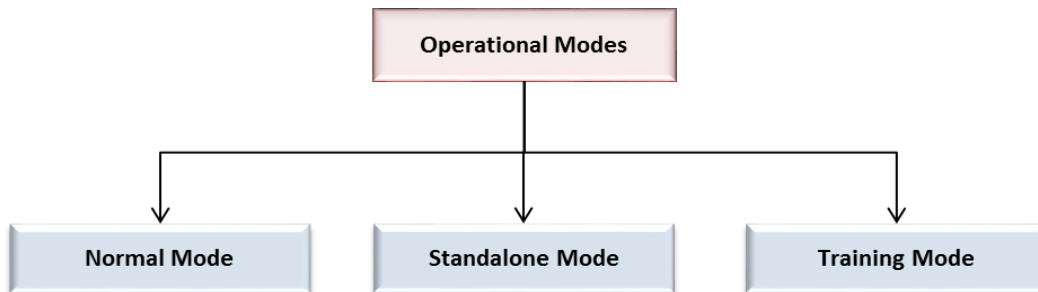
Operational Mode of TRITON defines the capability it can provide depending on its purpose. It also determines how the users will get the services provided by the system in case a mode change occurs.

4.1.1.1. Servers and Clients

For TRITON, Operational Mode of the system is determined according to its purpose and set to its Server during start-up. TRITON Functional Services can be used in one of the defined modes with certain limitations. TRITON Servers can run either on static sites or afloat sites. Clients do not have any mode of operation.

4.1.1.2. Mode Definitions

The TRITON Operational Modes are given in the following figure:



The definitions of these modes are given below:

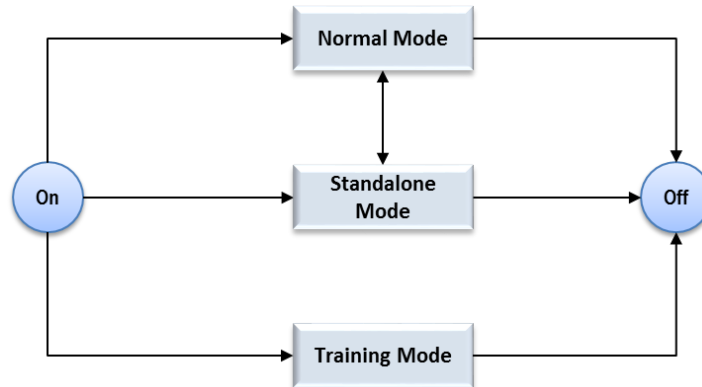
Normal Mode : TRITON is used for operational purpose on either a static or afloat site. The Server has connections to any other Functional Services as well as other TRITON Servers.

Standalone Mode : TRITON is used for operational purpose on an afloat site. The Server does not have any connection to other TRITON Servers or other Functional Services. Some functions of TRITON use internal core services with limited capabilities.

Training Mode : TRITON is used for training purposes. The Server runs in a closed environment and emulates the external world for training purposes.

4.1.1.3. Mode Settings

TRITON Operational Mode is set during the system initialisation. It can also be changed by operators during operation. Possible mode changes are depicted in the following diagram:



When the system is initialised for the first time, it will use the given default mode of operation. Training Mode is used in the Training System and it is initialised as Training.

Test and Reference Systems can use any of the modes.

Operational modes of TRITON-NS and TRITON-NU will be identical and managed by authorised users separately.

[T1-R001] *TRITON shall have Operational Modes, as described in the Description, which define its purpose of operational use.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R002] *TRITON shall allow the authorised user to set the Operational Mode during the system initialisation and change it during the operation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R003] *TRITON shall perform an internal check to determine if all the necessary services and interfaces are available for Standalone operation if it is initialised in Standalone Mode, and then sets its Operational State accordingly.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 4
 Qualific. Method : Demonstration
 Comment : The detailed criteria for checking the availability of services and interfaces will be determined during Software Requirements Analysis.

4.1.2. Operational States

TRITON will be able to change its Operational State automatically according to the conditions occur during run-time. The Operational States are defined separately for Servers and Clients.

4.1.2.1. Server States

Normal Mode is the standard Operational Mode of TRITON for operational use. There may be more than one TRITON Instance on the same network running with full functionality. Authorised users can change the Operational Mode either during initialisation or during run-time.

4.1.2.1.1. State Definitions

Operational States of TRITON Servers in Normal Mode are defined as follows:

On : Server is powered on.

Maintenance : Server is running, ready for maintenance, but not available for operational use.

Standby : Operational settings are loaded, Server is running, connected to other Servers, not processing any data.

Operational : Server is running with full functionality and connected to other Servers.

Degraded : Server is running, connected to other Servers, but some functions or dependent interfaces are not available.

Shutdown : Server is shutting down, no command is accepted.

After the Operational Mode of TRITON is changed to Standalone, the definition of Operational States for Server is changed as follows:

Maintenance : Server is running, ready for maintenance, but not available for operational use.

Standby : Operational settings are loaded, Server is running, no connection with other Servers, not processing any data.

Operational : Server is running with full functionality without connection to other Servers.

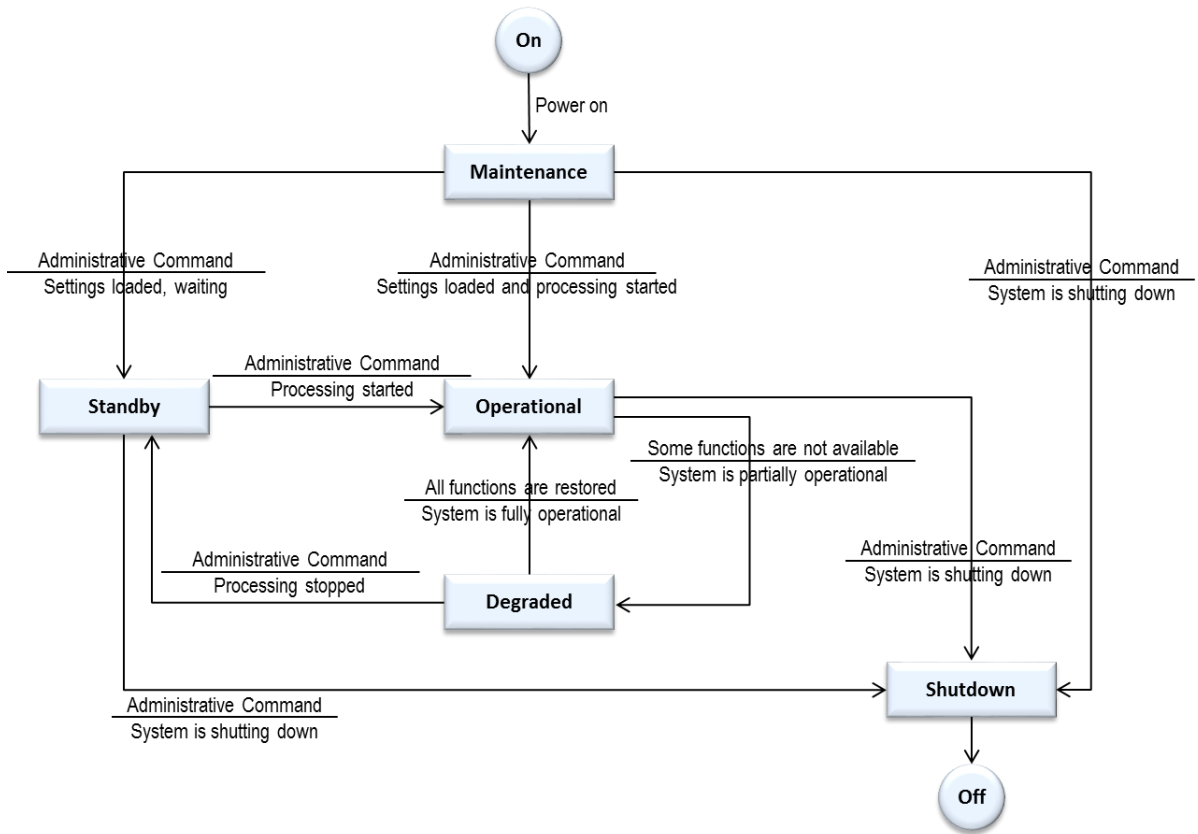
Degraded : Server is running, connected to other Servers, but some functions or dependent interfaces are not available.

Shutdown : Server is shutting down, no command is accepted.

When TRITON is in Training Mode, the Operational States for Standalone Mode are applicable.

4.1.2.1.2. State Transitions

TRITON Servers will change their operational states according to external or internal triggers. State Transitions for the Server are shown in the following sample state transition diagram:



[T1-R004] *TRITON shall monitor the system functions and interfaces that are specified in the System Configuration Settings as "critical" for operational state change.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R005] *TRITON shall allow the authorised user to modify the causes for Operational State changes in the System Configuration Settings.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R006] *TRITON shall allow the authorised user to set the Operational State to Operational or Maintenance when the system is turned on. The default shall be Operational.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R007] *TRITON shall allow the authorised user to change the Operational State manually with a notification to all users.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1

Qualific. Method : Test

[T1-R008] *TRITON shall change its state automatically from "Operational" to "Degraded" when the functions or interfaces specified in the System Configuration Settings are not available for a configurable maximum allowed time.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R009] *TRITON shall change its state automatically from Degraded to Operational when all the functions and interfaces specified in the System Configuration Settings are available for a configurable minimum allowed time.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R010] *TRITON shall switch to "Shutdown" state when an administrative command is issued by either an authorised user or the TRITON System Technical Management Function.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

[T1-R011] *TRITON shall notify all Clients when the Server enters in the Shutdown state after a configurable time period (e.g. "The system is shutting down in 5 minutes").*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

[T1-R012] *TRITON shall notify the authorised user if it detects connection failure to the specified TRITON Server for more than five (5) minutes while it is operating in Normal Mode, then automatically change its mode to Standalone Mode after waiting for configurable count-down period for the authorised user input.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 4

Qualific. Method : Test

[T1-R013] *TRITON Deployable Kit shall utilise its own infrastructure to support the operational software in Standalone Mode.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 4

Qualific. Method : Demonstration

4.1.2.2. Client States

TRITON Clients consist of Web-based applications including the Mission Application (AppView) and Visualisation Application (GeoView). Therefore their state will depend upon the connectivity with each other and with their servers. AppView determines the overall state of the TRITON Client.

4.1.2.2.1. State Definitions

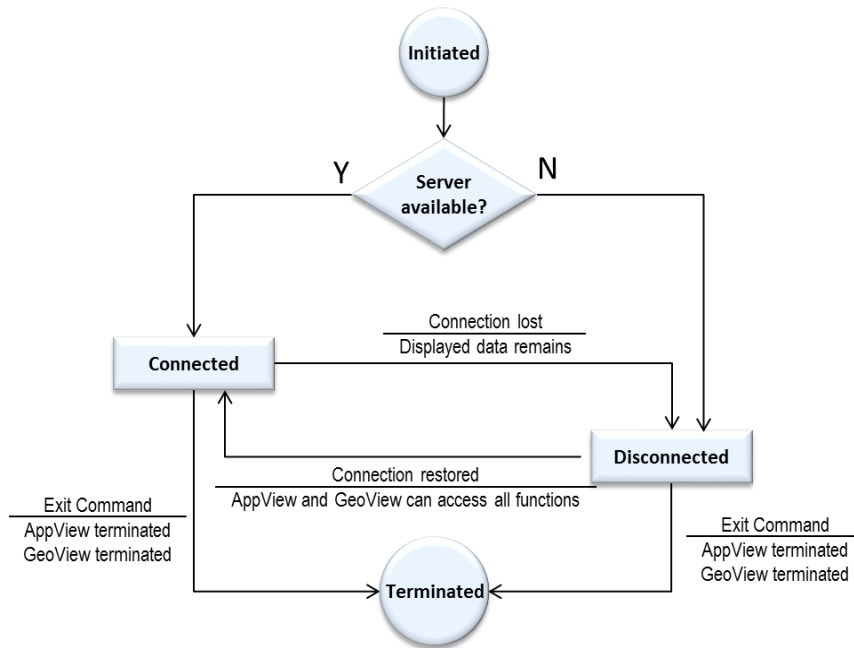
Operational States of TRITON Clients will be determined according to the Selected Server and defined as follows:

Connected : AppView is connected to the selected TRITON Application Server.

Disconnected : AppView has no connection to the selected TRITON Application Server.

4.1.2.2.2. State Transitions

The AppView state transitions are depicted in the following diagram:



[T1-R014] *TRITON AppView shall be available to all users if the standard NATO CIS Infrastructure and a workstation with a browser is available.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R015] *TRITON AppView shall be able to connect to a selected TRITON Server.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R016] *TRITON AppView shall switch to "Connected" state if it gets connected to the selected TRITON Server.*

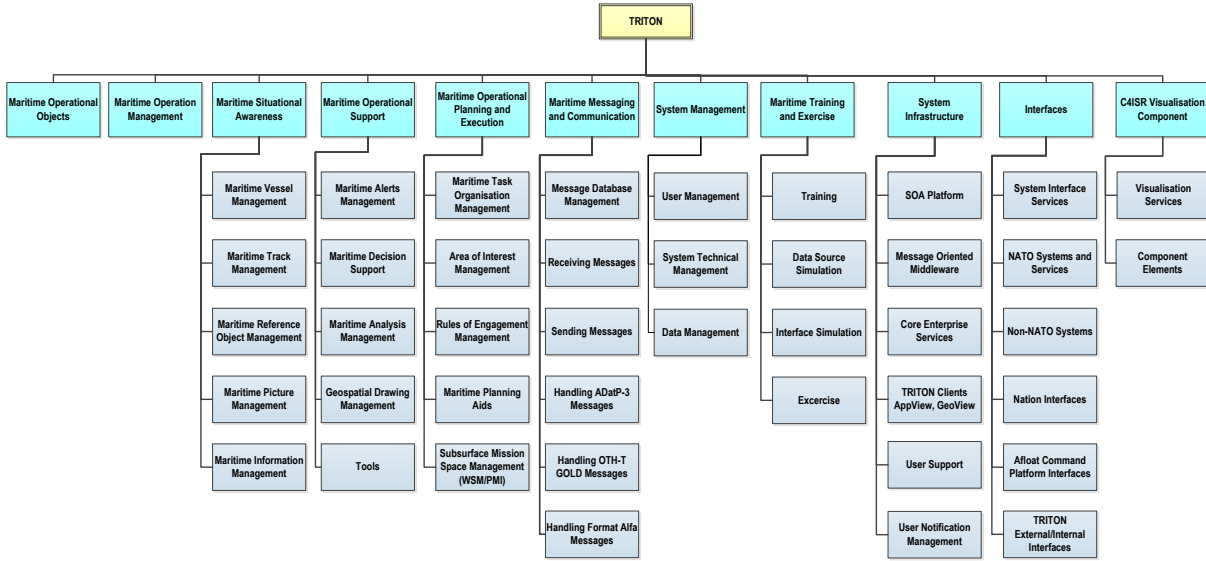
Requirement Property :
 Domain for Static: Both

Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

- [T1-R017] *TRITON AppView shall allow the user to launch GeoView when it is in "Connected" state.*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test
- [T1-R018] *TRITON AppView shall switch to "Disconnected" state if it loses its connection to the selected TRITON Server.*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test
- [T1-R019] *TRITON AppView shall be able to detect network connection failure and automatically reconnect to the selected TRITON Server if the network connectivity is re-established within a configurable time period.*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test
- [T1-R020] *TRITON AppView shall notify the user if it loses its connection to the selected TRITON Server, keep displaying the available operational data and shall not accept any operational function command.*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test
- [T1-R021] *TRITON AppView shall terminate with an Exit Command from the user with confirmation. If GeoView has been launched, it shall be terminated when the AppView is terminated.*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2. TRITON Functional Service Requirements

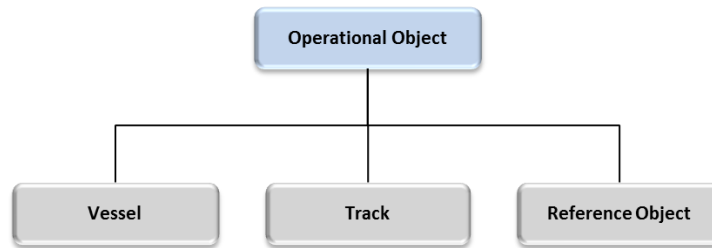
A Bi-SC AIS Functional Service enables users to collect, process, present and distribute information that supports the major functions of maritime operations which are the set of military activities conducted by maritime air, surface, sub-surface and amphibious forces to attain and maintain a desired degree of control of the surface, sub-surface, and air above the sea, influence events ashore, and, as required, support land, air and space operations. TRITON, as a full Bi-SC AIS Functional Service, will consist of a set of User Applications and Technical Services as explained in the Reference Architecture. The capabilities and functions of TRITON within the scope of Increment 1 are logically grouped into a structure. The following diagram shows the high-level breakdown of TRITON up to the second level.



Each functional group is elaborated further in the paragraphs of this Section. The lowest level components contain the system-level requirements. These components will be implemented as User Applications and Technical Services compliant to the C3 Taxonomy [C3TAXO]. Depending on the selected configuration identification method, the main functions will be mapped to system elements (configuration items and components) in the Product Breakdown Structure.

4.2.1. Maritime Operational Objects

TRITON uses Maritime Operational Objects to address all operationally related entities that need to be tracked, recorded and displayed. They are also known as Battle Space Object (BSO). A Maritime Operational Object has three entity types as shown below:



The definition of each entity type is given below:

Vessel : A maritime craft designed for transportation on water, such as ships, boats or submarines.

Track : Graphic and/or alphanumeric representation of successive positions of a moving object, point, or bearing whose position and/or characteristics are collected from sensors and/or other data sources. It can also be defined as a collated set of data associated with a track number for the purpose of representing the position and/or characteristics of point, or bearing (TRITON will use only point tracks).

Reference Object : A "Reference Point", a "Line" or an "Area" on earth that has an operational or tactical meaning.

Each type of entity is handled appropriately by its management functions.

4.2.2. Maritime Operation Management

Maritime Operation is a military action or the carrying out of a strategic, tactical, service, training, or administrative military mission; the process of carrying on combat, including movement, supply,

attack, defence and manoeuvres needed to gain the objectives of any battle or campaign. Maritime Operations include any actions performed by forces on, under, or over the sea to gain or exploit command of the sea, sea control or sea denial, and/or to project power from the sea. In a joint environment, maritime forces do more than simply pursue the maritime objectives of the JFC's campaign [AJP-3.1]. There may be Tasks and Nested Tasks in a Maritime Operation as well. The duration of a Maritime Operation can vary. It may be for a couple of weeks, a couple of years or continuous. An example to a long-term operation is to collect and monitor "White Shipping" at the NATO Shipping Centre.

Maritime Operation Types:

The types of Maritime Operations as defined in AJP-3.1 are listed below:

- Surveillance and Reconnaissance
- Coastal Defence Operations
- Protection of Shipping
 - Sea Control
 - Distant and Close Escort
 - Naval Cooperation and Guidance for Shipping
 - Convoying
- Sea Control Operations
 - Establishment and Maintenance of a Recognised Maritime Picture
 - Shaping Operations
 - Barrier Operations
 - Layered Defence
 - Exclusion Zones
- Maritime Power Projection Operations
 - Maritime Air Strikes
 - Amphibious Operations
 - Special Operations Forces
- Maritime Support to Joint Air Defence
- Other Maritime Operations
 - Maritime Interdiction Operations
 - Embargoes and Quarantine
 - Blockade
 - Other

Due to the nature of a maritime operation, an exercise or training, a "Maritime Operation" will be the key logical grouping factor for delivering services in TRITON. All input data is processed and grouped within the context of associated Maritime Operation. Therefore, Maritime Operations are defined as a manageable entity with its own context and the related TRITON services are applicable to a particular operation only in its context. Each operation context defines an "Environment" so that users can access the TRITON services in that Environment. This approach requires the automated management of Maritime Operations controlled by the authorised users.

Maritime Operation:

TRITON will maintain a list of Maritime Operations where each Maritime Operation is represented with at least the following attributes:

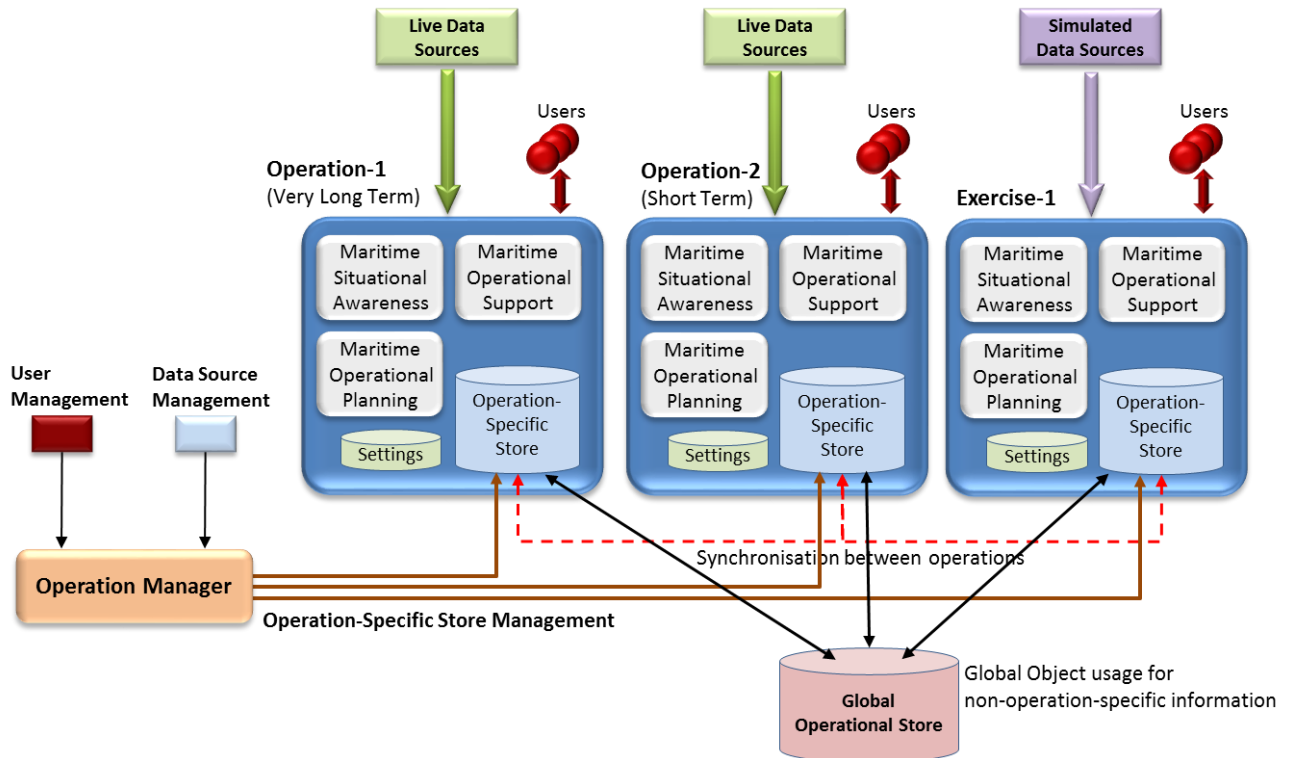
- Maritime Operation Identifier
 - Exercise Identification
 - Operation Codeword

- Operation Alias Identifier
- Type (one of the above-mentioned operation types)
- Mode (live, exercise, mixed)
- Description (text)
- Objective (text)
- Security Classification
- Commander
- Begin/End Dates
- Status (in-preparation, active, inactive)
- Environment information (context)
- User Management data (user groups, users, privileges)
- Area of Operation (as an Area definition)
- Links to related documents (i.e. OPLAN, OPTASK RMP)
- Rules of Engagement List (associated to the ROE List)
- Associated Maritime Task Organization (see Maritime Task Organization Management)

The Maritime Operations List will be maintained by TRITON without any capacity limitation.

TRITON will maintain a logical store named as "Global Operational Store" to hold the information common to all operations at the global context. This includes the Vessel Database and other C2-related databases and lists (WSM/PMI Database etc.). When a new Maritime Operation is created, an "Operation-Specific Store" for holding the Maritime Operational Objects (Tracks, Vessels, Reference Objects and other data) is also created with a context called "Environment". This Environment is then filled with the selected information from the Global Operational Store.

The picture below depicts the concept of Operation Management, handling data flows and storing Maritime Operational Objects followed by their explanation:



Operation Manager:

The Operation Manager is a managing function in the System Management which acts as the central orchestrator to handle the creation of Environments specific to a Maritime Operation, management of users and data sources.

Users:

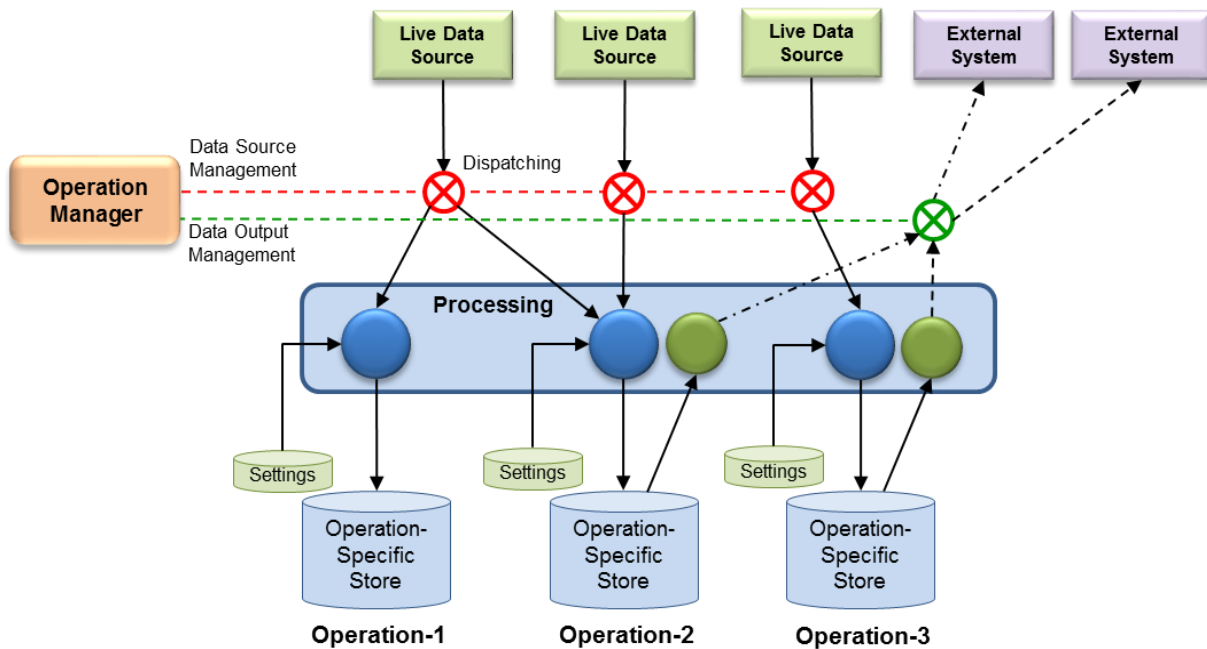
A user who wants to access TRITON services via a Client will initially be asked to select a Maritime Operation to which he/she will participate or view. After selection, the user will be able to enter into the Environment of the selected Maritime Operation. At any given time, a TRITON Client can access, if authorization provided, to as many Maritime Operations as the user wishes to access, including the RMP of that particular Maritime Operation.

Data Handling:

Operation-Specific Store also contains the data routing rules specific to the Maritime Operation so that incoming data (e.g. messages) are dispatched accordingly. The period and the destination of the generated data in a Maritime Picture can also be handled in the same manner. The data generated in a Maritime Operation can be sent to other Operations according to their releasability labels.

Data Sources:

All external data sources (systems or services) are managed centrally by the Operation Manager which can dispatch the incoming/outgoing information flows from/to external systems/services. The Operation Manager is controlled by the Operations Administrator. The Operation Administrator manages the connection between the Operation-Specific Store and the data source by creating, modifying, deleting a connection, and monitoring their status. The concept of directing the flow of information under the control of Operation Manager is depicted in the following picture:



Operation Context:

All maritime functions will be available for any Maritime Operation regardless of their duration and classification. The logical store, Operation-Specific Store, will hold all the information related only to the Maritime Operation. It includes at least the following information:

- Name (the name of the Maritime Operation)
- Authorized users (with their roles within a Maritime Operation)
- Interfaces to external data sources (valid for the Maritime Operation)
- Operation-specific Vessels List (including COI/CCOI/VOCI/Custom Lists)

- TRITON Operational Object Databases (each object is uniquely identified in the global scope together with its security classification label and releasability label)
- Lists (e.g. C2 Areas, Person of Maritime Interest)
- There will be another store called "Settings" to hold the operation-specific configuration settings for Maritime Operational Object Management functions. Correlation Criteria settings is an example to this.

Each Maritime Operation will have its own data context with security classification and releasability labels. Operation-Specific Stores can synchronise their data according to these labels automatically.

Administration:

Each Maritime Operation has its own administration by the authorised user, Operations Administrator, who also configures the Environment including the Operation-Specific Store. Another administrative role, Operation-Specific Administrator, manages the users in a Maritime Operation and the settings for that Environment such as rules for Track Management and Picture Management. These settings can be configured according to the procedures (i.e. OPTASK RMP) associated to the Maritime Operation.

Databases:

TRITON Operational Object Databases are maintained separately in each Maritime Operation as part of their Operation-Specific Store. These databases store the Tracks, Vessels, Reference Object and other data such as WSM/PMI Areas and then used to build the RMP within the Maritime Operation Environment to conduct a specific Maritime Operation. All Maritime Operational Objects in databases have labels to indicate their releasability to Maritime Operations. When they are marked by the authorised user, the other Maritime Operations can access that information. In order to preserve the data integrity, only the authorised Maritime Operation can manage the Vessel Database in the Global Operational Store when the local one ([Operation-Specific Store](#)) is updated. All privileges to Maritime Operations are given by the Operation Manager while local settings are configured by the Operation-Specific Administrator. If necessary, off-line databases can be used to feed data into the databases within a Maritime Operation. Databases can be archived into a designated storage to be referenced later on.

Processing:

Based on the configuration settings, TRITON redirects the flow of information from/to external systems/services to its internal functions to process build the relevant databases and to output the Information Products. An example to operation-specific processing includes reception, validation, correlation, identification, association and filtering of tracks and vessels within a specific Maritime Operation. Default rules will be applied over the incoming data according to the Mode of the Maritime Operation (for example, live data will not be accepted in a simulated Maritime Operation as defined in NATO RMP SOP (Section 4, Paragraph (e) [RMP SOP]). The Operation-Specific Store will then be used to build the Maritime Operational Picture. If the local information in the Operation-Specific Store is not sufficient for identification process, then the Global Operational Store will be used. For example, if an Operation-Specific Store doesn't contain all the information for a particular vessel identification such as MMSI, IMO number, then it will look for this information in the Global Operational Store.

Accessing Maritime Picture:

The inherent way of accessing (in addition receive the disseminated information) a Maritime Picture compiled within a Maritime Operation will be achieved by first accessing the relevant Maritime Operation and then use the Picture Management capabilities. In addition, TRITON will be able to disseminate RMP using Web services and Formatted Messages.

Off-line Use:

Maritime Operations can be used for off-line data analysis purposes. A specific Maritime Operation can be created as a working environment. The user can then import data from an external archive (e.g.

an exported Vessel Database) into this Maritime Operation. Any user accessing this Maritime Operation can visualise the objects on the GeoView and perform any analysis.

Applicability:

All the functions defined in this SRS will be applicable to each Maritime Operation in an independent manner in its context.

[T1-R022] *TRITON shall maintain a list of Maritime Operations.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R023] *TRITON shall allow the authorised user to manage (create, modify, delete, import) the Maritime Operations List.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R024] *TRITON shall allow the authorised user to import Maritime Operation information from a selected TRITON Server of a selected installation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R025] *TRITON shall allow the authorised user to manage the databases in the Global Operational Store.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R026] *TRITON shall allow the authorised user to manage (create, backup, restore, delete, import, export) the Operational-Specific Store. The user shall be able to import whole or part of previously exported Maritime Operational Object Databases into the internal databases of a Maritime Operation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R027] *TRITON shall allow the authorised user of a Maritime Operation to manage the users in that Maritime Operation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R028] *TRITON shall control and direct the flow of information coming from external data sources to a Maritime Operation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R029] *TRITON shall control and direct the flow of information to external systems/services within a Maritime Operation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R030] *TRITON shall allow the authorised user of a Maritime Operation to manage the flow of information to/from external data sources.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R031] *TRITON shall allow the authorised user of a Maritime Operation to manage the sharing of data with other Maritime Operations according to the security classification and releasability labels.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R032] *TRITON shall allow the authorised user of a Maritime Operation to make use of the shared data by other Maritime Operations according to the security classification and releasability labels.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R033] *TRITON shall allow the authorised user of a Maritime Operation to manage the configuration settings applicable to information processing.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2.3. Maritime Situational Awareness

Maritime Situational Awareness (MSA) capability allows the users to consult, manage and process shipping information both military and non-military. NATO MSA is an enabling capability which seeks to deliver the required information in the maritime environment to achieve a common understanding of the maritime situation to increase effectiveness in the planning and conduct of operations.

MSA covers both the military and non-military realms and involves interoperability and/or collaboration with a wide variety of non-traditional data sources, organizations and actors. While this profile is unclassified, comprehensive MSA includes other architectural elements such as classified intelligence and locations of warships to provide the full RMP.

The maritime environment comprises the oceans, seas, bays, estuaries, waterways, coastal regions and ports. Considerable resources for merchant shipping data are available ranging from commercially available databases to transient records of vessels passing through the world's ports posted on port websites.

Information related to non-combatant (civilian) vessels may be collected from both static reference external databases such as World Port Index (WPI) or Lloyd's Marine Intelligence Unit, and dynamic sources such as Automatic Identification System (AIS), Long Range Tracking and Identification (LRIT) system as well as from operator defined data. Combatant (military) vessels can be tracked by using the Tactical Data Link capabilities, Nations' reports and information collected by ACPs. Intelligence reports and any other inputs can be used to enhance the MSA. Warships AIS (W-AIS) [STANAG 4668], [STANAG 4669] may also be used if the data is available in reporting sources.

The MSA functionality in TRITON includes the management of Maritime Operational Objects (Tracks, Vessels and Reference Objects), Maritime Picture Management and Maritime Information Management. These functions enable users to access, collate, and merge validated data to build the global Maritime Operational Picture which will then be used to build the Recognised Maritime Picture.

4.2.3.1. Maritime Vessel Management

A maritime craft will be represented as a Maritime Vessel in TRITON. Virtually all maritime vessels in the world will be stored in a database called "Vessel Database". It will hold all naval units, merchant vessels, fishing vessels, pleasure crafts and government ships like coastguard, police, customs and research. The Vessel Types are defined in APP-20 as follows:

Combatants:

Naval, Coast Guard and Government-owned vessels/craft which possess some sort of inherent armed or combat capability primarily intended for offensive use. This group of vessels has the following sub-groups:

- Submarines
- Principal Surface Combatants
- Patrol Vessels
- River/Roadstead Patrol Vessels
- Mine Warfare Vessels
- Amphibious Warfare Vessels
- Special Warfare Vessels
- Coast Guard Vessels (including law-enforcement vessels)

Non-Combatants:

Auxiliary, Service Support or Merchant/Recreational Vessel types, which tend to be role specific. They may possess an armed or combat capability intended primarily for self-defence purposes. This group of vessels has the following sub-groups:

- Auxiliary Vessels
- Service and Support Vessels
- Government-owned Vessels
- Merchant Vessels
- Recreational Vessels

Once Vessel Database is accumulated, only the authorised user can manage (add, modify, remove) the Vessel Database. The information from various data sources such as Nation reports, intelligence reports and data links is analysed and correlated, and the available Tracks can be associated with Vessels in the Vessel Database. This database provides detailed, static information for those Tracks and stores the history. The authorised users can manually update the static attributes of Vessels like activity, status, capabilities, image.

All TRITON users can issue a search to find a specific Vessel and view its attributes including the last reported position and kinematic history. TRITON displays the Vessels using the same symbology as Tracks. RMP can be enhanced using this database in addition to the Track Database.

4.2.3.1.1. Vessel Definition

A maritime vessel, for both combatant and non-combatant, is represented in TRITON with a record in the Vessel Database. The primary sets of data stored are given below:

Identification Set:

A set of attributes called "Identification Set" is used to uniquely identify a Vessels in the Vessel Database. It consists of the following:

- Country
- Vessel Name
- Name synonyms
- International call sign
- Hull number (for combatants)
- IMO number (for non-combatants)

Kinematics Data:

Kinematics Data consists of with at least the following:

- Geographical position (latitude, longitude)
- Course and a speed
- Depth (for submerged vessels)
- Updating source identification
- Date-Time Group (DTG) of update

Journey Data:

Journey Data for non-combatants consists of the following:

- Departure port, DTG
- List of Last Ports of Call (at least ten (10))
- Next Port of Call and Estimated Time of Arrival (ETA as DTG)
- Arrival port, DTG

Event Data:

Event Data for non-combatants consists of the following:

- Events (text, e.g. attempt for hijacking)
- Response to Hailing
- Area
- DTG

Activity Data:

Activity Data for combatants consists of the following:

- Activity (for surface/subsurface platforms as defined in STANAG 5516)
- Maritime Mission

- Maritime Unit Task
- Begin DTG, end DTG

History:

History data for each Vessel consists of a list of records containing the following:

- Kinematics History : A timely set of Kinematics Data
- Journey History : A set of Journey Data
- Activity History : A timely set of Activity Data
- Event History : A timely set of Event Data

Vessel Data:

TRITON will store the data related to each Vessel with a record called "Vessel Data" which includes at least the following attributes:

- Unique identification (TRITON Vessel Number)
- Identification Set (as defined above)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Picture designation (Recognised, Military, White, none)
- High Value Unit (yes/no)
- RMP designation
 - Included RMP Region identification
 - Excluded RMP Region identification
- Exercise Indicator
- Exercise Identification Set
 - Exercise Identity
 - Exercise Country (STANAG 1059, Annex C)
 - Exercise Vessel Name
- Vessel Type (combatant or non-combatant)
- For Combatants:
 - Ship Designator (one of the ship designators for combatant as defined in APP-20 Table 1A-1)
 - Class name (name of the class that the ship belongs to)
 - Sensor information (types, ranges, status, etc.)
 - Weapon information (types, ranges, status, etc.)
 - Damage status (text)
 - Endurance (fuel, oil status)
 - Speed capabilities (maximum, economical, cavitation speed (submarines))
 - Diving capability (submarines)
 - Commanding Officer
 - Activity History (as defined above)
- For Non-combatants:
 - Ship Designator (one of the ship designators for non-combatant as defined in APP-20 Table 1A-1)
 - LRIT Equipment Identifier
 - Voluntary reporting (whether or not contributing to voluntary reporting scheme with Format Alfa)
 - Number of crew

- Number of passengers
- Owner company and contact details
- Speed capabilities (maximum, economical, cruise)
- Endurance (range, duration)
- Journey History (as defined above)
- Detention List indication with the associated list if exists
- Standard Identity (STANAG 1241)
- AIS MMSI Number
- Physical characteristics (length, beam, draught, masthead-height, displacement, deadweight, etc.)
- Cargo (LPG, oil, chemicals, goods, material, food, machinery, container, etc.) and amount
- Built date and builder
- Launch and commissioning dates
- Propulsion (engine, steam, nuclear, sail)
- Status (operational, overhauling, maintenance, hijacked, decommissioned, lost, sank, etc.)
- Last Known Kinematics Data (as defined in the Description)
- Kinematics History (as defined above)
- Event History (Event Data)
- Image files
- Data files
- URL list for any external references
- Vessel List indication with the associated list (CCOI/COI/VOCI/Custom) if exists
- Local Remarks (text, DTG and originator)

Note: All time values are in UTC.

The attributes of Vessels will be determined according to the most recent Maritime Datasets available. Attributes as history information (Kinematics, Activity, Event, Journey) will have no capacity limitation. A configuration parameter History Period will be used to set the time period for storing data.

4.2.3.1.2. Vessel Database Management

Cuurrently, there are over half a million maritime vessels of different sizes in the world. It is expected in near feature that this number will approach to five million. TRITON will maintain an internal storage called "Vessel Database" for dynamically storing and managing Vessels in all types and sizes as recognised by NATO. The Vessel Database will be optimised for quick access, update and retrieval without any physical capacity limitation, considering the future needs. The history information for each Vessel will also have no capacity limitation. For design purposes, the expected number of vessels in future will be used.

The authorised user can manage (add, modify, remove, export, import, backup) the Vessel Database. Vessel Database can be updated by importing data from external Maritime Datasets (see Maritime Information Management / Maritime Datasets). Whole or portions of the Vessel Database can be exported into a file in Recognised Export File Format.

[T1-R034] *TRITON shall maintain a Vessel Database to store all Vessels in the world in all types and sizes as recognised by NATO.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

Comment : The Vessel Data definition will be finalised during SwDR.

[T1-R035] *TRITON shall use an optimised database structure for storing only the relevant data for relevant attributes for particular types of Vessels (for example, weapons data will be stored for only combatants).*

Requirement Property :
Domain for Static: Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R036] *TRITON shall allow the authorised user to manage (add, modify, remove, import, export, backup) the Vessel Database in each Maritime Operation scope. The user shall be able to export or import whole or part of the database.*

Requirement Property :
Domain for Static: Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R037] *TRITON shall be able to store the attribute changes made by the authorised in the Vessel Database user for at least ninety (90) days.*

Requirement Property :
Domain for Static: Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection

[T1-R038] *TRITON shall be able to store Kinematics History, Journey History, Activity History and Event History for each Vessel for a period of time set in the configuration parameter History Period.*

Requirement Property :
Domain for Static: Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration
Comment : For test purposes ninety (90) days will be used.

[T1-R039] *TRITON shall allow the authorised user to set the configuration parameter "History Period" which is used for determining the period of history to be stored in the Vessel Database.*

Requirement Property :
Domain for Static: Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R040] *TRITON shall notify the authorised user about the Vessels if their History Period is reached with an option of time extension.*

Requirement Property :
Domain for Static: Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R041] *TRITON shall allow the authorised user to set the configuration parameter "Vessel History Distance" for each vessel type in order to determine the interval for updating the vessel positions in the Vessel Database.*

Requirement Property :

Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.1.3. Vessel Number Management

TRITON will use multi-level Vessel Identification. System-specific internal vessel identification mechanism may be hidden from the users, but a user-level vessel numbering scheme named as "TRITON Vessel Number" (TVN) will be maintained system-wide. TVN will be a decimal number sufficiently large to address all vessels in the Vessel Database. TVNs will be used to display vessels on GeoView even if they are not associated to tracks.

Each TRITON instance may have the same vessel number scheme, but separate pools (number blocks) can be defined and allocated for each of them. Similarly, a number block is allocated for each Maritime Operation.

[T1-R042] *TRITON shall use unique decimal numbers to identify vessels at user level.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R043] *TRITON shall allow the authorised user to allocate TVN pool for the entire system and each Maritime Operation by defining the first and last vessel numbers.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R044] *TRITON shall assign a unique TVN to each new vessel added into the Vessel Database.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.1.4. Vessel Identity Management

TRITON can display vessels on the GeoView using the track symbology (e.g. APP-6) with the default Standard Identity (for Standard Identities see Track Identity Management) in the database.

Standard Identities:

All vessels in the Vessel Database will have the default Standard Identities as given below:

On the NS Domain:

- All alliance combatants : FRIEND
- All others : NEUTRAL

On the NU Domain:

- All types of vessels : NEUTRAL

In addition, TRITON will allow the authorised user to define the Standard Identities to be assigned to the vessels according to the current SOPs.

[T1-R045] *TRITON shall assign FRIEND as the default Standard Identity to all alliance combatant vessels in the Vessel Database and NEUTRAL to all other vessels on the NS Domain.*

Requirement Property :

Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 1
 Qualific. Method : Test

[T1-R046] *TRITON shall assign NEUTRAL as the default Standard Identity to all vessels including the alliance combatant vessels in the Vessel Database on the NU Domain.*

Requirement Property :

Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 1
 Qualific. Method : Test

[T1-R047] *TRITON shall allow the authorised user to assign a new Standard Identity according to [STANAG 1241] to selected vessels in the Vessel Database.*

Requirement Property :

Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.1.5. Vessel Management

Vessels in the Vessel Database can be managed (add, modify, remove, import, export) by the authorised user. Any attribute of any Vessels can be modified only by the authorised user. Vessel Database can be updated by importing data from external Maritime Datasets. Selected Vessels can be exported into a file in Recognised Export File Format.

Vessels in different Maritime Operations can be shared if they are labelled accordingly in their Releasable Maritime Operations attribute.

[T1-R048] *TRITON shall allow the authorised user to import data from recognised Maritime Datasets into the Vessel Database.*

Requirement Property :

Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R049] *TRITON shall check the key attributes of Vessel Data during the import process from a selected Maritime Datasets into the Vessel Database and prevent any duplications with notification.*

Requirement Property :

Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R050] *TRITON shall be able to use a Vessel Data Import Tool to import data from a selected Maritime Datasets into a file in Recognised Import File Format.*

Requirement Property :

Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1

Qualific. Method : Demonstration

[T1-R051] *TRITON shall allow the authorised user to be able to export data from the Vessel Database according to a given selection criteria into a user-specified file in Recognised Export File Format.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R052] *TRITON shall be able to share the Vessels in the Vessel Database among multiple Maritime Operations if they are labelled accordingly in their Releasable Maritime Operations attribute.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

4.2.3.1.6. Vessel List Management

Vessel List Management provides managing (create, update, delete) dynamic lists of maritime vessels that are subject to close interest. A list will hold the names of a number of ships with a label explaining the purpose and context of the list. Following Vessel Lists, as defined in [MC0367/2], will be identified:

Critical Contact of Interest (CCOI):

Any platform in the maritime domain conducting activities qualified as illegal by international law and considered to be an imminent threat to NATO, NATO Nations maritime security interests and/or related assets.

Contact of Interest (COI):

Any platform in the maritime domain conducting activities qualified as illegal by international law considered to be a potential threat to NATO, NATO Nations maritime security interests and/or related assets.

Vessel of Collection Interest (VOCI):

Any platform in the maritime domain involved in any activity of intelligence interest.

Custom Watch List:

Any platform in the maritime domain conducting activities that do not qualify for one of the above but raise special interest for NATO. For example, NATO Shipping Centre Priority List can be created and maintained.

For the purpose of detailed situational awareness, COIs and VOICs are sub-categorised in reporting according to the reason that led to their classification. The following seven types are being used in accordance with international law, including any applicable treaties and customary law and with full respect for any relevant United Nations Security Council Resolutions:

- Type 1: Platform/ Owner or Company possibly associated with terrorism;
- Type 2: Platform/ Owner or Company possibly associated with Weapon of Mass Destruction (WMD) Proliferation;
- Type 3: Platform/ Owner or Company possibly associated with illegal Immigration;
- Type 4: Platform/Owner or Company possibly associated with piracy, slave trade or engaged in other activities qualified as illegal by international law;
- Type 5: Platform having displayed suspicious behaviour;

- Type 6: Platform possibly posing an environmental concern;
- Type 7: Selected platforms of armed forces of non-NATO nations and other platforms as the situation dictates.

The Vessel Lists can be shared with national authorities using formatted messages.

Vessel Information:

For each Vessel List at least the following information will be stored:

- COI Category (CCOI/COI/VOCI and Custom Watch List)
- Vessel List identification (name)
- Activity (Terror, Weapon of Mass Destruction, Immigration, Illegal, Suspicious, Environment, Military, and/or Others)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operation
- RMP designation
 - Included RMP Region identification
 - Excluded RMP Region identification
- Description of the interest of the list
- Comments (e.g. "not to be hailed without approval")
- Date of validity of the list
- List of Vessels

There may be several Vessel Lists to be maintained concurrently. Each Vessel List also contains hundreds of vessels of interest. TRITON will not have a capacity limitation to store and manage the Vessel Lists.

[T1-R053] *TRITON shall maintain Vessel Lists to store CCOI/COI/VOCI and Custom Lists as defined in the Description.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat : NS
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R054] *TRITON shall allow the authorised user to manage (create, modify, delete, import, export) the Vessel Lists.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat : NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R055] *TRITON shall allow the authorised user to define the default identities to be assigned to CCOI and COI vessels.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat : NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R056] *TRITON shall automatically assign the default identities to CCOI and COI vessels when the Vessel List is created.*

Requirement Property :
 Domain for Static : NS

Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R057] *TRITON shall allow the user to display the Vessels in the selected Vessel List in sortable tabular form with an option to indicate it on the GeoView.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R058] *TRITON shall allow the user to display the positions of the Vessels of the selected Vessel List on the GeoView based on user-selected criteria (e.g. type, date, country, area).*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R059] *TRITON shall allow the authorised user to export selected Vessel Lists into a file in Recognised Output File Format and import Vessel Lists from a given file in Recognised Input File Format.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R060] *TRITON shall allow the authorised user to select a Vessel List and generate a Formatted Message (e.g. OTH-T GOLD CONTACT REPORT or ADatP-3 MARINTREP).*

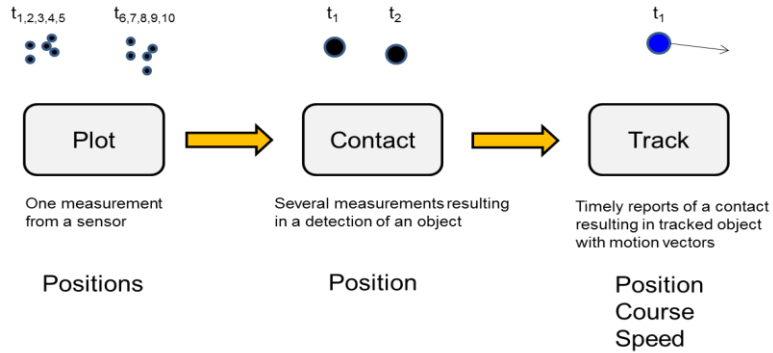
Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

4.2.3.2. Maritime Track Management

Starting from the sensor level, a sensor detection is called a "plot". Plots are used to build "contacts" reported by the sensors. Those contacts can then form a "track" if a tracking process is used either within the sensor or outside of the sensor.

A "track" is the representation of a moving object in terms of its position, course, speed and general characteristics. The information comes from external sources. Tracks may be in two forms: Point Tracks and Bearing Tracks. A Point Track may have two or three dimensions with course and speed. Bearing tracks can have only one dimension, an origin and an angle from true north.

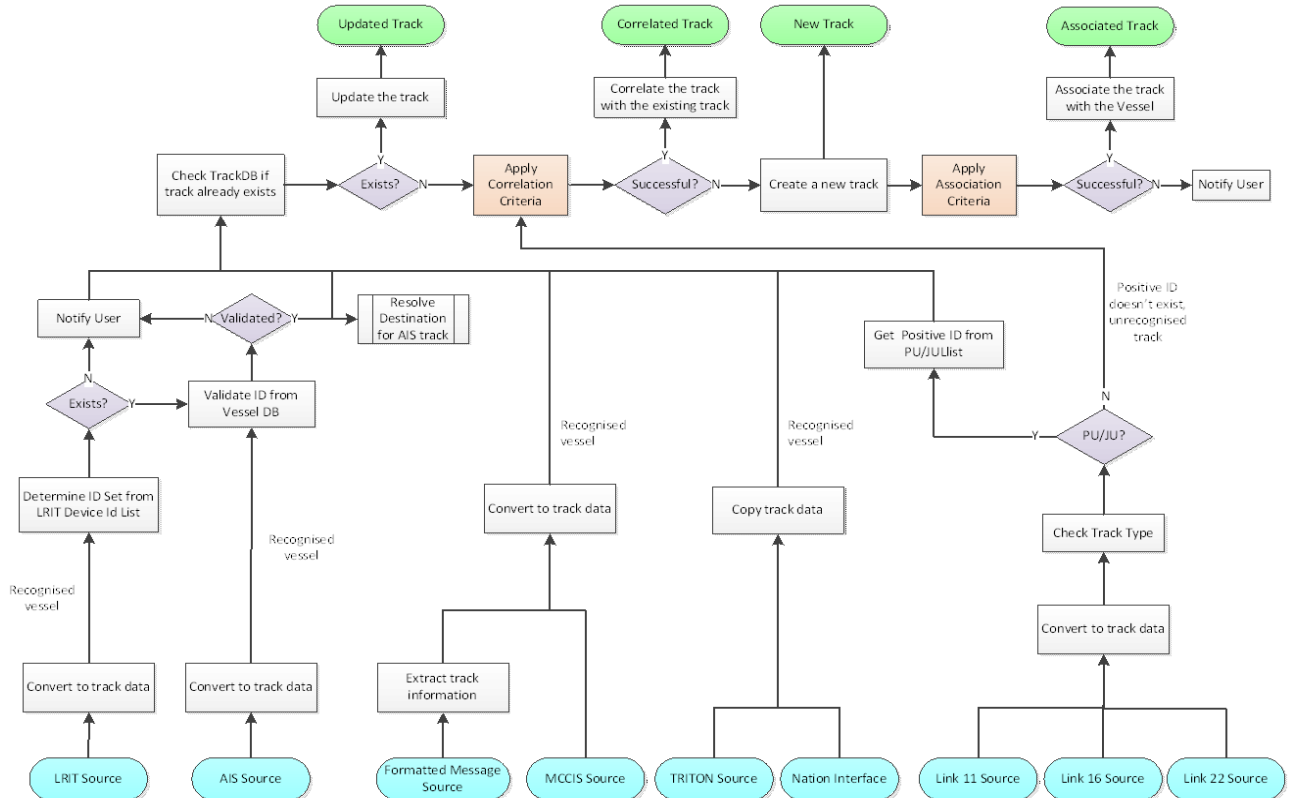
TRITON will use only point tracks, not contacts and sensor plots. The terminology distinction is depicted below:



TRITON will use the term "track" for both one-time report for a vessel and continuous on-line reporting of a vessel by a recognised source. For example, AIS track from an AIS source, NIRIS track feed or Nations' on-line track feeds are all considered as tracks. Similarly, a report received from a Nation using OTH-T GOLD message will also be treated as a track. The contact reports received from a source will be used to create a TRITON track if it doesn't exist, follow-on reports will be used to update that track. Tracks can be dropped by TRITON if no update is received within a specified time period. Tracks can also be deleted by its reporting source.

TRITON will support world-wide track management, which means all tracks detected and reported from different regions of the world will be identified uniquely in the system context. Therefore, unique number allocation will consider multiple TRITON instances.

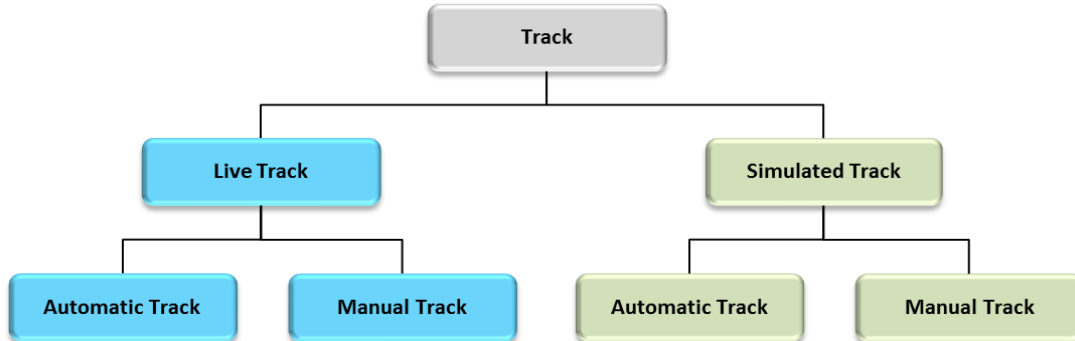
TRITON maintains an internal track store, creates tracks based on the received track data, updates them, correlates them if they are reported by different sources, and deletes them if they are deleted by source or not updated for a given time. A notional flow of data from sources to user-level tracks is illustrated in the following flowchart:



Each process and decision point is explained in relevant paragraphs and associated with requirements.

4.2.3.2.1. Track Definition

TRITON will process only point tracks using 3-dimensional coordinates. Geodetic positions (Latitude and Longitude) will be used to indicate the location on earth. Altitude and depth will be processed and displayed. TRITON track types are shown below:



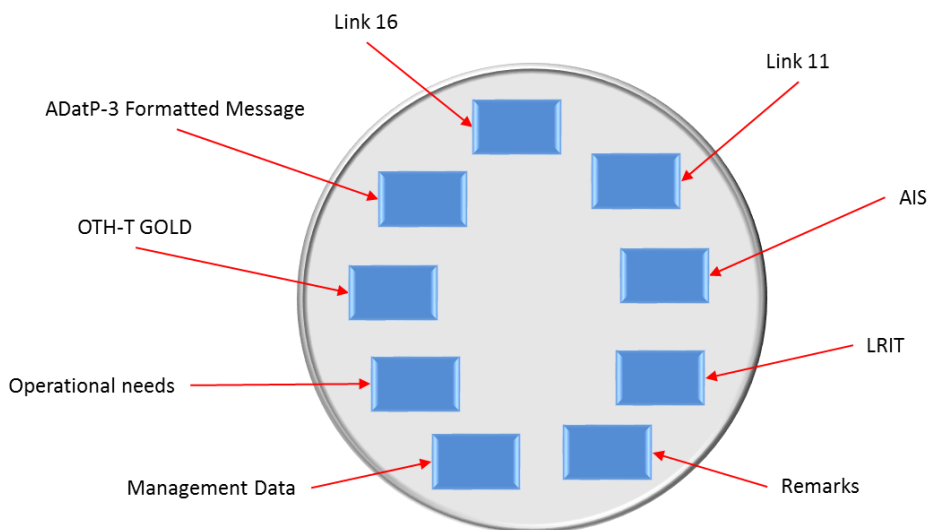
The definitions of these track types are given below:

- Live Track** : A track that represents a real object in the world.
- Simulated Track** : A track that represents an imaginary object.
- Automatic Track** : A track reported by a sensor or simulator and updated continuously.
- Manual Track** : A track manually initiated and maintained by an operator.

AIS, LRIT, on-line Nation feed and TDL tracks are examples to automatic tracks. Nations report (via formatted messages) and user-initiated tracks are manual tracks.

The attributes for maritime objects may be different depending on the type of the vessel being tracked. TRITON will use a standard track definition internally which is a composition of several track types received from various sources. It is called "Track Data", which consists of a combined set of attributes for both combatant and non-combatant tracks. When received from external sources, depending on the type of the track, only the relevant attributes of a track will be used in the Track Data, which will then be processed, stored and displayed appropriately.

The figure given below conceptually depicts how the TRITON track definition is derived from several definitions of track:



Identification Set:

TRITON uses a set of attributes called "Identification Set" to uniquely identify a track. This set is also used to identify Vessels and includes the following:

- Country
- Vessel name
- Name synonyms
- International call sign
- Hull number (for combatants)
- IMO number (for non-combatants)

Kinematics Data:

Each Track Data record keeps the last known position and course-speed information using "Kinematics Data" which consists of the following attributes:

- Geographical position (Latitude / Longitude)
- Course and a speed (over ground)
- Depth (for subsurface tracks)
- Altitude (for air tracks)
- Elevation (for land tracks)
- Time of update (UTC)

Kinematics History:

The positions of a Track will be stored in its Kinematics History at an interval which will be computed by using a configurable system setting called "Track History Distance". The Track History Distance will be used to calculate the "Track Kinematics History Update Interval" according to the following formula:

$$\text{Track Kinematics History Update Interval} = \text{Track History Distance} / \text{Current Track Speed}$$

Example: If the Track History Distance is set to 2000 yards and the track speed is 20 kts, the Track Kinematics will be stored at every 180 seconds (3 minutes).

In a similar fashion, the positions of a Vessel associated to a Track will be updated in the Vessel Database at an interval which will be computed by using a configurable system setting called "Vessel History Distance". The Vessel History Distance will be used to calculate the "Vessel Position Update Interval" according to the following formula:

$$\text{Vessel Position Update Interval} = \text{Vessel History Distance} / \text{Current Track Speed}$$

Example: If the default for the Vessel History Distance is 2000 yards and the track speed is 10 kts, the Vessel position is to be updated at every 360 seconds (6 minutes).

The update intervals gets longer if the track speed gets lower. There will be separate Track History Distance and Vessel History Distance parameters for each vessel type (e.g. frigates, submarines, tankers, leisure boats).

Track Data:

TRITON uses "Track Data" record to store a Track in the Track Database. It will consist of at least the following attributes:

- Unique Identification (TRITON Track Number)
- Identification Set
- Source (track originator's type and identification)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- High Value Unit (Yes/No)
- Picture designation (Recognised, Military, White, none)
- RMP designation
 - Included RMP Region identification
 - Excluded RMP Region identification

- Track type (live, simulated)
- Update type (automatic, manual)
- Life cycle status
- Ship Designator (one of the ship designators for combatant and non-combatant as defined in APP-20 Table 1A-1)
- For Combatants
 - Tactical Data Link information (Link identification and Network Track Number if reported by a TDL)
 - Identity amplifier/modifying descriptor (combination of STANAG 5511 and STANAG 5516)
 - Activity (for surface/subsurface platforms as defined in STANAG 5516)
 - Special interest descriptor
- For Non-combatants
 - LRIT Equipment Identifier
 - Last Port of Call and Departure Date
 - Next Port of Call and Estimated Arrival Date
 - Destination (name and geographical position)
- Track Source (visual, radar, AIS, LRIT, asset-reported, nation-reported, intelligence, C2-system, TRITON instance, etc.)
- Other TRITON Track Number (if received from a source as another instance of TRITON)
- Environmental descriptor (surface, sub-surface, land, air, space, unknown) [STANAG 1241]
- Standard Identity [STANAG 1241]
- AIS Information (if available)
 - AIS Version
 - MMSI number
 - Receiver Type and ID
 - Heading
 - Rate of turn
- Exercise Indicator (if set)
 - Exercise Identification Set
 - Exercise Identity
 - Exercise Country [STANAG 1059] (Annex C)
 - Exercise Vessel Name
- Confidence Level
- Kinematics Data
- Time of last update
- Kinematics History (as defined above)
- Vessel of Interest status (COI/CCOI/VOCI/Custom, none)
- Local Remarks (text, DTG and originator)

Note: All time values are in UTC.

4.2.3.2.2. Track Database Management

TRITON will maintain an internal storage called "Track Database" for dynamically managing Tracks. There may be several thousands of Tracks to be managed and stored. The number of tracks will increase for White Picture as space-based AIS data sources become available, and small vessels also start using AIS devices. The number of vessels reporting AIS data will be approaching to five million

over the coming years. Therefore, TRITON Track Database will not have a physical capacity limitation. For design purposes, expected number of vessels will be used.

The Track Database will be optimised for quick access, update and retrieval.

[T1-R061] *TRITON shall maintain a Track Database to store all tracks within the Environment of a Maritime Operation with a standard "Track Data" representation as given in the Description of the Track Definition.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

Comment : The Track Data definition will be finalised during SwDR.

[T1-R062] *TRITON shall use a Track Database structure optimised to store only the relevant data for relevant attributes for particular types of vessels (for example, weapon information will be stored for only combatants).*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R063] *TRITON shall allow the authorised user to set the configuration parameter Track History Distance for each vessel type in order to determine the interval for storing the Kinematics History in the Track Database. The details are given in the Description.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R064] *TRITON shall allow the authorised user to purge the Track Database (delete all tracks) after confirmation.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R065] *TRITON shall be able to share the Track Data among multiple Maritime Operations if they are labelled accordingly in their Releasable Maritime Operations attribute.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

4.2.3.2.3. Track Source Management

TRITON will have several track sources that are identified uniquely so that multi-source and track-to-track correlation will be possible. On-line, near-real time tracks will be received from external sources data such as NIRIS, MSSIS, AIS and LRIT. NIRIS provides the interface for TDLs used by maritime platforms. One NIRIS interface may have multiple sources. Nations feed their track data and contact reports using either on-line data stream or formatted messages. Each Nation is considered as a

separate track source for TRITON. The configurable source identification information will be displayed to the user within the track information set.

TRITON will use Confidence Level for each track source. Confidence Level will be a decimal number indicating the validity or certainty of the information provided in the track data. A larger value represents a greater confidence level. Tracks reported by a source will have a default Confidence Level which can then be used as a decision aid in correlation process and RMP filtering.

A System Interface Service (see System Management) will be used for each track source, capable of handling all track reports coming from a source.

It is expected that several millions of vessels will be reporting AIS data over the coming years. TRITON will be able to handle large number of tracks reported simultaneously. For performance and scalability reasons, a track source may be separated into multiple services, and filters can be applied.

TRITON will maintain a Confidence Level Table having default values for each track source. Track sources will assign a default Confidence Level depending on the type of the track it received from external world. For example, a reported track whose source is a radar will be indicated as such.

A sample table with values between 1 and 5 is given below:

Source	Confidence Level
Track Report from a NATO Asset with positive identification	5
Track Report from a NATO Asset without positive identification	4
Tracks received from TDL via NIRIS	5
Track received from a Nation	5
NATO AGS-Radar track (no ID)	3
NATO AGS-AIS track	1
NATO AGS-processed track	5
MSSIS	1
AIS Data Source	1
LRIT Data Centre	4
Correlated AIS and LRIT tracks	3
Correlated two AIS tracks	1
Correlated Radar and AIS tracks	4

[T1-R066] *TRITON shall identify each track source uniquely (i.e. maintaining a Source ID). A System Interface Service (SIS) shall be used for each external source where each individual track source is identified with a Source ID.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R067] *TRITON shall allow the authorised user to configure track sources dynamically (add, modify, remove) without re-starting the whole Application.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R068] *TRITON shall assign the Releasable Maritime Operations label to a track source as received from the Maritime Operation Manager.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R069] *TRITON shall allow the authorised user to control (allow or prohibit) input of tracks from a selected source into a Maritime Operation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R070] *TRITON shall be able to process all tracks received from a track source by taking the performance issues into consideration. Depending on the load, scalable services, pre-filtering, configurable update rates can be used.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration
 Comment : Performance criteria for high number of track inputs will be determined at the CDR.

[T1-R071] *TRITON shall assign the source identification to each track when it is received for the first time and maintain it thereafter.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R072] *TRITON shall maintain a Confidence Level Table, for each Maritime Operation, to be used as the default for track sources.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R073] *TRITON shall allow the authorised user to modify the Confidence Level Table, while the system is operating.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.2.4. Track Number Management

TRITON will use multi-level track identification. System-specific internal track identification mechanism is hidden from the users, but a user-level track numbering scheme named as "TRITON Track Number" (TTN) will be maintained system-wide. TTN will be a decimal number with sufficient digits to address all tracks.

Each TRITON instance may have the same track number scheme but differing pools (number blocks) can be defined. Similarly, a number block is allocated for each Maritime Operation.

Tactical Data Link (TDL) Track Numbers will also be stored in the Track Data if the tracks are received from TDLs.

[T1-R074] *TRITON shall use unique decimal numbers to identify tracks at user level.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R075] *TRITON shall allow the authorised user to allocate TTN pool for the entire system and each Maritime Operation by defining the first and last track numbers.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R076] *TRITON shall assign a unique TTN to each new track received from external sources or initiated internally.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

4.2.3.2.5. Track Identity Management

Tracks in TRITON have attributes for distinguishing them from each other by using identification information. If reported tracks have information which helps to derive country name and vessel name, then it is said to be Positively Identified. Some track sources may report tracks without positive identification but with Standard Identities.

Standard Identities:

The Standard Identities for platforms are described in STANAG 1241 and given below:

- UNKNOWN - An evaluated track that has not been identified (AAP-6)
- ASSUMED FRIEND - A track which is assumed to be a friend because of its characteristics, behaviour or origin
- FRIEND - A track belonging to a declared, presumed or recognised friendly nation, faction or group. (AAP-6)
- NEUTRAL - A track whose characteristics, behaviour, origin or nationality indicate that it is neither supporting nor opposing friendly forces (AAP-6).
- SUSPECT - A track which is potentially hostile because of its characteristics, behaviour, origin or nationality
- HOSTILE - A track whose characteristics, behaviour or origin indicate that it is a threat to friendly forces. Designation as hostile does not necessarily imply clearance to engage (AAP-6).

Tracks which have not been subject to the identification process but which are available for reporting will be reported with a status of PENDING.

Following amplifying/modifying descriptors identities can also be used for the tracks having special interest:

- KILO (friendly track with special interest)

- TRAVELLER (a SUSPECT surface track following a recognised traffic route)
- ZOMBIE (a SUSPECT air track conforming to ATC rules or following a recognised traffic pattern)

An identity other than UNKNOWN is only to be applied to a track if sufficient identification has taken place to meet the requirements of that identity.

A recognised track is defined as such because when its identification has been verified. During the RMP building process, reported tracks are evaluated by an assigned RMP Manager. Recognised tracks can then be associated to vessels in the Vessel Database.

Tracks that exist in the real world but are being used for exercise purposes can have an additional attribute named as "Exercise Indicator". When this indicator is set, the identity of friendly tracks can be amplified and marked that the track is acting as other than a FRIEND for exercise purposes and to include artificial data in certain fields. Artificial data for that track can be used for exercise purposes. The identity attribute can take the following values:

- EXERCISE PENDING
- EXERCISE UNKNOWN
- EXERCISE ASSUMED FRIEND
- EXERCISE FRIEND
- EXERCISE NEUTRAL
- JOKER (a friendly track acting as SUSPECT for exercise purposes)
- FAKER (a friendly track acting as HOSTILE for exercise purposes)

[T1-R077] *TRITON shall use Standard Identities as defined in STANAG 1241 for tracks on the NS Domain.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat : NS
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R078] *TRITON shall restrict the user to assign SUSPECT and HOSTILE as Standard Identities to any track or vessel on the NU Domain.*

Requirement Property :
 Domain for Static : NU
 Domain for Afloat : NU
 Baseline : BL 1
 Qualific. Method : Test

[T1-R079] *TRITON shall restrict Standard Identity change for automatic tracks if the authorised user has already made a change on it.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat : NS
 Baseline : BL 1
 Qualific. Method : Test

[T1-R080] *TRITON shall automatically assign the Standard Identity FRIEND to a received track if it doesn't have a Standard Identity but its Ship Designator is combatant and its country is one of the NATO Nations as indicated in the NATO Standard Country Code Table.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat : NS
 Baseline : BL 1
 Qualific. Method : Test

[T1-R081] *TRITON shall allow the authorised user to assign a new Standard Identity to a received track with Ship Designator non-combatant.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: NS

Baseline : BL 1

Qualific. Method : Test

[T1-R082] *TRITON shall compare the names in the Identity Set when a new positive identity (country and vessel name) is entered by a user for an existing track and notify the user if another track with the same name already exists.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R083] *TRITON shall use the associated Vessel name if the reported names for correlated tracks are differing.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R084] *TRITON shall allow the authorised user to assign Exercise Indicator and Exercise Identity to a track.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: NS

Baseline : BL 1

Qualific. Method : Test

[T1-R085] *TRITON shall be able to process a received track with its Exercise Identity if its Exercise Indicator is set by the originator.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: NS

Baseline : BL 1

Qualific. Method : Test

4.2.3.2.6. Track Life Cycle Management

TRITON automatic and manual tracks will have life cycle states that define their presence.

Initiation of automatic and manual tracks and managing their life cycle may be different due to the nature of track source, update rate and time late.

Automatic tracks need to be updated by their source at certain intervals. If they are not updated for a given time period then they are declared as "Lost". For example, AIS tracks are reported at intervals between two seconds and three minutes. If AIS information from a particular ship has not been received for a given period of time which set by the authorised user according to the type of the source and the speed of the ship, then that track becomes Lost. This may happen, for example, when the ship is out of AIS coverage (~50 nautical miles). If reporting starts again, a new track is initiated.

Similarly, other automatic track sources like TDLs or on-line feeds from NATO assets can be declared as Lost.

The default LRIT update rate is six hours, which can be increased to 15 minutes for a specified period of time. Since LRIT reports have positive identity and they are considered as manual tracks, they are never declared as Lost and the Vessel Database is updated automatically.

Manual tracks will have an attribute called "Time Late" which is the amount of elapsed time since the last report. This duration is used to determine the life of a manual track.

Track Life Cycle:

A sample definition for the track life cycle states are given below:

TRITON automatic track life cycle states:

- Tentative** : An automatic track is created and being checked for correlation.
- Updating** : Position of an automatic track is being updated.
- Lost** : Position of an automatic track is not updated for a Lost Track Duration.
- Dropped** : Automatic track is to be deleted.
- Deleted** : Automatic track is deleted.

TRITON manual track life cycle states:

- Created** : A manual track is created at a given position.
- Updated** : Position of a manual track is updated.
- Expired** : Manual track is not updated for a duration of Maximum Time Late.
- Deleted** : Manual track is deleted.

Lost Track Duration and Maximum Time Late are parametric values that can be altered by the authorised user in hours and minutes.

[T1-R086] *TRITON shall perform automatic and manual track life cycle management including creation, update and deletion.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R087] *TRITON shall automatically update automatic or manual tracks when new data report is received.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R088] *TRITON shall allow the authorised user to set the Lost Track Duration for automatic tracks between 30 (thirty) seconds and ten (10) minutes depending on the type of its source and speed.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R089] *TRITON shall declare an automatic track as Lost if it is not updated by its source more than the Lost Track Duration.*

Requirement Property :
 Domain for Static: Both

Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

- [T1-R090] *TRITON shall maintain the Lost tracks for the time period set by the authorised user a system configuration parameter after the user acknowledges the lost track indication.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

- [T1-R091] *TRITON shall allow the authorised user to set the Maximum Time Late for manual tracks up to thirty-six (36) hours with one minute intervals.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

- [T1-R092] *TRITON shall declare the manual track as Expired and notify to user about deletion of the track if the Maximum Time Late duration is exceeded.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

- [T1-R093] *TRITON shall indicate (such as blinking or faded track symbol) Lost tracks and Expired tracks on the GeoView until they are deleted.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

- [T1-R094] *TRITON shall continue maintaining automatic, correlated track until at least two tracks are left. If one more track is deleted, then the correlated track shall become normal track.*

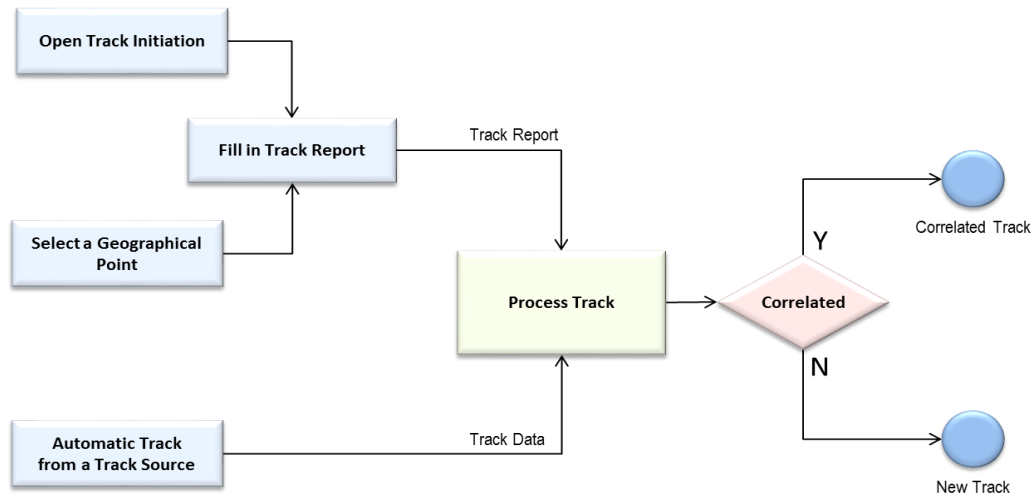
Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

- [T1-R095] *TRITON shall stop displaying an associated track when it is deleted.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.2.7. Track Initiation, Update and Deletion

TRITON will use automatic and manual track initiation. Predefined track sources can initiate tracks and update them automatically. Authorised users can initiate new tracks manually, update or delete them. The process is illustrated below:



When the Track Report or Track Data is received from a source (Track Source or User), the Identification Set of the track is used as the unique key to process the track and locate it in the Track Database. The attributes of the Identification Set are automatically derived from the track attributes such as country information. If no country information is available for an AIS track, the MMSI number will be used to derive the flag information. If the Identification Set of the track is not found in the Track Database, then a new track will be initiated. If it is found in the database, then Correlation Process will be executed.

If the attributes of an automatic track is modified by the authorised user, then subsequent updates to the same track will not change its attributes.

The authorised user will be notified if new or conflicting data for attributes is received from any source. This conflict has to be resolved before the change is applied. A notification will be issued if the track already has user-overridden attributes.

Automatic tracks cannot be deleted by the users. However, if an authorised user wants to delete an automatic track, track deletion process is applied with a notification, and a new track will be initiated at the next track report of the track source.

Dead Reckoning (DR) can be used to move a track to a new position in given time with its present course and speed. Any user can use this feature, but only the authorised user can change the track position permanently. DR will use Rhumb Line calculation for short ranges and Great Circle projection for long ranges.

[T1-R096] *TRITON shall initiate an automatic track in the Track Database when it is received for the first time from a Track Source. The process is explained in the Description.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R097] *TRITON shall allow the authorised user to initiate a manual track with default attributes (and source as the user) at a given geographical position or at the pointed position on the GeoView. The user shall fill in Track Report and submit. The process is explained in the Description.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R098] *TRITON shall allow the authorised user to manually update any attribute of a manual track. A notification shall be issued to the user if that attribute has already been changed by another authorised user.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R099] *TRITON shall automatically update the attributes of an automatic track (e.g. AIS, LRIT) when they are changed by its source. TRITON shall check the non-kinematic attributes of an automatic track when a new track update is received. The updated attribute shall be applied to the Track Data only if it is not manually overridden by the authorised user.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R100] *TRITON shall automatically update the kinematic attributes of an automatic track (e.g. AIS, LRIT) when they are changed by its source. The update rate shall be set inside the relevant System Interface Service.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R101] *TRITON shall resolve destination name into geographical position using the Destination Resolution Function when a new AIS track is created.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R102] *TRITON shall allow the authorised user to dead reckon a track or a vessel to the current time or a given time with its last known course and speed with an option of leaving at the new position or returning to the original position.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R103] *TRITON shall allow the user to dead reckon (DR) a track or a vessel to the current time or a given time with its last known course and speed without leaving it at the new position.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R104] *TRITON shall use Rhumb Line DR calculation of tracks or vessels for ranges up to sixty (60) Nautical Miles and Great Circle projection for longer ranges.*

Requirement Property :

Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R105] *TRITON shall dead reckon a track for the amount of time given by the user. The range shall be ten (10) minutes to eight (8) hours.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R106] *TRITON shall automatically delete a manual track after Maximum Time Late has passed from its last update time.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R107] *TRITON shall automatically delete an automatic track when it is deleted by its source (e.g. track is dropped in TDL or Nation feed explicitly drops it from its feed).*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R108] *TRITON shall allow the authorised user to delete a manually-initiated track. A notification shall be issued if the track has one or more user-overridden attributes or it is associated to a Vessel.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R109] *TRITON shall allow the authorised user to delete an automatic track. A notification shall be issued to indicate that the automatic track is being deleted, and a new track may be initiated at the next update.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R110] *TRITON shall allow the user to slave a Reference Point or an Area to a track on a true or relative bearing and to assign independent course and speed.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R111] *TRITON shall compute and use the Track Position Update Interval at each update process by using the Track History Distance given for the type of the vessel in the System Operational Parameters.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

[T1-R112] *TRITON shall store the track positions in the Kinematic History of each track in the Track Database using the position and speed of the track at intervals indicated by the Track Kinematic History Update Interval.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

[T1-R113] *TRITON shall keep the Kinematic History of a track for a duration of Maximum Time Late. After the time has elapsed, the last data position shall be dropped.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R114] *TRITON shall be able to display Kinematic History of a selected track for a user-selected period of time on the GeoView.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R115] *TRITON shall delete all data including its Kinematic History when a track is deleted by either an authorised user or the source of that track with a notification if the track has user-overridden attributes or not associated.*

Requirement Property :

Domain for Static: Both

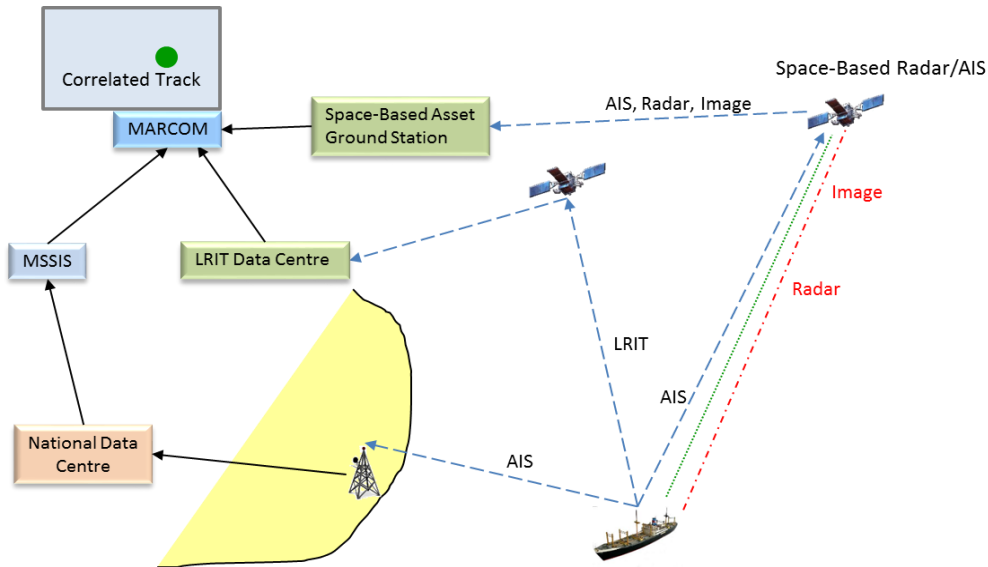
Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

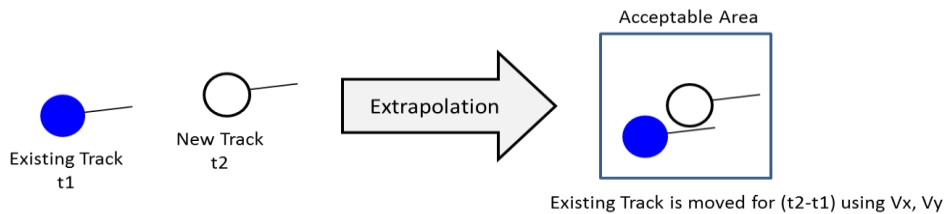
4.2.3.2.8. Track Correlation

Since TRITON will have several track sources, it is likely that the same maritime vessel may be reported to TRITON by more than one source. TRITON will handle track information received from multiple sources by using a correlation process. The objective of the correlation process is to provide the user with only one track if multiple sources report the same vessel. A scenario for correlating tracks from separate track sources, AIS and LRIT, is illustrated below:

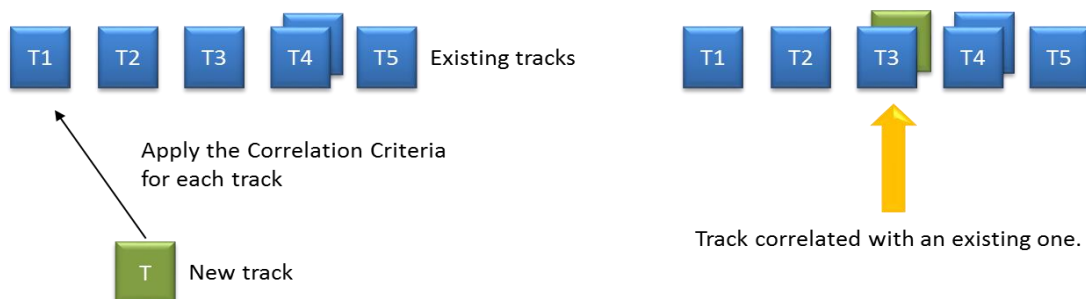


When a new real track is received, TRITON will check its positive identification and validate it. If the track has a positive identification, then TRITON will search for it in the Track Database using the Identification Set. If the Identification Set matches, then it correlates the two tracks. If not, a new track is created. If the track does not have a positive identification, then TRITON will try to correlate it automatically with an existing track using positional comparison. The nearest match will be used to correlate the tracks.

Positional comparison of tracks will be performed after extrapolation in order to bring the tracks to the same time domain. That is, the track with older update time will be temporarily moved to a future position based on its present course and speed for the amount of time difference between the two tracks' update time. If the aligned positions of the two tracks are within the allowed limits then they can be considered as correlated, the latest update time becomes the tracks update time. The concept is depicted below:



The figure below depicts how a new track is correlated with an existing one by scanning through the Track Database:



The track having higher Confidence Level will become the main track and the other one will be hidden from the users. If the new track has the same Confidence Level of the existing candidate track and the type of source is the same, then correlation will not take place. For example, an AIS track from a contracted live data source is in the Track Database. When a new AIS track from MSSIS is received, its Identification Set is searched in the Track Database and a match is found. Then, the Confidence Levels

are compared. If they the same, the time stamps are compared. If the time stamp of the new track is older than the existing one (due to processing latency in the source), then it will not be correlated.

Decorrelated tracks are treated as new tracks and processed accordingly only if their last time of update is not older than the Maximum Time Late. if so, the decorrelated track is deleted.

Correlation Criteria:

Two tracks can be correlated if the Correlation Criteria which includes at least the following checks are met:

- Both tracks are Live or both tracks are Simulated.
- Identification Set matches (Country, Vessel Name or its synonym match).
- IMO number matches.
- The differences in course and speed values are within the allowed ranges.
- The distance between the two tracks are within the allowed limit that is set by a configuration parameter.
- The basic attributes of the tracks are not conflicting (like identity, category, classification).
- Higher Confidence Level to be favoured to determine the values of the attributes.

Correlation Criteria will be configurable by an authorised user so that selected conditions can be used for correlation causing a user notification. There may be more than two tracks correlated with each other. The attributes of the correlated tracks will be combined according to the Confidence Level of the sources. The most recent and reliable kinematic information will be used to update the position of the correlated track.

Decorrelation Criteria:

Each update to correlated tracks will also cause a decorrelation check. Correlated tracks will be decorrelated if one of the conditions in the following Decorrelation Criteria is met:

- One of the basic attributes of the tracks is conflicting (like identity, category, type, classification change).
- The distance between the two tracks exceeds the allowed limit that is set by a configuration parameter.
- The differences in course and speed values are exceeding the allowed ranges.

When a track is decorrelated, it will be treated as a new track, processed as such and presented to the user. If the new track has a positive identity (e.g. unique vessel name), and it cannot be correlated then TRITON will perform an association check.

If a manual track is correlated with an automatic track, the track may be de-correlated when the distance between the tracks exceeds the allowed limit after subsequent updates to the automatic track.

Scalability:

Due to high number of tracks to be handled, special mechanisms for scaling the input and processing may be required. The design must handle scalability, especially for AIS data. For example, multiple levels can be used for the correlation; tracks of similar type are correlated first with each other, and then with the other types of tracks.

[T1-R116] *TRITON shall automatically correlate a new track with an existing track if the configurable conditions of the Correlation Criteria are satisfied.*

Requirement Property :

Domain for Static : Both

Domain for Afloat : Both

Baseline : BL 1

Qualific. Method : Test

Comment : The algorithm will be finalised during Software Requirements Analysis.

[T1-R117] *TRITON shall automatically correlate a new track with an existing track and notify the authorised user if one or more of the authorised user-selected conditions of the Correlation Criteria are not being satisfied.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

Comment : The algorithm will be finalised during Software Requirements Analysis.

[T1-R118] *TRITON shall automatically decorrelate the previously correlated tracks if the Decorrelation Criteria is satisfied.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

Comment : The algorithm will be finalised during Software Requirements Analysis.

[T1-R119] *TRITON shall update each track under a manually correlated track even though their attributes do not match.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R120] *TRITON shall allow the authorised user to manually correlate two tracks if automatic correlation is not successful.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R121] *TRITON shall allow the authorised user to modify the Correlation and Decorrelation Criteria in the System Operational Parameters.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R122] *TRITON shall not allow simulated tracks to be correlated with live tracks.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R123] *TRITON shall use extrapolated positions of tracks for correlation and decorrelation checks as explained in the Description.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R124] *TRITON shall keep one track if that track is correlated with another track, and display only the correlated track.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R125] *TRITON shall use the highest Confidence Level of the correlating tracks to determine the Confidence Level of the correlated track.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R126] *TRITON shall use the most recent kinematics information of the correlating tracks to set the kinematics of the correlated track (as explained in the Description).*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R127] *TRITON shall treat a decorrelated track as a new track, and process it if its last time of update is not older than the Maximum Time Late. If it is older, then the decorrelated track shall be deleted automatically.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R128] *TRITON shall display correlated tracks with an indication in the GeoView (e.g. a small dot on the symbol).*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R129] *TRITON shall allow the user to view the detailed track information for each track under the correlated track.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R130] *TRITON shall update each track under an automatically correlated track if their key attributes are not changed.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R131] *TRITON "should" be scalable for processing high number of tracks (e.g. over 100,000) with high update rates (e.g. less than 30 seconds) and handle correlation.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

Comment : The parameters allowing fine tuning will be determined during the Software Design.

[T1-R132] *TRITON shall be able to correlate a new track with an existing track in less than five (5) seconds within ten thousand (10,000) tracks.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

4.2.3.2.9. Track and Vessel Association

When a new live track with positive identity is received or a new positive identity is defined for an existing track, TRITON will check the Vessel Database automatically to find the matching vessel according to the Association Criteria. If the criteria are satisfied, the track will be said to be "associated" to the vessel by establishing a link between the track and the vessel. The kinematics of the track will be used to update the vessel position in the Vessel Database. When the track is displayed on the GeoView, its attributes are augmented with the information in the Vessel Database. For example, the physical characteristics of a ship is not in Track Database, but it can be stored in the Vessel Database.

Association Criteria:

Tracks will be checked against the Vessel Database with at least the following Association Criteria:

- The track is a Live Track
- The track Identification Set matches the vessel's (using the Name Matching Criteria of Search).
- The standard identification, type, category and classification attributes of the track match the vessel's.

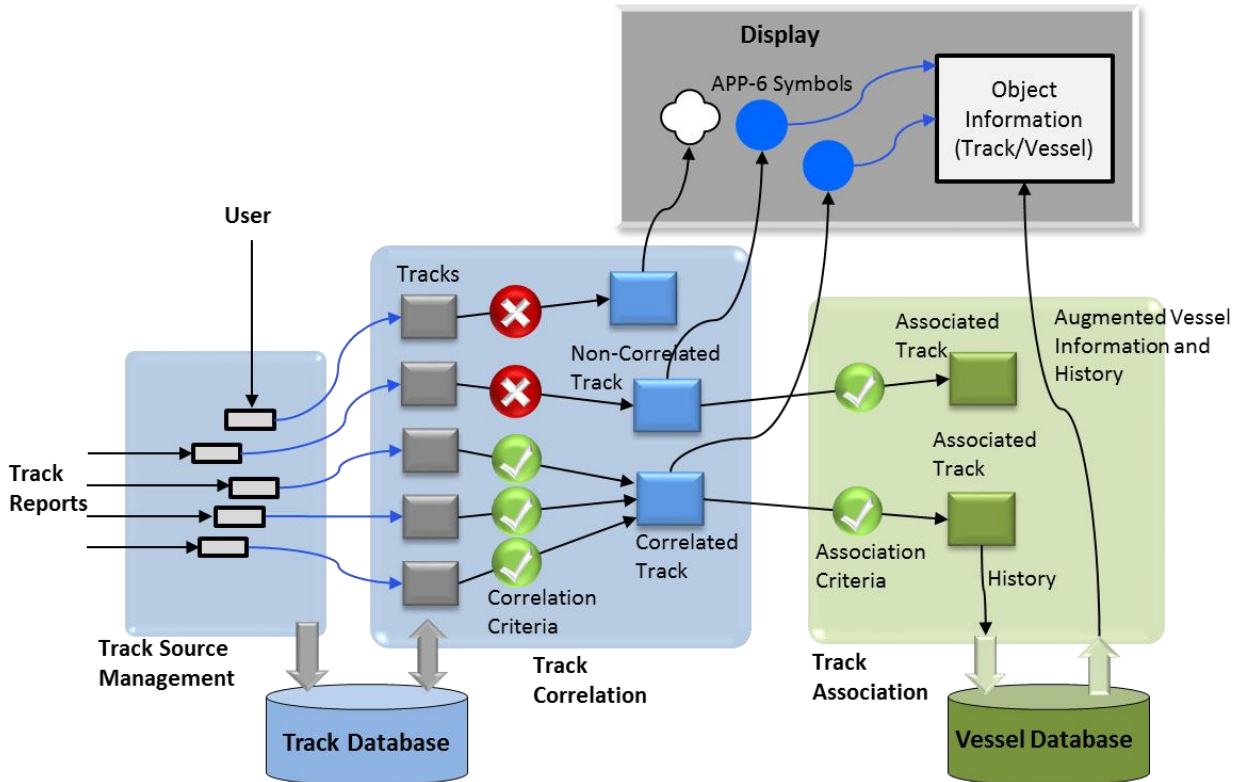
If a matching track identification is not found in the Vessel Database, the user will be notified.

Disassociation Criteria:

An associated track can be disassociated if at least one of the following Disassociation Criteria is met:

- If the Identification Set of the track is changed after an update (e.g. the name of a vessel is changed)
- If the associated track is deleted from the Track Database
- If the associated vessel is deleted from the Vessel Database.

Users will be able to display augmented vessel information for associated tracks. The relation of tracks, vessels and augmented information display is depicted below:



[T1-R133] *TRITON shall allow the authorised user to change the Association and Disassociation Criteria in the System Operational Parameters*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R134] *TRITON shall automatically associate an automatic Live Track with an existing vessel in the Vessel Database if the Association Criteria is satisfied.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 1
 Qualific. Method : Test
 Comment : Bidders will be able to propose their own Association Criteria. The algorithm will be finalised during Software Design.

[T1-R135] *TRITON shall allow the authorised user to manually associate an automatic or manual Live Tracks with a Vessel even though some of the attributes of a reported Track do not match to the Vessel's.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R136] *TRITON shall display associated Tracks and their augmented information with an indication on the GeoView.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both

Baseline : BL 1
 Qualific. Method : Test

[T1-R137] *TRITON shall display the TTN of the Track if it is associated to a Vessel.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R138] *TRITON shall notify the authorised user with an indication to the Track if its automatic association check fails.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R139] *TRITON shall notify the authorised user about disassociation of an associated automatic Live Track and a Vessel if one of the Disassociation Criteria is met.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R140] *TRITON shall automatically update Kinematic History, Journey History and Activity History information of a Vessel in the Vessel Database if the Vessel is associated to a Track. The kinematics information with the most recent time of update shall be used to update the Vessel kinematics.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R141] *TRITON shall compute and use the Vessel Position Update Interval at each update process by using the Vessel History Distance given for the type of the Vessel in the System Operational Parameters.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R142] *TRITON shall update the Vessel positions in the Vessel Database using the position and speed of the associated Track at intervals indicated by the Vessel Position Update Interval.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.2.10. Simulated Track Handling

TRITON will support simulated tracks. If a track is tagged as Simulated, then this track will not be correlated with Live Tracks and will not be associated with vessels.

- [T1-R143] *TRITON shall be able to process Simulated Tracks generated by its own simulators.*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration
- [T1-R144] *TRITON shall create a Simulated Track when a simulated link track is received from a TDL via NIRIS.*
 Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 1
 Qualific. Method : Test
- [T1-R145] *TRITON shall display Simulated Tracks as readily distinguishable from Live Tracks.*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration
- [T1-R146] *TRITON shall prevent correlation of Simulated Tracks with Live Tracks and association with Vessels.*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

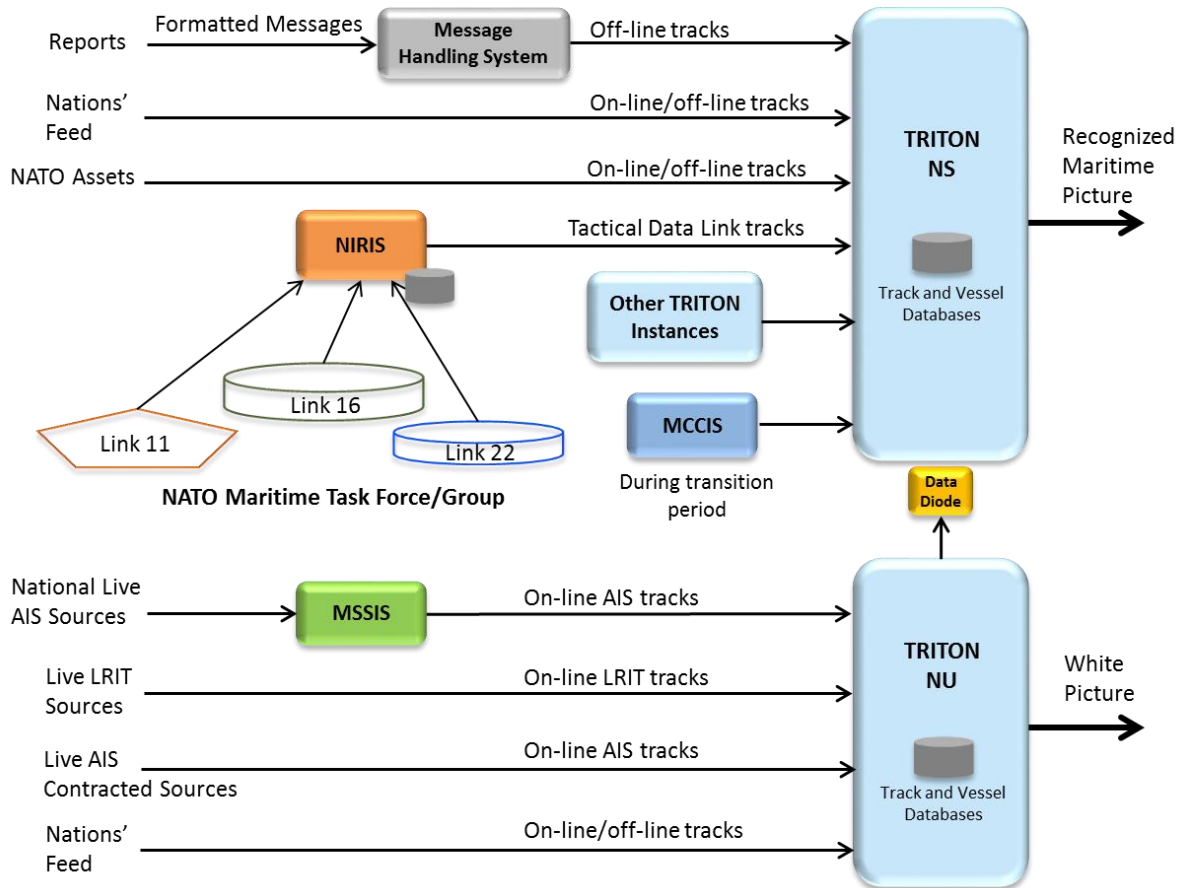
4.2.3.2.11. Track Interface Handling

TRITON will receive on-line and off-line track information from various sources. It will create internal tracks using the reports, correlate those tracks with the existing tracks if their key attributes match, associate the tracks with vessels if their key attributes match, and periodically update the Vessel Databases with the last reported positions of the track. Each update to an existing, associated track in the Track Database will also cause an update to the Vessel Database.

TRITON will not interface any physical device providing track (e.g. AIS device, Link 11). TRITON will not directly participate to any Tactical Data Link (Link 11, 16, 22) (TDL) either. However, it is expected that tactical tracks of a TDL can be received via NIRIS.

TRITON Deployable Kits will have capability to receive on-line or off-line tracks from the platform C2 system using TRITON ACP Interface.

Following picture illustrates the on-line and off-line track sources of TRITON for both NS and NU Domains.



Each track source may have its own track definition. TRITON System Interface Service (SIS) will convert the received track data into standard, internal track representation.

Although an external track source update the tracks at certain periods, TRITON SIS will update the Track Database at a lower update rate, configurable for each source, in order not to degrade the overall performance. For example, an AIS track may be updated at every 10 seconds by its source, but the TRITON SIS sends the updates to the Track Management at every 60 seconds. The update rate will be adjusted automatically if the user takes the track into close monitoring.

The tracks will be updated only when one of its attributes is changed. For example, a position update for an AIS track will be stripped from excessive and repeating data or invalid fields for not causing information clutter and performance degradation; only the changed position data will be updated.

Own Ship:

TRITON will maintain Own Ship information for each user so that the users on afloat platforms can take Own Ship to the centre of the GeoView as Own Position. Any track can also be designated as Own Ship.

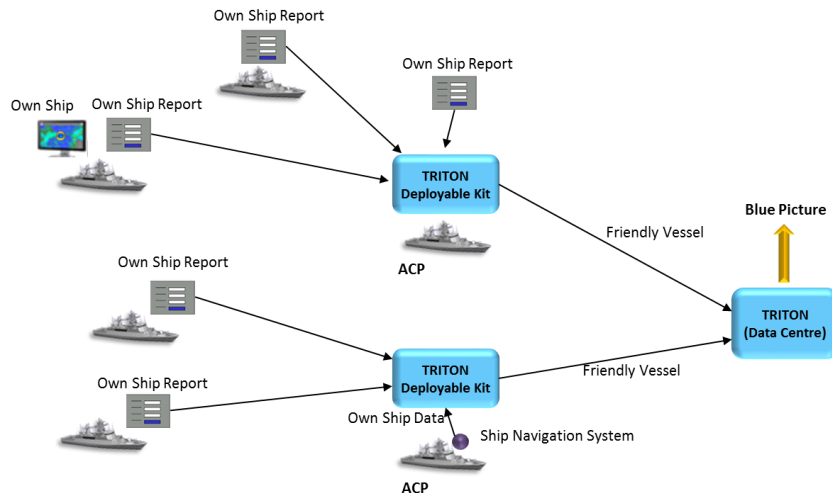
Own Ship Data:

TRITON Deployable Kits will maintain Own Ship Data which can be updated manually by the authorised user or automatically via the ACP Interface.

Own Ship Report:

Own Ship Report is similar to track reporting with a distinction that the Confidence Level has the highest value. When an authorised user on board an afloat platform fills in the data for the Own Ship Report, this information is automatically processed, and a track is initiated in the Track Database and then associated with a Vessel in the Vessel Database. If there is correlated track with this Report, the track attributes are updated with the attributes of the Report.

Handling Own Ship information is illustrated below:



[T1-R147] *TRITON shall handle track information received from external sources using standard interfaces and convert different track feeds and reports into standard, internal track representation using the TRITON Track Specification (NS or NU).*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Inspection

[T1-R148] *TRITON shall use configurable update rate for internal processing in each System Interface Services (SIS) which receives tracks from external sources.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R149] *TRITON shall allow the authorised user to control the internal update rate of the tracks that are received from a particular external source.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R150] *TRITON shall automatically maximise the internal update rate of the tracks assigned to the Status Board for close monitoring purposes by any user.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R151] *TRITON shall automatically maximise the internal update rate of a track if it is requested by a user in the Object Information Display (see GeoView).*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

- [T1-R152] *TRITON shall update internal tracks when at least one attribute of a track is changed by its source.*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test
- [T1-R153] *TRITON shall use separate source identification for each SIS acting as a track source (e.g. NIRIS Interface, Formatted Message Interface, MCCIS Interface, AIS Data Source Interface).*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Inspection
- [T1-R154] *TRITON shall allow the authorised user to exchange track data between Maritime Operations according to their releasability attribute.*
 Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Inspection
- [T1-R155] *TRITON shall manage Own Ship as a track and make it available for the GeoView to be displayed as Own Position.*
 Requirement Property :
 Domain for Static: N/A
 Domain for Afloat: Both
 Baseline : BL 4
 Qualific. Method : Demonstration
- [T1-R156] *TRITON shall allow the user to set a track as Own Ship on the GeoView.*
 Requirement Property :
 Domain for Static: N/A
 Domain for Afloat: Both
 Baseline : BL 4
 Qualific. Method : Test
- [T1-R157] *TRITON shall maintain Own Ship Data for the Deployable Kits.*
 Requirement Property :
 Domain for Static: N/A
 Domain for Afloat: Both
 Baseline : BL 4
 Qualific. Method : Demonstration
- [T1-R158] *TRITON shall allow the authorised user to manually update Own Ship Data for the Deployable Kits.*
 Requirement Property :
 Domain for Static: N/A
 Domain for Afloat: Both
 Baseline : BL 4
 Qualific. Method : Test
- [T1-R159] *TRITON shall allow the authorised user to create an Own Ship Report to provide reports for any afloat platform.*

Requirement Property :
 Domain for Static : N/A
 Domain for Afloat: Both
 Baseline : BL 4
 Qualific. Method : Test

[T1-R160] *TRITON shall process Own Ship Reports created by the authorised users on board afloat platforms and initiate manual tracks with the highest Confidence Level.*

Requirement Property :
 Domain for Static : N/A
 Domain for Afloat: Both
 Baseline : BL 4
 Qualific. Method : Test

4.2.3.3. Maritime Reference Object Management

Control measures are directives given to assign responsibilities, coordinate fires and manoeuvre, and control operations. They may be boundaries, special area designations, and other unique markings related to operational environment geometry and necessary for planning and management of operations. Control measure symbols represent control measures that can be portrayed graphically and provide operational information that cannot be displayed via icon-based symbols alone. They can be displayed as points, lines, areas or tactical mission tasks [APP-6].

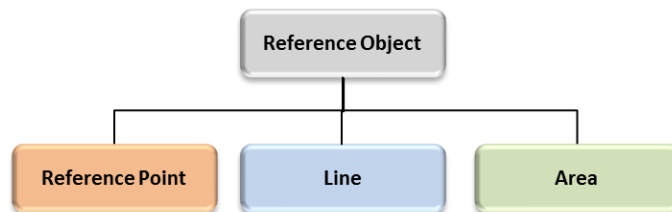
Maritime control measures are used by NATO to help the maritime component commander and his subordinate commanders to direct action by establishing responsibilities and to prevent ships, units, or aircraft from impeding one another and to impose necessary coordination. They aid the cooperation among forces without imposing needless restrictions on their freedom of action. In general terms, maritime control measures can be broken down into the following groups: points, lines, and areas [APP-6].

TRITON will support maritime control measures (reference points, special points, lines and areas) under "Reference Objects". TRITON will provide world-wide management of Reference Objects as well as within Maritime Operations, which are identified uniquely in the system context. TRITON will display the control measures according to APP-6. Control measures can be black, blue (friendly), red (hostile), green (obstacles), or yellow (chemical, biological, radiological, nuclear (CBRN) contaminated area fill).

4.2.3.3.1. Reference Object Definition

A Reference Object is a geographical or moving point, or a line or an area having an operational or tactical meaning (e.g. launch point, Data Link Reference Point, No-firing Area, minefield). Points, lines and areas are defined in support of the surveillance picture to mark points, lines or areas of special interest. Some of these move with an independent course and speed. Certain points and areas can be slaved to a moving track and its position shall be updated along with the updates to the track. This facilitates, for example, a Missile Engagement Zone (MEZ) to be established at a given position relative to a ship or force centre that is moving. Another example is Mine Danger Area.

TRITON Reference Object types are given below:

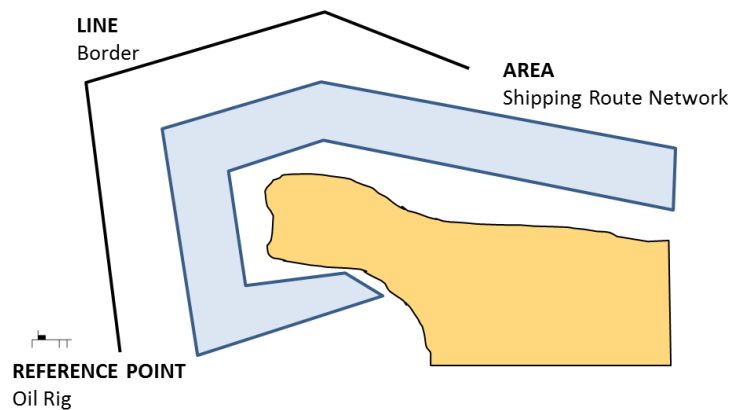


Reference Point: A Reference Point is a geographical coordinate for a special point or a real object. They are displayed using the selected symbology.

Line: A Line is a connection of at least two geographical points. It can be a polyline in any form.

Area: An Area is a closed, geographical shape. It can be a circle, ellipsis, rectangle or polygon. The last point of a multi-point area is always at the same position as the first.

The picture below shows some examples to Reference Objects on a GeoView.



Each Reference Object is represented with a set of attributes as explained and defined below:

Reference Point Data:

- Identification
 - ID Name (e.g. Mine Reference Number)
 - ID Number (e.g. 00456)
- Point Type and Amplification (to be optimised using the definitions in [STANAG 5516])
- Geographical position
- Altitude

Line Data:

- Identification
 - ID Name
 - ID Number
- Amplification (to be optimised using the definitions in [STANAG 5516])
- Geographical position of points of a line
- Drawing thickness and colour

Area Data:

- Identification
 - ID Name
 - ID Number
- Amplification (to be optimised using the definitions in [STANAG 5516])
- Geographical position of centre and radius of a circle, major/minor axis, vertices of a polygon
- Drawing and fill colours
- Transparency

Reference Object Data:

TRITON will use a record called "Reference Object Data" to store information for any type of Reference Object. It will consist of at least the following attributes:

- Unique identification (TRITON Reference Number)
- Name

- Type (Reference Point, Line, Area)
- Reference Point Data / Line Data / Area Data (to be selected depending on the Type)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Picture designation (Recognised, Military, White, none)
- RMP designation
 - Included RMP Region identification
 - Excluded RMP Region identification
- Time Validity (in hours and minutes) (defined as Time Function in STANAG 5516)
- Exercise Status
- Reference Object specific data
 - Reference Point Data / Line Data / Area Data
- Course and speed
- Time of last update
- Slaved indicator (yes/no)
- Related track
- Remark.

4.2.3.3.2. Reference Object Database Management

TRITON will maintain an internal storage called "Reference Object Database" for dynamically managing Reference Objects. There may be several thousands of Reference Objects to be stored and maintained. The Reference Object Database will be optimised for quick access, update and retrieval without any physical capacity limitation.

[T1-R161] *TRITON shall maintain a Reference Object Database to store all types of Reference Objects within the Environment of a Maritime Operation with a standard Reference Object Data representation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R162] *TRITON shall allow the authorised user to manage (add, modify, remove, import, export) the Reference Object Database.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R163] *TRITON shall be able to share the Reference Object Data among multiple Maritime Operations if they are labelled accordingly in their Releasable Maritime Operations attribute.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.3.3. Reference Object Number Management

Reference objects will be uniquely identified by "TRITON Reference Number" (TRN). System-specific internal identification mechanism may be hidden from the users, but a user level numbering scheme will be maintained system-wide. TRN will be a decimal number which can address all objects in the database.

Each TRITON instance may have the same Reference Object number scheme but differing pools (number blocks) can be defined. Similarly, a number block is allocated for each Maritime Operation.

Tactical Data Link (TDL) Track Numbers will also be stored in the Reference Object Data if the objects are received from links.

[T1-R164] *TRITON shall use unique decimal numbers (TRN) to identify Reference Objects at user level.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R165] *TRITON shall allow the authorised user to allocate TRN pool for the entire system and each Maritime Operation by defining the first and last Reference Object numbers.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R166] *TRITON shall assign a unique TRN to each new Reference Object received from external sources or created internally.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

4.2.3.3.4. Reference Object Life Cycle Management

TRITON Reference Objects can be created, updated and deleted locally. Those objects that are received from external sources (e.g. Tactical Data Links) cannot be modified; they can only be displayed.

Reference Objects may have life cycles controlled by either automatically or manually. They can be assigned a Time Validity value which provides automatic deletion after the specified time elapses. If Time Validity is assigned as "Permanent", the Object will not be deleted automatically.

[T1-R167] *TRITON shall perform automatic and manual Reference Object life cycle management.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R168] *TRITON shall maintain the Reference Objects starting from their creation time for a period specified in the Time Validity.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R169] *TRITON shall be able to create appropriate Reference Objects if Special Points, Lines and Areas are received from an external source such as TDL over NIRIS or Formatted Message over MHS.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R170] *TRITON shall delete a Reference Object according to the criteria associated to the type of the object (e.g. Missile Impact Point can be deleted after its impact time exceeded).*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R171] *TRITON shall provide a Time Validity value for Reference Objects for controlling its presence automatically in addition to user deletion. Objects having "Permanent" Time Validity shall not be deleted automatically.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R172] *TRITON shall notify the user at least ten (10) minutes before the Time Validity of a Reference Object expires.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.3.5. Reference Object Creation, Update and Deletion

TRITON users will be able to manage (create, modify, update, delete) the Reference Objects in each Maritime Operation scope. Authorised users can create Reference Objects or they can be received from external sources such as Formatted Messages or TDLs. Their attributes can be modified by the authorised users or updated by their sources. Authorised users can dead reckon (DR) the position of Reference Objects if they have course and speed values. Reference Objects can be shared along with RMP if needed.

[T1-R173] *TRITON shall allow the user to manage (create, modify, delete) the Reference Objects in each Maritime Operation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R174] *TRITON shall allow the user to create a Reference Point, a Line or an Area by using the C2 Drawing facilities of the GeoView.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both

Baseline : BL 1
 Qualific. Method : Test

[T1-R175] *TRITON shall update attributes of a Reference Object automatically if it is received from an external source.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R176] *TRITON shall allow the authorised user to dead reckon a Reference Object to the current time or a given time with its last known course and speed with an option of leaving at the new position or returning to the original position.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R177] *TRITON shall allow the user to dead reckon a Reference Object to the current time or a given time with its last known course and speed without leaving it at the new position.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R178] *TRITON shall allow the user to dead reckon the position of a Reference Object if it has a course and speed value.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R179] *TRITON shall use Rhumb Line dead reckoning calculation of Reference Objects for ranges up to sixty (60) Nautical Miles and Great Circle projection for longer ranges.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R180] *TRITON shall dead reckon a Reference Object for the amount of time given by the user. The range shall be ten (10) minutes to eight (8) hours.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R181] *TRITON shall delete a Reference Object automatically if its external source drops it.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1

Qualific. Method : Test

[T1-R182] *TRITON shall provide the user with the capability to initiate Lines and multipoint Areas containing at least fifty (50) segments. The C2 Areas of the GeoView shall be used to visualise the Areas.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R183] *TRITON shall allow the user to assign independent course and speed to a Reference Object.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R184] *TRITON shall allow the authorised user to exchange Reference Objects between Maritime Operations according to their releasability attribute.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.3.6. Reference Object Association

A Reference Object is said to be "slaved" if it is associated to a Track. An example of a slaved point is a marshal point used during aircraft recovery operations aboard an aircraft carrier.

TRITON will be able to slave a Reference Object to a Track using the Reference Object Association Criteria with at least the following checks:

- There is no conflict on Track type and Reference Object type (such as slaving a DLRP to a sub-surface track or Ground Zero to a Track).
- Reference Object has a reference point to align with the Track

TRITON will maintain the association relation between the Track and the Reference Object until one of them is deleted.

[T1-R185] *TRITON shall allow the user to slave a Reference Object to an indicated Track.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R186] *TRITON shall associate a Reference Object to a Track if the Reference Object Association Criteria is not conflicting.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test
 Comment : The Reference Object Association Criteria will be finalised during Software Requirements Analysis.

[T1-R187] *TRITON shall notify the user if the indicated Reference Object cannot be associated with the indicated Track.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R188] *TRITON shall allow the user to indicate the reference point of the Reference Object for aligning its position to the slaved Track.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R189] *TRITON shall cancel slaving if either the associated Track or the Reference Object is deleted.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R190] *TRITON shall keep a slaved Reference Object at its last position if the Track associated to it has been deleted.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

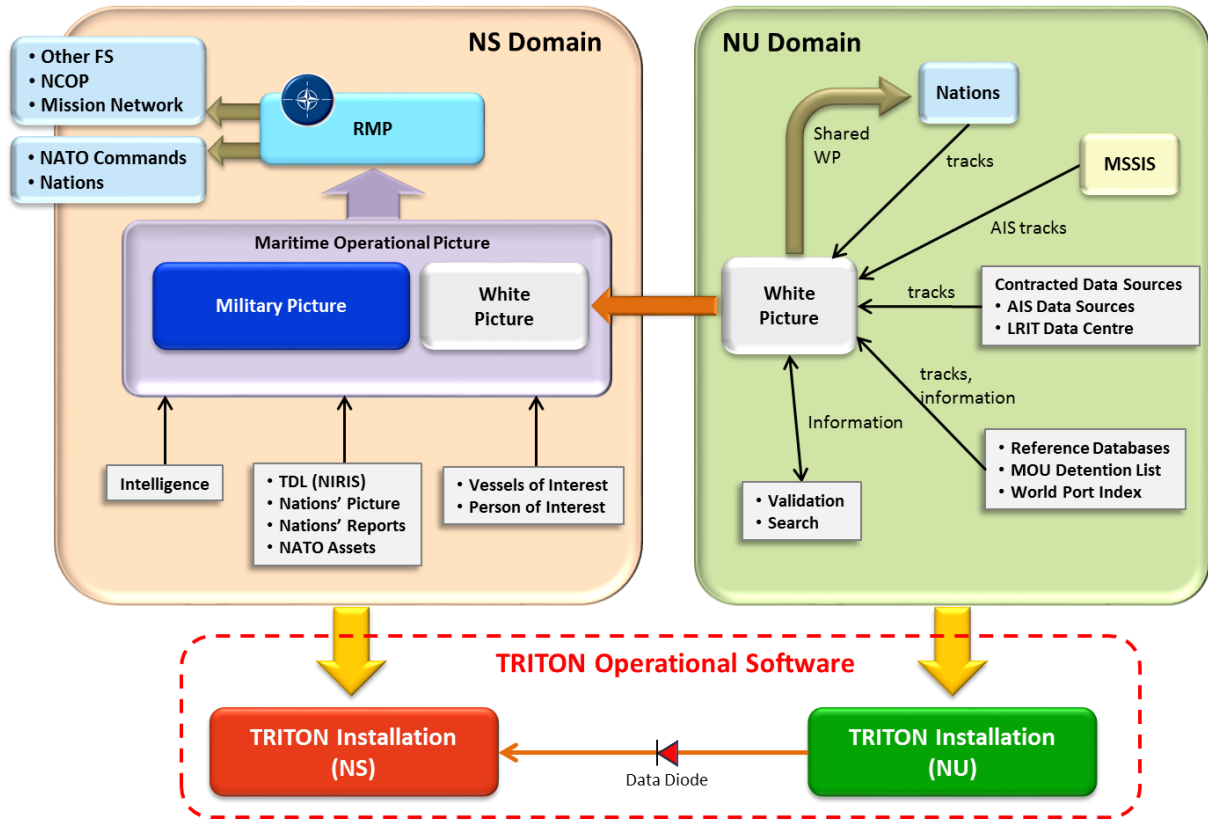
4.2.3.4. Maritime Picture Management

Maritime Picture Management functionality provides compiling and presenting the information related to both combatant and non-combatant vessels. The functionality builds the Maritime Operational Picture (MOP), in the broadest sense, which consists of all kinds of Maritime Operational Objects available. MOP is the overall collection of the following:

- **Military Picture (MP):** The collection of all recognised combatant Tracks, Vessels and relevant Reference Objects
- **White Picture (WP):** The collection of civilian maritime Tracks and Vessels with classification of non-combatants (merchant, fishing, pleasure, research, government etc.) and relevant Reference Objects.
- **Other Information:** UNKNOWN and PENDING tracks and other available supportive information

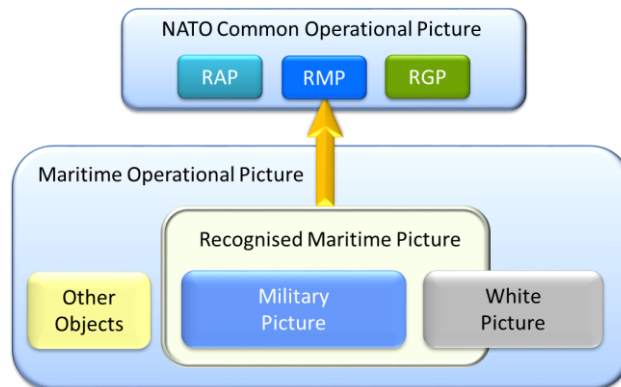
The NATO Recognised Maritime Picture (RMP) is a managed geographic presentation of processed all-source contact and information data, known at a given time, from all available assets, and compiled by an assigned RMP Manager. The RMP consists of all contacts in the maritime environment, both surface and subsurface, commercial, military and government platforms and vessels. RMP is compiled by using Military Picture and the relevant parts of White Picture.

Following figure depicts the relations and information flow between domains during maritime picture compilation:



The WP is built first on the NU Domain by using AIS and LRIT data from contracted sources and then the WP information is transferred to NS Domain. Here, the WP is elaborated more with the information received from NATO assets. The Military Picture is compiled using reports and data feeds from various NATO sources and Nations. Therefore two instances of TRITON will be at operation, one for each security domain, NS and NU.

The RMP is built on NS Domain as an operational, non-real-time, geographic presentation of recognised surface and subsurface units, forces, and operations. The RMP is one of the components of the NATO Common Operational Picture (NCOP). The relationship between these pictures are illustrated below:



The Maritime Picture Management functionality also allows the user to create, query, and retrieve current and historical information of underlying data (e.g. tracks, vessels, figures, ports, special points) comprising the MOP. It provides foundation for operational support functions, decision aid tools and maritime planning functions.

4.2.3.4.1. Operational Display

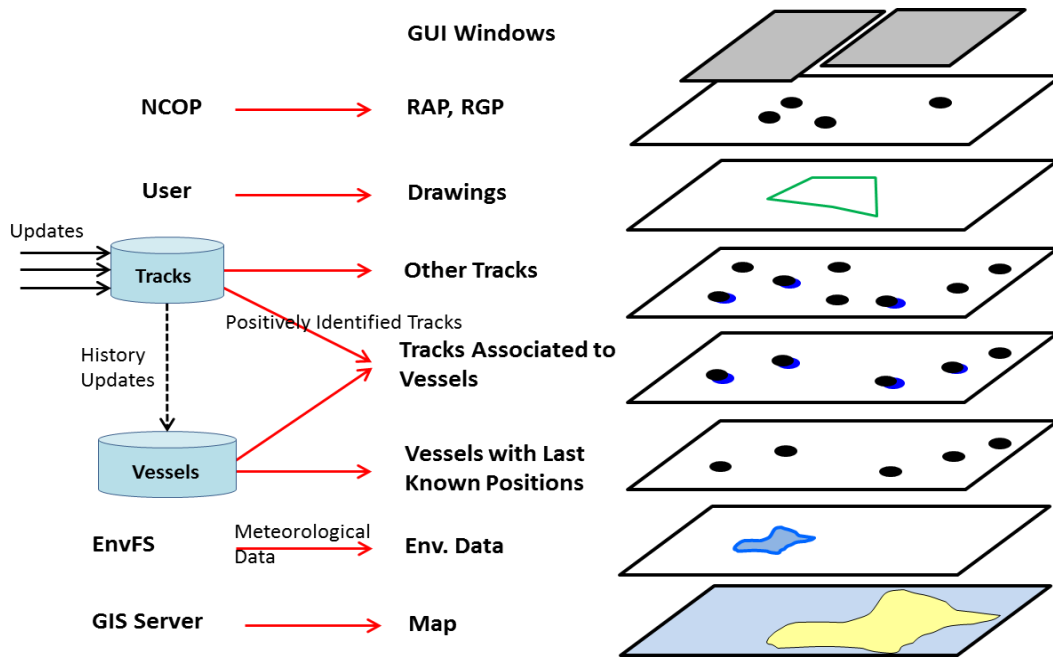
TRITON will manage all Maritime Operational Objects (Tracks, Vessels and Reference Objects), and display their detailed information on the Clients using two separate views:

Application View (AppView):

Application-specific user interfaces in textual form will be displayed in this view. When a user wants to display geospatial data, a separate application will be launched in another browser, GeoView, to display the geospatial information.

Geospatial View (GeoView):

This view displays digital maps, geospatial data, Maritime Operational Objects as well as information received from other Functional Services in separate layers (overlays). Following figure depicts how the layers are used to build the Maritime Picture.

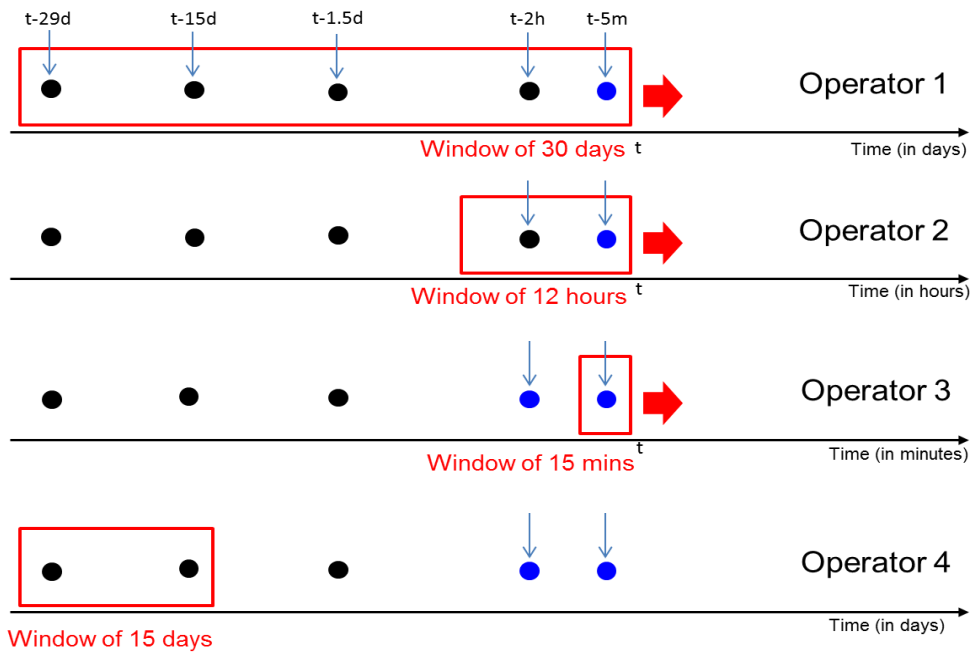


4.2.3.4.1.1. Picture Display

TRITON will be able to display all Maritime Operational Objects (Tracks, Vessels and Reference Objects) on the GeoView according to a configurable Display Criteria using a symbology set selected by the user (e.g. APP-6, NTDS). When TRITON is deployed on ACP, Own Ship indication will be set and displayed on the GeoView.

When users want to display a set of Objects, only those Objects inside the current Spatial Extent of the GeoView will be displayed and updated. Any changes in the Spatial Extent will be handled automatically. For example, when zoomed out, more objects will be displayed, but increased zoom-out will cause clustering of objects.

Users can adjust Time Windows to display Tracks and Vessels according to their operational needs. The figure below depicts how Time Windows are used for different settings with examples:

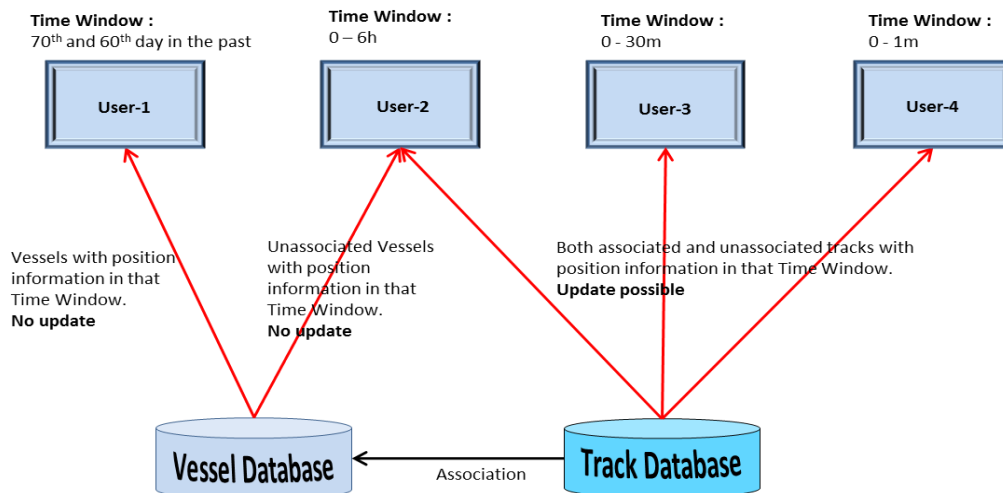


Those operators who need to work with historical data can set their Time Window long enough to cover the past activities of vessels (Operator 1 and 2). The tracks within the Window are updated and the Vessels are displayed if their last time of position update is within the Time Window.

Some operators (Operator 3) may want to see only the recently updated tracks and vessels with a specified Update Rate. Tracks will then be displayed if their last update time is within the Time Window.

Some operators can also set their Time Window totally in the past, giving a beginning and end date&time for historical analysis purposes (Operator 4). This setting prevents displaying the tracks with recent updates.

Vessels can be displayed as tracks if their last time of position update is in the Time Window. A conceptual example is illustrated in the following figure:



Examples to use of Track and Vessel Databases along with a Search function are given below:

- Display the last known positions of tankers in the indicated area, yesterday, between 0800 and 1800.
- Display the combatants of country 'C' with their last known positions in the indicated area in the last 12 hours.

Reference Objects are displayed in a similar way if their life cycle is within the Time Window.

Object Display:

TRITON will display Maritime Operational Objects in the GeoView with a symbology set selected by the user. The GeoView will adjust the spatial extent according to user-selected View Scale. The AppView will dispatch the request to filter out only those Objects within the extent and within the Time Window. For example, a user may issue a request to display the positions of the vessel 'X' between 051200ZJAN14 to 071200ZJAN14 with 60 minute intervals and plotted on the GeoView until cancellation.

Object Grouping:

Any user may view any number of Maritime Operational Objects in GeoView up to "Maximum Number of Objects to Display" setting. Depending on the number of object within the current Spatial Extent, TRITON may limit the number of Objects to be displayed by grouping more than one Object into one virtual Object. Similar types of Object can be grouped according to the distance between them. The grouping algorithm will consider the distance between objects as a configurable parameter and provide only the centre location information and number of objects grouped.

Update Rate:

If the number of Objects is less than the Maximum Number of Objects to Display for a particular GeoView, then the Objects will be displayed and the update rate for moving Objects will be determined according to the current display scale. For example, if the scale is 50 NM then the tracks can be updated as fast as they are updated by their sources. If the scale is 2000 NM, then the tracks will be updated at every 10 minutes.

[T1-R191] *TRITON shall display Maritime Operational Objects in the GeoView with a symbology set selected by the user in Layers.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R192] *TRITON shall allow the user to set a Time Window and Update Rate for Picture Display.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R193] *TRITON shall allow the user to display the last known positions of Maritime Operational Objects based on the user-selected duration in the GeoView, within the current extent (only those Objects within the GeoView Spatial Extent shall be retrieved).*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R194] *TRITON shall provide and update only those Maritime Operational Objects which are inside the Spatial Extent of each GeoView. Only those Objects having the last update time within the given Time Window shall be displayed and updated.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1

Qualific. Method : Test

[T1-R195] *TRITON shall adjust the Update Rate for tracks to be displayed according to the Spatial Extent scale of the GeoView.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

Comment : The algorithm will be finalised during the Software Design.

[T1-R196] *TRITON shall allow the user to display historical positions of Maritime Operational Objects within a given date-time period and with given time intervals, in sortable tabular format in the AppView with an option to display them in the GeoView.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R197] *TRITON shall display in AppView and GeoView, the number of Maritime Operational Objects currently displayed in the GeoView, in the Area of Interest, and the Total Number of Objects in the selected Time Window. This information may be displayed with respect to the Layers.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

[T1-R198] *TRITON shall group the Maritime Operational Objects if the number of Objects to be displayed in a GeoView is greater than the "Maximum Number of Object to Display" setting.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R199] *TRITON shall be able to display the picture with the given Time Window, Update Rate and Spatial Extent within ten (10) seconds after the user request. TRITON AppView shall notify the user if the available bandwidth is not sufficient to receive the full requested picture from the server.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 4

Qualific. Method : Test

[T1-R200] *TRITON shall notify the user if preparing and displaying the requested history information will take longer than fifteen (15) seconds.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R201] *TRITON shall display associated and unassociated tracks from Track Database and unassociated vessels from Vessel Database when users issue viewing request with a Time Window.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R202] *TRITON shall use TTN of the track in the Object Label if the Track is associated to a Vessel and TVN of the Vessel if no Track is associated.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R203] *TRITON shall display TTN, TVN and TRN in a distinguishable format (e.g. a letter indication such as T, V, R in front of the numbers) on the Object Label while displaying it on the GeoView.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

[T1-R204] *TRITON shall allow the authorised user to set Own Ship when it is deployed on an ACP.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 4

Qualific. Method : Test

4.2.3.4.1.2. Object Display Control

TRITON will be able to display Maritime Operational Objects as the Maritime Picture on the GeoView according to user-defined Display Criteria set in the Object Display Control. Users will be able to define filters for the Objects to be displayed.

Display Criteria:

The configurable Display Criteria includes at least the following:

- Object type (e.g. only Tracks)
- Selected Object Attribute(s) (e.g. combattant, leisure, tanker)
- Geographical Area (a region) (e.g. a defined geographical area)
- Display-specific settings (e.g. Layer identification).

Display Option:

When AppView displays the objects in tabular format, it will provide the user with the following options to display them in the GeoView:

- Current Display: If one object is selected, and the object is within the current map extent, then the GeoView will display the object with an indicator (e.g. a yellow circle) without changing the Map Panel extent and centre.
- Centre Object: If one object is selected, the GeoView will move the Map Panel extent to take the object to the centre of the Map Panel without changing the zoom scale, and display it with an

indicator (e.g. a yellow circle). If the object is out of the extent, the GeoView will move the extent to take that object to the centre.

- Zoom to Object: If one object is selected, the GeoView will adjust the extent to take the object to the centre with a zoom level that covers the object within a pre-set percentage distance of the extent and mark it with an indicator.
- Group of Objects: If more than one object is selected, the GeoView will apply the same rules taking the furthest points of the group (e.g. furthest tracks on each direction) to be included in the extent.

[T1-R205] *TRITON shall provide the user with the control of displaying Operational Objects in the GeoView.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R206] *TRITON shall allow the user to manage (create, save, modify, delete) Display Criteria and Display Options as given in the Description. The Ribbon Bar of the AppView may be used to activate or de-activate them.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R207] *TRITON shall filter the Maritime Operational Objects according to the selected Display Criteria and selected Display Option. This data shall be passed to the GeoView over the AppView using NMAPI.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R208] *TRITON shall allow the authorised user to adjust configuration parameters related to display options.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.4.1.3. Operational Information Display

Operational Information consists of detailed object information, planning information, system interface status information, results of a search in tabular form, control and monitoring functions. TRITON AppView will provide this information in relevant GUI panels and dialog boxes.

Object Information:

When a user needs more detailed information on a selected Maritime Operational Object either in a list displayed in the AppView or in the GeoView, a pop-up window called "Object Information Box" will be displayed. The Object Information Box will contain tabs which include at least the following for an object:

- Identification (e.g. ID, name, country, Standard Identity and Amplification, Category)
- Kinematics (e.g. Position, Course, Speed, Time of Last Update)

- Operational Information (e.g. Mission/Campaign/Operation, Task, Activity, Status)
- Intelligence information (query and result)
- Visual information (picture or video)
- Object-specific Information (any specific data for the object)

The user can issue an Intelligence Query to INTEL-FS regarding the object. The query result is displayed in the Object Information Box, Intelligence Tab.

Object Information Box can be used in both AppView and GeoView. The information to be displayed in the GeoView will be passed over the NMAPI.

[T1-R209] *TRITON shall be able to present Operational Information on the AppView using both dedicated panels and dialog boxes.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

Comment : The design will be determined at SRR and finalised ad SwDR-1.

[T1-R210] *TRITON shall display the detailed information for a selected Maritime Operational Object in a pop-up window called "Object Information Box" on the View from which it is requested.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

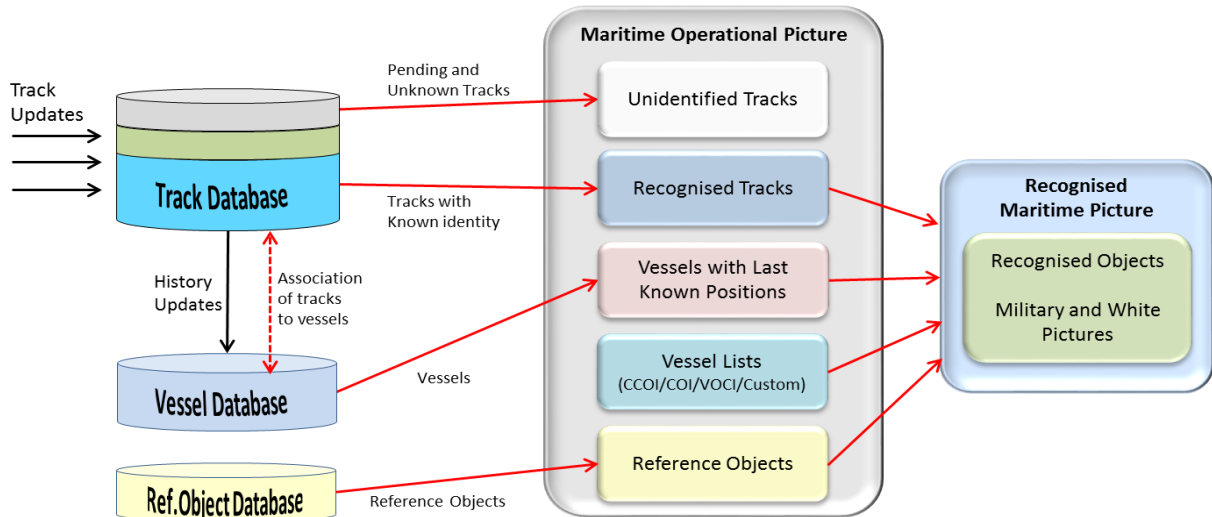
4.2.3.4.2. Maritime Operational Picture Management

Maritime Operational Picture (MOP) is the collection of all available Maritime Operational Objects. It includes all Tracks with all identities in the Track Database and all Vessels in the Vessel Database. Authorised user can see the MOP over the GeoView.

The MOP is built on the Maritime Operation Domain by using the Track Database, Vessel Database and Reference Object Database. It includes Tracks with standard identity PENDING and UNKNOWN which require further investigation in addition to the recognised Tracks having the other Standard Identities (FRIEND, ASSUMED FRIEND, NEUTRAL, HOSTILE and SUSPECT).

The recognised Tracks can be associated to vessels in the Vessel Database.

The Military and White Pictures are then used to build the RMP as depicted below:



[T1-R211] *TRITON shall build the MOP as a collection of all available Maritime Operational Objects on the NS Domain.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat : NS
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R212] *TRITON shall be able to display the MOP in the GeoView as a Layer.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat : NS
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R213] *TRITON shall allow the authorised user to modify the assigned Standard Identities for all types of Maritime Operational Objects in the MOP.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat : NS
 Baseline : BL 1
 Qualific. Method : Test

4.2.3.4.3. Military Picture Management

The Military Picture (MP) contains all friendly, hostile, suspect and neutral combatant tracks and vessels. There may also be other Reference Objects (Reference Points, Lines and Areas) in the MP.

TRITON will compile the MP only on the NS Domain using the track feeds coming from Nations, on-line and off-line own status reports from NATO assets and NIRIS. The Standard Identity FRIEND will be assigned to all friendly Maritime Operational Objects. If NATO maritime assets participate in a Tactical Data Link, and the link information can be received by NIRIS, then all Participating Units (PU/JU (NU in future)) are automatically declared as FRIEND. Authorised users can select friendly Maritime Operational Objects based on a user-selected filter (e.g. area, type, task).

Other Standard Identities will be assigned according to the current operational requirements set by OPTASK RMP.

[T1-R214] *TRITON shall be able to filter the Military Picture as a separately controllable collection of information according to the Standard Identities and display them as a layers on the GeoView.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R215] *TRITON shall allow the authorised user to select Maritime Operational Objects as the Military Picture by using a filter on Standard Identity.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 1
 Qualific. Method : Test

[T1-R216] *TRITON shall be able to display the Military Picture in the GeoView as a Layer.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 1
 Qualific. Method : Demonstration

4.2.3.4.4. White Picture Management

White Shipping refers to commercial shipping including passenger, cargo, tanker, ferries, container vessels, fishing vessels and other non-military vessels. However, the current notion of White Shipping tends to be limited to such vessels that exceed 300 tons displacement per the IMO AIS requirement.

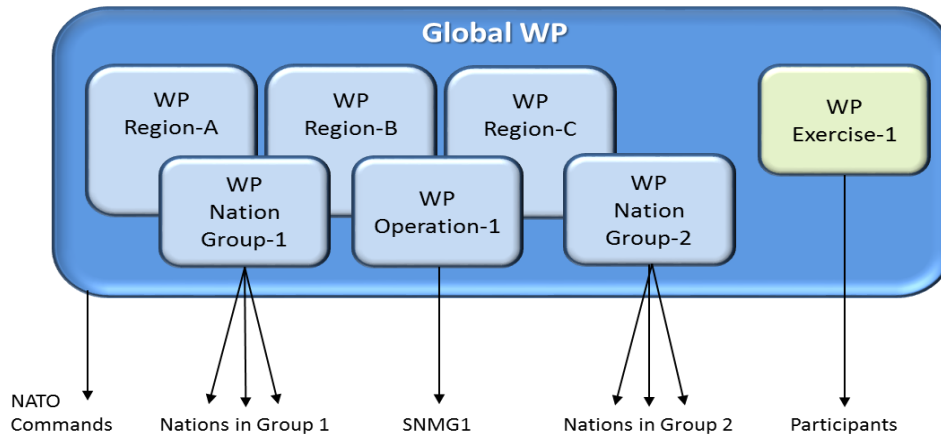
The current IMO requirement (effective 31 Dec 2004) for AIS is: "The regulation requires AIS to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages and all passenger ships irrespective of size (i.e. AIS – class A).

"White+ Shipping" refers to the sharing information on all manner of commercial vessels regardless of their displacement/tonnage, length or other specifications. White Shipping displacement AIS requirement. While it is recognised that future commercial rules may mandate AIS transponders, A or B, on many other commercial vessels, including ferries, the intent of the "White+ Shipping" is to serve as a broad "other" category for commercial shipping to include all manner of non-warship vessels on the seas or in port.

The term "White Picture" will be used in TRITON to address all non-combatant (civilian) maritime vessels and tracks with classification of non-combatants (merchant, fishing, pleasure, research, government etc.). There may also be other objects like special points, lines, and areas in the WP.

TRITON will use Maritime Operational Object to represent WP data. All vessels, tracks and objects will be uniquely identified with TRITON Track or Vessel Number (TTN or TVN). In addition, country, vessel name, IMO number and MMSI number will also be used to positively identify tracks and vessels. Users can display any of these identification indicators as configurable labels on the GeoView.

According to certain operational needs, WP in global scope can be split into geographical regions so that dissemination can be managed according to the particular Area of Interest. The figure below depicts the WP Region concept:



TRITON will maintain a list of WP Regions which can be managed by the authorised user. Each WP Region has its own White Picture information, which can be disseminated at user-selected intervals. The WP Region in TRITON will have at least the following attributes:

- Region name
- Description
- Geographical Region (Area)
- Dissemination Rate

4.2.3.4.4.1. White Picture Compilation

TRITON will compile the WP first on the NU Domain using the track feeds coming from MSSIS, LRIT, AIS data sources, Nations' feed and off-line track reports. Tracks are built in the Track Database and then the Vessel Database will be updated for the associated tracks.

The WP will be built on the NU Domain and then transferred to the NS Domain. The WP on the NS Domain will be enhanced with additional track information received from NATO assets and other sources.

The WP on NU Domain can be separated into WP Regions according to geographical filters. Each Region can then be managed and shared with external users separately.

[T1-R217] *TRITON shall maintain the WP as a separately controllable and displayable collection of information on the NU and NS Domain.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R218] *TRITON shall be able to build the WP according to the settings of the Maritime Operation on the NU Domain.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R219] *TRITON shall maintain a list WP Regions for each Maritime Operation on the NU Domain.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R220] *TRITON shall be able to process received track information from external sources on the NU Domain, update the Track Database and the Vessel Database on the NU Domain.*

Requirement Property :
 Domain for Static : NU
 Domain for Afloat : NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R221] *TRITON shall maintain the WP on the NS Domain with the WP information received from the NU Domain and the information received from NATO assets operating on the NS Domain.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat : NS
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R222] *TRITON shall be able to display the White Picture in the GeoView as a Layer.*

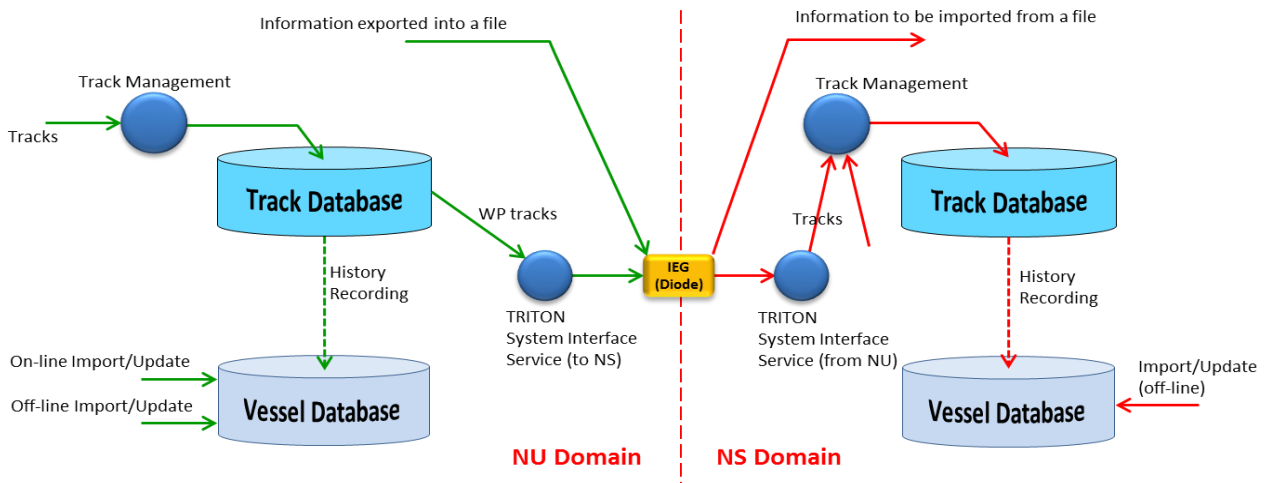
Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 2
 Qualific. Method : Demonstration

4.2.3.4.4.2. White Picture Transfer

WP will be compiled on the NU Domain, and the Maritime Operational Object Databases will continuously be updated. The track information from the Track Database will be transferred to the NS Domain automatically and continuously. An internal System Interface Service (SIS) will provide the user-monitored transfer over the Information Exchange Gateway (IEG) (requirements are in the Cross-Domain Support) with a configurable update rate. The SIS will put the data into files and send it to the IEG. The IEG accepts the labelled data in files and transfers them to the NS Domain. While transferring tracks from the NU Domain, the TRITON Track Numbers will also be transferred so that the relevant tracks can be addressed easily on the NS Domain.

On the NS Domain, another SIS receives the data coming from TRITON-NU, extracts track information and sends them to the Track Management for correlation and association process.

Following figure depicts the transfer of WP from the NU Domain to the NS Domain and the processing.



If other data needs to be transferred from the NU Domain to the NS Domain, then manual operation will be used. For example, transferring an Area can be achieved by first exporting it into a file on the NU Domain, transfer the file manually to the NS Domain over the IEG, and import the file on the NS Domain using the relevant function.

Data transfer from the NS Domain to the NU Domain will not be on-line.

[T1-R223] *TRITON shall transfer the WP information from the NU Domain to the NS Domain automatically.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R224] *TRITON shall allow the authorised user to control and monitor the automated data transfer from the NU Domain to the NS Domain.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R225] *TRITON shall allow the authorised user to set the transfer parameters from the NU Domain to the NS Domain.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R226] *TRITON shall pass the WP information to the NS Domain over the IEG-Data Diode.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R227] *TRITON shall be able to receive WP information from the NU Domain via the Data Diode and process the track information automatically.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R228] *TRITON shall allow the authorised user to transfer files having exported WP information from the NU Domain to the NS Domain over the Data Diode.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R229] *TRITON shall allow the authorised user to receive data files from the NU Domain and import them on the NS Domain.*

Requirement Property :
 Domain for Static: NS

Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

4.2.3.4.4.3. White Picture Sharing

NATO White Picture (WP) can be shared with Nations over the NU Domain. Nations who want to make use of NATO WP will be able to use the Web service (e.g. WP Service) to receive the vessels in the indicated Area of Interest. It will also be possible for other organizations to access the NATO WP by using the Web Service.

[T1-R230] *TRITON shall make the NATO WP available to external systems through Web Services (e.g. WP Service).*

Requirement Property :
 Domain for Static : NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R231] *TRITON shall allow the authorised user to control and monitor the dissemination of WP information according to the Releasability Label over Maritime Operations and the RMP Regions.*

Requirement Property :
 Domain for Static : NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

4.2.3.4.5. Recognised Maritime Picture Management

NATO RMP is a managed geographic presentation of, processed all source contact and information data known at a given time, of surface, sub-surface, amphibious and maritime air activities in the maritime operating environment. The NATO RMP is compiled in accordance with operational directives and tasking to support decision makers in the conduct of C2 of maritime forces and operations. The NATO RMP is an operational picture, not a tactical plot. It is not intended to be used to directly support weapon systems, target acquisition or engagements.

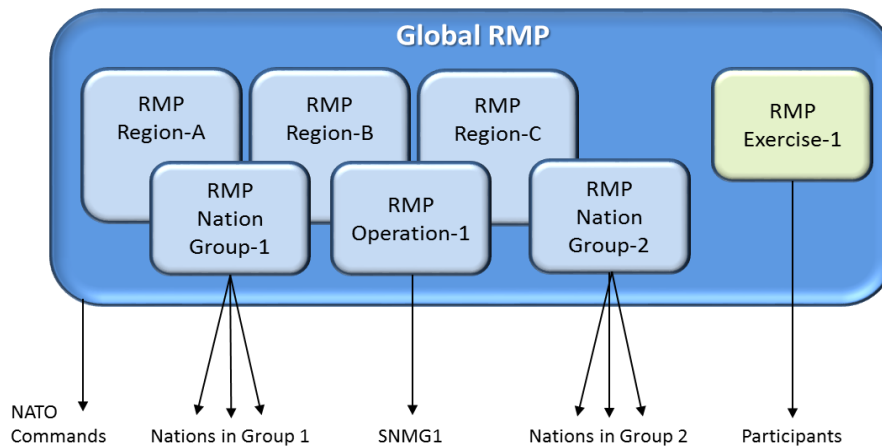
RMP data includes positional and operational data on friendly, neutral and adversary units and forces based on information provided from a variety of sources. Therefore, TRITON will build the RMP using the Military and White Pictures as components of the RMP.

Once the RMP is built, it can be shared by other Functional Services and Nations. TRITON will use the following methods to share and disseminate RMP:

- Making data available via a Web-service
- Sending track data to special users in NVG format
- Database synchronisation with other TRITON instances
- Nation Interfaces
- ADatP-3 formatted messages
- OTH-T GOLD messages

RMP is a global collection of recognised maritime objects. Although the RMP will be made available to TRITON Clients regardless of their location, it may be essential to disseminate the RMP with the currently used formats such as OTH-T GOLD messages to particular destinations. According to certain operational needs, RMP in global scope can be split into geographical regions so that dissemination can be managed according to the particular Area of Interest. For example, part of the RMP can be sent

to ACP which is conducting an operation at sea. Part of the RMP can be filtered before sending it to a particular Nation or Nation Group.



TRITON will maintain a list of RMP Regions which can be managed by the authorised user. Each RMP Region has its own Military and White Pictures, which can be disseminated at user-selected intervals. The RMP Region in TRITON will have at least the following attributes:

- Region identification
- Description
- Geographical Region (Reference Object - Area)
- Dissemination Rate

4.2.3.4.5.1. RMP Building

NATO RMP building uses filtering, validation, evaluation and correlation processes. TRITON will use the recognised (positively identified) tracks and the vessels with their last known positions assigned as Military and White Picture components. The RMP, with its components, will be made available to users allowing them to filter and display the objects within a given time frame.

The authorised user (RMP Manager) can create an RMP Region, select tracks and vessels to be included in this RMP Region by using the RMP Filter Criteria. The RMP Filter Criteria for each RMP component will provide the user to select at least the following:

- Standard Identity
- Classification
- Track Confidence Level
- Selected Vessel Lists (CCOI/COI/VOCI/Custom)

In addition, individual Maritime Operational Objects can be assigned to a selected RMP Region within the Current Maritime Operation.

All combatant vessels belonging to NATO Nations will be automatically assigned as FRIEND. The non-combatant vessels that are in Vessel List will be automatically assigned a Standard Identity and designated to relevant picture. The defaults will be as follows:

- Non-combatants (non-military) : NEUTRAL, White Picture
- VOCI Type 1 to 5 : SUSPECT, Military Picture
- VOCI Type 6 and 7 : NEUTRAL, White Picture
- COI : SUSPECT, Military Picture
- CCOI : HOSTILE, Military Picture

[T1-R232] *TRITON shall maintain a list RMP Regions for each Maritime Operation.*

Requirement Property :
Domain for Static: NS

Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R233] *TRITON shall use the recognised Tracks in the Track Database and the Vessels with last known positions in the Vessel Database on the NS Domain to build the RMP by using the RMP Filter Criteria.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R234] *TRITON shall automatically designate tracks with classification of Combatant to the Military Picture of the global RMP.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R235] *TRITON shall automatically designate the Vessel Lists according to the default Picture of the global RMP.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R236] *TRITON shall allow the authorised user to designate Maritime Operational Objects to be included in the RMP according to their RMP designation information within the Current Maritime Operation.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R237] *TRITON shall allow the authorised user to designate a selected Vessel List to be included in the RMP of the Current Maritime Operation or excluded.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R238] *TRITON shall not allow the user to designate Simulated Tracks and Exercise Tracks into the RMP if the Maritime Operation is not of type Exercise.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R239] *TRITON shall be able to display the RMP in the GeoView as a Layer.*

Requirement Property :
 Domain for Static: NS

Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Demonstration

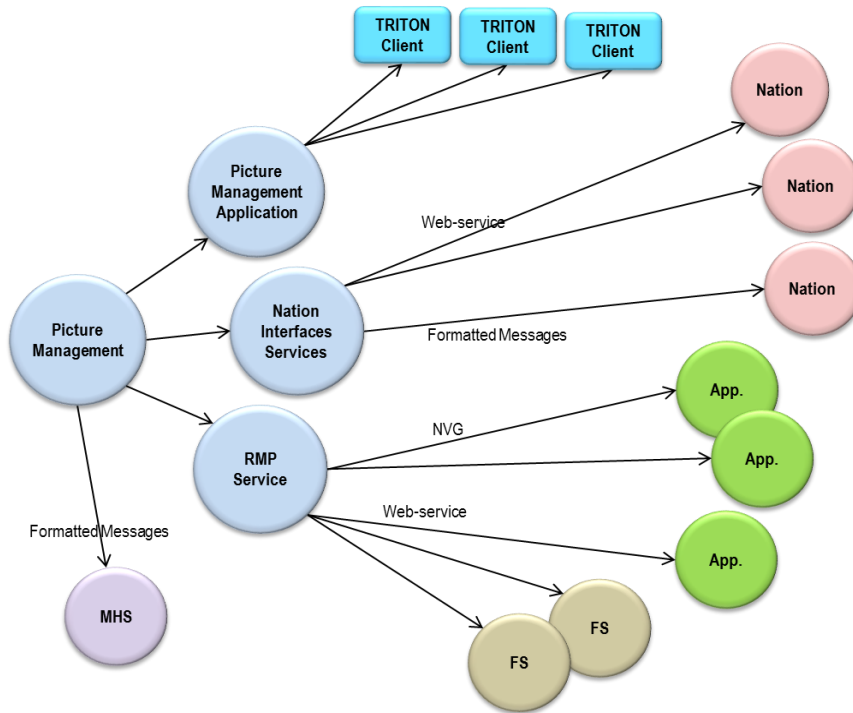
4.2.3.4.5.2. RMP Control and Sharing

NATO RMP is controlled by authorised users and can be shared with NATO Commands, HQs, Nations and other Bi-SC AIS Functional Services. While TRITON allows the users to access Maritime Operational Picture as well as RMP by means of Picture Display function configured for each Maritime Operation, it will also be able to disseminate the RMP using NVG format and APP-11/OTH-T GOLD messages. It will also make the RMP available for external access via the RMP Service. In addition, RMP can be exported into a file in a user-selected format.

Nations will be able to get any part of any RMP via a dedicated Nation Interface (Web-service).

Military and White Pictures within an RMP Region may have different dissemination rates depending on the operational use. For example, Military Picture every 20 minutes, White Picture every 60 minutes.

Following picture depicts how RMP can be disseminated with various options:



An authorised TRITON user will be able to generate Formatted Messages by either selecting Tracks on the GeoView or issuing a Track Search query.

[T1-R240] *TRITON shall make the RMP available over the RMP Service for external access.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: N/A
 Baseline : BL 3
 Qualific. Method : Test

[T1-R241] *TRITON shall make the RMP available over the Nation Interface for each Nation.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: N/A
 Baseline : BL 3

Qualific. Method : Test

[T1-R242] *TRITON shall make the RMP available over the ACP Interface for the platform on which the Deployable Kit is installed.*

Requirement Property :

Domain for Static: N/A

Domain for Afloat: NS

Baseline : BL 4

Qualific. Method : Test

[T1-R243] *TRITON shall allow the authorised user to generate a selected Formatted Message after selecting the tracks on the GeoView or from a Search Result.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: NS

Baseline : BL 3

Qualific. Method : Test

[T1-R244] *TRITON shall be able to generate RMPSITSUM message based on user-selected Tracks and Reference Objects.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: NS

Baseline : BL 3

Qualific. Method : Test

[T1-R245] *TRITON shall be able to generate NAVSITSUM message based on user-selected Tracks filtered for correct identity.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: NS

Baseline : BL 3

Qualific. Method : Test

[T1-R246] *TRITON shall be able to generate NAVSITREP message based on user-selected Tracks filtered for correct identity.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: NS

Baseline : BL 3

Qualific. Method : Test

[T1-R247] *TRITON shall be able to generate MARINTSUM message based on user-selected Tracks filtered for correct identity.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: NS

Baseline : BL 3

Qualific. Method : Test

[T1-R248] *TRITON shall be able to generate MARINTREP message based on user-selected Tracks filtered for correct identity.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: NS

Baseline : BL 3

Qualific. Method : Test

- [T1-R249] *TRITON shall be able to generate NAVPOSREP message based on user-selected Tracks filtered for correct identity.*
- Requirement Property :
Domain for Static: NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test
- [T1-R250] *TRITON shall be able to generate OTH-T GOLD CONTACT REPORT message based on user-selected Tracks.*
- Requirement Property :
Domain for Static: NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test
- [T1-R251] *TRITON shall be able to generate OTH-T GOLD ENHANCED CONTACT REPORT message based on user-selected Tracks.*
- Requirement Property :
Domain for Static: NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test
- [T1-R252] *TRITON shall be able to generate OTH-T GOLD OVERLAY-2 message based on user-selected Reference Objects.*
- Requirement Property :
Domain for Static: NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test
- [T1-R253] *TRITON shall be able to generate OTH-T GOLD OVERLAY-3 message based on user-selected Reference Objects.*
- Requirement Property :
Domain for Static: NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test
- [T1-R254] *TRITON shall be able to send the generated Formatted Messages containing the RMP or its Regions to the selected destination addresses at a selected Dissemination Rate.*
- Requirement Property :
Domain for Static: NS
Domain for Afloat: NS
Baseline : BL 3
Qualific. Method : Test
- [T1-R255] *TRITON shall allow the authorised user to select the destination system/service and send the RMP using NVG format [NVG].*
- Requirement Property :
Domain for Static: NS
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test
- [T1-R256] *TRITON shall be able to export the RMP into Recognised Output File Format.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R257] *TRITON shall allow the authorised user to select the RMP component and export into a file in Recognised Output File Format.*

Requirement Property :
 Domain for Static : NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

4.2.3.4.6. Operational Object Search

TRITON will provide a Search Function for finding one or more Maritime Operational Objects being stored in the internal databases. TRITON will implement the Object Search function compatible to the specification given in [Open Search]. It will be accessible via the TRITON External Services (i.e. RMP Service, ICI Service).

The Search Function will have two options: Quick Search and Detailed Search.

Quick Search:

The Quick Search option will use the following Quick Search Criteria:

- Operational Object Number (Track Number, Vessel Number or Reference Object Number)
- Country
- Vessel Name
- International Call Sign
- IMO number
- MMSI number
- Range (from a given point or an Object)

Detailed Search:

The Detailed Search Function will use the Detailed Search Criteria which contains broader set of attributes (e.g. Descriptions, Remarks) of Operational Objects stored in the databases. Users can create search queries using the database fields, values, text search with wildcards (e.g. *, ?), intervals and logical operators (AND, OR, NOT) to define detailed search. Users can build Search Filters using the Detailed Search Criteria, save them in their Workspace, and re-use them to quickly initiate a new search. Examples of Detailed Search:

- Display the tracks having Activity related to Fishing in the specified area.
- Display the tracks carrying oil from a given port.
- Display the vessels replied (participating) to hailing in a given area in a given date interval.
- Display the vessels having helicopters on board.
- List the vessels capable of carrying containers with flag A.
- Display the current locations of the vessels in the VOI having flag B.

Name Matching Criteria:

When TRITON executes a search using a given Vessel Name, it will use the Name Matching Criteria to compare it with other Vessel Names in the Vessel Database, both the Vessel Name and Synonyms. As there may be Vessel Names which contain special characters (e.g. '!'), the Search Criteria will be able to handle them as exceptional cases using the Name Matching Criteria. These special characters can either be excluded or the closest results are returned. The Name Matching Criteria will consider at least the following:

- Removing characters which are not letters or numbers (excluding user selected special characters such as '!')
- Removing spaces
- Removing well-known prefixes like "MV", "RORO", "MT", "CF", "MR", "FB"
- Converting Arabic numbers (1, 2, 3, 4, ...) to Latin representatives (I, II, III, IV, ...)
- Calculate Levenshtein distance between two names (Levenshtein distance is a number of changes which has to be made on one string to get a second one. '0' means that strings are identical, '2' means two changes; e.g. one deletion plus one changed character).

Search Results:

The Search Results returned after a Quick or Detailed Search query execution will be displayed in sortable tabular format in the AppView, giving the closest 10 results first with an option to get more. The results can be displayed with user-selected symbols, which is provided by the Symbology Service. The user will also be able to find one or more Objects within the Search Results (e.g. sorting) and have them displayed or highlighted in the GeoView.

[T1-R258] *TRITON shall provide an Operational Object Search Capability compliant to Open Search [OpenSearch].*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R259] *TRITON shall allow the user to manage (create, modify, delete, export, import) Search Filters to be saved in the Workspace and reuse an existing one to issue a new search.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R260] *TRITON shall allow the users to search for Maritime Operational Objects stored in the databases using queries based on the given Quick Search Criteria or Detailed Search Criteria, as given in the Description. Both search criteria shall handle Vessel Name exceptions by displaying the closest the matches.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 1
 Qualific. Method : Test
 Comment : Search query options will be defined during Software Requirements Analysis.

[T1-R261] *TRITON shall display the search results in sortable tabular format with a capability of finding one or more Maritime Operational Objects and displaying them on the GeoView. If the Objects are included in the current Spatial Extent, they shall be highlighted, if not, user confirmation shall be requested to move the Extent to cover the last known position of the Objects.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R262] *TRITON shall display the closest ten (10) results of a search with an option to extend the number of results if a given name does not exactly match with any of the records in the databases.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

Comment : Name matching criteria will be defined during Software Requirements Analysis.

[T1-R263] *TRITON shall be able to display augmented information from the Vessel Database if the searched tracks are associated.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

[T1-R264] *TRITON shall allow the user to access the Object Search function in the context of a User Application.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Test

4.2.3.4.7. Operational Object Animation

TRITON will be able to animate moving Maritime Operational Objects in a given time period. The user will be able to build a data set for animation by selecting the objects, time period and speed of animation. TRITON will then display this data set in the GeoView having Timeline to control the animation.

[T1-R265] *TRITON shall be able to animate the selected Maritime Operational Objects on the GeoView.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 2

Qualific. Method : Test

[T1-R266] *TRITON shall allow the user to select the Maritime Operational Objects, time period and the speed of animation.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 2

Qualific. Method : Test

4.2.3.4.8. NATO Common Operational Picture Handling

NATO Common Operational Picture (NCOP) provides the ability to integrate the Recognised Maritime Picture (RMP), Recognised Air Picture (RAP) and Recognised Ground Picture (RGP) into a single display. It can be displayed and managed on C2 Information Systems comprised of the necessary applications to process, manage and display required data and information.

TRITON will be able to get RAP, RGP and if necessary other relevant objects from NCOP while providing RMP to NCOP via its RMP Service.

[T1-R267] *TRITON shall receive RAP and RGP and display them on separate layers in the GeoView.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: NS

Baseline : BL 3

Qualific. Method : Test

[T1-R268] *TRITON shall allow the authorised user to control and monitor the NCOP Interface.*

Requirement Property :

Domain for Static: NS

Domain for Afloat: N/A

Baseline : BL 3

Qualific. Method : Test

4.2.3.5. Maritime Information Management

This function enables users to access, process and disseminate information from external sources (e.g. commercially available databases, Internet sites) that present a specific interest for the maritime community of interest, and to define, produce and maintain information about maritime objects and entities.

4.2.3.5.1. Reference Data Source Management

TRITON will use various data sources and recognised databases to collect information related to maritime vessels.

4.2.3.5.1.1. Maritime Datasets

Maritime Datasets are commercially provided data about all maritime vessels. For example, the Information Handling Services Inc. (IHS) Fairplay is a commercial data service providing information about vessels, owners, managers, maritime companies and shipping companies. Lloyd's Register of Ships (IHS) is used for validating merchant shipping data from unverified or external sources. IHS Jane's provides access to a series of publications that provide open source information and analysis about defence, security, transport, public safety and law enforcement.

TRITON will be able to access the Web sites as well as accessing the datasets off-line at the indicated network locations as recognised Maritime Datasets.

[T1-R269] *TRITON shall maintain a list of Network Locations to access the information related to off-line Maritime Datasets.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 2

Qualific. Method : Demonstration

[T1-R270] *TRITON shall maintain a list of Web Sites to access the information related to Maritime Datasets on-line.*

Requirement Property :

Domain for Static: NU

Domain for Afloat: NU

Baseline : BL 2

Qualific. Method : Test

[T1-R271] *TRITON shall allow the authorised user to manage (create, modify, delete) the List of Web Sites and Network Locations having Maritime Datasets.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R272] *TRITON shall allow the user to access the on-line Maritime Datasets on the specified Web Sites with a search capability.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R273] *TRITON shall allow the user to access the off-line Maritime Datasets on the specified Network Location with a search capability.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R274] *TRITON shall be able to use the search capability provided by the on-line Maritime Datasets.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R275] *TRITON shall be able to download a specified Maritime Dataset at configurable intervals from indicated addresses into local Network Location. The authorised user shall be notified about the beginning and end of update process.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

4.2.3.5.1.2. Person of Maritime Interest List

A Maritime Person of Interest is anyone associated with maritime interests. These people might include owners, past and potential crew members, pirates (suspected or confirmed), dockworkers and passengers.

TRITON will maintain lists of people related to maritime interests. There may be more than one list each having different identification. There may be several thousand people, however, TRITON will not have a capacity limitation in this list.

Person Data:

Person of Maritime Interest List consists of "Person Data" which includes the following attributes:

- Person identification
- Kind of relation with maritime interest (owner, crew member, pirate etc.)
- Activity

- Skills
- History of the commitment in the maritime community (former crews)
- Current location
- Link to the file containing additional information

Person Definitions ~~from~~ received from external sources can be combined with the existing ones if the user-selected attributes of Person Definition match.

Selected records of Person Data can be exported into a file in Recognised Export File Format.

[T1-R276] *TRITON shall maintain a list for Person of Maritime Interest for each Maritime Operation with a search capability.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R277] *TRITON shall allow the authorised user to manage (create, modify, delete) the Person of Maritime Interest List.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R278] *TRITON shall allow the authorised user to manually combine the information received from external sources with the existing ones in the Person of Maritime List ~~List~~ if the user-selected attributes of Person Data match.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R279] *TRITON shall allow the authorised user to display the vessel on the GeoView if the person in the Person of Maritime Interest List is embarked on a vessel.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R280] *TRITON shall allow the authorised user to add a file holding the list of passengers on board a Vessel in the Vessel Database.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R281] *TRITON shall allow the authorised user to filter and export the Person of Maritime Interest List in a user-specified file in Recognised Export File Format.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

4.2.3.5.1.3. Lloyd's Maritime Intelligence Unit

Lloyd's Maritime Intelligence Unit (MIU) provides information about vessel movements, shipping company, credit reports, commercial ports and terminals and marine casualty data from Lloyd's MIU Seasearcher in order to validate merchant shipping data from unverified and external sources. The information is available via subscription and is received from several sources around the world.

TRITON will maintain a list of Lloyd's MIU by importing the relevant information from Lloyd's MIU Website. The list maintains MIU Data with at least the following attributes:

- Vessel information
- Company

[T1-R282] *TRITON shall maintain a list of Lloyd's MIU Data.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R283] *TRITON shall allow the user to manage (create, modify, delete) the Lloyd's MIU List.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R284] *TRITON shall be able to import Lloyd's MIU data from an indicated file into the Lloyd's MIU List.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R285] *TRITON shall allow the authorised user to access on-line Lloyd's MIU dataset and import the datasets into the local list.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R286] *TRITON shall allow the authorised user to import Lloyd's MIU dataset from a file into the local list.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R287] *TRITON shall allow the authorised user to export the selected Lloyd's MIU Data into a file in Recognised Export File Format.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R288] *TRITON shall allow the user to display Lloyd's MIU List in sortable tabular form with search and filter capabilities.*

Requirement Property :

Domain for Static : Both

Domain for Afloat: Both

Baseline : BL 2

Qualific. Method : Test

4.2.3.5.1.4. Detention List

Detention Lists contain current and historical information about banned and detained vessels and their violations in order to identify, track and investigate Vessels of Interest (VOIs). The Memorandum of Understanding (MOU) Detention Lists can be derived from a number of sites. Following are the sites to provide Detention Lists:

- Abuja MOU
- Black Sea MOU
- Caribbean MOU
- Indian Ocean MOU
- Mediterranean MOU
- Paris MOU
- Riyadh MOU
- Tokyo MOU
- Viña del Mar Agreement

The Paris MOU provides the current detained list (updated daily) and the banned list. Other sites are updated weekly or monthly.

European Maritime Safety Agency (EMSA) and Food and Agriculture Organization of the United Nations related to Illegal, Unreported and Unregulated (IUU) fishing publishes information to be considered.

MOU Detention List:

TRITON will maintain a list of MOU Detention Lists each having at least the following attributes:

- List identification
- List source
- General detention reason
- Dates of validity
- Detained Vessel List (a list of banned and detained vessels associated with vessels in the Vessel Database)

Each vessel in the Detained Vessel List will have at least the following:

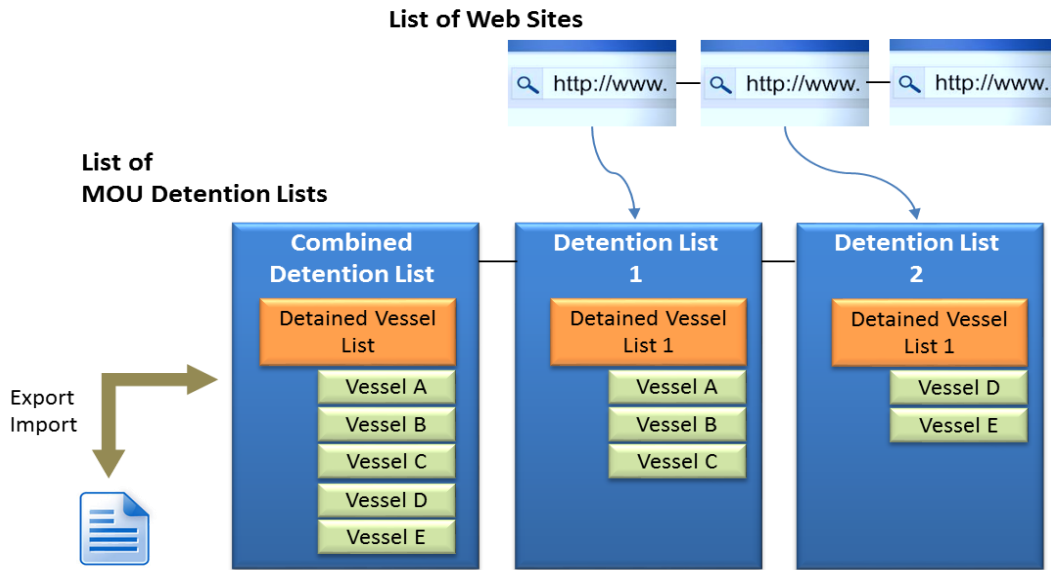
- Vessel identification
- Detention reason
- Dates and events

All vessels belonging to a detention or banning list and those flying a black listed flag, will be included in the Detention List and tagged appropriately in the Vessel Database.

TRITON will provide the user with capability to manage (create, modify, delete) the Web Sites to be searched for. TRITON will have a capability, initiated by the authorised user, to combine MOU Detention Lists by correlating information received from different sources. The Detention List Correlation Criteria will include comparison for at least the following:

- Vessel identification
- Detention events and dates

A conceptual representation of these lists is shown in the following figure:



Selected and filtered Detention Lists can be exported into a file in Recognised Export File Format.

[T1-R289] *TRITON shall maintain a list of Web Sites to scrape to access information related to MOU Detention Lists.*

Requirement Property :
 Domain for Static : NU
 Domain for Afloat : NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R290] *TRITON shall allow the authorised user to manage (create, modify, delete) the List of Web Sites having MOU Detention Lists.*

Requirement Property :
 Domain for Static : NU
 Domain for Afloat : NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R291] *TRITON shall maintain a list of MOU Detention List to locally store information on banned and detained vessels for each Maritime Operation with a search capability.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R292] *TRITON shall allow the authorised user to manage (create, modify, delete) the local MOU Detention List.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat : Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R293] *TRITON shall allow the authorised user to export filtered Detention Lists into a file in Recognised Export File Format.*

Requirement Property :

Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R294] *TRITON shall allow the authorised user to import data from a file in Recognised Import File Format into a local Detention List.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R295] *TRITON shall allow the authorised user to be able to combine the MOU Detention Lists received from different sources by using the Detention List Correlation Criteria.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R296] *TRITON shall allow the authorised user set the rules for the Detention List Correlation Criteria for combining MOU Detention Lists received from different sources.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R297] *TRITON shall allow the authorised user to search for specific vessel(s) through the Detention Lists over selected Web Sites and display the result in sortable tabular format.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R298] *TRITON shall associate vessels in any of the Detention Lists in the local MOU Detention List with the vessels in Vessel Database.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R299] *TRITON shall allow the authorised user to search for a vessel in the local MOU Detention Lists, display the details of the recording and the associated vessel in the Vessel Database with an option to display its position on the GeoView.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R300] *TRITON shall allow the authorised user to display the local MOU Detention Lists in sortable tabular form with an option to display the position of the selected vessel.*

Requirement Property :

Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

4.2.3.5.1.5. Merchant Ships Characteristics

Merchant ship characteristics, including images can be retrieved from external sources such as the Office of Naval Intelligence Database (U.S.) or Marine Traffic. TRITON will be able access the specified databases and provide information to the user to validate merchant shipping data from unverified and external sources and to investigate vessels. TRITON will maintain a list of addresses to such databases.

[T1-R301] *TRITON shall maintain a list of Web Sites to scrape to access information related to Merchant Ship Characteristics.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R302] *TRITON shall allow the authorised user to manage (create, modify, delete) the List of Web Sites having Merchant Ship Characteristics.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R303] *TRITON shall allow the user to access the Merchant Ship Characteristics dataset on the specified sites.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R304] *TRITON shall allow the authorised user to manually update the Vessel Database by using the Merchant Ship Characteristics reference dataset.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

4.2.3.5.1.6. World Port Index

The World Port Index (WPI) (PUB 150) contains a tabular listing of ports throughout the world (approximately 64,000 entries) describing their location, characteristics, known facilities, and available services. The table is arranged geographically, with an alphabetical index. It is published by the Defense Mapping Agency Hydrographic Topographic Center of the U.S. National Geospatial-Intelligence Agency (NGA) based on specific selection criteria for the places included. New editions are published bi-annually.

TRITON will maintain a World Port Database internally in order to provide support to Destination Resolution process and display them on the GeoView. It also allow the user to access and query detailed information about ports of the world in support of maritime and related operations. This

database will be manually updated using the NGA database. There may be several thousands of Port Data in the database, however, there will be no capacity limitation.

Ports:

Ports in the World Port Database consists of at least the following attributes:

- Country
- Name
- Port type (naval, civilian)
- Geographical location
- Capabilities

World Port Database can be exported into a file in a user-selected format and imported data can be used to build the World Port Database.

TRITON can also consume a WFS or Gazetteer Service for handling the World Port Database if it is incorporated in the available GIS Server.

[T1-R305] *TRITON shall maintain an internal World Port Database to store the world-wide port information with a search capability.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R306] *TRITON shall maintain a list of Naval Bases in the World Port Database based on country.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R307] *TRITON shall allow the authorised user to manage (create, modify, delete) the internal World Port Database.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R308] *TRITON shall be able to import World Port dataset from a selected online source.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R309] *TRITON shall allow the authorised user to manually import data from the World Port data published by U.S. National Geospatial-Intelligence Agency (NGA) into World Port Database.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R310] *TRITON shall allow the authorised user to import data from an external file in Recognised Import File Format to build the internal World Port Database.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R311] *TRITON shall allow the authorised user to export the internal database into a file in Recognised Export File Format.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R312] *TRITON shall use internal or external World Port data to support Destination Resolution process for AIS tracks.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R313] *TRITON shall allow the user to search for port(s) on either internal database or on-line database and display them as Reference Points on a Layer in the GeoView.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R314] *TRITON shall be able to store classified information about Naval Bases in the World Port Database.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R315] *TRITON shall allow the user to display the selected Ports or Naval Bases on the GeoView in a Layer.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R316] *TRITON shall be able to use a World Port Data Service if ~~a~~ the available GIS Server can provide (e.g. WFS, Gazetteer Service).*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

4.2.3.5.1.7. Shipping Route Networks

Standard maritime shipping routes provide users important context for Maritime Information Management. A route can be defined as the representation of the typical path between two points. The following picture depicts basic maritime routes around the world.



A Route Network is an information layer providing a synthetic representation of historical vessel traffic. The ability to display a Shipping Route Network provides Pattern of Life context to users to and helps users distinguish between standard maritime traffic and possible anomalous vessel activities. A Shipping Route Network can be visualized as a number of poly-lines (lines between a series of waypoints) which provide a representation for typical vessel movements along each route.

Shipping Route Networks can represent traffic flows from a global, regional or local perspective. Regionally and locally, Shipping Route Networks may also have a seasonal component. It is therefore possible to have multiple Shipping Route Networks representing standard routes for a specific area, region, or any other Area of Operation.

TRITON will maintain a list of Shipping Route Networks where each Route Network will have summary information which further describes the characteristics of vessels using that route in summary statistics.

Shipping Route Networks can be imported from a published format like SHP or XML without any capacity limitation.

Route Network:

A Route Network will consists of at least the following attributes:

- Route unique identification
- Entry waypoint
- Exit waypoint
- Route waypoints (poly-line)
- Route transit duration
- Frequency of transits
- Route length in nautical miles
- Vessel type distribution
- Vessel flag distribution
- Vessel length distribution
- Point of departure
- Destination
- Usual speed on the network

There may be several thousands of Routes in several Shipping Route Networks.

TRITON will allow the authorised user to perform statistical analysis of the followed routes at sea during a defined period (typically several years) in a defined area in order to check the validity of the current Maritime Shipping Route Network and highlight the necessity to create a new maritime Shipping Route Network.

[T1-R317] *TRITON shall maintain a list of Shipping Route Networks to store Route Networks.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R318] *TRITON shall allow the authorised user to manage (create, modify, delete, import, export) the Route Networks in the Shipping Route Networks List.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R319] *TRITON shall allow the authorised user to import Shipping Route Networks from a file in Recognised Import File Format.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R320] *TRITON shall allow the authorised user to export Shipping Route Networks to a file in Recognised Export File Format.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R321] *TRITON shall allow the authorised user to create a new Route Network by defining nodes (ports) and legs by either entering the position data for nodes manually or pointing the positions of nodes on the GeoView.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R322] *TRITON shall allow the authorised user to perform statistics analysis of the followed routes at sea during a defined period in a defined area.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R323] *TRITON shall allow the authorised user to check the validity of the current Shipping Route Networks by visually comparing the result of statistical analysis and the existing network.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

- [T1-R324] *TRITON shall allow the authorised user to search for summary statistics for selected routes in a Shipping Route Network given in Recognised Import File Format.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

- [T1-R325] *TRITON shall be able to display a Shipping Route Network on the GeoView in a Layer.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

- [T1-R326] *TRITON shall allow the user to search and display the selected Shipping Route Networks to be displayed on the GeoView.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

4.2.3.5.1.8. Internet Searching

TRITON will provide a search capability for external on-line reference databases from Recognised Web Sites on the Internet (NU Domain only). The user will be able to manage the List of Recognised Web Sites and the List of Search Queries.

The Search Queries including the attributes like Country, Class, Type, can be set by the user including the sites to be scrapped.

- [T1-R327] *TRITON shall maintain a list of Recognised Web Sites and a list of Search Queries to be used for searching for information on the Internet.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Demonstration

- [T1-R328] *TRITON shall allow the user to manage (create, modify, delete) the List of Recognised Web Sites to be used for Internet Searching.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

- [T1-R329] *TRITON shall allow the user to define a Search Query, including free text, to perform a search over external reference databases on the selected Recognised Web Sites.*

Requirement Property :
 Domain for Static: NU

Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R330] *TRITON shall allow the user to manage (create, modify, delete) the List of Search Queries and issue a new search by using an existing Search Query.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R331] *TRITON shall be able to use the search capability provided by the reference databases (e.g. Web services).*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R332] *TRITON shall display the Internet Search results in sortable tabular format.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

4.2.3.5.1.9. Handling Country Codes

The Country Codes can be represented either as a two-letter code (alpha-2) which is recommended as the general purpose code, a three-letter code (alpha-3) which is more closely related to the country name and a three digit numeric code (numeric -3) which can be useful if using Latin script is to be avoided [ISO 3166]. NATO has a standard, [STANAG 1059], to extend the ISO 3166-1,2, and 3 if they do not provide a suitable code. Additionally, it provides exercise geographical codes (each to begin with the character 'X').

TRITON will maintain two tables to handle the Country Codes:

MMSI-Flag Mapping Table:

This table will be used to derive the flag of an AIS track from the MMSI Number in accordance with International Maritime Organization (IMO) list. The Flag is derived from the first three digits of the MMSI via the official mapping tables from the IMO.

NATO Standard Country Codes Table:

This table will be constructed in accordance with [STANAG 1059], supporting both two-letter and three-letter Country Codes. It will also indicate the NATO Nations and exercise codes. The codes defined in this table will also be used for displaying the flag icons together with the object symbols on the GeoView.

TRITON will use the Country Names based on the Country Codes included in a track report, particularly in an AIS message. It will derive the Flag of an AIS track based on its MMSI Number automatically or manually. The derived Flag may not reflect the most recent information, because it is not reported by the vessel, and it is not cross-referenced or validated by NATO Standard Country Codes. In that case, the user will be notified.

[T1-R333] *TRITON shall maintain a "NATO Standard Country Codes Table" compliant to [STANAG 1059] with a search capability.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Demonstration

[T1-R334] *TRITON shall allow the authorised user to manage (modify, import, export) the NATO Standard Country Codes Table.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R335] *TRITON shall maintain a "MMSI-Flag Mapping Table" compliant to the IMO Country Codes.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R336] *TRITON shall allow the authorised user to manage (modify, import, export) the MMSI-Flag Mapping Table.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R337] *TRITON shall allow the authorised user to import the MMSI-Flag Mapping Table and the NATO Standard Country Codes Table from a file in Recognised Import File Format.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R338] *TRITON shall allow the authorised user to export the MMSI-Flag Mapping Table and the NATO Standard Country Codes Table to a file in Recognised Export File Format.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R339] *TRITON shall automatically derive the Flag of an AIS track based on its MMSI Number using the MMSI-Flag Mapping Table.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R340] *TRITON shall be able to derive the Flag for a user-selected track from its Country Code using the NATO Standard Country Codes Table.*

Requirement Property :

Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 1
 Qualific. Method : Test

[T1-R341] *TRITON shall display the Flag of a track or vessel indicating its reference source as STANAG 1059 or IMO (for the countries that are not covered by STANAG 1059). The flag icon can be displayed together with the object symbol, and the detailed object information shall provide the descriptive information.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R342] *TRITON shall automatically assign FRIEND as the Standard Identity for an AIS track if its derived Flag is a NATO Nation.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

4.2.3.5.2. Order of Battle Information Management

Operational and tactical level planning requires management of Order of Battle (ORBAT) as a collection of hierarchical information regarding friendly and enemy forces within a Maritime Operation. TRITON will maintain an ORBAT Database to store Friendly ORBAT and Enemy/Suspect ORBAT. The entire ORBAT can be displayed in a tree-like structure in the AppView. TRITON will also associate the ORBATs to Vessels in the Vessel Database when applicable. ORBAT Data, which is stored in the Database, includes as a minimum the following attributes:

- Identification (Descriptor)
- ORBAT Code
- Identity (Friendly, Suspect, Enemy)
- Owner (e.g. NATO, NATO/EAPC)
- Associated Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Forces
 - Force category
 - Command Relationship
 - Units (Nation, Type)
 - Location
 - Equipment Items

TRITON will allow the authorised user to manage (create, modify, delete) the ORBAT Database manually. INTEL-FS can provide Enemy ORBAT - Maritime through its interface. TRITON will be able to receive this information and update the ORBAT Database upon user approval.

TRITON will also allow the user to display all or selected parts of the ORBAT in the GeoView if they are associated with Vessels.

[T1-R343] *TRITON shall maintain an ORBAT Database for each Maritime Operation.*

Requirement Property :

Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R344] *TRITON shall allow the authorised user to manage (create, modify, delete) the ORBAT Database.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R345] *TRITON shall be able to receive Enemy ORBAT information from INTEL-FS and update the ORBAT Database after the authorised user's approval.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R346] *TRITON shall allow the authorised user to associate maritime vessels contained in the ORBAT Database with the Vessels in the Vessel Database.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R347] *TRITON shall be able to display the ORBAT information in a tree-like structure in AppView as selected by the user (e.g. Enemy ORBAT - Maritime), and provide a search capability.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

[T1-R348] *TRITON shall allow the user to display the selected ORBAT elements at their last known positions in the GeoView (on a Layer) if they are associated with Vessels in the Vessel Database.*

Requirement Property :
 Domain for Static: NS
 Domain for Afloat: NS
 Baseline : BL 3
 Qualific. Method : Test

4.2.3.5.3. Environmental Information Management

Bi-SC AIS Environmental Functional Services (ENV-FS) enable users to collect, process, present and distribute information for Environmental Support to operations. Environmental Support is the set of (military) activities that are undertaken to systematically observe and report the military significant aspects of the meteorological, hydrographic, oceanographic, and geographic characteristics of the area of operations. It generates the Recognised Environmental Picture as described in [AAP-6].

TRITON will be able to receive the Environmental Information from ENV-FS (see External Interface Requirements, Environmental FS) or import it from files in Recognised Import File Format and display it in the GeoView as Layers (i.e. .

[T1-R349] *TRITON shall be able to receive the Environmental Information and display it in the GeoView as Layers with the symbology defined in [APP-6].*

Requirement Property :

Domain for Static: NS
 Domain for Afloat: N/A
 Baseline : BL 3
 Qualific. Method : Test

[T1-R350] *TRITON shall be able to import Environmental Information from a file in Recognised Import File Format and display it in the GeoView as Layers with the symbology defined in [APP-6].*

Requirement Property :

Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

4.2.3.5.4. CBRN Defence Information Management

Chemical Biological and Radioactive and Nuclear (CBRN) Defence is the set of military activities that are conducted by forces to protect the NATO populations, territory or forces against attacks with CBRN weapons or agents, and to minimize the effects of these attacks. It generates CBRN Common Operational Picture.

Bi-SC AIS CBRN Functional Services (CBRN-FS) provide operational level C2 with functionalities supporting NATO to prevent CBRN incidents, to protect NATO forces from the effects of CBRN incidents, and to take recovery actions, so that NATO forces are able to accomplish the mission and maintain freedom of action in a CBRN environment. CBRN-FS enables the users to collect, process, present and distribute information that supports the major functions of CBRN Defence operations.

TRITON will be able to receive the CBRN Information from CBRN-FS (see External Interface Requirements, CBRN FS) or import it from files in Recognised Import File Format and display it in the GeoView as Layers.

[T1-R351] *TRITON shall be able to receive CBRN Information and display it on a Layer in the GeoView with the symbology defined in [APP-6].*

Requirement Property :

Domain for Static: NS
 Domain for Afloat: N/A
 Baseline : BL 3
 Qualific. Method : Test

[T1-R352] *TRITON shall be able to import CBRN Information from a file in Recognised Import File Format and display it in the GeoView as Layers with the symbology defined in [APP-6].*

Requirement Property :

Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

4.2.3.5.5. Intelligence Information Management

Bi-SC AIS Intelligence Functional Services, INTEL-FS, collects, maintains and disseminates intelligence information regarding non-Alliance entities. It provides intelligence support as the set of military activities that are undertaken to receive commander's direction, proactively collects information, analyses it, produces useful predictive intelligence and disseminates it in a timely manner.

TRITON will be able to receive the Intelligence Information given below:

Intelligence Information:

- Current Intelligence Situation
- Maritime Intelligence Report
- Maritime Intelligence Summary
- Enemy ORBAT
- Area Information

The authorised user will be able to issue a query regarding a maritime vessel to INTEL-FS and display the returned result in the AppView.

When Enemy ORBAT information is received, TRITON will update its ORBAT Database. When Area Information is received, TRITON will convert it to Reference Object - Area and store it in the Reference Object Database.

[T1-R353] *TRITON shall allow the user to request Intelligence Information given in the Description from INTEL-FS, and display the received information in text or sortable tabular form in the AppView.*

Requirement Property :

Domain for Static: NS
 Domain for Afloat: N/A
 Baseline : BL 3
 Qualific. Method : Test

[T1-R354] *TRITON shall be able to receive the Enemy ORBAT Data from INTEL-FS and update the ORBAT Database after the authorised user's approval.*

Requirement Property :

Domain for Static: NS
 Domain for Afloat: N/A
 Baseline : BL 3
 Qualific. Method : Test

[T1-R355] *TRITON shall be able to receive Area Information from INTEL-FS, and store it in the Reference Object Database as an Area after the authorised user's approval.*

Requirement Property :

Domain for Static: NS
 Domain for Afloat: N/A
 Baseline : BL 3
 Qualific. Method : Test

[T1-R356] *TRITON shall allow the authorised user to prepare a query regarding a maritime vessel, send it to INTEL-FS, and display the returned result in the AppView. If the INTEL-FS interface is not available, the user shall be notified.*

Requirement Property :

Domain for Static: NS
 Domain for Afloat: N/A
 Baseline : BL 3
 Qualific. Method : Test

4.2.4. Maritime Operational Support

Maritime Operational Support is a collection of functions which help users to conduct C2 of maritime operations. Alerts, decision support tools, analysis management, drawing management and various tools assist the users.

4.2.4.1. Maritime Alerts Management

Maritime Alerts Management utilizes the User Notification Management of the System Infrastructure to notify users when a specified event occurs. There are Operational and User Defined events which can be used to set alerts. For example, an Area Alert is issued when a track enters a defined area. When an anomaly is detected, the related users will be notified. When a timer function elapsed the user gets notified.

4.2.4.1.1. Operational Alerts

Operational Alerts are predefined functions associated with notifications to users. TRITON will support notifications for at least the following operational functions:

- Area Alerts
- Maritime Anomaly Alerts
- Time-Late Alerts

4.2.4.1.1.1. Area Alerts

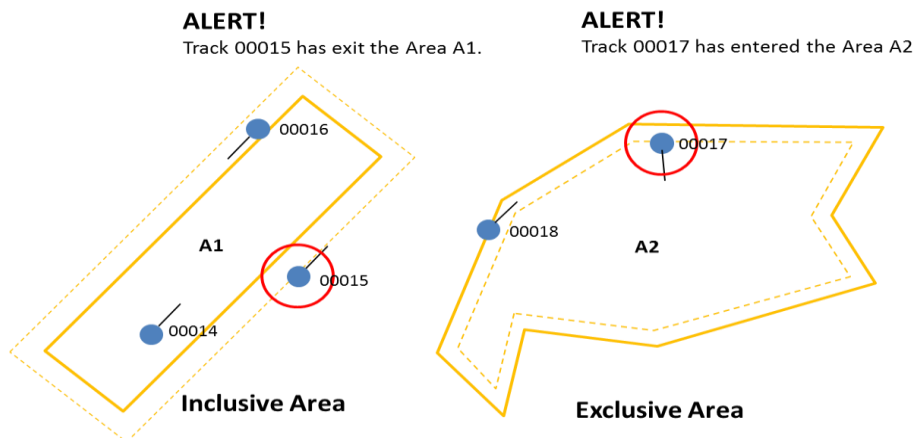
TRITON will provide the users with a capability to define an Area (a Reference Object) or Geospatial Drawings forming Areas, and set alerts when a track with user-defined criteria enters or exits. The user can set filter according to track attributes (e.g. vessel type = merchant). Tolerance Distances are used for not triggering false alerts due to inaccurate ship position reports.

Two types of Areas will be used to implement alerting:

Inclusive Area: This type of area issues alerts when a track exits it after passing through a Tolerance Distance.

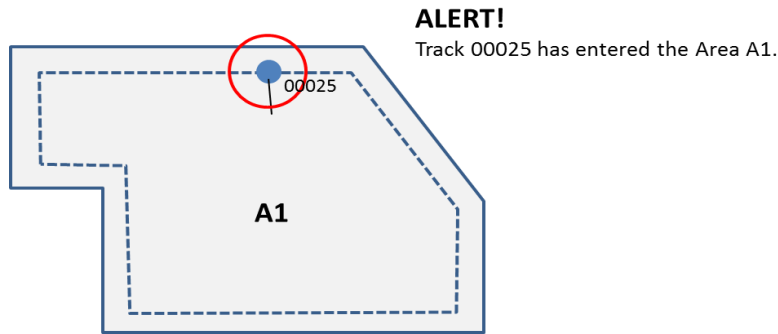
Exclusive Area: This type of Area issues an alert when a track enters it after passing a Tolerance Distance.

Examples to Inclusive and Exclusive Areas are depicted below:



Tolerance Distance is set by the user while creating the Area and displayed on the GeoView.

Geographical Proximity Area is an Area which is defined by the authorised user to automatically detect if a track with user defined filter criteria enters into. An Alert will be issued when a track enters the area. TRITON will use Exclusive Area to implement Geographical Proximity Detection.



Area Attributes:

An Exclusive or Inclusive Area will have at least the following attributes:

- Name
- Type (Exclusive, Inclusive)
- Tolerance Distance
- Interval (minimum 10 seconds, maximum 10 minutes)
- Filter
 - Attributes of Tracks (e.g. type. flag)
 - Number of Tracks
- Status (active, inactive)
- Alert.

[T1-R357] *TRITON shall allow the authorised user to define an Inclusive Area which raises an Alert when a track fulfilling the user-defined filter exits the Area, and passes through the Tolerance Distance.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R358] *TRITON shall allow the authorised user to define an Exclusive Areas which raises an Alert if-when a track fulfilling the user-defined filter enters the Area, and passes through the Tolerance Distance.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R359] *TRITON shall monitor Exclusive and Inclusive Areas within each Maritime Operation independently and concurrently.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R360] *TRITON shall notify the authorised user with an Alert when an active Exclusive/Inclusive Area filter is satisfied.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both

Baseline : BL 2
 Qualific. Method : Test

[T1-R361] *TRITON shall not issue an Alert for those tracks that are already inside or outside the defined Exclusive/Inclusive Area when the Area is created.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R362] *TRITON shall monitor the Exclusive/Inclusive Areas with checks at Intervals set by the user.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R363] *TRITON shall monitor the Grouped Areas (Exclusive or Inclusive) as one single Area.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R364] *TRITON shall be able to display the selected Exclusive/Inclusive Areas in the GeoView as Layers.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

4.2.4.1.1.2. Time-Late Alerts

Automatic tracks are updated at certain intervals. TRITON users can select both automatic and manual tracks and activate time-watchers in order to get notified if they are not updated for a specified time period. For example if a track of interest is not updated for three hours the user will be notified. Users will be able to set a Time-Late value in increments of minutes.

[T1-R365] *TRITON shall monitor all tracks and issue Time-Late Alerts if the specified Time-Late duration for a track has elapsed.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R366] *TRITON shall allow the authorised user to create Time-Late Alerts for automatic or manual tracks.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R367] *TRITON shall allow the authorised user to set Time-Late value up to thirty-six (36) hours in steps of one (1) minute for a selected track.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

4.2.4.1.1.3. Maritime Anomaly Alerts

When a maritime anomaly is detected, TRITON will issue an Alert. The maritime anomalies are defined in the Maritime Analysis Management.

4.2.4.1.2. Manual Alerts

TRITON will allow the user to issue a notification as a Manual Alert to inform a group of users about a particular event. For example, an Alert can be issued manually by a user when a hostile activity is recognised by a user. A position or a Maritime Operational Object can be used as the reference information to be indicated and displayed to the selected User Group with a user-specified annotation.

Alert Template:

~~There will be~~ Alert Templates, managed by the authorised users, ~~to~~ help users to define ~~their~~ Manual Alerts on predefined standard events. An Alert Template, selectable according to its context, consists of the following as a minimum:

- Alert ID (assigned by the system)
- Alert type (MSA, operational, etc.)
- Destination User or User Group
- Priority
- Associated Maritime Object (e.g. track, area)
- Fixed text for explaining the standard events
- Additional free text
- Time validity as DTG.

[T1-R368] *TRITON shall allow the user to issue a Manual Alert by manually entering the type, explanation, track/vessel identification, area, position and the User Group to be notified.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R369] *TRITON shall allow the authorised user to issue a Manual Alert by selecting Maritime Operational Objects on the GeoView or by using the Search function.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R370] *TRITON shall allow the user to issue a Manual Alert by using Alert Templates as defined in the Description.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R371] *TRITON shall allow the authorised user to manage (create, modify, delete) the Alert Templates.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R372] *TRITON shall be able to disseminate a Manual Alert to the users of the specified User Group.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

4.2.4.2. Maritime Decision Support

TRITON will provide decision support for operational-level decision makers by means of tools and functions. These functions can be used to build up information on the status and intention of one or more vessels by providing nautical calculations.

4.2.4.2.1. Track Statistics

TRITON will provide statistical information for tracks in the Track Database including Time-Late which is defined as the difference between the time of the last report and current time.

Track Statistical Information:

The Track Statistical Information will include at least the following:

- Time-Late statistics for all or selected tracks (by selecting tracks on the GeoView using the pointing device or by issuing a query on the databases)
- Number of tracks having updates between current time and the Maximum Time-Late ago.
- Number of current tracks per source
- Number of current military tracks
- Number of current non-military tracks (tanker, passenger, fishing, government etc.)
- Number of current correlated and associated tracks.

[T1-R373] *TRITON shall provide the user with a capability to display Track Statistical Information as given in the Description.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R374] *TRITON shall compute Time-Late statistics for all or selected tracks in the Track Database in a given time window. The results shall be displayed in tabular format or graphs (if applicable).*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R375] *TRITON shall display number of tracks according to their types, source, correlation and association status in a selected graph form (e.g. a bar chart of track types in a region).*

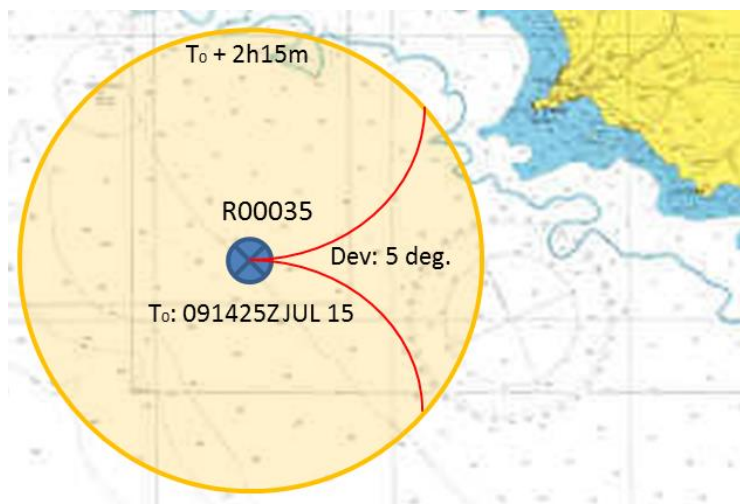
Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R376] *TRITON shall allow the user to select tracks either using the pointing device or issuing a query on the Track Database and initiate statistics calculation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

4.2.4.2.2. Furthest on Circle

Furthest on Circle (FOC) is an illustration of where an object could be at a given time based on its last known speed. If the last course is known, an anticipated course deviation can be expressed in percentage to calculate the possible location. A sample display of FOC with time labels is given below:



FOC can be active for a user-selected time period. TRITON will display FOC on the GeoView and notify the authorised user before it automatically deletes the FOC.

[T1-R377] *TRITON shall be able to initiate a FOC at an indicated position and update it automatically.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R378] *TRITON shall be able to handle independent FOCs in each Maritime Operation.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R379] *TRITON shall allow the user to initiate a FOC at an indicated point on the GeoView or manual input or getting the last updated position of a track indicated by the user with either the pointing device or track ID.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R380] *TRITON shall use the last known speed for calculating the radius of the FOC and last known course and for calculating the possible location with given anticipated course change. The visualisation on the GeoView shall be updated automatically.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R381] *TRITON shall update the FOC at intervals defined in the Configuration Settings. The default shall be sixty (60) seconds.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R382] *TRITON shall display the FOC in the GeoView as an Application-based C2 Area.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R383] *TRITON shall keep a FOC active for the amount of time set by the user. The time range shall be ten (10) minutes to eight (8) hours with an option to extend when the user informed about automatic deletion.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

4.2.4.2.3. Status Board

Status Board is used to display changing information of selected Maritime Operational Objects. It allows the user to closely monitor only those Maritime Objects of close interest. After the adding the Objects into the Status Board, their user-relevant information, separate for each Maritime Operational Object type (i.e. Track, Vessel, Reference Object), will be displayed in sortable tabular format and updated automatically. Only the authorised users can use the Status Board.

[T1-R384] *TRITON shall maintain a Status Board for each user.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R385] *TRITON Status Board shall be able display the changing information of selected Maritime Operational Objects in sortable tabular format.*

Requirement Property :

Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Demonstration

[T1-R386] *TRITON shall allow the user to manage (create, modify, delete) Maritime Operational Objects for the Status Board and select the attributes to be displayed with respect to object types.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R387] *TRITON shall be able to display at least twenty (20) Maritime Operational Objects in a Status Board for each user.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

[T1-R388] *TRITON shall keep the Status Board active until the user terminates it.*

Requirement Property :
 Domain for Static : Both
 Domain for Afloat: Both
 Baseline : BL 3
 Qualific. Method : Test

4.2.4.3. Maritime Analysis Management

Maritime Analysis Management enables users to access and validate information reporting vessel position data by comparing information with internal and external data sources.

4.2.4.3.1. Track Information Analysis

TRITON will be able to perform automatic or manual analysis for detecting unexpected behaviours using the information in Track and Vessel Databases. Live data or off-line data can be used for analysis. A user can perform an analysis on databases within a Maritime Operation. If necessary, a user can import data from an archive into a Maritime Operation which is created for analysis purposes only. The user can then visualise the objects under analysis on the GeoView.

4.2.4.3.1.1. Destination Validation

TRITON will be able to validate the name of a reported destination of a track against all available locations in the world. TRITON will be able to use the following sources:

- The World Port Index Database (internal or external)
- GeoNames geographical database (www.geonames.org)
- Gazetteer Service (GIS Server)

These sources will be used to validate a given name and retrieve its geographical location (resolving destination). If more than one result are returned, the user will be able to select one and resolve the destination manually.

[T1-R389] *TRITON shall be able to validate the destination of a selected track by comparing the reported destination with the available locations in the World Port Index database, GeoNames geographical database or Gazetteer Service.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R390] *TRITON shall use an internal or external World Port Index Database to resolve the reported destination of a track.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R391] *TRITON shall be able to use Web services from GeoNames to resolve the reported destination of a track.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R392] *TRITON shall be able to use Gazetteer Service of the GIS Server to resolve destination if the service is available.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R393] *TRITON shall allow the authorised user to select the data source and validate the destination of a selected track manually in case more than one result are returned.*

Requirement Property :
 Domain for Static: NU
 Domain for Afloat: NU
 Baseline : BL 2
 Qualific. Method : Test

4.2.4.3.1.2. Shipping Route Validation

Shipping Route validation is a process that predicts the route a track might take to its destination. The calculation takes at least the following into account:

- The current vessel position
- The resolved position of the vessel destination (resolved destination)
- The selected Shipping Route from the Shipping Route Networks.

The process derives the shortest path of the vessel from the starting position to the given destination over the given sea route.

[T1-R394] *TRITON shall derive the shortest usual path from the position of a selected vessel to its resolved destination using the selected Shipping Route.*

Requirement Property :
 Domain for Static: Both
 Domain for Afloat: Both
 Baseline : BL 2
 Qualific. Method : Test

[T1-R395] *TRITON shall allow the authorised user to perform Shipping Route Validation for a selected track.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 2

Qualific. Method : Test

4.2.4.3.1.3. Vessel Identity Validation

TRITON will maintain Vessel Database to store all existing maritime vessels using their unique identity information. This database is used to validate the received identity information of a track. If the identity cannot be validated with the internal Vessel Database, then TRITON will use the user-selected, external reference databases.

Following data can be checked with relevant databases:

- IMO number
- MMSI number
- International Call Sign
- Country and vessel name

TRITON will use external reference databases for the Vessel Identity Validation process. At least the following databases can be used:

- IHS Fairplay (or any other contracted data service)
- Lloyds MIU Detention List
- At least three (3) other accessible databases providing Web services over the NU Domain

If the track is validated with external reference databases, then the internal Vessel Database will be updated by the authorised user.

[T1-R396] *TRITON shall perform Vessel Identity Validation process on a selected track using first the Vessel Database. If the track cannot be validated with the Vessel Database, then TRITON shall use the external reference databases, as given in the Description, and as indicated by the authorised user.*

Requirement Property :

Domain for Static: NU

Domain for Afloat: NU

Baseline : BL 2

Qualific. Method : Test

[T1-R397] *TRITON shall allow the authorised user to add on-line or off-line reference databases to be included during the Vessel Identity Validation process.*

Requirement Property :

Domain for Static: NU

Domain for Afloat: NU

Baseline : BL 2

Qualific. Method : Test

[T1-R398] *TRITON shall inform the authorised user about the result of the Vessel Identity Validation process.*

Requirement Property :

Domain for Static: NU

Domain for Afloat: NU

Baseline : BL 2

Qualific. Method : Test

4.2.4.3.1.4. Maritime Pattern of Life Analysis

Maritime pattern of life includes deducing information from patterns derived from historical vessel positions. Fishing density in a region during a fishing season is an example. TRITON will maintain a list of Maritime Pattern of Life Areas (as Reference Objects) defined by the authorised user based on density observations.

Pattern of Life Data:

TRITON Maritime Pattern of Life Area will consist of the following attributes:

- Name
- Area (as a Reference Object)
- Description (annotation)

These Areas can be managed and displayed in the GeoView as Layers. Further analysis can be made by the user and the Areas can be annotated.

[T1-R399] *TRITON shall maintain a list of Maritime Pattern of Life Areas to assist analysis.*

Requirement Property :
 Domain for Static : NU
 Domain for Afloat : NU
 Baseline : BL 2
 Qualific. Method : Demonstration

[T1-R400] *TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the List of Maritime Pattern of Life Areas.*

Requirement Property :
 Domain for Static : NU
 Domain for Afloat : NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R401] *TRITON shall allow the authorised user to add descriptive annotations to a Maritime Pattern of Life Area.*

Requirement Property :
 Domain for Static : NU
 Domain for Afloat : NU
 Baseline : BL 2
 Qualific. Method : Test

[T1-R402] *TRITON shall allow the user to display the selected Maritime Pattern of Life Areas on the GeoView as a Layer.*

Requirement Property :
 Domain for Static : NU
 Domain for Afloat : NU
 Baseline : BL 2
 Qualific. Method : Test

4.2.4.3.2. Maritime Incident Recording

TRITON will provide Maritime Incident Recording capability to record maritime incidents or events such as accidents, detaining, banning, and hijacking.

Maritime Incident:

TRITON will store at least the following information as a Maritime Incident:

- Incident type
- DTG

- Associated vessel(s)
- Geographical Position
- Incident explanation as free text.

TRITON will allow the authorised user to manage the records, including exporting and importing and association of incidents to the vessels in the Vessel Database.

TRITON will implement this capability by using Joint Operations Centre Watchkeeper's Log (JOCWatch) which was developed by the NCI Agency. JOCWatch is a standardised and widely utilised, Web-based tool to build and maintain real time Situational Awareness for mission-related security events. It enables the build-up of a historical archive of security events as a mission or operation progresses. It has its own database to store all incident related information and interface to add/publish incident information.

Events are reported and stored in the form of Event Exploitation Reports (EVENTEXPLOITREP), which is the primary message to exchange information. It is currently defined in the Reference Architecture and has been proposed to develop a new standard APP-11 message format.

The Operational Incident Report (OIR) is the native exchange format for JOCWatch. This format is a complete description of incident and log entry data within the application. By definition, JOCWatch is both a producer and consumer of OIR. Third-party applications may also access the OIR format programmatically for their own purposes.

TRITON will use JOCWatch to enter, store, view and search Maritime Incidents as Incident Recordings.

JOCWatch Web Services Specification - Operational Incident Report (OIR) – 1.2, Sep 2011 [JOCWatch WSS] defines the interface for OIR, which is an XML schema. as OIR will be used until the proposed message EVENTEXPLOITREP is included in APP-11. XML schema defined in [JOCWatch ICD] which is a Formatted Message.

[T1-R403] *TRITON shall be capable of exchanging information with JOCWatch using JOCWatch OIR Service as defined in [JOCWatch ~~ICD~~WSS].*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Demonstration

Comment : First, BL3 on NS Domain will be implemented and then the same solution

will be applied to BL2 on NU Domain.

[T1-R404] *TRITON shall be capable of ~~importing-consuming~~ EVENTEXPLOITREP XML schema Operational Incident Report (OIR) from JOCWatch as defined in [JOCWatch ~~ICD~~WSS].*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Demonstration

[T1-R405] *TRITON shall allow the authorised user to manage (create, modify, import, export, delete) the Maritime Incidents (given in the Description) ~~via~~ by accessing JOCWatch.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Test

[T1-R406] *TRITON shall provide access to the search capability of JOCWatch over the Incident Recordings.*