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

[T1-R407] *TRITON shall automatically associate, upon initiation by the authorised user, a Maritime Incident to one or more vessels in the Vessel Database if the vessel identification is indicated in the incident.*

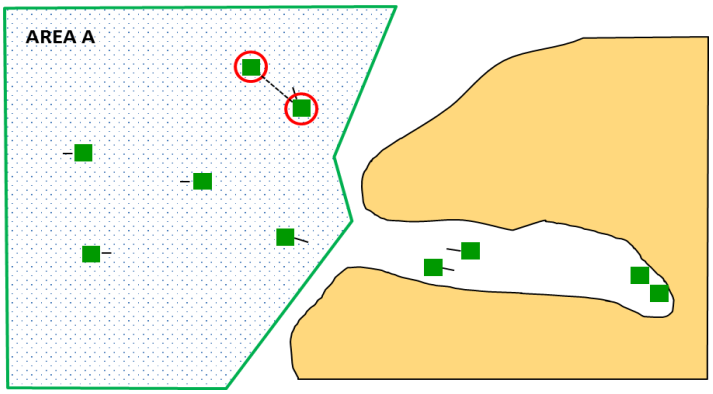
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.4.3.3. Maritime Anomaly Detection

TRITON will provide the user with automated and manual anomaly detection functions related to civilian maritime traffic. Examples of anomalies include: ships cruising outside usual shipping lanes; ships that loiter at drift; that rendezvous; ships having AIS identification (MMSI, Name, IMO, Call Sign) discrepancies.

4.2.4.3.3.1. Rendezvous Detection

Rendezvous Detection function uses kinematic values of tracks to detect when two vessels come alongside each other within a given distance either at a full stop or low speed. The objective is to detect potential rendezvous to transfer either crew, passengers, cargo, etc. The function can be initiated at an indicated geographical area near chokes points (straits, routes) to periodically process tracks passing through the area. A conceptual representation is given below:



Rendezvous Detection Criteria:

A Rendezvous Detection Criteria with at least the following will be used to detect potential rendezvous for transfers from / to ships which may be connected to activities of potential interest:

- Two or more vessels merging within a given distance (from ten (10) yards to two-thousand (2000) yards with five-hundred (500) yards as the defaults)
- All ships are in the Rendezvous Detection Area
- Proceeding at speeds slower than a given value (default is five (5) knots)

The detection process will be conducted automatically either periodically or manually until the detection process for that area is cancelled. TRITON will keep a list of Rendezvous Detection Areas with at least the following attributes:

- Area definition (geographical location, identification as a Reference Object)
- Rendezvous Detection Criteria to be applied

- Interval from five (5) minutes to thirty (30) minutes with ten (10) minutes the default
- Notification method (alert or listing)
- Status (Active / Inactive)

TRITON will not have a limitation for the number of areas. The given number of areas and tracks will be used for performance test purposes only. The analysis processes created by users can run in the background, allowing the authorised user to monitor them.

[T1-R408] *TRITON shall maintain a list of Rendezvous Detection Areas for each Maritime Operation.*

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

[T1-R409] *TRITON shall allow the authorised user to manage (create, modify, delete) the Rendezvous Detection Area List and the processes initiated by users.*

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

[T1-R410] *TRITON shall be able to handle at least one-hundred (100) Rendezvous Detection Areas simultaneously in global scope.*

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

[T1-R411] *TRITON shall be able to process at least one-thousand (1000) tracks in a Rendezvous Detection Area.*

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

[T1-R412] *TRITON shall allow the authorised user to set the values used for the Rendezvous Detection Criteria and detection process (i.e. Area definition, distance, speed, periodicity).*

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

[T1-R413] *TRITON shall apply Rendezvous Detection Criteria, as given in the Description, to all ships within the designated area periodically or manually.*

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

[T1-R414] *TRITON shall notify the authorised user if the current number of Rendezvous Detection Areas with given intervals cannot be processed with the current processing load.*

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

[T1-R415] *TRITON shall inform the authorised user about the status of the current Rendezvous Detection processes and issue notification in case the Rendezvous Detection Criteria matches.*

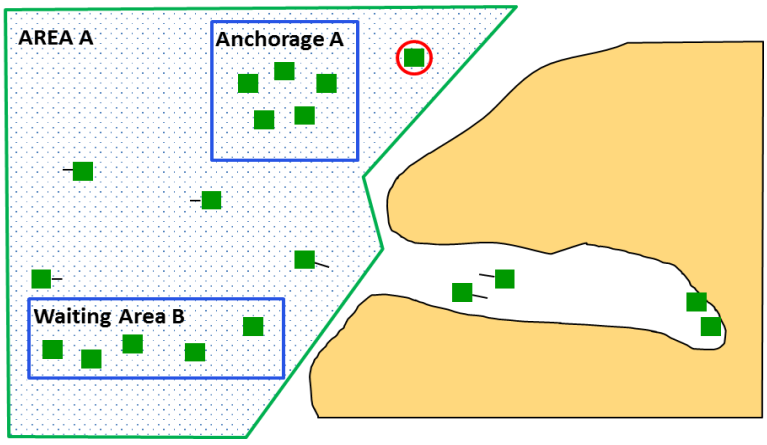
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test

[T1-R416] *TRITON shall display the result of selected Rendezvous Detection process in sortable tabular form with a capability of indicating the selected the track(s) in the GeoView.*

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

4.2.4.3.3.2. Positional Anomaly Detection

Positional Anomaly Detection function uses the position, course and speed values of tracks to detect vessels that are loitering out of Usual Areas such as anchorage areas or waiting areas. A Usual Area is an area defined by the user to indicate the Positional Anomaly Detection will not be applicable. A waiting area or an anchorage area can be considered as Usual Areas which can be implemented using TRITON Areas and grouping function. The concept is depicted below:



Positional Anomaly Detection Criteria:

A user-configurable Positional Anomaly Detection Criteria with at least the following will be used to detect vessels behaving abnormally:

- The predicted position is within a given Detection Area but out of given Usual Areas
- Speed is less than a given value with the default of five (5) knots

The detection process will be conducted automatically either periodically or manually until the detection process for that area is cancelled.

TRITON will keep a list of Positional Anomaly Detection Areas with at least the following attributes:

- Detection Area definition (geographical location, identification as a Reference Object (Inclusive Area))

- Usual Area definition (geographical location, identification as a Reference Object (Exclusive Area))
- The Positional Anomaly Detection Criteria to be applied
- Interval - from five (5) to thirty (30) minutes; ten (10) minutes the default (0 will mean Manual)
- Notification method (alert or listing)
- Status (Active / Inactive)

TRITON will not have a limitation for the number of areas. The given number of areas and tracks will be used for performance test purposes only. The analysis processes created by users can run in the background, allowing the authorised user to monitor them.

[T1-R417] *TRITON shall maintain a list of Positional Anomaly Detection Areas for each Maritime Operation.*

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

[T1-R418] *TRITON shall allow the authorised user to manage (create, modify, delete) the Positional Anomaly Detection Area List and the processes initiated by the users.*

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

[T1-R419] *TRITON shall be able to handle at least one-hundred (100) Positional Anomaly Detection Areas simultaneously in global scope.*

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

[T1-R420] *TRITON shall be able to handle at least ten (10) Usual Areas for each Positional Anomaly Detection Area, which are excluded in checks.*

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

[T1-R421] *TRITON shall be able to process at least one-thousand (1000) tracks in a Positional Anomaly Detection Area in less than ten (10) seconds.*

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

[T1-R422] *TRITON shall allow the authorised user to configure the Positional Anomaly Detection Criteria and detection process (i.e. Area definitions, speed, intervals).*

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

[T1-R423] *TRITON shall apply Positional Anomaly Detection Criteria, given in the Description, to all tracks and vessels within the designated area periodically at given intervals or when manually initiated by the user.*

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

[T1-R424] *TRITON shall notify the authorised user if the current number of Positional Anomaly Detection Areas with given intervals cannot be processed with the current processing load.*

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

[T1-R425] *TRITON shall inform the authorised user about the status of the current Positional Anomaly Detection process and issue notification in case the Positional Anomaly Detection Criteria matches.*

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

[T1-R426] *TRITON shall display the result of the Positional Anomaly Detection process in AppView, in sortable tabular form, with a capability of indicating the selected the track(s) on the GeoView.*

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

4.2.4.3.3.3. Destination Anomaly Detection

Ships normally declare their destination and Estimated Time of Arrival (ETA) or Next Port of Call (NPOC) in their AIS data. TRITON will be able to perform a Destination Anomaly Detection process based on this information and the selected vessel's current course and speed.

Destination Anomaly Detection Criteria:

A Destination Anomaly Detection Criteria with at least the following will be used to detect the inconsistencies:

- Check if a destination or a NPOC is declared
- If destination or NPOC exists, then validate it first using the Destination Resolution function
- Check that if ETA can be achieved with present course and speed using ETA Verification function.

[T1-R427] *TRITON shall perform Destination Anomaly Detection process for a selected track using the Destination Anomaly Detection Criteria given in the Description.*

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

[T1-R428] *TRITON shall allow the authorised user to initiate Destination Anomaly Detection process for a selected track and display the result.*

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

4.2.4.3.3.4. Estimated Time of Arrival Anomaly Detection

Estimated Time of Arrival (ETA) is an attribute of civilian vessel information to indicate when it is planning to arrive at the indicated destination. TRITON determines if a vessel could conceivably make it to its destination in the time allotted for its arrival (based on characteristic e.g. cruising speed and positional information). TRITON calculates the speed for a selected track required to get following straight line from its actual position to its resolved destination (destination name is validated and its geographical position is found). If the calculated speed is smaller than the minimum limit or greater than the maximum limit defined by the user, then it is considered that ETA is not achievable and the user will be notified. The calculation will be performed if the range is within the user-specified limits.

[T1-R429] *TRITON shall calculate ETA of a selected track using its present speed and its resolved destination if the range is within the user-selected limits.*

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

[T1-R430] *TRITON shall allow the authorised user to select a track, define the minimum and maximum limits for speed, minimum and maximum limits for range and initiate the ETA verification.*

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

[T1-R431] *TRITON shall notify the user if the calculated speed is smaller than the minimum limit or greater than the maximum limit.*

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

[T1-R432] *TRITON shall resolve the destination of the selected track prior to ETA calculation and notify the user if the destination is not resolved.*

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

4.2.4.3.3.5. Historical Anomaly Detection

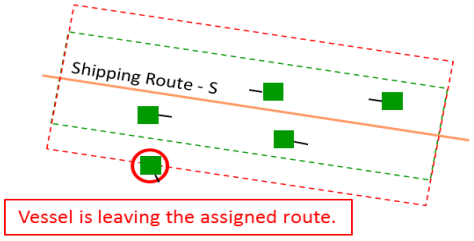
Historical Anomaly Detection includes historical, trend and pattern analysis of disparate vessel data sources in order to identify anomalous behaviour (e.g. a vessel identifying itself as a known passenger ferry but it is deviating from its normal route).

Historical Anomaly Detection Rules:

TRITON will be able to monitor vessels assigned to a particular Shipping Route with logical corridor definitions and notifies the user if the vessels leaves the corridor. The user can set the Historical Anomaly Detection Rules for a selected Shipping Route and vessels assigned to it. The Historical Anomaly Detection Rules consist of at least the following:

- Shipping Route identification
- List of assigned vessels
- Maximum range deviation from the Shipping Route (nautical miles)
- Range margin (allowed positional dislocation in nautical miles in addition to the range deviation)
- Begin and end time
- Status (active, inactive)

A notional example is given below:



Rules:	
Vessel	: V
Assigned Shipping Route ID	: S
Maximum range deviation	: 1.5 NM
Range margin	: 0.5 NM

The detection processes created by users can run in the background, allowing the authorised user to monitor them.

[T1-R433] *TRITON shall be able to monitor and detect positional dislocation of vessels assigned to a particular Shipping Route based on user-defined Historical Anomaly Detection Rules.*

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

[T1-R434] *TRITON shall allow the authorised user to define a Shipping Route with a range and set the Historical Anomaly Detection Rules given in the Description.*

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

[T1-R435] *TRITON shall perform Historical Anomaly Detection as initiated by the users and notify the initiating user about the status of process.*

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

4.2.4.3.3.6. Kinematic Anomaly Detection

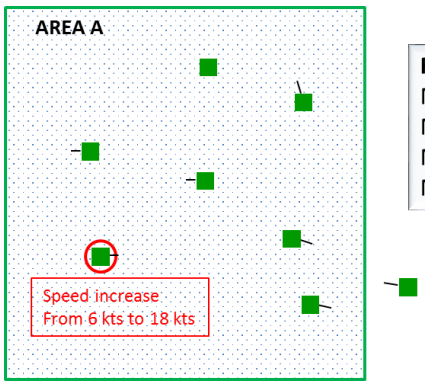
Kinematic Anomaly Detection function provides analysis of vessels with possible anomalous behaviour. Examples of this would include significant changes to course (e.g. 90 degrees in a short timeframe), change of speed (e.g. going from 5 knots to 20 knots in a short timeframe), deviating from known shipping lines in the high sea, coming to an all stop at sea without reporting any mechanical issues (perhaps to dump cargo for later collection), etc.

Kinematic Anomaly Detection Area:

TRITON will be able to detect kinematic anomalies when the user runs the function for a given time for a given Area with a set of rules. The user can set anomaly detection rules for an Area with at least the following:

- Area identification
- Minimum/maximum allowed speed
- Maximum speed change
- Maximum course change
- Begin and end time
- Status (active, inactive)

A notional example to Kinematic Anomaly Detection is given below:



Rules:

Minimum allowed speed	: 4 kts
Maximum allowed speed	: 12 kts
Maximum speed change	: 10 kts
Maximum course change	: 60 degrees

[T1-R436] *TRITON shall be able to detect course and speed changes based on user-defined rules for tracks that are in a given Area.*

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

[T1-R437] *TRITON shall allow the authorised user to define an Area and rules for kinematic anomaly detection for those tracks entering that Area.*

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

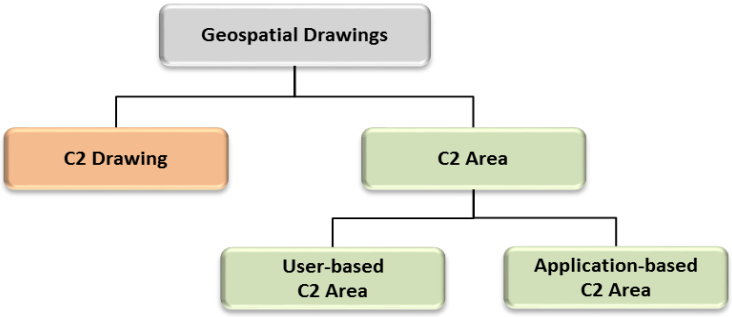
[T1-R438] *TRITON shall perform Kinematic Anomaly Detection as initiated by the users and notify the initiating user about the status of process.*

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

4.2.4.4. Geospatial Drawing Management

Geospatial Drawings (Geo-drawing) are graphical drawing objects having geospatial information which can be managed by users or applications. Their geospatial data can also be processed by applications. Users can create Geo-drawings using drawing primitives provided by the GeoView, assign values to their attributes, save them and retrieve them for displaying in a Layer.

A Geo-drawing can be created either by a user or an Application. TRITON will be able to handle the following types of Geo-drawings:



C2 Drawings are graphical objects created by users with the pointing device. Users can draw any kind of shape on a selected Layer of the GeoView using the Drawing capability. The Drawings are then used to visually enhance the Operational Picture and their geospatial data can be processed by Applications.

The users create C2 Drawings and assign values to their attributes. Examples to C2 Drawings are:

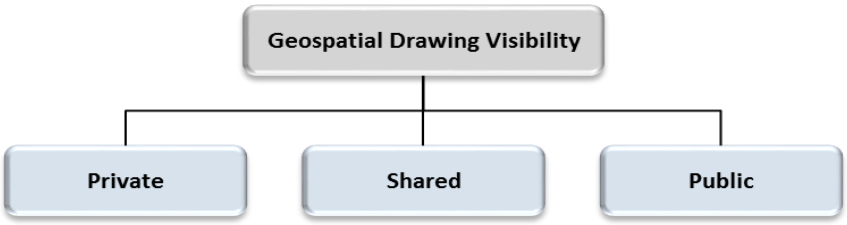
- Points (e.g. history of tracks)
- Lines (e.g. borderline, ship course, attack direction, movement indication, control features defined in APP-6)
- Areas (e.g. Exclusive/Inclusive Areas, fishing zone within national waters, danger areas).
- C2 Areas are predefined C2 Drawings having operational meaning created by a user or an Application. A formation of ships, dispositions, grids are examples.

Both types of Geo-Drawings can be associated to a track.

TRITON manages the Geo-Drawings, displays them based on their Visibility Types.

Visibility Types:

The Visibility Types of Geo-drawings are given below:



Private : Visible only by the user who has created it.

Shared : Visible to a group of users that are allowed by the creating user.

Public : Visible to all users.

Geo-drawing Attributes:

All Geo-Drawings have the following attributes (properties) as a minimum:

- Identification
- Name (or Label)
- Type (C2 Drawing, C2 Area)
- Description

- Tooltip text
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Owner
- Visibility (private, shared, public)
- Layer identification
- Drawing specifications (vertices' locations, size, colour, filling etc.)
- Geographical position of the geometric centre
- Associated Maritime Operational Object
- Date and Time (DTG) of Activation and Deactivation
- DTG of Deletion
- Status (active/inactive).

4.2.4.4.1. C2 Drawing Handling

C2 Drawings can be created using the Drawing capability of the GeoView. TRITON manages these Drawings and display them on the GeoView.

[T1-R439] *TRITON shall maintain a list of C2 Drawings for each Maritime Operation.*

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

[T1-R440] *TRITON shall allow the user to manage (create, modify, delete, activate/deactivate) the C2 Drawing List.*

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

[T1-R441] *TRITON shall allow the user to use the GeoView Drawing capability for creating C2 Drawings.*

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

[T1-R442] *TRITON shall allow the user to set attributes (properties) of a C2 Drawing.*

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

[T1-R443] *TRITON shall activate or deactivate a C2 Drawing according to its DTG settings.*

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

[T1-R444] *TRITON shall allow the user to activate or deactivate a C2 Drawing.*

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

[T1-R445] *TRITON shall display an active C2 Drawing in the GeoView on a user-specified Layer.*

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

[T1-R446] *TRITON shall notify the authorised user fifteen (15) minutes before a C2 Drawing is automatically deleted if it has DTG of Deletion.*

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

4.2.4.4.2. C2 Area Handling

C2 Areas consist of the following types:

- User-based C2 Areas
- Application-based C2 Areas

4.2.4.4.2.1. User-based C2 Area Handling

User-based C2 Areas are predefined Drawings created automatically when the necessary attributes are filled by the user. TRITON will implement at least the following C2 Areas without a capacity limitation for storing:

- Simple Area (with or without inner/outer borders)
- Special areas (e.g. firing zone, danger area)
- Maritime Disposition Four-Whiskey (4W) (ATP-1 Vol.1)
- Maritime Position and Intended Movement (PIM)
- Maritime Route (ship route with waypoints)
- Maritime Shipping Route Network
- Q-Route (Naval Mine Warfare)
- Water Space Management (WSM) - Moving Havens
- Maritime Area of Interest (AOI)
- Multi-leg Channel (centre line, width, vertices)

TRITON will manage the C2 Areas generated from templates.

[T1-R447] *TRITON shall maintain a list of User-based C2 Area Templates.*

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

[T1-R448] *TRITON shall allow the authorised user to manage (create, modify, delete) the User-based C2 Area Template List supported by the GeoView.*

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

[T1-R449] *TRITON shall maintain a list of User-based C2 Areas for each Maritime Operation.*

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

[T1-R450] *TRITON shall allow the authorised user to manage (create, modify, delete, activate/deactivate) the User-based C2 Areas List.*

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

[T1-R451] *TRITON shall allow the user to create a User-based C2 Area from the available Area Templates and set its attributes (properties).*

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

[T1-R452] *TRITON shall display a User-based C2 Area on the GeoView on a user-specified Layer when activated by the user.*

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

[T1-R453] *TRITON shall notify the authorised user fifteen (15) minutes before a User-based C2 Area is automatically deleted if it has DTG of Deletion.*

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

[T1-R454] *TRITON shall implement Templates for the User-based C2 Areas given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration
Comment : Implementation can be scheduled according to specific requirements of a Baseline.

4.2.4.4.2.2. Application-based C2 Area Handling

Application-based C2 Areas are predefined Drawings created automatically when the necessary attributes are filled by the Application. TRITON will implement at least the following Application-based C2 Areas without a capacity limitation for storing:

- Water Space Management (WSM) - Moving Havens
- CBRN Hazardous Area
- Maritime Furthest on Circle (FOC).

[T1-R455] *TRITON shall maintain a list of Application-based C2 Area Templates.*

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

[T1-R456] *TRITON shall allow the authorised user to manage (create, modify, delete) the Application-based C2 Area Template List.*

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

[T1-R457] *TRITON shall maintain a list of Application-based C2 Areas for each Maritime Operation.*

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

[T1-R458] *TRITON shall be able to manage (create, update, activate/deactivate, delete) an Application-based C2 Drawing automatically.*

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

[T1-R459] *TRITON shall display an Application-based C2 Drawing in the GeoView on a user-specified Layer when activated automatically.*

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

[T1-R460] *TRITON shall implement Templates for the Application-based C2 Areas given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration
Comment : Implementation can be scheduled according to specific requirements of a Baseline.

4.2.4.5. Tools

TRITON will provide various utility tools to quickly compute navigational values and to assist presentation of information.

4.2.4.5.1. Unit Converter

TRITON will provide a Unit Converter which can perform conversion of units relevant to maritime domain. The Unit Converter will be able convert a given value in a selected unit to another selected unit in the areas given below:

Conversion Areas:

- Distance (Nautical Mile, Statute Mile, Data Mile, Yard, Feet, Metre, Kilometre)
- Wind speed and force (e.g. Beaufort to km/h)
- Speed (knots, Data Mile per hour, km/h, m/s, mph)
- Weight/Mass
- Length
- Area
- Volume
- Temperature
- Density/Pressure

The conversion routines will be provided as a service which can be used by other components/modules.

[T1-R461] *TRITON shall provide a Unit Converter application supported by a conversion service, which shall be made available to internal and external use.*

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

[T1-R462] *TRITON Unit Converter shall provide the Conversion Functions conversion of nautical measurement, speed, weight/mass, area, volume, temperature and density/pressure values.*

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

[T1-R463] *TRITON shall allow the user to activate the Unit Converter and perform conversions for the given values between selected units.*

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

4.2.4.5.2. Coordinate Converter

TRITON will use geographical positions in one of the following ways:

- Latitude/Longitude and Geodetic Datum
- Universal Transverse Mercator (UTM)
- Common Geographic Reference System (CGRS)

- Military Grid Reference System (MGRS)

TRITON will be able to convert a given geographical position to any other including the following types of input data:

- Degrees/Minutes/Seconds
- Decimal degrees
- Degrees and Decimal Minutes
- Degrees, Minutes and Decimal Seconds
- Other Geodetic Datum.

[T1-R464] *TRITON shall be able to convert position data from/to any of the Latitude/Longitude, Geodetic Datum, UTM, CGRS and MGRS values.*

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

[T1-R465] *TRITON shall allow the user to enter a geographical position in one coordinate system to convert it into a selected coordinate system. A conversion service, available to internal and external use should be used (It may be combined with the unit converter).*

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

4.2.4.5.3. Logbook

TRITON will provide a "Logbook" to record important events having operational meaning (like a ship log). A configurable set of user and system actions will be recorded automatically in the Logbook. The authorised user can also add entries into the Logbook in free text.

Logbook Action List:

A sample set of information, in two parts, as the Logbook Action List is given below:

Operational Part:

- Sending Formatted Messages
- Dissemination of Maritime Information

Technical Part:

- Maritime Operation creation
- System mode changes, start-up, shut-down
- Addition or removal of data sources (e.g. a new AIS Data Source is added)
- Information exchange start, stop (e.g. a Nation Interface with Nation A has started at 11:00 to send RMP.)

Each record in the Logbook will have metadata which includes the event, current user, description and timestamp.

The authorised user can configure the Logbook Action List. The Logbook cannot be modified by any user, but can be viewed by the authorised user. TRITON will start logging when a Maritime Operation is created, continue logging until the Operation is deleted, and then archive it (see Archiving).

[T1-R466] *TRITON shall maintain a Logbook for each Maritime Operation.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R467] *TRITON shall allow the authorised user to configure the Logbook Action List.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Test
Comment : The actual events subject to logging will be determined at Software Design Review.

[T1-R468] *TRITON shall create and start a Logbook automatically when a new Maritime Operation is created.*

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

[T1-R469] *TRITON shall allow the authorised user to explicitly stop logging data into the Logbook and start again.*

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

[T1-R470] *TRITON shall allow the authorised user to make an entry in free text into the Logbook.*

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

[T1-R471] *TRITON shall allow the user to view the Logbook in sortable tabular format with a search capability.*

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

[T1-R472] *TRITON shall log an event into the Logbook with the current user, description and timestamp.*

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

[T1-R473] *TRITON shall allow the authorised user export the Logbook in Recognised Output File Format.*

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

Baseline : BL 2
Qualific. Method : Test

[T1-R474] *TRITON shall archive the Logbook after a period of time as configured by the authorised user. By default the Logbook shall be archived after thirty (30) days of Logging Period. If logging activity reaches the limit of the default log file size before the Logging Period is completed, TRITON shall create another Logbook file and continue logging.*

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

4.2.5. Maritime Operational Planning and Execution

Maritime Operational Planning includes a number of functions for planning and C2 of maritime operations at operational and tactical level. 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 to project power from the sea. Planning functions help to quickly develop an action plan to achieve a task.

TRITON manages Maritime Operations in global scope having Maritime Missions and Maritime Unit Tasks associated to that Operation. Increment 1 only manages the Maritime Operations. Missions and Tasks will be added in Increment 2.

4.2.5.1. Maritime Task Organization Management

NATO uses three systems, all in force at the same time, for organising the maritime operational units allocated to various commands as defined in AJP 3.1:

Task Organization: This type of organization structures forces to accomplish the assigned mission, and provides the necessary flexibility for meeting changing operational requirements while retaining a clear indication of the chain of command. Whenever a task organization is created, the commander shall be named in the order creating it.

Type Organization: The organization of units normally of the same type into fleets/flotillas/groups/squadrons, divisions and subdivisions together with assigned flagships, tenders, and aircraft. Type organization is mainly for national administration and logistic purposes.

Warfare Organization: The functional organization of forces assigned to conduct tasks within a specific area of maritime operations (e.g. AAW, ASUW, ASW). The warfare organization can be implemented within either a task, or type organization.

Since the term ORBAT is not commonly used in Maritime Community, TRITON will manage "Task Organizations" by storing and managing the information about Operations, NATO Maritime Task Forces, Task Groups, Task Units and Task Elements which are defined below:

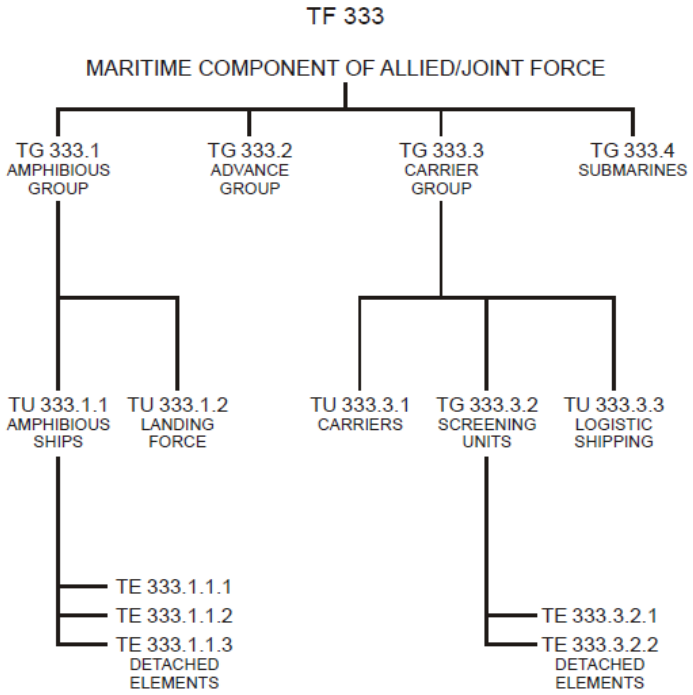
Task Force: A Task Force (TF) is a large maritime formation capable of conducting the full range of maritime operations. A TF will combine several packages normally including a carrier battle group as well as maritime air, land attack and amphibious capabilities.

Task Group: Task Groups (TG) are able to conduct and sustain maritime operations within their special warfare areas through their organic C2 capability (on a tactical level) and would possess organic support elements.

Task Unit: A Task Unit (TU) is a maritime asset which serves special purposes.

Task Element: A Task Element (TE) is a maritime asset subordinate to TUs.

Task organization is designated using task force numbers. Following figure depicts an example of command relationships [AJP 3.1]:



TRITON will maintain Maritime Task Organization within a Maritime Operation (see Maritime Operation Management). An authorised user can manage (including creation, modifying, saving) Maritime Task Organizations. TRTION will be able to display the items in the Task Organization in a tree-like display which can be expanded starting from Maritime Operation down to Task Elements.

Maritime Task Organization:

A Maritime Task Organization will be represented in TRITON with at least the following attributes:

- Unique name for the Maritime Task Organization
- Organization ID code (number set with x.x.x.x notation)
- Serial (reference to higher organization)
- Begin-end dates
- List of Task Forces, Groups and Units
- Associated Maritime Operation
- Remarks

The descriptions of organizational items used in TRITON Maritime Task Organization are given below:

Task Element:

A Task Element will be represented with at least the following attributes:

- ID code (unique)
- Serial
- Nation
- Capabilities (text)
- Functional category (i.a.w. APP-6)
- Commitment status and effective date
- Current Activity
- Future Activity
- Associated Vessel (linked to the Vessel Database with TRITON Vessel Number)
- Associated Equipment (if exists in another database)

- Ratings and effective dates (personnel strength rating, equipment holding rating, ammunition holding rating, fuel holding rating)
- Remarks

Task Unit:

A Task Unit will be represented with at least the following attributes (fields of OPSTATUNIT can be used):

- ID code (unique)
- Serial
- Nation
- Capabilities (text)
- Functional category (i.a.w. APP-6)
- Commitment status and effective date
- Current Activity
- Future Activity
- Associated Vessel (linked to the Vessel Database with TRITON Vessel Number)
- List of Task Elements
- Radio Silence status
- Associated Maritime Unit Task or Maritime Mission (text)
- Associated Target List (placeholder)
- Link to Friendly ORBAT
- Remarks

Task Group:

A Task Group will be represented with at least the following attributes:

- ID code (unique)
- Serial
- Nations
- Capabilities (text)
- Functional category (i.a.w. APP-6)
- Commitment status and effective date
- Current Activity
- Future Activity
- Objectives
- Commanders
- Areas of Interests
- List of Task Units
- Radio Silence status
- Associated Maritime Task or Maritime Mission (text)
- Associated Target List (placeholder)
- Link to Friendly ORBAT
- Remarks

Task Force:

A Task Force will be represented with at least the following:

- ID code (unique)
- Serial
- Begin-end dates
- Current Activity
- Future Activity

- List of Task Groups
- Associated Maritime Mission (text)
- Associated Target List (placeholder)
- Link to Friendly ORBAT
- Remarks.

[T1-R475] *TRITON shall maintain a list of Maritime Task Organization with attributes as given in the Description for each identified Maritime Operation.*

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

[T1-R476] *TRITON shall allow the authorised user to manage (create, modify, save, delete, import, export) the Maritime Task Organization List.*

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

[T1-R477] *TRITON shall display Maritime Task Organizations in a tree-like structure in the AppView, starting from Maritime Operation down to Task Elements with an option to expand at each level.*

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

[T1-R478] *TRITON shall allow the user to view the selected units of a Maritime Task Organization in the GeoView.*

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

4.2.5.2. Area of Interest Management

Area of Interest (AOI) is the area of concern to a commander relative to the objectives of current or planned operations, including his areas of influence, operations and/or responsibility, and areas adjacent thereto (AAP-6). There are also following Area Types:

Area of Responsibility (AOR):

AOR is the geographical area assigned to the Supreme Allied Commander Europe. In naval operations, a predefined area of enemy terrain for which supporting ships are responsible for covering by fire on known targets or targets of opportunity and by observation.

Area of Operations (AOO):

AOO is an operational area defined by a joint commander for land or maritime forces to conduct military activities. Normally, an Area of Operations does not encompass the entire joint operations area of the joint commander, but is sufficient in size for the joint force component commander to accomplish assigned missions and protect forces. Operational area is an overarching term encompassing more descriptive terms for geographic areas in which military operations are

conducted. Operational areas include, but are not limited to, such descriptors as area of responsibility, theatre of war, theatre of operations, joint operations area, amphibious objective area, joint special operations area, and area of operations (APP-6).

AOO may have the following types:

Named Area of Interest (NAI):

NAI is a geographical area where information is gathered to satisfy specific intelligence requirements (APP-6).

Target Area of Interest (TAI):

TAI is the geographical area where high-value targets can be acquired and engaged by friendly forces.

Area Operations:

In maritime usage, operations conducted in a geographical area and not related to the protection of a specific force.

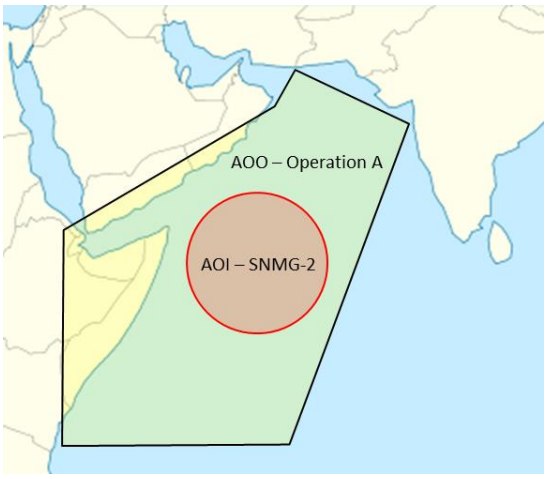
Area Search:

Reconnaissance or search of a specific area to provide new or updated information on general or specific situations and/or activities.

Area Target:

A target consisting of an area rather than a single point.

In general, AOIs are represented on the GeoView as shown below:



AOI Data:

An AOI representation in TRITON will have at least the following attributes:

- Name
- Area Type (as defined above)
- Description
- Associated Maritime Operation
- Associated Maritime Task Organization
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Area definition (a geographic area with anchor points)
- Related Areas (list of other areas within this Area)
- Type (static or slaved to a vessel)
- Slaved vessel identification
- Point of reference

TRITON will maintain a list of AOIs to be managed by the authorised users. An AOI may have nested AOIs in its structure.

TRITION on ACPs (Deployable Kits) can define an AOI with the ACP being the slaved vessel, to indicate their AOO. This AOO will then be used by the TRITON Server (via SIS TRITON) to synchronise only the relevant parts of the databases.

AOIs can also be used as an area filter for maritime analysis.

[T1-R479] *TRITON shall maintain a list of Areas of Interest (AOI) for each Maritime Operation.*

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

[T1-R480] *TRITON shall allow the authorised user to manage (create, modify, delete) the AOI List.*

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

[T1-R481] *TRITON shall allow the authorised user to create a static AOI with a point of reference at an indicated geographic location.*

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

[T1-R482] *TRITON shall allow the authorised user to slave an AOI to a vessel at its point of reference.*

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

[T1-R483] *TRITON shall allow the authorised user to create an AOI by either entering location values or drawing as an Area and display it on the GeoView as a layer.*

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

[T1-R484] *TRITON shall allow the authorised user to associate an AOI to a group, element or unit in an Maritime Task Organization.*

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

4.2.5.3. Rules of Engagement Management

Rules of Engagement (ROE) are directives issued by competent military authority which specify the circumstances and limitations under which forces will initiate and/or continue combat engagement with other forces encountered [AAP-6]. ROE generally limit the otherwise lawful use of force.

ROE Data:

TRITON will keep a list of ROEs for a Maritime Operation and update the list as relevant messages arrive. An ROE Data record will contain at least the following:

- Unique identification
- Associated Maritime Operation
- ROE
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Status (implemented/cancelled)
- DTG
- Remarks

ROE Profile:

ROE Profile is also defined as a list of rules of engagement selected for a force assigned to a particular role or Maritime Operation within defined time and space boundaries. Following Formatted Messages are used:

- ROE Request (ROEREQ) Message is used to ask for authorisation to implement specific ROEs.
- ROE authorisation (ROEAUTH) Message is used by the North Atlantic Council (NAC)/Defence Planning Committee (DPC) to authorise implementation or cancellation of specific ROEs.
- ROE Implementation (ROEIMPL) Message is used to implement and/or cancel specific ROEs.

[T1-R485] *TRITON shall maintain an ROE List for each Maritime Operation*

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

[T1-R486] *TRITON shall allow the authorised user to manage (create, modify, delete) the ROE List.*

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

[T1-R487] *TRITON shall be able to build the ROE List from a received ROEAUTH Message.*

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

[T1-R488] *TRITON shall allow the user to display the ROE Profile.*

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

[T1-R489] *TRITON shall maintain an ROE Request List for each Maritime Operation.*

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

[T1-R490] *TRITON shall allow the authorised user to process the requests in the ROE Request List.*

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

[T1-R491] *TRITON shall allow the authorised user to issue ROE Request to be processed by the higher command. Each Request will automatically enter into the ROE Request List.*

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

[T1-R492] *TRITON shall be able to generate ROEREQ Message to assist the users of subordinate commands to prepare the message.*

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

[T1-R493] *TRITON shall be able to generate ROEIMPL Message based on the selected ROEs in the ROE List to distribute them to subordinate commands.*

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

[T1-R494] *TRITON shall allow the authorised user to set the ROE Status (implementation or cancellation) and notify the authorised users of the subordinate commands.*

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

[T1-R495] *TRITON shall be able to send the ROEREQ and ROEIMPL Messages to MHS for distribution.*

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

4.2.5.4. Maritime Planning Aids

Maritime Planning Aids provide the planners tactical-level planning capabilities. These tools can be used to plan movements of maritime assets. Dispositions, Position of Intended Movement and Q-Routes are covered.

4.2.5.4.1. Disposition Management

A disposition is a combination of two or more formations and may be formed by linear or circular methods. TRITON provides the users with predefined templates to create dispositions, assign assets and set their visibility as Private, Shared, Public.

Disposition:

A Disposition has at least the following attributes:

- Disposition Name
- Visibility (Private, Shared, Public)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Status (active, inactive)

TRITON will keep a list of Dispositions for each Maritime Operation without a capacity limitation.

[T1-R496] *TRITON shall maintain a list of Dispositions for each Maritime Operation.*

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

[T1-R497] *TRITON shall allow the authorised user to manage (create, modify, delete) the Disposition List.*

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

[T1-R498] *TRITON shall allow the authorised user to set visibility, Security Classification and Releasability Label of Dispositions.*

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

[T1-R499] *TRITON shall display Dispositions in the GeoView as a Layer with user-selected label options.*

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

4.2.5.4.1.1. Disposition Four Whiskey

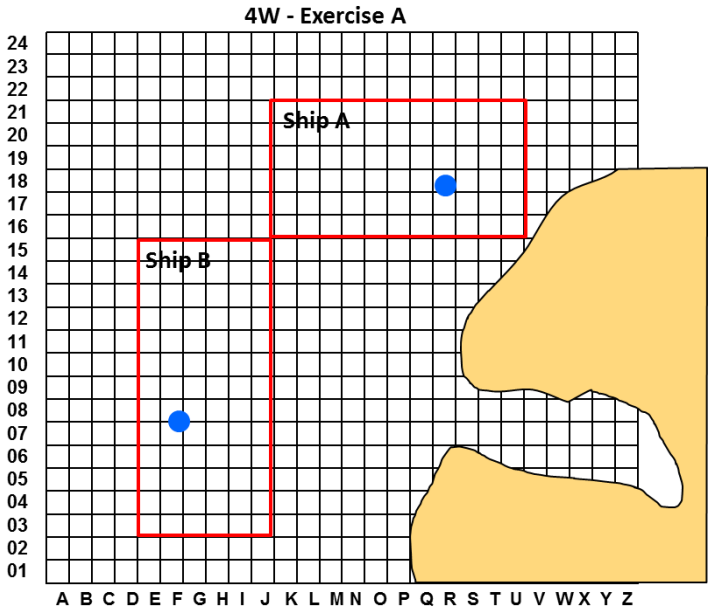
Disposition Four-Whiskey (4W) is used i.a.w. ATP-01, Vol. I, para 3218 on a pointer position or on a selected track. The Disposition 4W may be displayed as a square grid consisting of 24 x 24 to 48 x 48 cells. Units of 4W are assigned areas of the grid within which they may move about freely. One cell of the 4W grid is designated as the PIM cell and is the key to geographic positioning of the disposition. The grid can be assigned at a user point, a track or a PIM route.

Disposition 4W consists of at least the following attributes:

- Disposition
- Number of grid points
- Cell size
- Assigned ship name
- User point
- Track
- PIM track (route)

TRITON will provide the user with the capability of 4W Editor.

A sample Disposition 4W is given below:



[T1-R500] *TRITON shall maintain a list of Disposition 4W for each Maritime Operation.*

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

[T1-R501] *TRITON shall allow the authorised user to manage (create, modify, delete) Disposition 4W List.*

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

[T1-R502] *TRITON shall have Disposition 4W Editor.*

Requirement Property :

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

[T1-R503] *TRITON shall allow the authorised user to generate Disposition 4W i.a.w. ATP-01 on a pointer position or on a selected track with given attributes.*

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

[T1-R504] *TRITON shall allow the authorised user to select the Disposition 4W grid boxes by either using the pointing device or manually entering the their identification.*

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

[T1-R505] *TRITON shall allow the authorised user set visibility and status of Disposition 4W.*

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

[T1-R506] *TRITON shall be able to display the Disposition 4W in the GeoView as a Layer.*

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

4.2.5.4.2. Position and Intended Movement

Position and Intended Movement (PIM) is a navigational plot where the intended route and timeline of a unit is illustrated. PIM Routes (a.k.a. tracks) can be used for normal ship/battle group movement (navigation planning), possible threat movements, and for mission planning for aircraft and submarines.

Waypoint:

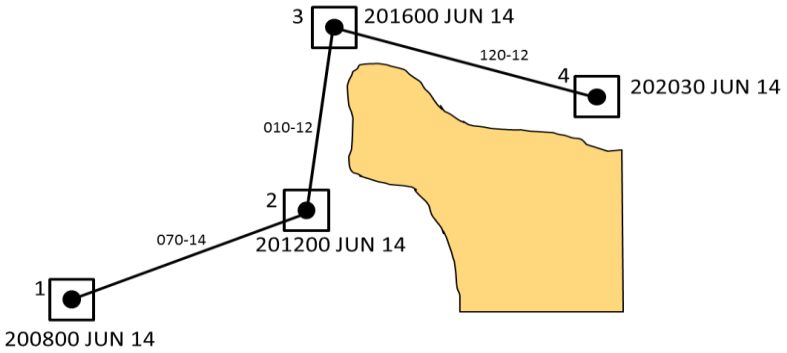
A Waypoint is a position where there is change in course and/or speed. A PIM Route consists of two or more legs separated by Waypoints. Each Waypoint has an identification, a geographical position and a DTG which indicates the time that the vessel be at that point.

Leg:

A Leg is a track which connects two Waypoints. It has a course and speed value, which the vessel must follow to reach the next Waypoint.

PIM Route:

A PIM Route is a path or a track, with a number of Waypoints connected with Legs. A PIM Route is plotted on the GeoView with a symbol indicating the Waypoint and Legs along the track. Any user can create a PIM Route by manually entering the Waypoint positions or by selecting the positions on the GeoView. A sample PIM Route display is given below:



TRITON will store PIM Routes with at least the following attributes:

- PIM Route name
- Visibility (Private, Shared or Public)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Status (active, inactive)
- List of Waypoints and Legs (any number)

Modes:

Speed-oriented:

When a PIM Route is created with a user-selected constant speed, the DTG of each Waypoint is calculated automatically as they are created. As the user sets the initial position and DTG, by either defining the First Waypoint in the list or selecting a Starting Position on the GeoView. Next creation of a new Waypoint in the list with a position causes calculation of the DTG and course. Similarly, the next selection on the GeoView causes creation of a new Waypoint with a calculated DTG and course. Modification of speed will cause re-calculation of DTG of Waypoints. Modification of Waypoint position in the list or on the GeoView will also cause re-calculation of DTG values.

Time-oriented:

When a PIM Route is created with Time-oriented method, the DTG of each Waypoint is entered manually. The speed on each Leg is calculated automatically. Modification of Waypoints will cause re-calculation of course and speed values.

When the user completes the creation of a PIM Track, he/she sets the Visibility, Security Classification, Releasability Label and saves it. If it is activated it will be displayed on the GeoView. Displaying the PIM Tracks on the GeoView is subject to the current projection system calculation.

[T1-R507] *TRITON shall maintain a list of Position and Intended Movement (PIM) Routes for each Maritime Operation.*

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

[T1-R508] *TRITON shall allow the authorised user to manage (create, modify, delete) the PIM Route List.*

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

[T1-R509] *TRITON shall allow the authorised user to create a PIM Route in Speed-oriented Mode by entering the constant speed and creating the Waypoints. TRITON shall calculate the DTG of each Waypoint automatically.*

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

[T1-R510] *TRITON shall allow the authorised user to create a PIM Route in Time-oriented Mode by entering the DTG of the Waypoints. TRITON shall calculate the speed to be used at each Leg automatically.*

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

[T1-R511] *TRITON shall allow the authorised user to create a PIM Route in the GeoView, indicating the start position and Waypoints.*

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

[T1-R512] *TRITON shall be able to display the selected PIM Routes as a Layer in the GeoView according to their visibility settings.*

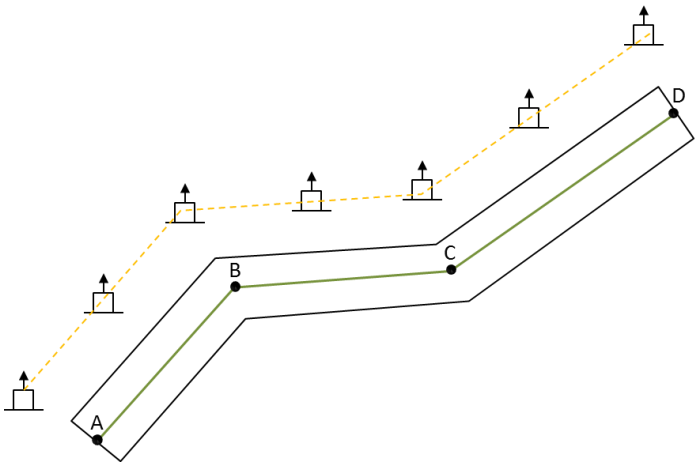
Requirement Property :
- Domain for Static : NS
- Domain for Afloat: NS
- Baseline : BL 3
- Qualific. Method : Demonstration

4.2.5.4.3. Q-Route Management

It would be impossible to search all mineable waters in which ships normally navigate. For this reason pre-planned, dormant, channels, routes and anchorages are surveyed during peacetime. Although they are not routes in the strictest sense, anchorages, in view of their importance to shipping, and for the fact they may be subject to Mine Countermeasures (MCM), are categorised as "routes". They should be designed in accordance with geographic features of the area and may therefore be either circular or box shape. Selection of known routes for use by allied shipping during tension or war enables environmental data and prominent sonar contacts on, or near, the routes to be collected in peacetime and compiled by national Mine Warfare Data Centres and inserted into comprehensive Mine Warfare Pilots (AMP-11) for use by MCM forces. Account is also taken in selecting routes that assist with the defence of allied shipping from air, surface, and sub-surface attack. Thus dormant routes are established ready for activation in tension or war in order that defences can be concentrated and used more economically [MTP-06].

"Q-Route" is a series of maritime routes that a ship may follow when transiting between the open ocean and port approaches. Channels are normally established to coincide with routes, the centreline of the channel being identical to the line connecting the route positions. Channels will usually be marked by offset buoys (if redundancy is required),.

A sample channel also marked with buoys is shown below:



The predefined Q-Routes are given in [AHP-7]. Users can create these routes in TRITON using this capability or importing previously defined Q-Routes.

Types of Q-Routes:

Routes may be subdivided into the following:

- Transit. A route which crosses the open water joining two coastal routes.
- Coastal. A route, normally following the coastline, which joins adjacent approach routes.
- Approach. A route which joins a port to the coastal or a transit route.
- Local. A route that connects the Fairway Buoy to the harbour.
- Link. A route, other than a coastal route, transit route or local route, which links two or more routes.
- Diversion. A route which bypasses a section or the whole of a transit, coastal, or approach route or link.
- Channel. The whole, or part of a route on which MCM operations will be or have been conducted. The width of the channel must be specified; the narrower the channel the fewer number of enemy mines likely to be found in it, and thus it is likely to be safer. The minimum width of a channel is governed by the requirements of safe navigation.
- Exercise Routes. Used solely for exercise purposes or to maintain the integrity of dormant wartime routes.
- Q-Anchorage. A wartime anchorage which is designated as a~~n~~ Q-Anchorage for use by Q-Route shipping. Q-Anchorages are subject to Q-Route security classification; they interface directly with Q-Routes and are subject to active MCM and route survey procedures. Q-Anchorages may coincide with peacetime anchorages, can be in either national or international waters and are based on the criteria laid down in MTP-06.

Q-Route Data:

TRITON will maintain a list of Q-Routes each having at least following attributes (details are in [MTP-06], [ATP-06], [AHP-1~~1~~]):

- Q-Route Identification (3 or 4 digit number)
- Q-Route Name
- Q-Route Type
- Visibility (Private, Shared or Public)
- Current Maritime Operation
- Security Classification
- Classification Colour (Red, Yellow, Green)
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Status (Dormant, Active)
- Activation DTG

- De-activation DTG
- Description (amplifying text)
- List of sections (legs)
  - Section Label
  - Geographical Position of each points along channel on the centre line
- Channel width
- Minimum depth

Although Q-Routes are related to Mine Warfare, TRITON will allow the user to create Q-Routes as C2 Areas and display them in the GeoView.

This information is made available to selected maritime assets on the NS Domain. It may also be needed to plot some Q-Routes on the NU Domain.

[T1-R513] *TRITON shall maintain a list of Q-Routes for each Maritime Operation.*

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

[T1-R514] *TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the Q-Route List.*

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

[T1-R515] *TRITON shall allow the authorised user to create a Q-Route by entering attribute values manually.*

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

[T1-R516] *TRITON shall allow the authorised user to create a Q-Route by using the Geospatial Drawings and entering the values for the attributes.*

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

[T1-R517] *TRITON shall display Q-Routes in Layers in the GeoView according to their visibility settings.*

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

4.2.5.4.4. Navigational Area Management

TRITON will be able to manage various areas having navigational importance. Following are examples:

- Transit corridors
- Avoidance areas
- Fishing areas
- Anchorage areas
- Non-anchorage areas

These areas will be defined using Reference Object-Area and maintained in a list of Navigational Areas. A Navigational Area will have the following attributes:

- Navigational Area Name
- Visibility (Private, Shared or Public)
- Current Maritime Operation
- Security Classification
- Releasable Maritime Operations (more than one Maritime Operation can be indicated)
- Status (active, inactive)
- A list of Areas (as Reference Objects)
- Remark

[T1-R518] *TRITON shall maintain a list of Navigational Areas for each Maritime Operation.*

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

[T1-R519] *TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the Navigational Area List.*

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

[T1-R520] *TRITON shall allow the authorised user to create a Navigational Area using the Reference Object-Area.*

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

[T1-R521] *TRITON shall allow the user to display selected Navigational Areas in the GeoView.*

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

4.2.5.5. Subsurface Mission Space Management

Sub-surface mission space used by submarines, mine countermeasure units, divers or other activities below surface is required to be managed for safety reasons. operational requirements cover the process and procedures needed to avoid mutual interference of Alliance sub-surface vehicles. The mission space is managed for war time and peace time with the following functions:

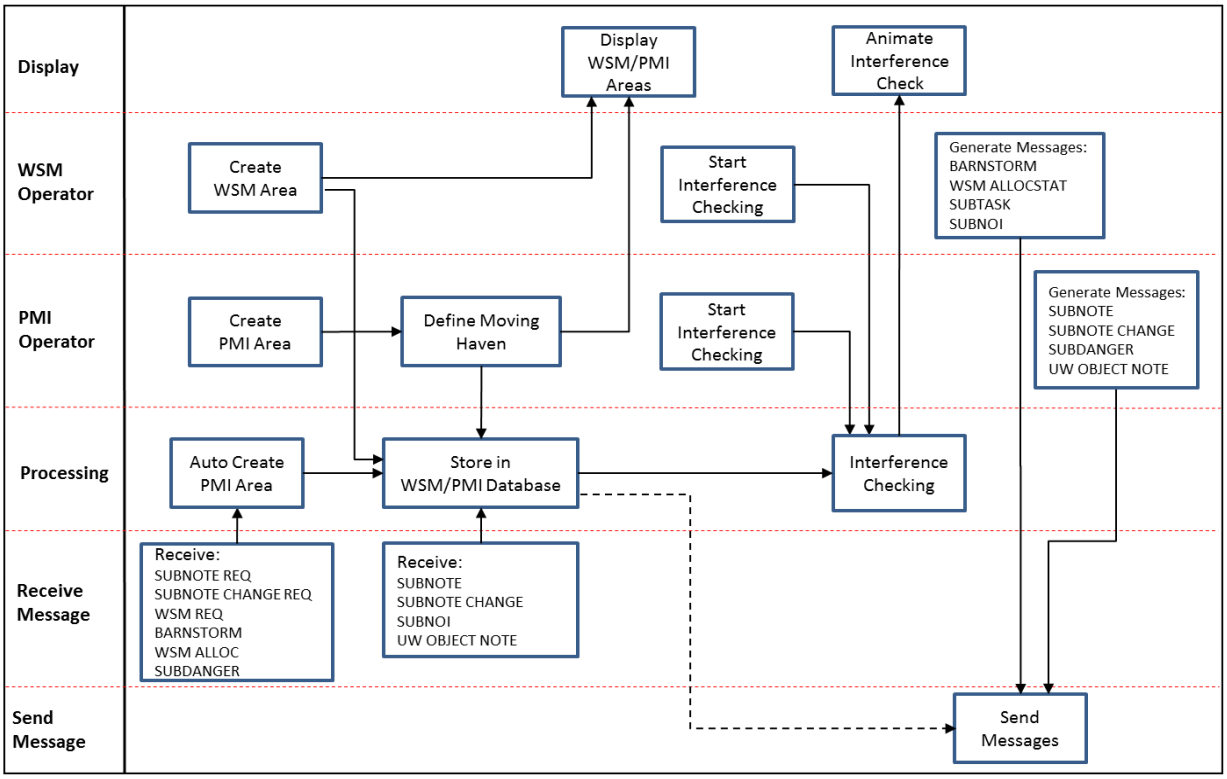
Water Space Management (WSM):

The purpose of the WSM is allocate waterspace in terms of ASW attack restrictions to permit the rapid engagement of enemy submarines while preventing inadvertent attack of friendly submarines.

Prevention of Mutual Interference (PMI):

The purpose of the PMI is to prevent interferences between submarines and any hazard for the submarine navigation.

TRITON WSM/PMI functionality will include the ability to check interferences, handle water space requests, allocations and notifications. The process is shown in the following diagram:



4.2.5.5.1. WSM/PMI Area Definition

The sub-surface mission space under water is controlled by the authorised user by defining "WSM/PMI Areas". Following areas are applicable [ATP-01]:

- ASW Free Area
- Submarine Action Area
- Joint Action Area
- ASW Area of Responsibility
- Submarine Safety Lanes
- Task Group Submarine Area

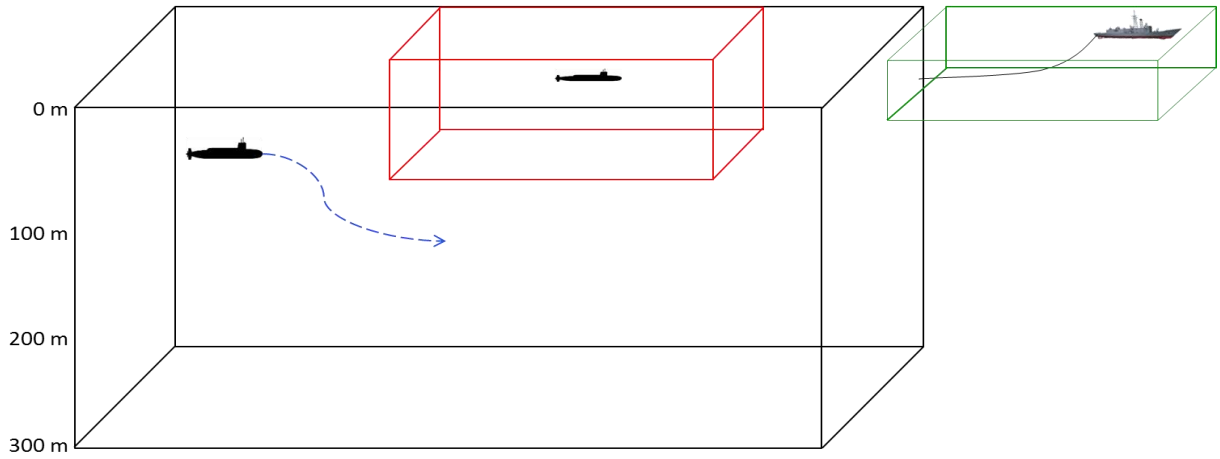
TRTION will use the following attributes to define a WSM/PMI Area, in addition to the Reference Object-Area attributes:

- Type of the Area (WSM Area, Moving Haven)
- Geographic Position of the Area
- Referenced Maritime Operational Object
- Minimum Depth
- Maximum Depth
- Moving Haven size (ahead, behind, either sides)
- Vertical Separation (below surface)

- Message Reference
  - Message Type
  - Reference Number
  - DTG
- Associated Maritime Task Unit
- Responsible Command
- Status (Activated or Deactivated)
- List of Affected Units
  - Type (submarine, other)
  - Nationality
- Remarks

Users can build and manage sub-surface WSM/PMI Areas and Moving Havens (MHN) i.a.w. ATP-18. For PMI, a MHN is a three-dimensional box that is designated to the submarine for submerged operations along a track (route). This box moves along the PIM track (route) at the Speed of Advance (SoA) of the track. Depths can be assigned for both the minimum and maximum depths.

A conceptual illustration of a PMI Area is given below:



TRITON will display the WSM/PMI Areas in 2D while doing the checks in 3D.

[T1-R522] *TRITON shall maintain a WSM/PMI Database to keep WSM/PMI Areas and tracks (routes) for supporting both WSM and PMI Functions.*

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

[T1-R523] *TRITON shall allow the authorised user to set Visibility, Security Classification, Releasability Label of WSM/PMI Areas and modify their drawing attributes (drawing colour, fill colour, transparency).*

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

[T1-R524] *TRITON shall be able to display the WSM/PMI Areas and Moving Havens in the GeoView.*

Requirement Property :
Domain for Static : NS

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

[T1-R525] *TRITON shall be able to display all WSM/PMI Areas in sortable tabular format in the AppView.*

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

[T1-R526] *TRITON shall allow the authorised user to filter the tabular format of the WSM/PMI Areas displayed in the AppView with an option to display the selected ones in the GeoView.*

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

[T1-R527] *TRITON shall allow the user to select the WSM/PMI Areas to display them in the GeoView.*

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

4.2.5.5.2. Interference Check

When WSM/PMI Area is created, the authorised user can initiate an Interference Check. The checking process compares the areas and reports all conflicts between areas, tracks, grid assignments, and area sequences for surface and subsurface operations, including SUBDANGERs, UWONOTEs, HYDROLANTs, etc.

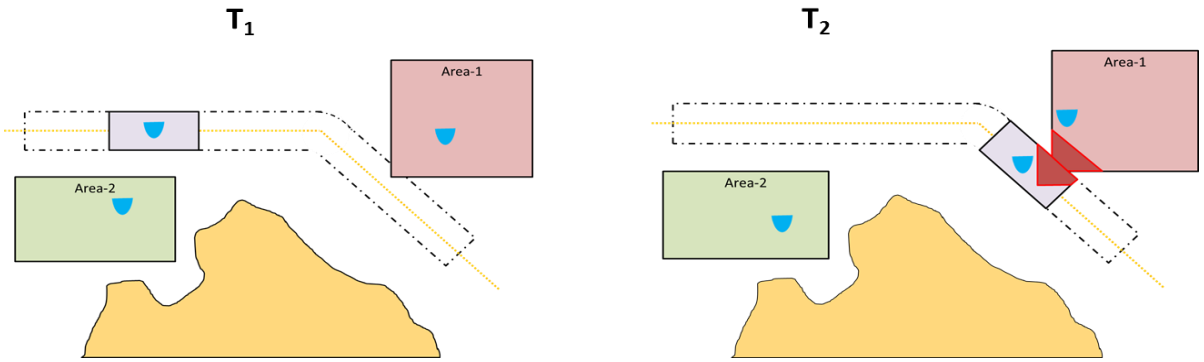
When activated, TRITON compares a given PMI Area and MHN, in three dimensions, using the Interference Check Criteria, with the other PMI Areas; in a similar way it compares the WSM Areas in two dimensions.

Interference Check Criteria:

The Interference Check Criteria consists of at least the following:

- PMI Area or MHN touches or crosses another PMI Area or MHN horizontally or vertically
- WSM Area touches or crosses another WSM Area horizontally

TRITON will also display WSM/PMI Areas and MHNs in two dimensions with top-view on the GeoView. An example showing the interference between an active area and a moving submarine with an animation is given below:



TRITON will be able to animate a given WSM/PMI Area according to the speed of the MHN using accelerated time. If there is a conflict with another WSM/PMI Area, an indication of the conflict will be displayed.

[T1-R528] *TRITON shall be able to perform Interference Check according to the Interference Check Criteria (as given in the Description) for overlapping WSP/PMI Areas and tracks assigned to different units under consideration of depth separation.*

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

[T1-R529] *TRITON shall allow the authorised user to set a time and a horizontal distance value which is added to each direction of all WSM/PMI Areas before checking for overlap.*

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

[T1-R530] *TRITON shall notify the authorised user if there is an interference with other areas when the user creates a new area and initiates a check process.*

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

[T1-R531] *TRITON shall allow the authorised user to calculate the vertical separation based on ATP-18(G)(NAVY) Para. 0226 (NU).*

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

[T1-R532] *TRITON shall allow the authorised user to exclude specific WSM/PMI Areas from Interference Checks for specified units.*

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

[T1-R533] *TRITON shall display all WSP/PMI Area interferences in sortable tabular format in the AppView.*

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

[T1-R534] *TRITON shall be able to animate a selected WSM/PMI Area and Moving Haven starting from a given position, time, duration and update rate. Forward or backward animation shall be possible. The animation capability of the GeoView (Animating C4ISR Objects) shall be used.*

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

[T1-R535] *TRITON shall allow the authorised user to initiate an animation for a selected WSM/PMI Area and Moving Haven by setting the starting position, time, duration of animation and interval for position update with at least one (1) minute steps.*

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

[T1-R536] *TRITON shall allow the authorised user to pause the animation, modify the WSM/PMI Area and Moving Haven and resume the animation. The Timeline of the GeoView may be used to control the animation.*

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

[T1-R537] *TRITON shall allow the authorised user to set the start time of the WSM/PMI animation to the beginning of a selected interference.*

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

[T1-R538] *TRITON shall be able to generate SUBNOTE and SUBNOTE CHANGE messages based on user-selected Moving Havens. The user shall be able to send these messages to the Message Handling System.*

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

4.2.5.5.3. Prevention of Mutual Interference

The Prevention of Mutual Interference (PMI) provides the authorised user to avoid the risk of submerged interference between friendly submarines, between submarines and friendly ship-towed bodies or between submarines and any other underwater or surface objects. The PMI concept prevails in the conduct of daily operations during peacetime, including exercises.

[T1-R539] *TRITON shall allow the authorised user to manage (create, modify, delete) the PMI Areas in the WSM/PMI Database.*

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

[T1-R540] *TRITON shall be able to generate PMI Areas as a Formatted Message.*

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

[T1-R541] *TRITON shall allow the authorised user to generate SUBDANGER and UW OBJECT NOTE Messages. The user shall be able to send these messages to the Message Handling System.*

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

4.2.5.5.4. Water Space Management

The Water Space Management (WSM) is a set of operating areas and attack rules specifically defined for submarine and Anti-Submarine Warfare (ASW) assets.

TRITON will maintain the WSM Areas in the WSM/PMI Database. WSM Areas will be checked against the other WSM Areas. The authorised user will be able to create a WSM Area when a WSM Request is received. The user will be able to generate Formatted Messages using the WSM Areas.

[T1-R542] *TRITON shall allow the authorised user to manage (create, modify, delete) the WSM Areas in the WSM/PMI Database.*

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

[T1-R543] *TRITON shall maintain a list of WSM Requests.*

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

[T1-R544] *TRITON shall allow the authorised user to manage (create, modify, delete) the WSM Request List.*

Requirement Property :
- Domain for Static : NS

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

[T1-R545] *TRITON shall allow the authorised user to create a WSM Request in the WSM Request List when a WSM REQ message is received.*

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

[T1-R546] *TRITON shall be able to generate BARNSTORM, WSM ALLOCSTAT, SUBTASK and SUBNOI messages based on user-selected WSM Areas. The user shall be able to send these messages to the Message Handling System.*

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

4.2.6. Maritime Messaging and Communication

The Maritime Messaging and Communication capability enables users to receive, prepare and send maritime-related formatted messages. It will provide a standardised messaging interface compatible with the following formats:

- ADatP-3(A) with APP-11(C) Chg.1 / APP-11(D)
- OTH-T GOLD format
- Format Alfa

TRITON will be able generate messages according to user inputs and allow the user to edit the message before sending them. All generated messages will be stored in the Message Database. Users are provided the necessary management functions such as search, retrieve and edit.

4.2.6.1. Message Database Management

TRITON will store incoming and outgoing formatted messages in a database named as "Message Database". The authorised users will be able to manage this database within each Maritime Operation. The database will contain Message Records where each record has least the following attributes:

- Message Type (ADatP-3, OTH-T GOLD, Format Alfa)
- Originator (the name of the command originating the incoming message)
- Sender (the name of the command of the message sender)
- Destination
- Channel identification
- DTG
- Message identification number
- Subject Indicator Code
- Classification
- Priority (precedence) (Flash, Priority, Operational immediately, Routine and Critical)
- Status (Received and processed, Unable to process, Deleted and Reprocessed)
- Message text

All messages will be stored in the Message Database, without a capacity limitation, providing the user with management (add, edit, delete) and archiving capabilities.

[T1-R547] *TRITON shall maintain a Message Database to store incoming and outgoing messages.*

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

[T1-R548] *TRITON shall allow the authorised user to manage (add, edit, delete) the Message Database.*

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

[T1-R549] *TRITON shall allow the user to search for a message according to given set of attributes, display the results in sortable tabular format and display the content of a selected message in the AppView.*

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

[T1-R550] *TRITON shall allow the authorised user to archive Message Database and import archived data when needed.*

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

[T1-R551] *TRITON shall provide a Message Editor with configurable default fields. The Message Editor shall have basic text editing functions to allow the user to type messages and save them.*

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

4.2.6.2. Receiving Messages

TRITON will be able to receive messages automatically by using System Interface Services (SIS) (e-mails, files, point-to-point connections or Formal Messaging Capability if available). Received messages will be parsed and the contained information will be processed by the relevant function. Following means will be used for receiving messages:

- ADatP-3 Formatted Messages (NS) : SIS for Message Handling System
- OTH-T GOLD Messages (NS) : SIS for Nations and other systems
- Format Alfa Messages (NU) : E-mails on the NU Domain

[T1-R552] *TRITON shall be able to receive ADatP-3 Formatted Messages from external systems via System Interface Services.*

Requirement Property :
Domain for Static : NS
Domain for Afloat: NS

Baseline : BL 1
Qualific. Method : Demonstration

[T1-R553] *TRITON shall be able to receive OTH-T GOLD messages from external systems via System Interface Services.*

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

[T1-R554] *TRITON shall validate received ADatP-3 Formatted Messages and notify the authorised user if a Formatted Message is not validated.*

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

[T1-R555] *TRITON shall allow the authorised user to set criteria to exclude messages from parsing.*

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

[T1-R556] *TRITON shall store unrecognised messages for editing and reparsing.*

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

[T1-R557] *TRITON shall provide adequate documentation (e.g. Software Requirements Specification and Software Design Description) for the mappings and transformations between the supported message types and the associated Maritime Information Entity. An adequate specification is one that enables a programmer or user to understand the data transformation and validate its correctness.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

4.2.6.3. Sending Messages

TRITON will be able send prepared ADatP-3 Formatted Messages and OTH-T GOLD messages to a selected e-mail address to the MHS (see MHS Interface) using SMTP. In addition, TRITON will be able to send OTH-T GOLD messages to selected Network Addresses.

[T1-R558] *TRITON shall be able to send prepared messages to selected e-mail addresses via SMTP.*

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

[T1-R559] *TRITON shall be able to export the prepared messages as text files.*

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

4.2.6.4. Handling ADatP-3 Messages

ADatP-3 specifies the Concept of NATO Message Text Formatting System (FORMETS). FORMETS is a collection of character-oriented information procedural standards suitable for the efficient exchange of information. The system includes the syntax and rules governing the representation of agreed conceptual definitions (fields), and the arrangement of these fields into sentences (sets) and message texts. FORMETS is intended to be used for all formatted character-oriented messages within the NATO Command, Control and Information System (NCCIS).

FORMETS also provides the rules, constructions and vocabulary for standardised character-oriented Message Text Formats (MTF).

TRITON will support ADatP-3 Baseline 13.1 based information exchange. Only a selected set of Formatted Messages out of the APP-11 (C) Chg.1 Message Catalogue will be used. If newer versions are available when the implementation starts, the most recent versions of the standards will be used in addition to these ones in order to keep backward compatibility with MCCIS.

TRITON will only concern with the part of a message containing the actual information that the originator wishes to communicate.

TRITON design should cover possible replacement of Message Parsing Module in future.

Used Formatted Messages:

TRITON will handle the following ADatP-3 Formatted Messages within relevant functions:

- NAVSITSUM

  The NAVSITSUM Message is used to provide a periodic summary of friendly forces giving details of their command, control, task organization, location and planned movements.

- NAVSITREP

  The NAVSITREP Message is used to report specific events, changes in location and movement, changes in readiness, or changes in major equipment status of maritime forces.

- MARINTSUM

  The MARINTSUM Message is used to provide periodic summary information pertaining to the movement of non-NATO forces in NATO maritime areas.

- MARINTREP

  The MARINTREP Message is used to provide time sensitive advisory information pertaining to the movement of non-NATO forces in NATO maritime areas.

- RMPSITSUM

  The RMPSITSUM Message is used to periodically report the location of surface and/or sub-surface contacts and/or the overlay details of a specified geographical area, comprising the RMP.

- NAVPOSREP

  The NAVPOSREP Message is used to report the location and/or intended movement of own military and auxiliary vessels and the location of military organizational entities.

- LOCATOR

The LOCATOR Message is used to report surface, subsurface, air, mines, or special interest units operating in the maritime environment.

- PURPLE

The PURPLE Message is used to provide a comprehensive summary of the activities of a mission or event.

- OPSTAT UNIT

The OPSTAT UNIT Message is used to provide the officer-in-tactical command (OTC) and other authorities or units, as appropriate, with operational and administrative information, or to report changes to this information.

- ORBATSEA

The ORBATSEA Message is used in peacetime to report the numbers and/or names of maritime forces and the readiness of the forces currently assigned to the major NATO commands, strategic commands and in periods of tension to report the names and readiness of the forces assigned to the major NATO commands following the declaration of the appropriate alert measure.

- SUBNOTE

The SUBNOTE Message is used to order and inform about the movement of a submarine.

- SUBNOTE REQ

The SUBNOTE REQ Message is a request to order and inform about the movement of a submarine.

- SUBNOTE CHANGE

The SUBNOTE CHANGE Message is used to order and inform about a change in the movement of a submarine.

- SUBNOTE CHANGE REQ

The SUBNOTE CHANGE REQ Message is a request to order and inform about a change in the movement of a submarine.

- SUBTASK

The SUBTASK Message is used to assign a submarine to the supported group/force. It also indicates the passage and movement areas.

- WSM REQ

The WSM REQ is used to request anti-submarine warfare areas for water space management.

- BARNSTORM

The BARNSTORM message is the primary method by which a Submarine Operations Authority (SUBOPAUTH) will pass all major operational control, safety and communication instructions to submarines on operational patrols and during major exercises reading a submarine broadcast.

- WSM ALLOCSTAT

The WSM ALLOCSTAT is used to promulgate Water Space Management information and to minimize mutual interference between submarines and ASW forces.

- SUBDANGER

The SUBDANGER is used to promulgate intended operations or actions hazardous to submarines

- SUBNOI

The SUBNOI is used to promulgate underwater (sub-surface) notice of intention.

- UW OBJECT NOTE

The UW OBJECT NOTE is used to provide information to appropriate authorities on a unit's intention for streaming or deployable sonic or other underwater device.

- ROEREQ

The ROEREQ is used to request authorisation to implement specific rules of engagement (ROE(s))

- ROEAUTH

The ROEAUTH is used by the North Atlantic Council (NAC)/Defence Planning Committee (DPC) to authorise implementation or cancellation of specific ROE(s).

- ROEIMPL

The ROEIMPL is used to implement and/or cancel ROE(s).

4.2.6.4.1. Processing ADatP-3 Formatted Messages

TRITON will be able to parse a received ADatP-3 Formatted Message and perform the related action according to the message information. TRITON will validate (i.e. formatted message cannot be parsed completely) each received formatted message. If validation fails, the authorised user will be notified.

If the message includes a track report then a track will be created which will attempt to correlate with an existing track. If TRITON Track Management can correlate this track with an existing one, then its position will be updated. This position update also causes a position update in Vessel Database if the track is associated with a vessel. If the new track is not correlated to a track, then a new track is created. If the track has positive identification then TRITON will associate it with a vessel and updates its position.

[T1-R560] *TRITON shall be able to process NAVSITSUM message, extract the track reports from the message and either create new Tracks or update the existing Tracks.*

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

[T1-R561] *TRITON shall be able to process NAVSITREP message, extract the track report from the message and either create a new Track or update the existing Track.*

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

[T1-R562] *TRITON shall be able to process MARINTSUM message, extract the contact report from the message and either create new Tracks or update the existing Tracks.*

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

[T1-R563] *TRITON shall be able to process MARINTREP message, extract the contact report from the message and either create a new Track or update the existing Track.*

Requirement Property :
Domain for Static : NS

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

[T1-R564] *TRITON shall be able to process RMPSITSUM message, extract the track report or the Reference Object data from the message and then either create new Tracks and Reference Objects or update the existing ones.*

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

[T1-R565] *TRITON shall be able to process NAVPOSREP message, extract the track report from the message and either create new Tracks or update the existing Tracks.*

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

[T1-R566] *TRITON shall be able to process LOCATOR message, extract the track report from the message and either create new Tracks or update the existing Tracks.*

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

[T1-R567] *TRITON shall be able to process PURPLE message, and display PURPLE area/route as a C2 Area drawing with the provided track information.*

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

[T1-R568] *TRITON shall be able to process OPSTAT UNIT message, extract the unit report from the message and either create a new friendly Track or update the existing friendly Track. If the unit is in the Maritime Task Organization, it shall be updated accordingly.*

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

[T1-R569] *TRITON shall be able to process SUBNOTE and SUBNOTE CHANGE messages, extract the PMI Moving Haven from the message and create the requested Moving Haven entry in the WSM/PMI Database.*

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

[T1-R570] *TRITON shall be able to process SUBNOTE REQ and SUBNOTE CHANGE REQ messages, extract the PMI Moving Haven from the message and create the requested Moving Haven entry in the WSM/PMI Database.*

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

[T1-R571] *TRITON shall be able to process BARNSTORM, WSM ALLOCSTAT, SUBDANGER, SUBNOI and UW OBJECT NOTE messages, extract the WSM/PMI Areas and create a WSM/PMI Area in the WSM/PMI Database if not exists already.*

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

[T1-R572] *TRITON shall be able to process WSM REQ message, extract the WSM Area from the message and create the requested WSM Area in the WSM/PMI Database.*

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

[T1-R573] *TRITON shall be able to process ROEREQ message, extract the ROE information from the message and update the ROE Request List (see ROE Management).*

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

[T1-R574] *TRITON shall be able to process ROEAUTH message, extract the ROE information from the message and update the ROE List.*

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

[T1-R575] *TRITON shall be able to process ROEIMPL message, extract the ROE information from the message and update the ROE List.*

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

[T1-R576] *TRITON shall allow the authorised user to process a selected ADatP-3 Formatted Message text file as an input for parsing.*

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

[T1-R577] *TRITON should have a replaceable module that handles the parsing of Formatted Messages.*

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

4.2.6.4.2. Generating ADatP-3 Messages

TRITON will provide the user with the capability of generating Formatted Messages and editing before sending them. In case tracks are to be selected, TRITON will perform an automatic identity check based on the Standard Identity of the selected tracks. The identity check will use the following rules to filter the tracks for correct identity:

- NAVSITSUM, NAVSITREP, NAVPOSREP messages are used for only the identities FRIEND and ASSUMED FRIEND.
- MARINTSUM, MARINTREP messages are used for only the identities NEUTRAL to HOSTILE.

TRITON will also allow the authorised user to configure the format of the message.

TRITON design should cover possible replacement of Message Generator Module in future.

[T1-R578] *TRITON shall be able to generate ADatP-3 Formatted Messages and allow the authorised user to edit the message.*

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

[T1-R579] *TRITON shall allow the authorised user to change the configuration of the fields of the message format.*

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

[T1-R580] *TRITON shall be able to get semi-static parameters for ADatP-3 Formatted Messages from the System Operational Parameters.*

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

[T1-R581] *TRITON should have a replaceable module that handles the generation of Formatted Messages.*

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

4.2.6.5. Handling OTH-T GOLD Messages

A modified Over-the-Horizon Targeting GOLD Rev.D. (2000) (OTH-T GOLD) format is used by both NATO and National maritime HQs to automatically process received formatted data into an RMP. Although it is not a NATO format, it is included in the TRITON interface options as an optional non-NATO agreed standard.

Following modifications are applicable:

- Including AIS line from OTH-T GOLD 2007
- Using STANAG 1166 Ed. 7 or APP-20 (i.e. Ed. 8) (the most recent version to be used during implementation) as Ship Type Table
- Using MCCIS internal Table for Ship Class Table
- Using NATO Standard Country Codes Table (STANAG 1059)
- Allowing to use the Pennant Number field to indicate "COI", "CCOI" or "VOCI" for merchant vessels.
- Using OVERLAY messages to define graphics with additional attributes

TRITON will handle the following OTH-T GOLD messages:

- CONTACT REPORT

This message is used for the exchange of processed contact data or track management information between computer systems. It contains data relative to the identity, location, and movement of surface, subsurface, land, and air contacts

- OVERLAY-2

This message is used to transmit graphics information and to delete a single overlay from one computer to another.

- OVERLAY-3

This message is used to transmit single or multiple overlays, or to delete a single overlay from one computer to another with provisions for enhanced precision and accuracy reporting.

- PIM TRACK

This message is used to transmit PIM track information from one computer to another.

PING This message is used by ASW community to promulgate low frequency active ping data including source ship location and ping data.

- ENHANCED CONTACT REPORT

This message is used for the exchange of processed contact data or track management information with enhanced precision and accuracy between computer systems.

4.2.6.5.1. Processing OTH-T GOLD Messages

TRITON will be able to receive OTH-T GOLD messages automatically, parse them and perform the related action according to the message content. For each track report in the message a new track will be created which will attempt to correlate with an existing track. If TRITON Track Management can correlate this track with an existing one, then its position will be updated. This position update also causes a position update in the Vessel Database if the track is associated with a vessel. If the new track cannot be correlated with an existing track, then a new track will be created. If the received track has positive identification, then TRITON will associate it with a vessel in the Vessel Database and updates its position.

[T1-R582] *TRITON shall be able to process OTH-T GOLD CONTACT REPORT message, extract the track report from the message and either create a new Track or update the existing Track.*

Requirement Property :

Domain for Static : NS

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

[T1-R583] *TRITON shall be able to process OTH-T GOLD ENHANCED CONTACT REPORT message, extract the track report from the message and either create a new Track or update the existing Track.*

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

[T1-R584] *TRITON shall be able to process OTH-T GOLD OVERLAY-2 message, extract the information describing the graphics from the message and either create a new Reference Object (Reference Point, Line, Area) or update the existing one.*

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

[T1-R585] *TRITON shall be able to process OTH-T GOLD OVERLAY-3 message, extract the information describing the graphics from the message and either create a new Reference Object (Reference Point, Line, Area) or update the existing one.*

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

[T1-R586] *TRITON shall be able to process OTH-T GOLD PIMTRACK message, extract the included PIM track and create the PIM Route.*

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

[T1-R587] *TRITON shall allow the authorised user to process a selected OTH-T GOLD Message text file as an input for parsing.*

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

[T1-R588] *TRITON shall use the NATO Standard Country Codes Table to map the country codes to country names.*

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

4.2.6.5.2. Generating OTH-T GOLD Messages

TRITON will provide capability to generate OTH-T GOLD messages to export selected tracks.

[T1-R589] *TRITON shall be able to generate OTH-T GOLD Messages from the Picture Management Function and allow the authorised user to edit the message before sending.*

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

4.2.6.6. Handling Format Alfa Messages

Format Alfa is a "process" by which civilian mariners can communicate intentions to military organizations charged with monitoring merchant traffic. The Format Alfa was developed so that merchant vessels could pass their voyage information to the NATO Shipping Centre to shorten the time required for assessment of validity. Based on the current situation, voluntary or mandatory reporting schemes may be implemented regarding entering, sailing in and leaving defined areas. Although requirements regarding information to be included in the Format Alfa can and will differ dependent on the schemes set for the specific area, its format is defined in the ATP-2(B) Volume II Naval Cooperation and Guidance For Shipping Manual (also given in www.shipping.nato.int).

The message contains the following information:

- Ship name
- Flag
- IMO number
- Inmarsat telephone number
- Time (UTC) and position
- Course
- Passage speed
- Freeboard
- Cargo
- Destination and ETA
- Last port, Departure DTG (UTC)
- Additional ports, ETA and ETD DTG (UTC)
- Start Suez Canal Transit, DTG (UTC)
- Notes and observations

Messages are received from external sources, usually via e-mail in a readable format, and then the authorised user copies them into TRITON manually. The formatted message is processed by TRITON and the track information is automatically extracted allowing the authorised user to create/update a track.

A sample message is shown below:

NAME/LauraD//

ICS/YL2209//

IMO/8226467//

CARGO/general nature of cargo//

LAST PORT/SAN DIEGO/131100ZMAY07/121100ZMAY07//

NEXT PORT/SAN JOSE/161100ZMAY07/160000ZMAY07//

ADDITIONAL PORT/SAN FERNANDO/171100ZMAY07/162100ZMAY07/

CURRENT POS/3300N 11700W/141300ZMAY07/141000ZMAY07/

WAY POINT/3800N 11722W/162044ZMAY07/161044ZMAY07//

REMARK/THIS IS A REMARK//

4.2.6.6.1. Processing Format Alfa Messages

TRITON will receive Format Alfa and Position Report messages (on-line or off-line) and the authorised user will have it processed. Format Alfa messages will be used only on the NU Domain. TRITON Format Alfa Parser validates (i.e. if the formatted message cannot be parsed completely) a received message when it is entered. If validation fails, the authorised user will be notified. The validated message will then be parsed and the track information will be extracted automatically. The authorised user can create a new track using this information or update the existing track.

TRITON will be able to tag the vessels in the Vessel Database according to their participating in this voluntary reporting scheme.

[T1-R590] *TRITON shall be able to process Format Alfa message, retrieve the track information.*

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

[T1-R591] *TRITON shall allow the authorised user to manually enter Format Alfa message text into the Format Alfa Parser for processing.*

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

[T1-R592] *TRITON shall allow the authorised user to either create a new track with the received information or update the existing track.*

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

[T1-R593] *TRITON shall be able to tag the associated Vessel in the Vessel Database reported by Format Alfa for its contribution with a DTG.*

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

[T1-R594] *TRITON shall allow the authorised user to store and manage Format Alfa messages in the Message Database.*

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

4.2.7. System Management

Since TRITON is a multi-user Functional Service, its management needs to be handled appropriately at various levels. Maritime Operation Management handles the management of Maritime Operations, their Environments, data flows in that Environment.

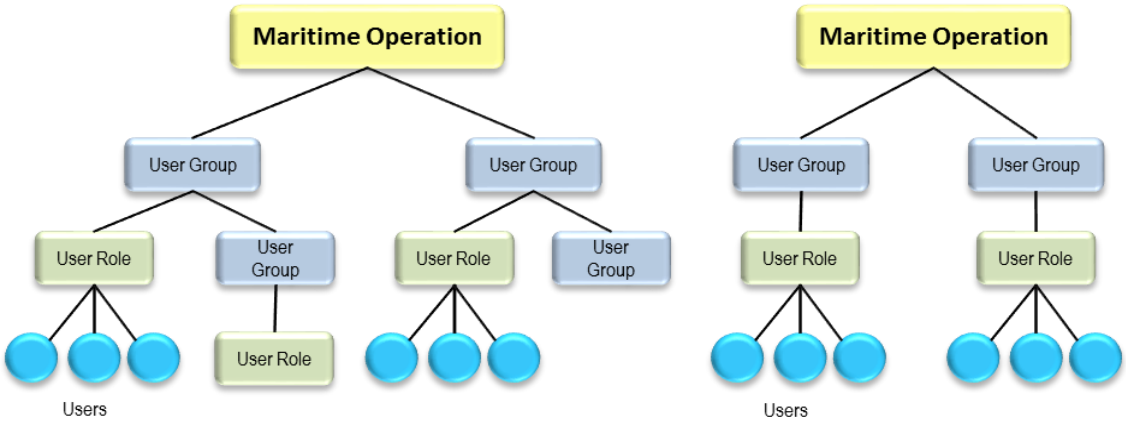
There will be a User Management capability which handles the operational users and their access privileges for each Maritime Operation.

The System Technical Management capability will provide the authorised users with managing and monitoring capability for the status of interfaces as well as general system status at any moment of time.

The Data Management capability provides the management of databases and any kind of information management.

4.2.7.1. User Management

TRITON User Management function provides the authorised users to control user management and adjust access privileges to groups, roles and users inside a Maritime Operation. TRITON users are primarily NATO Command Structure personnel that are individually introduced to the NS or NU Domain. These users can be assigned to roles which belong to user groups. A user may belong to multiple user groups. This multi-layer user management scheme is depicted below:



TRITON will only be operated by authorised users and can be accessed by general users. Only the authorised users can manage users and groups. System functions are defined as list of privileges and can be assigned to groups and roles. They can be inherited from top to down.

4.2.7.1.1. User Groups

A User Group in TRITON is defined with a name, a description, a list of roles and a list of top-level privileges. There may be several subgroups for each User Group and several User Roles for each Group or subgroup. All User Roles in the same group (or subgroup) have the same privileges.

TRITON will define at least the following User Groups as the default:

General Users : User Roles not related to an operational role but allowed to use a limited set of functions. They have read-only rights on data.

General Viewers : User Roles for view-only purposes.

Command Group N : User Roles defined for a specific Command Group (e.g. MARCOM Users). They may have Authorised Users having rights on managing data.

Administrators : User Roles having low-level control privileges.

User Groups can be created according to the organization on which TRITON is installed and used. following are examples to User Groups and subgroups:

Group : MARCOM

Subgroup : MARCOM_MOC

Subgroup : MARCOM_MOC_Picture_Managers

Group : SNMG_1

Subgroup : SNMG_1_Picture_Managers

Subgroup : SNMG_1_Commanders

Subgroup : SNMG_2_Picture_Managers

4.2.7.1.2. User Roles

TRITON User Roles are the operational roles that are necessary to use the system properly. They are defined by a set of permissions (i.e. access to objects and functionality) to perform certain operations. There may be one or more users associated to a User Role. All users have the same access privileges. There may be predefined roles and generic roles associated with predefined functions and data access privileges.

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:

- General User (A standard user with read-only privileges).
- Authorised User (A privileged user capable of accessing the authorised functions with management privileges).

A Basic Role is one of the primary roles in the TRITON (i.e. TRITON User, Organizational Node Administrator, Enterprise Administrator, System Administrator). These roles can be assigned to users who can be General User and Authorised User.

The primary Basic Roles are given below:

TRITON User: A person having Access Rights for TRITON User Functionality. This functionality includes viewing, creating, collaborating and maintaining Maritime Information Entities. User Accounts define a TRITON User.

TRITON Organizational Node Administrator: A person having Access Rights for TRITON Organizational Node Administrator Functionality. This functionality includes managing TRITON Accounts, Access Rights, and defining Information Exchange Contracts. Organizational Node Administrators are generally members of the site staff responsible for User Management, domain value management and system configuration for that particular TRITON Organizational Node. Organizational Node Administrators are also responsible for adapting and localising production workflow sequences to guide and control processes. They can assign user permissions on types of Maritime Information Entities (e.g. Track, Vessel) and functions (e.g. Read, Create, Modify, Delete) on those objects for that particular organizational node. To simplify administration, a role may be specified from more basic roles and permission sets. Organizational Node Administrators will have the capability to perform content management functions, including data cleansing and archiving.

TRITON Enterprise Administrator: A person having Access Rights for TRITON Enterprise Administrator Functionality. This functionality includes maintaining the enterprise-wide configuration (e.g. domain values).

Enterprise Administrators are responsible for overall management and administration of the system, including both technical and procedural aspects. In general, Enterprise Administrators are identified for each mission/domain. Procedural and administrative responsibilities of the Enterprise Administrators include the creation, documentation and enforcement of operating policies and

procedures associated with functional system configuration; domain management; User access and privilege management; data stewardship; workflow management; and identification and resolution of functional issues. Enterprise Administrators are responsible for overseeing development and maintenance of Standard Operating Procedures (SOPs) and coordination with Organizational Node Administrators. The technical responsibilities of Enterprise Administrators include enterprise domain management; collection of performance and accounting data; and ensuring security mechanisms are working. Enterprise Administrators are also responsible for identifying standard production workflow sequences.

TRITON System Administrator: A person having Access Rights for TRITON System Administrator Functionality. This functionality includes the functionality for TRITON System Administration and TRITON System Maintenance. TRITON System Administration Functionality includes deploying, configuring and updating TRITON. System Administrators are generally part of NCI Agency local CIS Support Unit (CSU) personnel responsible for system and network technical issues, and for ensuring the proper configuration, network connectivity and recoverability of the system. Responsibilities of the System Administrators include network and domain management; back-up and recovery of file systems and databases; and administration of TRITON Server and applications. System Administrators are responsible for maintaining Windows User Groups and adding new users to the Windows domain, and (re)installing the system as required.

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.

TRITON will define at least the following User Roles as the default:

General User **:** A User not having a specific operational role but allowed to use a limited set of functions.

General Viewer: A User who is allowed to use the services as only general view.

System Manager **:** A User responsible for system monitoring, technical system management and organizational management.

Administrator **:** A super user with all low-level control privileges.

Other roles can be created according to the organization on which TRITON is installed and used. following are examples to User Roles under User Groups (subgroups):

Group : MARCOM

Subgroup : MARCOM_MOC

Role : MARCOM_MOC_Chief

Role : MARCOM_MOC_Battle_Watch_Captain

Subgroup : MARCOM_MOC_Picture_Managers

Role : MARCOM_MOC_RMP_Manager

Role : MARCOM_MOC_RMP_Operator

Role : MARCOM_MOC_WP_Operator

Subgroup : MARCOM_Operation_Planners

Role : MARCOM_WSM_Planner

Group : SNMG_1

Subgroup : SNMG_1_Picture_Managers

Subgroup : SNMG_1_Commanders

Role : SNMG_1_Commander

4.2.7.1.3. Users

A "user" refers to a person having access to the operating system (an OS User) and TRITON. This can be a TRITON User, TRITON Organizational Node Administrator or TRITON Enterprise Administrator. A user can also be an authorised user.

A User in TRITON is the same as a standard NATO user on the NS or NU Domain.

TRITON User names are retrieved from the account names in the Logical Directory on the NS Domain.

Users are assigned to User Roles. A User can be assigned to more than one User Role. A user assignment example is given below:

Group : MARCOM

Subgroup : MARCOM_MOC_Picture_Managers

Role : MARCOM_MOC_RMP_Manager

User: A.Aaaa

Role : MARCOM_MOC_RMP_Operator

User: B.Bbbb

User: C.Cccc

Role : MARCOM_MOC_Battle_Watch_Captain

User: B.Bbbb

User: D.Dddd

User: E.Eeee

User: F.Ffff

4.2.7.1.4. Privileges and Access Rights

A privilege is a permission to perform an action. They can be automatic, granted or applied for. Access Rights according to user privileges are assigned to User Groups and User Roles.

Automatic Privilege:

An automatic privilege exists when there is no requirement to have permission to perform an action. For example, viewing maritime information on the GeoView does not require a privilege. Any TRITON user can access the GeoView. Default roles have default access rights.

Granted Privilege:

A granted privilege exists as a result of allowing access to a given function by an authorised user. For example, Picture Manager role can be given a privilege to create or delete a track.

Applied:

A privilege can be applied when it is granted to a User Role at run-time.

Privileges are assigned according to Function Tables. A Function Table is a list of functions with a number of access rights for Maritime Information Entities. Following types of Access Rights are defined:

- Create
- Read
- Update/Modify
- Delete
- None.

[T1-R595] *Each user of TRITON shall be assigned Access Rights based on TRITON Roles, the privileges within that Role, and the Organization of the user. A User can be assigned one or more TRITON Roles in one or more organizations.*

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

[T1-R596] *TRITON shall provide privileged TRITON accounts (e.g. system and security administrator accounts).*

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

[T1-R597] *TRITON shall provide for the authorised user a set of access rights (data and applications) such that these rights can be maintained.*

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

[T1-R598] *If a user has more than one Basic Role, the user shall have the privileges for all the Basic Roles.*

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

[T1-R599] *TRITON shall allow the authorised user with administration privileges to set roles and permissions for a user.*

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

[T1-R600] *TRITON shall allow only the authorised user with administration privileges to operate TRITON System Management Functionality and TRITON System Maintenance Functionality with appropriate operating system rights.*

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

[T1-R601] *TRITON shall allow a user to have the same or different Basic Roles for different simultaneous instances of TRITON.*

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

[T1-R602] *TRITON access controls shall ensure that users cannot access functions or Maritime Information Entities beyond those needed to execute their role.*

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

[T1-R603] *TRITON shall allow the authorised user with administration privileges to manage (create, modify, delete) User Groups, Subgroups, User Accounts, User Roles, password details, and assign User Roles to User Accounts and manage general access privileges of individual User Accounts.*

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

[T1-R604] *TRITON shall allow the authorised user to define unique User Groups and Subgroups within a User Group and then unique User Roles within a User Group or Subgroup.*

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

[T1-R605] *TRITON shall maintain a Function Table having a list of functions with Access Rights given in the Description.*

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

[T1-R606] *TRITON shall allow the authorised user with administration privileges to define privileges in the Function Table for User Groups and User Roles.*

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

[T1-R607] *TRITON shall be able to inherit access privileges from User Groups or subgroups down to User Roles.*

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

[T1-R608] *TRITON shall automatically change user privileges according to a predefined Function Table when the Operational State of the Server changes.*

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

Comment : The predefined Function Table will be defined during System Transition.

[T1-R609] *TRITON shall define sessions which provides authorisation along with authentication for each user that logs in to a Maritime Operation.*

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

[T1-R610] *TRITON shall integrate with existing users management systems from the Bi-SC AIS: Windows Active Directory and NATO Enterprise Directory Service.*

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

4.2.7.1.5. Identity and Session Handling

Authentication process identify the user based on the Maritime Operation selected. It controls which users are allowed to perform which functions and what permissions they have on processed data. Number of User Groups and Users in each Group can reach to several hundreds, but TRITON will not have any capacity limitation on creation of Users.

Role-based Access Control Guidelines:

- Users are associated with User Roles and also with Organizations:
- User Roles determine the functions and types of objects available to the user.
- Organizations determine the data available for use by the available functions.
- A User has permission on a particular data item only if the User has an authorised Role and is a member of that Organization.

When TRITON is to be used as a standalone application where enterprise-level authentication is not available, TRITON will implement an authentication service that requires the user to provide a valid User ID and password which are managed internally.

[T1-R611] *TRITON shall support Single-Sign-On (SSO).*

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

[T1-R612] *TRITON shall allow the user to log out anytime and during any process.*

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

[T1-R613] *TRITON shall automatically log out an inactive user after a defined timeout. This timeout value shall be included in the system configuration settings.*

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

[T1-R614] *TRITON shall allow the user (with the same User ID) to access the same information and functionality from any workstation on the network (i.e. "roving user" functionality). This capability shall not depend on the availability of the Windows Active Directory.*

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

[T1-R615] *TRITON shall be able to apply Role-based Access Control Guidelines given in the Description.*

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

[T1-R616] *TRITON shall assign the predefined Roles to a user after the user's authentication and authorisation is completed.*

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

[T1-R617] *TRITON shall automatically login a user who is authenticated by Windows Active Directory or the operating system.*

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

[T1-R618] *If an enterprise-level authentication is not available, TRITON shall implement an authentication service that requires the user to provide a valid User ID and password.*

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

[T1-R619] *For users accessing TRITON from networks which would not allow an instance of TRITON to authenticate the user, TRITON shall use the internal authentication service that requires the user to provide a valid User ID and password.*

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

[T1-R620] *TRITON shall not store login and password details locally ~~for users that cannot be authenticated through Windows Active Directory~~ while in the Normal Mode of operation. TRITON shall be configurable to use either the enterprise-level authentication services or the TRITON authentication service (appropriate for the Standalone Mode of operation), but not both simultaneously.*

Requirement Property :

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

[T1-R621] *The interval for password change in TRITON shall be selectable.*

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

[T1-R622] *TRITON shall allow the authenticated users to manage their password and their user profile (e.g. e-mail address, unit) information.*

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

[T1-R623] *TRITON shall provide help text to support the login process together with links to recover lost password and login details.*

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

[T1-R624] *TRITON shall limit the feedback of information during authentication to prevent users gaining knowledge of the authentication process.*

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

[T1-R625] *If an authenticated user is a member of more than one Organization (i.e. Organizational Node), the user shall be prompted to select the Organization to be used during that session.*

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

[T1-R626] *TRITON shall ~~only~~ display ~~functionality enabled~~ only the information allowed for a particular user to view according to the viewing permissions assigned to that~~e~~ user.*

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

[T1-R627] *TRITON shall automatically verify entries into TRITON Repository to ensure the user is authorised to effect such changes.*

Requirement Property :
Domain for Static : Both

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

[T1-R628] *TRITON shall display only the functionsality enabled for a particular user according to the execution permissions assigned to thate user and provide access to them.*

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

4.2.7.1.6. Workspaces

After successful logon, TRITON will provide the user a private working environment called "Workspace". A Workspace is a private environment that a user can alter the settings according to personal preferences. It provides the user with various options and the capability to save the Workspace. The authorised user can prepare a default Workspace and make it available to all users.

Workspaces can be customised according to user preferences for both AppView and GeoView, and when the session ends all settings are stored. At least the following information will be saved in a Workspace as personal preferences:

- AppView User Settings
  - Settings about general viewing style
  - Personal preferences
  - Search queries
- GeoView User Settings
  - Settings about general viewing style
  - Personal preferences
  - Search queries
  - Placemarks
  - Bookmarks
- Private operational data (e.g. visibility of an Area)

Mail, printer, directory or other local workstation desktop settings will be provided by the standard run-time environment on which the Client runs.

[T1-R629] *TRITON shall provide a configurable Workspace as defined in the Description for each user who is assigned to a User Role.*

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

[T1-R630] *TRITON shall allow the authorised user to manage (create, modify, delete, export, import) the Workspaces.*

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

[T1-R631] *TRITON shall automatically delete the allocated Workspace associated to a user when the user is de-assigned from a User Role by the authorised user.*

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

[T1-R632] *TRITON shall allow the user to manage (import, modify, save) his or her own Workspace including the User Settings for both AppView and GeoView.*

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

[T1-R633] *TRITON shall apply the User Settings for both AppView and GeoView at their start-up and manage them as the user applies any modification.*

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

4.2.7.2. System Technical Management

TRITON uses a central management capability which provides low-level system administration, management of system configuration, system interfaces and general status of components.

4.2.7.2.1. System Administration

TRITON low level management is provided by System Administrators having the highest privileges. Users, Roles and User Groups are defined by the System Administrators.

[T1-R634] *TRITON shall provide the authorised user with administration privileges to manage all access privileges.*

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

[T1-R635] *TRITON shall allow the authorised user to manage (create, copy, modify, delete) Users, Roles and User Groups.*

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

4.2.7.2.2. System Configuration Management

TRITON instantiations will be configured during installation and run-time using the values stored in Configuration Ssettings. The behaviour of operational functions can also be adjusted and fine-tuned using the values stored in Operational Parameters. Only the authorised users can alter the Configuration Settings and the Operational Parameters.

4.2.7.2.2.1. System Configuration Settings

TRITON will have Configuration Settings in order to fine-tune its operation. Network address settings, database definitions, location of datasets, names of interfaces are examples to these settings. Static Configuration Settings can be applied during system installation, and the Dynamic Configuration Settings can be applied at run-time without requiring restart.

[T1-R636] *TRITON shall be able to adjust itself according to its Configurable System Settings when they are changed.*

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

[T1-R637] *TRITON shall configure itself at start-up according to the Static Configuration Settings which shall be provided during system installation.*

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

[T1-R638] *TRITON shall allow the authorised user to manage (import, modify, save, export) the Static Configuration Settings.*

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

[T1-R639] *TRITON shall be able to configure itself at run-time according to the Dynamic Configuration Settings which shall be modified at run-time.*

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

[T1-R640] *TRITON shall allow the authorised user to manage (import, modify, save, export) the Dynamic Configuration Settings.*

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

4.2.7.2.2.2. System Operational Parameters

TRITON will use System Operational Parameters to adjust and fine-tune its operational functions at run-time. Correlation Criteria, History Distance are examples to these parameters.

[T1-R641] *TRITON shall be able to adjust and fine-tune the behaviour of its functions according to its System Operational Parameters.*

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

Qualific. Method : Test

[T1-R642] *TRITON shall be able to use the System Operational Parameters to adjust the behaviour of its functions at run-time.*

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

[T1-R643] *TRITON shall allow the authorised user to manage (import, modify, save, export) the System Operational Parameters.*

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

4.2.7.2.3. System Interface Management

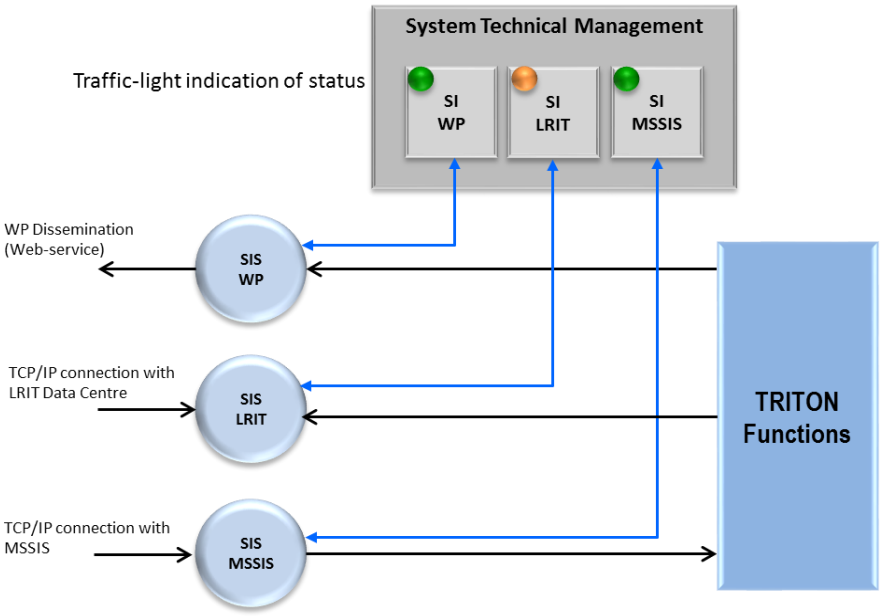
TRITON will maintain interfaces for all external systems and Functional Services. All interfaces will be managed by standard and independent software modules. Authorised users can control the interfaces and monitor their status via these modules.

4.2.7.2.3.1. System Interface Service Framework

TRITON will manage its external interfaces using separated, independent interfacing modules. According to the accepted terminology in the NATO Reference Architecture, these modules will be implemented as Technical Services in the Maritime Functional Services and named as "System Interface Service" (SIS).

TRITON will use dedicated SIS for interfacing each external system or service with an associated GUI for controlling and monitoring purposes. SIS will provide scalability and isolation of interface from the internal business logic. A SIS will report to the System Technical Management (STM) about the availability of the interface, connectivity and flow of data so that in case of a failure, appropriate recovery procedures are executed and the user is notified. STM will then display the status of the interface with traffic light representation.

The conceptual approach is depicted in the following figure:



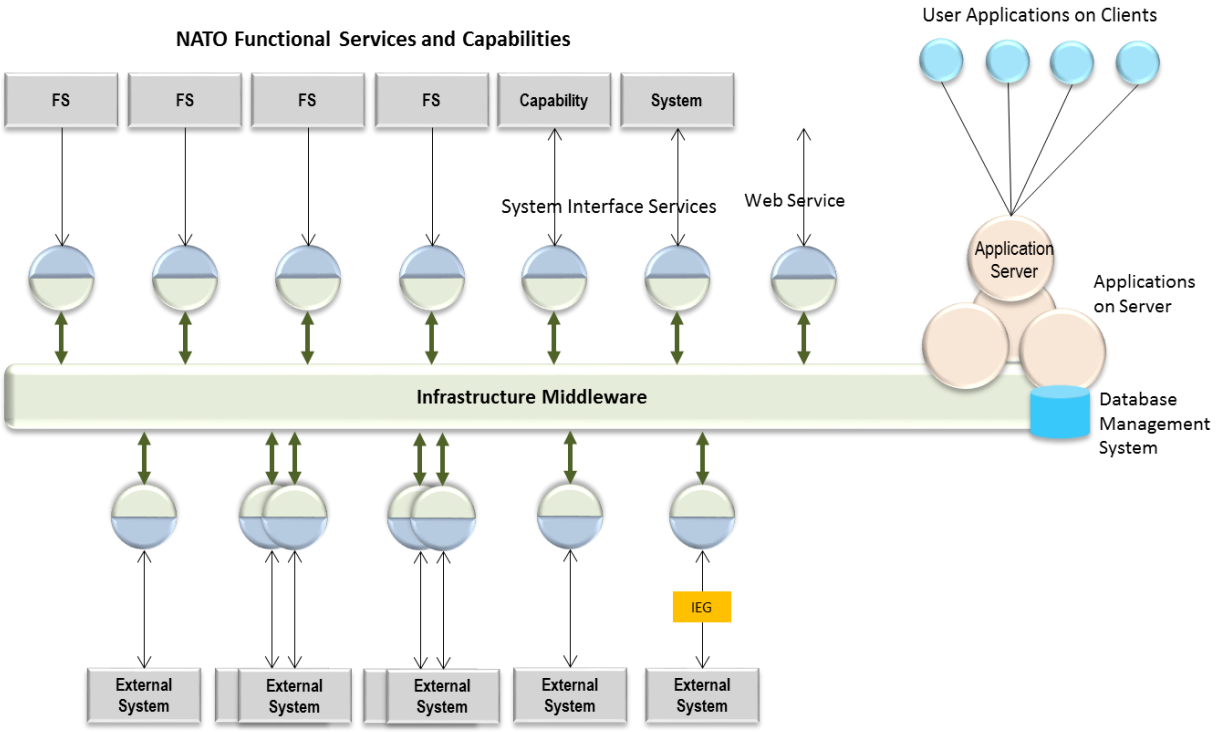
The structure of a SIS will consist of the following:

- A data exchange unit providing interface with a specific system or service
- A standard internal structure to process incoming data
- A standard internal structure to prepare outgoing data
- A standard self-reporting mechanism (own status and connectivity)
- A standard and coherent interface for internal communication mechanism
- A controlling GUI
- An error handling, reporting and recovery mechanism

Each SIS may have different tasks and even different implementation depending on the interface requirements. For example, a SIS may provide tracks to TRITON. It will then receive track information from external source in a specific format, convert it to internal track format, assign a local, internal track number along with the source identification and original track number, and send it to the Track Management component.

A SIS can be implemented as a Web service. Each SIS can be allocated onto a virtual or physical CPU for load balancing purposes.

There will be an infrastructure middleware which provides communication between each SIS and the TRITON internal functions. The conceptual illustration of the SIS Framework is given below:



Detailed diagrams for the NS and NU Domains are given in Section 5, Interface Requirements.

[T1-R644] *TRITON shall use a dedicated System Interface Service (SIS) for each identified external interface.*

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

[T1-R645] *TRITON shall use a standard internal structure for each SIS.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 1
- Qualific. Method : Inspection
- Comment : The structure design will be finalised by the SwDR-1.

[T1-R646] *TRITON shall use a standard status reporting and error handling functionality for each SIS.*

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

[T1-R647] *TRITON shall process incoming data according to the interface specification and convert this data into internal data representation.*

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

[T1-R648] *TRITON shall be able to provide Web Service capability via a SIS.*

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

[T1-R649] *TRITON shall automatically establish a dedicated connection to the external communication channel when it becomes available.*

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

[T1-R650] *TRITON shall be able to re-establish the connection to the external communication channel in case the connection is lost.*

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

[T1-R651] *TRITON shall convert internal data representation into external representation according to the interface specification and send the data through the physical communication channel.*

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

[T1-R652] *TRITON shall provide data logging capability for each SIS to be enabled and disabled by the authorised user.*

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

4.2.7.2.3.2. System Interface Control

TRITON system interfaces will be managed centrally using the SIS Framework. The management includes control and monitoring of each SIS by means of user interaction.

[T1-R653] *TRITON shall provide the user with the information (connectivity status, interface-specific information such as data rate) related to the status of each interface.*

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

[T1-R654] *TRITON shall provide the authorised user to control (start, stop, change mode) individual SIS.*

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

Baseline : BL 1
Qualific. Method : Test

[T1-R655] *TRITON shall allow the authorised user to manually allocate the selected SIS onto separate physical or virtual CPUs for load balancing purposes.*

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

4.2.7.2.4. System Technical Status Management

TRITON will monitor all interfaces and connections, their status and activities. Authorised users can control the individual services and modules.

4.2.7.2.4.1. Technical Status Monitoring

The interfaces of TRITON will be monitored centrally. TRITON will present the status of connections in both graphical and tabular format. Traffic Light presentation will also be used for quick recognition. In case a failure is detected, relevant actions will be taken by the system and the authorised user will be notified. The NATO Service Management and Control (SMC) Services in Enterprise Management System (EMS) will be informed according to the severity level of the error.

Key Performance Indicators (KPI) will be computed to determine the current operational status of TRITON Services. KPIs will be computed using a user-configurable table with weighed figures for each service. General overview of TRITON will be provided with a traffic light notation including the KPIs computed at intervals set by the authorised user.

KPI computation will consider at least the following:

- The current Operational Mode
- Weighed status of internal services
- Weighed status of external interfaces
- Number of users
- Available CPU power
- Available storage

TRITON will provide at least the following information to the SMC Services:

- Server location (or name)
- Operational state
- Operational mode
- Status of basic functions

[T1-R656] *TRITON shall display the status of each component and external interface in both sortable tabular form and graphical form using tree-like representation (i.e. a Dashboard).*

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

[T1-R657] *TRITON shall allow the user to view the detailed status of a selected external interface.*

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

Qualific. Method : Test

[T1-R658] *TRITON shall provide the authorised user with a configurable table of functions to compute the KPI.*

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

[T1-R659] *TRITON shall calculate its instantaneous KPIs based on status of its services, display the KPI and update it at intervals set by the authorised user.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Test
Comment : KPI calculation method will be determined during the Software Design.

[T1-R660] *TRITON shall provide the status of its functionality to SMC Services including its KPI.*

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

4.2.7.2.4.2. System Mode Management

System mode will be managed by the authorised users. Operational states for each mode will be managed automatically.

[T1-R661] *TRITON shall manage its Operational Mode automatically and allow the authorised user to change it manually.*

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

4.2.7.2.5. System Error Reporting

TRITON will have an error collecting, error logging and reporting mechanism for maintenance purposes. All system components and modules will report their exceptions and error conditions to the error reporting mechanism with detailed information. System maintainers will be able to trace the error in the system error log starting from the highest application to the lowest level function call in the code of the module reporting the error.

TRITON will report the errors to the SMC Services according to their severity levels as well, and notify the authorised users.

[T1-R662] *TRITON shall have an error collecting, error logging and reporting mechanism.*

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

[T1-R663] *TRITON shall allow the authorised user to access the error logs to examine the traces.*

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

[T1-R664] *TRITON shall allow the authorised user to manage (archive, delete) the error logs.*

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

[T1-R665] *TRITON shall report the errors to the SMC Services according to their severity levels and notify the authorised user.*

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

4.2.7.2.6. Client Monitoring and Control

All TRITON Clients connected to the server will be monitored. The connection status will be presented in sortable tabular and graphical form.

[T1-R666] *TRITON shall monitor the Clients connected to the TRITON Server.*

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

[T1-R667] *TRITON shall display the status of the connected Clients in both sortable tabular form and graphical form using tree-like representation.*

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

[T1-R668] *TRITON shall allow the authorised user to view the detailed status of a selected Client.*

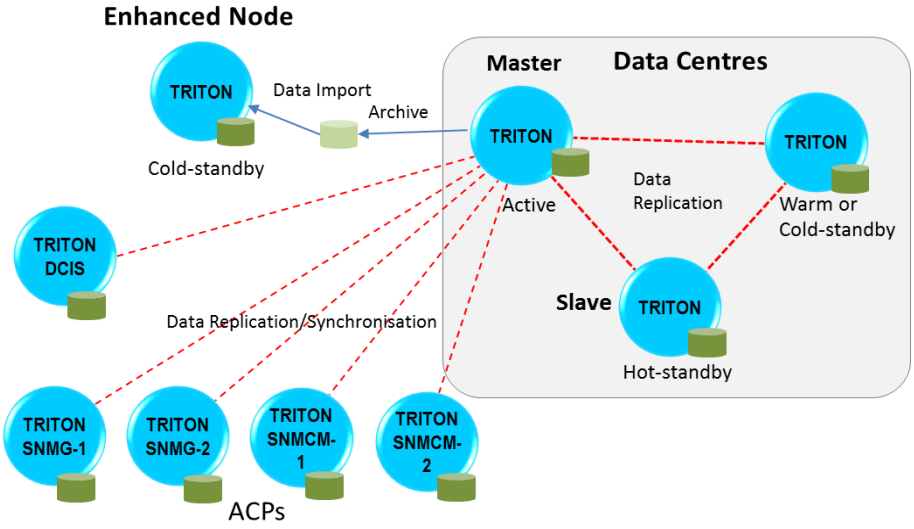
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test

[T1-R669] *TRITON shall allow the authorised user to control (including force logout) the session of a selected Client.*

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

4.2.7.2.7. Multi-Site Operation Management

TRITON will be deployed on a number of static and afloat sites. It will be possible to operate all instances of TRITON in harmony without causing any interference and preserve its data integrity. In a failure condition, the clustering mechanism immediately activate the services on the standby system without requiring administrative intervention. Each instance of TRITON can be configured for high availability under a general Multi-site Operation Concept. The concept with a sample clustered configuration is illustrated below:



Redundancy, data replication and synchronisation will be managed as described in the following paragraphs.

4.2.7.2.7.1. Redundancy Management

Other than the redundancy provided by the server equipment (e.g. hardware backup on virtual environment), TRITON will implement Redundancy Management using active-standby methods and master-slave mechanisms over geographically dispersed instances. Only one instance having the overall control of the entire Maritime Functional Services will be favoured over concurrent instances. Other instances will align themselves according to the master. In case the master instance fails, one of the candidates (hot standby) will take over. Following definitions for TRITON instances on static sites are applicable for Redundancy Management:

Active:

Only one instance of TRITON, as the master, is active at a Data Centre as a static site. The data is mirrored to the other instances by the Data Centre infrastructure in real time. Data from the active instance can be backed up or archived on a secondary storage.

Hot-Standby:

One instance of TRITON runs as a secondary (slave) system on a Data Centre. The software components on the secondary instance are up and running, but will not process data or requests. The data is mirrored to provide identical information to the slave. In case the master fails, the slave waiting in hot standby takes over in a few seconds.

Warm-Standby:

One instance of TRITON is installed on a Data Centre. The application is available on allocated virtual environment but not running. Data is replicated by the Data Centre Infrastructure. When necessary, the application is initiated manually, configured, and start using the most recent replicated data. This generally provides a recovery time of a few minutes.

Cold-Standby:

One instance of TRITON acts as backup of the other nodes on an Enhanced Node. The hardware or virtual environment is available, the software is installed, but not configured and not running. Data is not replicated. In case of a severe failure in the other nodes, this node is powered on and the data is restored from a selected off-line archive and the operational data is accumulated over time. This generally provides a recovery time of a few hours.

Configuration:

TRITON instances can be configured during their installation. The authorised user can configure the available instances according to the dynamic situation of available nodes or Data Centres. When the new instance becomes operational (i.e. ready to process data and user commands), world-wide C2 of a Maritime Operations will be possible. When the Standard Operating Procedures (SOP) are defined and applied, overall redundancy will be achieved through Redundancy Management.

[T1-R670] *TRITON shall implement a Redundancy Management using master-slave mechanism and redundancy methods as defined in the Description. COTS solutions may be used upon Purchaser approval.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3
- Qualific. Method : Demonstration
- Comment : The mechanism will be proposed by the Bidders and finalised during System Design. Tests will be performed during Multi-Site Operation Test.

[T1-R671] *TRITON shall allow the authorised user to configure instances of TRITON for Redundancy Management.*

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

[T1-R672] *TRITON shall allow the authorised user to control and monitor the Redundancy Management.*

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

[T1-R673] *In case the Active TRITON Instance fails, the Hot Standby Instance shall automatically take over and become operational within sixty (60) seconds.*

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

[T1-R674] *In case the Active TRITON Instance fails and the Hot Standby Instance is not available, the Warm Standby Instance shall become operational within fifteen (15) minutes after the manual initiation by the authorised user.*

Requirement Property :
- Domain for Static : Both
- Domain for Afloat: Both
- Baseline : BL 3

Qualific. Method : Test

[T1-R675] *In case the Active, Hot Standby and Warm Standby TRITON Instances fail, the Cold Standby Instance shall become operational within two (2) hours after the manual initiation.*

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

4.2.7.2.7.2. Data Replication

The basic function of the Data Replication is to make the same operational data available on both the source and destination databases on different servers separated by WAN. Replication also supports redundancy and resilience. TRITON will use the Data Centre Infrastructure to replicate its operational data over its instances at static sites. Deployable Kits will also have a Data Replication Process controlled by the user and limited to the Area of Interest.

Data Replication Process must be performed seamlessly, even under low bandwidth conditions for ACPs, so that the users are not affected. Since bandwidth allocation is an important performance factor for ACPs, TRITON Deployable Kits will have smart Data Replication capability. The authorised user will be able to configure the Data Replication capability such as setting up data exchange rules for just a given Area of Interest.

Data Replication Process:

The Data Replication Process will be identified for each type of instance to include automatic replication of all or selected portions of TRITON internal databases. Off-line databases and interfaces will be replicated manually. Following data types will be included in replication:

- All internal databases
- Interface configurations
- System Parameters.

Latency:

Data can be synhronised with indicated servers at certain time intervals. Depending on the selected methods and available bandwidth, the latency of synchronisation between a set of selected data must be completed within a certain time period. This period can be low for static sites and higher for static and afloat site. A maximum set of data will be comprised of those Maritime Operational Objects that can be displayed on a GeoView for static instances and the objects in an Area of Interest for an afloat site. A data set marked as "Critical" must be handled with higher priority.

[T1-R676] *TRITON shall support Data Replication to ensure complete, accurate, timely, confidential and consistent data coherence between instances. Data Centre Infrastructure shall be utilised to achieve resilience.*

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

[T1-R677] *TRITON shall allow the authorised user to configure Data Replication rules over selected data (e.g. critical, non-critical).*

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

[T1-R678] *The maximum allowed latency for a set of selected synchronised data shall not exceed one (1) minute for static instances and three (3) minutes for afloat instances.*

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

[T1-R679] *TRITON shall be able to replicate new data entry on the Active Instance database on the other Instances' databases based on the rules set by the authorised user.*

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

[T1-R680] *TRITON shall be able to replicate new data instances that are marked as "Critical" no later than ten (10) second plus the average network latency of the infrastructure.*

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

[T1-R681] *TRITON "will" be able to use Universally Unique Identifier (UUID) [ISO/IEC 9834] for Database Replication.*

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

[T1-R682] *TRITON shall allow the authorised user to manage (configure, monitor, control) Data Replication Process for all TRITON instances.*

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

[T1-R683] *TRITON Deployable Kits shall be able to replicate their databases on a selected TRITON Server if the full connectivity exists.*

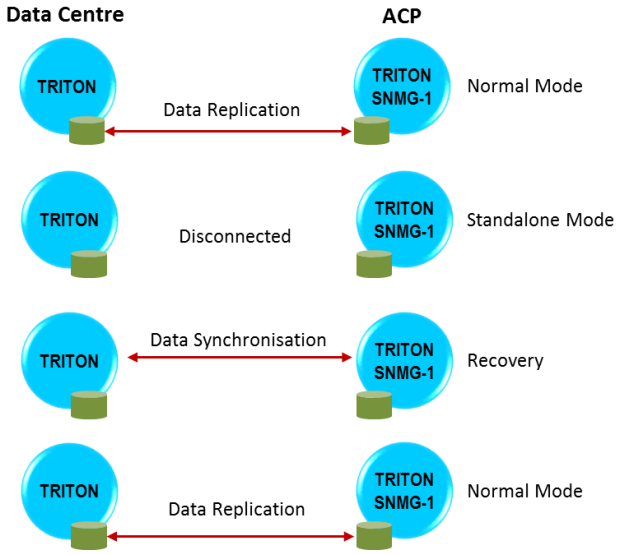
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration
Comment : Rules for synchronisation will be determined during Software Requirements Analysis.

4.2.7.2.7.3. Data Synchronisation

TRITON will support Data Synchronisation capability which provides integrity of data among all operational instances even after a failure recovery. While Data Replication provides redundancy at database level, Data Synchronisation provides more controlled data management based on operational settings in case connectivity is temporarily lost. Data Synchronisation process must be performed seamlessly after recovery, even under low bandwidth conditions, so that the users are not

affected. Since bandwidth allocation is an important performance factor for ACPs, TRITON Deployable Kits must have smart Data Synchronisation capabilities. The authorised users will be able to configure the capability such as the data exchange rules limited for just a given Area of Interest.

An example of the use of this process is given below:



Data Synchronisation Process:

During Data Synchronisation after re-connection, the functionality over operational data must be preserved. For example, when synchronising the Track Database, track numbering, correlation relationship and operational settings need to be taken into consideration. The Data Synchronisation Process will include automatic and manual synchronisation of at least the following data:

- Maritime Operation Database
- Track, Vessel and Reference Objects that are created, modified or deleted after disconnection
- History of vessels
- User Workspace
- Any changes to user privileges

[T1-R684] *TRITON shall support Data Synchronisation Process defined in the Description to synchronise its internal databases with the selected TRITON Server. The functionality over the data shall be preserved.*

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

[T1-R685] *TRITON shall allow the authorised user manage (configure, monitor, control) the Data Synchronisation Process.*

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

[T1-R686] *TRITON shall notify the authorised user when any inconsistency is detected during synchronisation process.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R687] *TRITON "will" be able to use Universally Unique Identifier (UUID) [ISO/IEC 9834] for Database Synchronisation.*

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

[T1-R688] *TRITON Deployable Kit shall be able to synchronise itself with the selected TRITON Server based on the Area of Interest set by the authorised user and the available bandwidth.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 4
Qualific. Method : Demonstration
Comment : Rules for synchronisation will be determined during Software Requirements Analysis.

4.2.7.3. Data Management

TRITON will utilise internal databases for storing Maritime Information Entities such as Track Database, Vessel Database, and Message Storage. These storages will be managed by authorised users. The database design will favour performance and data integrity.

4.2.7.3.1. Data Import and Export

TRITON functions will be able to import data from files or export own data into files in Recognised Export/Import File Formats.

[T1-R689] *TRITON shall be able to import data from a user-selected file in one of the Recognised Import File Formats according to the settings of a function.*

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

[T1-R690] *TRITON shall be able to export data to a user-specified file in one of the Recognised Export File Formats according to the settings of a function.*

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

[T1-R691] *TRITON shall be able to use the operating system file management to indicate the path or location of the file to be imported or exported.*

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

4.2.7.3.2. Databases

TRITON will maintain internal data storage as databases. It will allow the authorised user to manage (modify, delete, export, backup, archive) all data in the storage.

4.2.7.3.2.1. Database Management

TRITON databases will be managed by a Database Management System (DBMS). Each TRITON deployment will have its own DBMS, and keep track of all database activities including change history (Audit Trail) to record user activities.

NATO Infrastructure (DBMS Support):

The selected DBMS will be operating in the NATO Infrastructure, which can already support MS-SQL, PostgreSQL or Oracle, using Java, .NET or HTML/Java Script. Wherever possible, TRITON will make use of the existing NATO Infrastructure and Services, and will not use any proprietary SQL features so that it can run on any of the supported DBMS. The selected DBMS will also be able to support complex queries (a complex query is a parameter query that searches using more than one parameter value, i.e. on two or more criteria).

[T1-R692] *TRITON shall utilise a Database Management System (DBMS) to manage all internal data storage.*

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

[T1-R693] *Each TRITON instance shall have its own DBMS, compatible with the NATO Infrastructure as explained in the Desription.*

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

[T1-R694] *TRITON shall use only one database schema in a multiple user context (e.g. Live, Exercise, Training) during the execution and display which database is in use.*

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

[T1-R695] *TRITON shall provide the authorised user with database management, administration, monitoring capability allowing access to all historical data.*

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

[T1-R696] *TRITON shall provide auditing, audit trail with change recording, and activity logging mechanism with timestamps for all database activities.*

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

Qualific. Method : Demonstration

[T1-R697] *TRITON databases shall be able to support complex queries as explained in the Description.*

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

[T1-R698] *TRITON shall have "full-text search" capability of database in order to speed up free-text search in the database.*

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

[T1-R699] *TRITON shall allow the authorised user to perform database backup and archiving manually. The backup and archive shall be full, incremental backups and archives of data to a selected static network location and onto user-indicated transportable media.*

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

[T1-R700] *TRITON database shall support recovery facilities from backup and archive data (see Archiving).*

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

4.2.7.3.2.2. Database Import and Export

TRITON will be able to use the data previously stored by the legacy systems, MCCIS and/or MSA/BRITE, without any loss. During mapping from legacy systems, default values will be provided where actual values do not exist.

TRITON will also be able to export all or a portion of its databases.

[T1-R701] *TRITON shall be able to import data from legacy system (MCCIS and/or MSA/BRITE) databases without loss. On-line or off-line data migration tools shall be used to convert the existing data into the format recognised by TRITON databases.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration
Comment : The type and amount of data will initially be determined at SRR and finalised during the System Transition period.

[T1-R702] *TRITON shall perform mapping while importing data from legacy system databases.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3

Qualific. Method : Demonstration

[T1-R703] *TRITON shall be able to import data from previously exported own database.*

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

[T1-R704] *TRITON shall assign default values during mapping of data from legacy systems to current system, if the values do not exist.*

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

[T1-R705] *TRITON shall notify the authorised user when imported data requires overrides.*

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

[T1-R706] *TRITON shall be able to export all or a portion of its databases together with their metadata.*

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

[T1-R707] *TRITON shall allow the authorised user to select the set of entities to be exported based on at least Complete Database, Subset, Selected Entity Types and Specified Date.*

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

[T1-R708] *TRITON shall protect its database integrity during exporting.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

4.2.7.3.2.3. Archiving

Data Archiving is used to move the data that is not actively used anymore in TRITON databases to off-line storage media for long-term preservation. Archived data can be imported back into their respective databases if necessary. The authorised user can archive all or part of the TRITON database with predefined rules. Short, medium and long-term implications of managing such information as well as relevant preservation requirements will be developed and maintained.

Each Maritime Operation can be fully or selectively archived independently. An archived Maritime Operation can be fully or selectively imported into the same Maritime Operation or into a new one.

Archiving will be performed according to [AC/324-D(2014)0008].

Operational Record:

Operational Record consists of information created, received and processed in the course of a NATO operation and maintained as evidence and reference information by NATO in pursuance of legal obligations, and the conduct of military or civil emergency operations. TRITON will keep Operational Records through archiving functionality together with their metadata. The TRITON Logbook will also be maintained as an Operational Record and archived. All Operational Records will be protected against unauthorised access and alteration after any encryption and password protection is removed.

[T1-R709] *TRITON shall provide complete archiving capability according to [AC/324-D(2014)0008].*

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

[T1-R710] *TRITON shall provide a selective archiving capability for selected databases for a selected time period in a Maritime Operation.*

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

[T1-R711] *TRITON shall protect Operational Records defined in the Description against unauthorised access and alteration.*

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

[T1-R712] *TRITON shall uniquely identify archives for long term preservation.*

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

[T1-R713] *TRITON shall allow the authorised user to initiate archiving into selected storage media.*

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

[T1-R714] *TRITON shall allow the authorised user to import the entire or selected parts of archived data into a selected Maritime Operation or into a new Maritime Operation.*

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

[T1-R715] *TRITON shall perform archiving after removing any encryption or password protection.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Test

4.2.7.3.2.4. Backup

TRITON will provide data survivability by using backups and images.

[T1-R716] *TRITON shall permit full, partial and incremental backup of both the TRITON Databases. TRITON shall be able restore the system to its exact state at the point of any full/partial backup.*

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

[T1-R717] *TRITON shall be able to make a full backup of all or selected data automatically at a configurable frequency (e.g. every 24 hours).*

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

[T1-R718] *TRITON shall allow the authorised user to perform full and incremental backups of all databases and software itself without impacting the system availability.*

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

[T1-R719] *TRITON shall allow the authorised user to take the image of the system and restore a system from an existing image.*

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

4.2.7.3.3. Off-line Reference Data Management

TRITON will check for new external data using recognised sites or off-line data sources (e.g. IHS, Lloyds). If new data is available, it will update the Reference Data Sources which can then be imported into other TRITON installations.

Reference Data Sources can be stored on the TRITON Server as off-line data stores. Off-line Reference Data Sources can also be accessed using the interfaces provided by the vendors of commercial databases. However, TRITON will have a "Vessel Data Import Capability" to import data from Maritime Datasets into Recognised Import File Format. This file will then be used by the Vessel Database Management to update the Vessel Database.

[T1-R720] *TRITON shall allow the authorised user to check external on-line Reference Data Sources from recognised Web sites or off-line Reference Data Sources at indicated Network Locations and import data into local Reference Data Sources.*

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

[T1-R721] *TRITON shall have a Vessel Data Import Capability to be used for importing data from Maritime Datasets into Recognised Import File Format.*

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

[T1-R722] *TRITON shall allow the user to access the off-line Reference Databases with search and list capability.*

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

4.2.7.3.4. Own Ship Data Management

When TRITON is used on board a ship assigned as an ACP as a Deployable Kit, Own Ship Data will be managed automatically if an external data is provided. The data can be received through the ACP Interface according to "TRITON Own Ship Data Specification". The specification will include the following information:

- Task Unit information as used in Maritime Task Organization
- Ship position
- Course and speed
- Date and Time of update

Own Ship Data will be stored internally and made available to internal applications and services requiring information related to own ship.

[T1-R723] *TRITON shall maintain Own Ship Data.*

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

[T1-R724] *TRITON shall allow the authorised user to modify Own Ship Data manually.*

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

[T1-R725] *TRITON shall be able to receive Own Ship Data from external sources automatically according to TRITON Own Ship Data Specification.*

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

[T1-R726] *TRITON shall make Own Ship Data available for internal processing.*

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

4.2.8. Maritime Training and Exercise

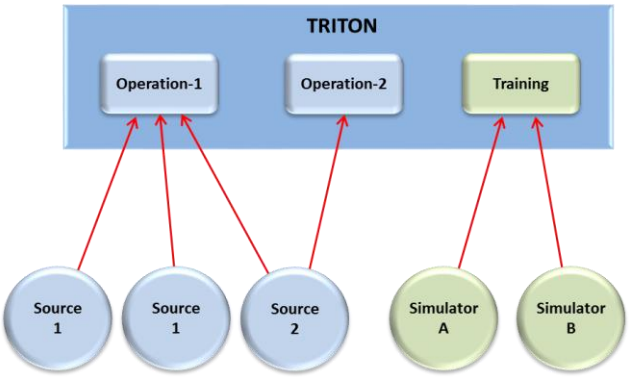
TRITON will provide the capability for training and participating in exercise while conducting live operation. It will be possible to use the Maritime Operation Management for training and exercise purposes. In addition, there will be separate Training Systems to provide individual or collective training to the operational users.

4.2.8.1. Training

TRITON Functional Services can be used for operator training during either real life operation by means of a separately-controlled Maritime Operation or in a separate Training Environment.

Training in Real System:

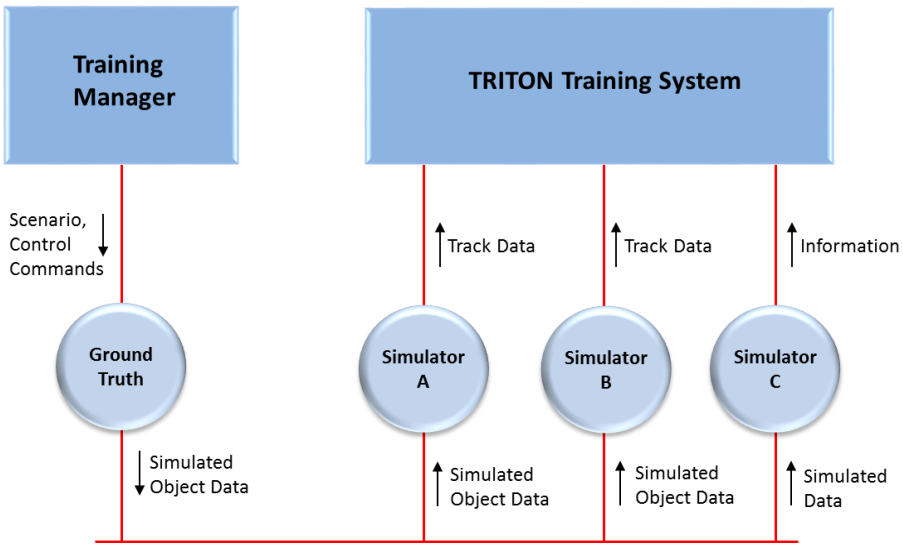
While TRITON is being used in real life, in an operational environment, a separate Maritime Operation can be created for training purposes. This could be either on static or afloat site. Simulators send their "Simulated" data to TRITON and then all TRITON functions can be used within that Maritime Operation created for training. The conceptual training capability is depicted below:



Training Using the Training System:

More independent training can be provided with TRITON Training Systems having TRITON-NS and TRITON-NU Operational Software. The TRITON Training System installed on a separate environment as a Support System is used for Individual or Collective Training purposes. Its Operational Mode set to "Training" to make it pretend as if it is in real world with real inputs.

The TRITON Training Systems will use Training Environment to simulate external data sources according to a common reference, "Ground Truth". All external simulators will then send their data as "Live" instead of "Simulated". The Training Environment will be configurable to use the available data simulators and to provide coordinated data inputs to the simulators (i.e. Object Data). A conceptual Training Environment is depicted below:



The Training Manager allows the user to define scenarios based on Simulated Objects. It will issue control commands to the Ground Truth according to the user-defined scenario to generate Simulated Object Data. These objects can then be read by the individual Simulators and corresponding track or information is generated. TRITON will then act as if it is receiving external data from a system or service.

The Training Environment should be flexible to accommodate future training needs.

Training Data:

TRITON Training Data will be stored in a Training Database associated with the Training Manager and Ground Truth. The Training Data will consist of the following:

- A database representation of an operational environment in size and coverage (i.e. all Maritime Information Entities and their relationships).
- Scenarios
- Simulated Object Data
- A dataset with evolutionary data over a period of time for training and representative evolutions for each type of Information Object/Product.

[T1-R727] *TRITON shall provide training capability using Simulated Tracks while operating in Normal or Standalone Mode.*

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

[T1-R728] *TRITON shall provide training capability to trainees with available external system simulators while operating in Training Mode (only for the Training System in the Training Environment).*

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

[T1-R729] *TRITON Training Environment shall have a Training Manager with scenario development and generation capability. This capability shall be able to run user-defined scenarios using user-defined dates and time, and save the scenarios for reviewing purposes.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R730] *TRITON Training Environment shall maintain a Training Database with the Training Data as defined in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R731] *TRITON Training Environment shall have a Ground Truth as a simulation engine to generate Simulated Object Data according to the scenario and user commands. The Simulated Object Data shall be made available to Simulators to generate actual information, coordinated in the same time and space domain.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R732] *TRITON shall allow the authorised user to manage (define, configure, start, stop) the Training Environment.*

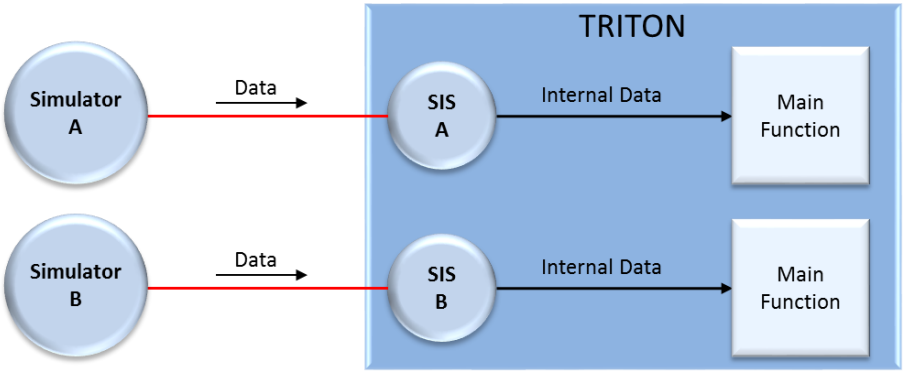
Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

4.2.8.2. Data Source Simulation

TRITON will be able to simulate external data sources for training or exercise purposes.

4.2.8.2.1. Track Simulation

TRITON will use a generic Track Simulator which can simulate certain types of external track data sources. More than one instance of the Track Simulator can be used to simulate external data sources. The concept of using Track Simulators is depicted below.



The Track Simulator will be able to simulate at least the following data sources:

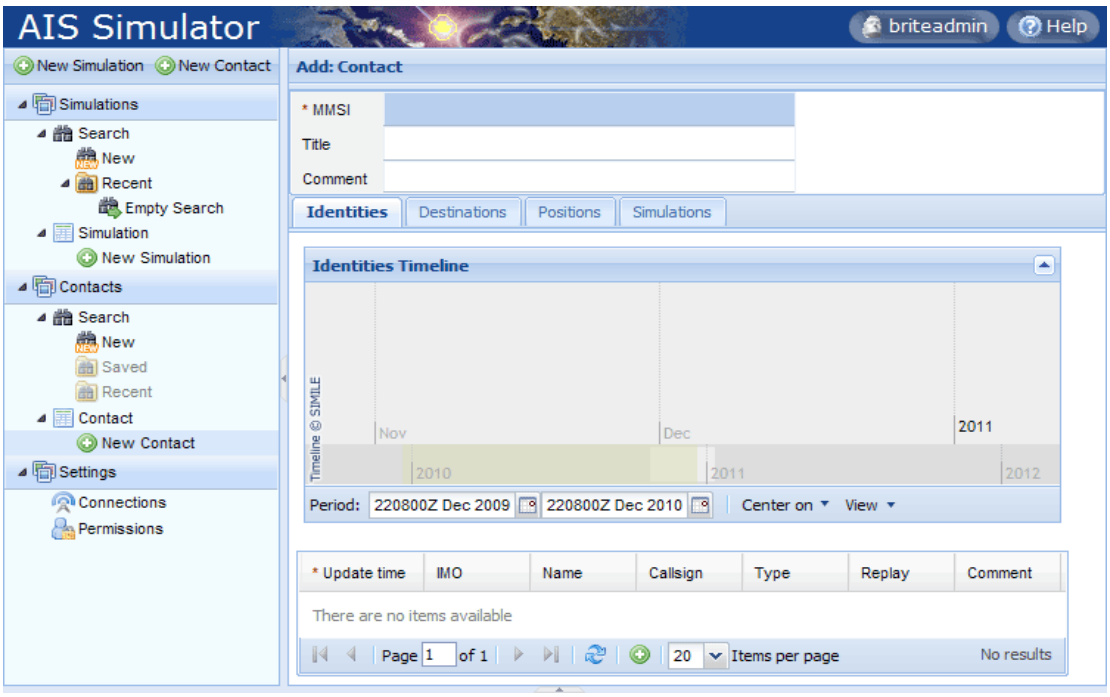
- Nation RMP Stream Simulation (NS Domain)
- Nation RMP Report Simulation (NS Domain)
- Nation WP Stream Simulation (NU Domain)

- AIS Track Stream Simulation (NS and NU Domains)

The Track Simulator will generate "Simulated" track data when TRITON operates in Normal Mode and "Live" data if it is running in Training Mode.

The user will be able to indicate an area to create the tracks either at default or random positions. The default positions of tracks have the same distances between each other until the given number of tracks fill in the area. Random positions are created by means of a random position generation within the given area. Similarly, course and speed values can be set as a standard value or randomly. The simulator can then move the tracks with these coure and speed values.

As an example, a view of the AIS Simulator used in MSA/BRITE is given below:



Track Simulator will be able to receive Simulated Object Data from the Ground Truth when it is configured to run in Training Environment.

[T1-R733] *TRITON shall be able to use Track Simulators running either with standalone control or integrated with the Training Environment.*

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

[T1-R734] *TRITON shall be able to run multiple instances of Track Simulator provided that each instance has a separate source identification.*

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

[T1-R735] *TRITON shall allow the authorised user to configure the Track Simulators as the replacement of actual sources and control their status.*

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

Baseline : BL 3
Qualific. Method : Test

[T1-R736] *TRITON Track Simulator shall detect the operational mode of the TRITON Server and generate Live Tracks if the mode is Training and generate Simulated Tracks for other modes.*

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

[T1-R737] *TRITON Track Simulator shall allow the user to assign values to track attributes (identity, classification, initial position, course, speed, etc.) in a configurable table.*

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

[T1-R738] *TRITON Track Simulator shall allow the user to set the update rate and edit the track attribute values while the simulator is running.*

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

[T1-R739] *TRITON Track Simulator shall allow the user to set an area that the tracks will be created either at default or random positions with the same or random course and speed.*

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

[T1-R740] *TRITON Track Simulator shall allow the authorised user to select a source and then manually initiate a Simulated Track at an indicated position on the GeoView when TRITON is in Normal Mode.*

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

[T1-R741] *TRITON Track Simulator shall be able to receive Simulated Object Data from the Ground Truth and generate the Track Data when it is used in Training Environment.*

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

4.2.8.2.2. Nation RMP Stream Simulation

TRITON Track Simulator will be able to generate a simulated RMP for a Nation as a stream of tracks having attribute values set by the user. The source of the tracks will be set as the indication of the simulated Nation. The stream of data will be sent over TCP/UDP/IP.

[T1-R742] *TRITON Track Simulator shall have a Nation RMP Stream Simulation capability which provides tracks as a stream on TCP/UDP/IP.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R743] *TRITON Track Simulator shall be able to manage (initiate, update, drop) Nation RMP tracks with the source of the stream set as a Nation.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

[T1-R744] *TRITON Track Simulator shall be able to generate and update at least five-thousand (5000) tracks if it is simulating the Nation RMP as a track stream.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

4.2.8.2.3. Nation RMP Report Simulation

TRITON Track Simulator will be able to generate a simulated RMP for a Nation as OTH-T GOLD Formatted Messages with tracks of given attribute values. The source of the tracks will be set as the indication of simulated Nation.

[T1-R745] *TRITON Track Simulator shall have a Nation RMP Report Simulation capability which provides tracks in OTH-T GOLD Formatted Messages.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Demonstration

[T1-R746] *TRITON Track Simulator shall be able to manage (initiate, update, drop) Nation RMP tracks with the source of the report set as a Nation.*

Requirement Property :
- Domain for Static : NS
- Domain for Afloat: N/A
- Baseline : BL 3
- Qualific. Method : Test

[T1-R747] *TRITON Track Simulator shall be able to generate at least one-hundred (100) tracks into OTH-T GOLD messages and send them to the relevant Nation Interface of TRITON if it is simulating the Nation RMP as track reports.*

Requirement Property :
- Domain for Static : NS

Domain for Afloat: N/A
Baseline : BL 3
Qualific. Method : Test

4.2.8.2.4. Nation WP Stream Simulation

TRITON Track Simulator will be able to generate a simulated WP for a Nation as a stream of tracks having attribute values set by the user. The source of the tracks will be set as the indication of the simulated Nation. The IMO and MMSI numbers will be set either in an order or randomly within a given number interval. The stream will be sent over TCP/UDP/IP.

[T1-R748] *TRITON Track Simulator shall have a Nation WP Stream Simulation capability which provides tracks as a stream on TCP/UDP/IP.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R749] *TRITON Track Simulator shall be able to manage (initiate, update) Nation WP tracks with the source of the stream set as a Nation.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

[T1-R750] *TRITON Track Simulator shall be able to generate and update at least five-thousand (5000) tracks if it is simulating the Nation WP as a track stream.*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Test

4.2.8.2.5. AIS Data Source Simulation

TRITON Track Simulator will be able to generate AIS tracks having attribute values set by the user. The source of the tracks will be set by the user, the IMO and MMSI numbers will be set either in an order or randomly within a given number interval. The simulator will update the track positions in timely manner according to the AIS Specification.

[T1-R751] *TRITON Track Simulator shall have a AIS Data Source Simulation capability which provides AIS tracks as a stream compliant to the AIS Specification.*

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

[T1-R752] *TRITON Track Simulator shall be able to manage (initiate, update) AIS tracks with the source of the stream set as an AIS data source name.*

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

[T1-R753] *TRITON Track Simulator shall be able to generate and update at least five-thousand (5000) AIS tracks if it is simulating an AIS data source.*

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

4.2.8.2.6. ACP Stream Simulation

TRITON Track Simulator included in the TRITON Deployable Kits will be able to generate tracks coming from a ship system as a stream with attributes set by the user. The source of the tracks will be set as the indication of the simulated ACP. The stream will be sent over TCP/UDP/IP.

[T1-R754] *TRITON Track Simulator shall have an ACP Stream Simulation capability which provides tracks as a stream on TCP/UDP/IP.*

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

[T1-R755] *TRITON Track Simulator shall be able to manage (initiate, update, drop) ACP tracks with the source of the stream set as the Unit Name of the ACP.*

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

[T1-R756] *TRITON Track Simulator shall be able to generate and update at least one-thousand (1000) tracks if it is simulating the ACP as a track stream.*

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

4.2.8.3. Interface Simulation

During development of TRITON, some external systems and services need to be simulated with limited behaviour. In order to be able to test the interfaces, simple Interface Simulators should be developed for test purposes. These simulators should emulate an external system/service and feed artificial data to TRITON. Their internal state does not have to accurately reflect the internal state of the external system, but provide realistic data for test purposes.

4.2.8.3.1. System Interface Simulator

During development of TRITON, some external systems and services need to be simulated with limited behaviour. In order to be able to test the interfaces, simple Interface Simulators should be developed for test purposes. These simulators should emulate an external system/service and feed artificial data to TRITON.

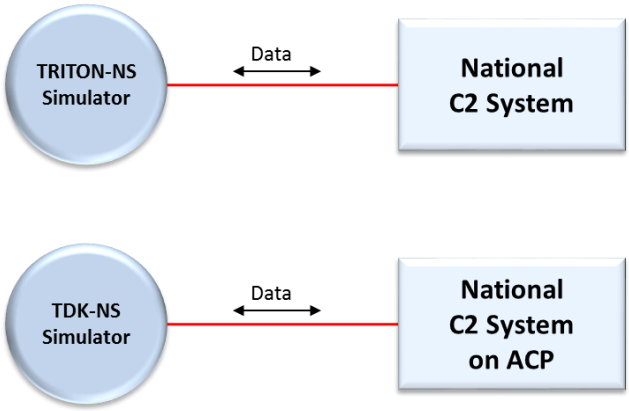
[T1-R757] *In case external systems or services are not available, System Interface Simulators "will" be developed and used for testing TRITON interfaces in the Test Environment. For example,*

if ENV-FS is not available at the time of testing, a simple interface simulator for ENV-FS will be used.

Requirement Property :
Domain for Static : Both
Domain for Afloat: N/A
Baseline : BL 1
Qualific. Method : Demonstration
Comment : Interface Simulators will be developed according to the BL needs.

4.2.8.3.2. TRITON Simulator

TRITON will have on-line interfaces with Nations through Services. In order to provide Nations to develop their own software and test it prior to integrating with TRITON, a "TRITON Interface Simulator" will be developed and provided to Nations. This simulator will emulate the TRITON External Services for Nations and ACPs on both NS and NU Domains for test purposes. The conceptual illustration is given below:



[T1-R758] *TRITON-NS Simulator shall emulate TRITON-NS External Interfaces (e.g. RMP Service, ICI Service).*

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

[T1-R759] *TRITON-NU Simulator shall emulate TRITON-NU External Interfaces (e.g. WP Service, ICI Service).*

Requirement Property :
Domain for Static : NU
Domain for Afloat: N/A
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R760] *TDK-NS Simulator shall emulate TDK-NS (e.g. ACP Interface - NS).*

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

[T1-R761] *TDK-NU Simulator shall emulate TDK-NU (e.g. ACP Interface - NU).*

Requirement Property :
Domain for Static : NU

Domain for Afloat: N/A
Baseline : BL 4
Qualific. Method : Demonstration

4.2.8.4. Exercise

TRITON will provide the same services for both live operations and exercises. In other words, TRITON will be agnostic to an exercise or to a live operation regarding provision of services. Users can access to a Maritime Operation defined as an Exercise and perform any function within that Environment. One TRITON Instance will be able to host multiple live and synthetic (Exercise) Environments simultaneously.

The Exercise Environment will be the same as the Live Environment from the functionality and settings point of view. There may be exercises with only simulated data (synthetic) as well as live data. Exercises with synthetic data can be conducted using entirely unreal units and unreal data from simulated sources. Exercises with real units and live data can also be conducted by impersonating live sources in Exercise Environment. For example, some ships in an exercise area can act as blue forces while some ships play the roles of red forces; they can both provide live track information.

RMP for an Exercise Environment can be built independently from other Maritime Operations and disseminated with appropriate classification level. Formatted Messages are labelled accordingly as well.

TRITON can process the Standard Identities of live track reports in any Maritime Operation if their Exercise Indicator is set.

ACPs can use the same Maritime Operation for an exercise as the conducting Headquarters.

[T1-R762] *TRITON shall provide exercise management capability via Maritime Operations while operating in Normal or Standalone Mode.*

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

[T1-R763] *TRITON shall utilise a Maritime Operation of type Exercise to conduct an exercise in fully synthetic, fully live or combined environment.*

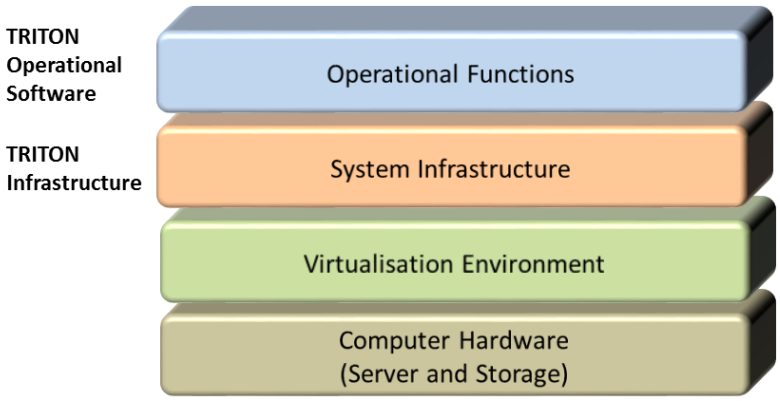
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R764] *TRITON shall allow the authorised user to build a separate Vessel Database in a Maritime Operation for exercise purposes by importing selected Vessels from a selected Maritime Operation.*

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

4.2.9. System Infrastructure

TRITON System Infrastructure provides a coherent foundation that supports all operational functions within the capability. The high-level, layered system architecture is illustrated below:



TRITON System Infrastructure also includes all support functions for users including user interaction, on-line help, notification, display capability and interfaces with Core Enterprise Services in a Service Oriented Architecture.

4.2.9.1. Service Oriented Architecture Platform

Service Oriented Architecture (SOA) is a software architecture within which functions are defined as independent services with well-defined interfaces which can be called separately or in defined sequences to form business processes. The interface is the focus and is defined in terms of the required parameters and the nature of the result when the service is invoked. A SOA enables services to be published, discovered and utilized [ADatP-34].

SOA provides a flexible, modular approach for implementing the functional requirements of systems, in the form of services, and a unified networking infrastructure ensures that those services can be accessed and used. A “Platform” provides a common framework, or a set of services, that are easily reused for fundamental activities. By leveraging a set of SOA Platform Services, the developers of new applications and services can avoid duplication of effort across a range of areas, leaving them to focus on adding value in the functionality of their particular area of expertise.

SOA Platform Services provide the foundation to implement Web-services in a loosely coupled environment, where flexible and agile service delivery is a requirement. They offer generic building blocks for SOA implementation (e.g. discovery, message busses, orchestration, information abstraction and access etc.) and can be used as a capability integration platform in a heterogeneous service-provisioning ecosystem. This includes the capabilities to:

- Deploy, run, manage and interconnect multiple heterogeneous services.
- Enable the creation of independent, loosely coupled service components to allow for seamless composition of these components and distribution of components across various logical and physical boundaries.
- Support SOA principles like simplified development of new service oriented applications, and reuse of existing ones, legacy applications migration capability towards SOA and service orientation.

TRITON should be able to provide services that will integrate with the existing NATO SOA architecture (Bound by NATO adopted standards – subset of standards used by main COTS). In addition, it must be able to consume the existing Bi-SC AIS services published or available.

Organization for the Advancement of Structured Information Standards (OASIS) is a global consortium that works on the development, convergence, and adoption of e-business and Web service standards. Reference Model for Service Oriented Architecture (SOA-RM) is a standard developed by OASIS.

TRITON SOA Platform will comply with SOA-RM standard. Whenever an existing standard is used other than the specified SOA standards for any reason, the rationale should be provided. Exceptional cases may apply due to legacy information exchange requirements.

NISP [ADatP-34] defines extended SOA Platform Services under the CES C3 Taxonomy for the Federated Mission Network (FMN). The FMN Profile described in [MCM-0106], addresses wide range of open standards defining SOA. TRITON should also comply with the NISP while implementing the SOA Platform. TRITON will be based on or be able to use standards that are supported by the major SOA products on the market today, like BPEL [OASIS WS-BPEL], WSDL and XML.

The Purchaser's guidance documents and Service Interface Profiles given in [NCIA-06.02.01 to 10] will be used during the detailed design of TRITON SOA Platform.

TRITON SOA Platform design will include a Service Layer in compliance with SOA and Open Standards. Following standards will be applicable:

Web Platform Services:

- IETF RFC 2616:1999, Hypertext Transfer Protocol HTTP/1.1
- IETF RFC 2817:2000, Upgrading to TLS Within HTTP/1.1
- IETF RFC 3986:2005, Uniform Resource Identifier (URI), Generic Syntax

Information Publishing:

Publishing information including text, multimedia, hyperlink features, scripting languages and style sheets on the network:

- Hypertext Mark-up Language (HTML) 4.01
- ISO/IEC 15445:2000, Information technology (Document description and processing languages -- Hypertext Mark-up Language (HTML)
- IETF RFC 2854:2000, The 'text/html' Media Type
- Hypertext Mark-up Language, Version 5 (HTML 5), W3C Candidate Recommendation, Aug 2013
- IETF: RFC 4329, 2006 (Java Script) Scripting Media Types
- OASIS Standard, Web Services for Remote Portlets Specification v2.0, 1 April 2008

Style Sheet:

Providing a common Style Sheet language for describing presentation semantics (that is, the look and formatting) of documents written in mark-up languages like HTML:

- Cascading Style Sheets (CSS) Level 2 Rev. 1 (CSS 2.1), W3C Recommendation, September 2009
- CSS Level 3, CSS Level 2 Rev. 1 (including errata) (CSS 2.1), W3C Recommendation, June 2011
- CSS Style Attributes, W3C Candidate Recommendation, 12 October 2010
- Media Queries, W3C Recommendation, 19 June 2012
- CSS Namespaces Module, W3C Recommendation, 29 September 2011
- Selectors Level 3, W3C Recommendation, 29 September 2011
- CSS Color Module Level 3, W3C Recommendation, 07 June 2011

Formatting:

General formatting of information for sharing or exchange:

- The Atom Syndication Format (Atom 1.0) [RFC 4287]
- The Atom Publishing Protocol [RFC 5023]
- Really Simple Syndication (RSS) 2.0 Specification Version 2.0.11, 30 March 2009

Geo-encoded Location:

Encoding of location as part of Web feeds:

- GeoRSS Geographically Encoded Objects for RSS feeds
- GeoRSS Simple encoding for <georss:point>, <georss:line>, <georss:polygon>, <georss:box>.
- GeoRSS GML Profile 1.0 a GML subset for <gml:Point>, <gml:LineString>, <gml:Polygon>, <gml:Envelope> of OGC 03-105r1: 2004-02-07, OpenGIS Geography Markup Language (GML) Implementation Specification version 3.1.1

Security:

Message Security for Web services (when processing classified data):

- WS-Security: SOA Platform Message Security 1.1
- XML Encryption Syntax and Processing, W3C Recommendation, 10 December 2002
- XML Signature Syntax and Processing (Second Edition), W3C Recommendation, 10 June 2008
- OASIS WS-I Basic Security Profile Version 1.1, 24 January 2010
- Web Services Security - SAML Token Profile 1.1, OASIS Standard
- Web Services Security - X.509 Certificate Token Profile 1.1, OASIS Standard

Security token issuing:

- OASIS Standard, WS-Trust 1.4
- Web Services Federation Language (WSFederation) Version 1.1, December 2006
- NPKI Certificate Policy(CertP), Rev2
- SAML Protocol (from OASIS Standard, Security Assertion Markup Language (SAML) 2.0), March 2005
- Web Services Policy 1.5 – Framework, W3C Recommendation, 04 September 2007
- WS-Security Policy 1.3, OASIS Standard

Transformation:

Transforming XML documents into other XML documents:

- XSL Transformations (XSLT) Version 2.0, W3C Recommendation 23 Jan 2007

Information Exchange:

Exchanging structured information in a decentralized, distributed environment via Web services:

- Simple Object Access Protocol (SOAP) 1.1, W3C Note, 8 May 2000 [OASIS SOAP]
- WSDL v1.1: Web Services Description Language (WSDL) 1.1, W3C Note, 15 March 2001
- Representational State Transfer (REST) in accordance with: University of California, Roy Thomas Fielding, Architectural Styles and the Design of Network-based Software Architectures: 2000, Irvine, CA
- SOAP Version 1.2 Part 1: Messaging Framework (Second Edition), W3C Recommendation, 27 April 2007
- SOAP Version 1.2 Part 2: Adjuncts (Second Edition), W3C Recommendation, 27 April 2007
- SOAP Version 1.2 Part 3: One-Way MEP, W3C Working Group Note, 2 July 2007

Publish/Subscribe:

Topic-based publish/subscribe Web services communication:

- OASIS, Web Services Base Notification 1.3 (WS-Base Notification), 1 October 2006
- OASIS, Web Services Brokered Notification 1.3 (WS-Brokered Notification), 1 October 2006
- OASIS, Web Services Topics 1.3 (WS-Topics), 1 October 2006

Addressing:

Providing transport-neutral mechanisms to address Web services:

- WS-Addressing 1.0 - Core, 9 May 2006 Web Services Addressing 1.0 – Core, W3C Recommendation, 9 May 2006

Messaging:

Reliable messaging for Web services:

- OASIS, Web Services Reliable Messaging (WS-Reliable Messaging) Version 1.2, February 2009

Query:

- SPARQL Protocol and RDF Query Language [SPARQL]

[T1-R765] *TRITON shall be able to use Web services compliant with WS-I Basic Profile Specifications using XML Schemas.*

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

[T1-R766] *TRITON should be able to use SPARQL Protocol and RDF Query Language Web services and ontologies.*

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

[T1-R767] *TRITON shall conform to the Reference Model for Service Oriented Architecture by OASIS (SOA-RM). As such, TRITON shall:*

- *Have entities that can be identified as services defined by the Reference Model.*
- *Show how visibility is established between service providers and consumers.*
- *Show how interaction is mediated.*
- *Show how the effect of using services is understood.*
- *Have descriptions associated with services.*
- *Show the execution context required to support interaction.*
- *Show how policies are handled and how contracts shall be able to be modelled and enforced.*

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

[T1-R768] *TRITON SOA Platform shall isolate transformation, message routing and publish-subscribe, Business Process Execution Language (BPEL)-kind of SOA-related activities onto a Service Layer. The design shall allow future replacement of the Service Layer tasks with an external Message Oriented Middleware Services.*

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

[T1-R769] *TRITON SOA Platform shall use HTTP as the transport protocol for information without "need-to-know" caveats between all service providers and consumers (unsecured HTTP traffic). HTTPS shall be used as the transport protocol between all service providers and consumers to ensure confidentiality requirements (secured HTTP traffic).*

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

[T1-R770] *TRITON SOA Platform design shall comply with the standards given in the Descriptions. Any deviation of the proposed solution from the compliance of these standards shall be documented in detail with its justification.*

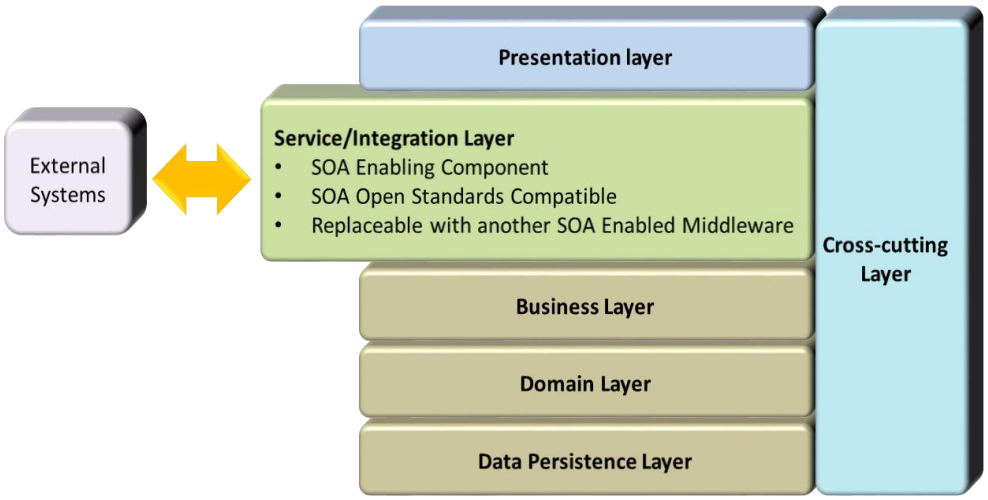
Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection
Comment : Any deviation will be subject to the approval of the Purchaser.

[T1-R771] *TRITON SOA Platform design shall comply with the Service Interface Profiles given in [NCIA-06.02.01 to 10].*

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

4.2.9.2. Message Oriented Middleware

TRITON will utilise a Service/Integration Layer which can be replaced in future with Purchaser-provided Middleware Services. The concept is shown below:



TRITON should use loosely coupled modules. A topic-based, publish/subscribe mechanism can be used as defined in the Service Interface Profiles [NCIA-06.02.08], [NCIA-06.02.09], [NCIA-06.02.10].

[T1-R772] *TRITON Middleware shall be compatible with the Service Interface Profiles given in [NCIA-06.02.08], [NCIA-06.02.09], [NCIA-06.02.10].*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Inspection
Comment : The proposed Middleware must be compatible with the given references allowing for future replacement.

[T1-R773] *TRITON Middleware should provide for any TRITON service to subscribe to hierarchical topics and receive publications over the Middleware.*

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

Baseline : BL 1
Qualific. Method : Inspection

[T1-R774] *TRITON Middleware should provide for consumer services to subscribe to Maritime Information Entities using the topic syntax.*

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

[T1-R775] *TRITON Middleware should use event-driven mechanisms compliant with OASIS WS-Notifications protocols to consume event driven, time sensitive and critical Web Services of other systems.*

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

[T1-R776] *TRITON Middleware should allow consumers to initiate and manage subscriptions.*

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

[T1-R777] *TRITON Middleware should provide for a publication manager to manage all publications from its services.*

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

[T1-R778] *TRITON Middleware should allow subscribers to manage their subscription.*

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

[T1-R779] *TRITON Middleware should publish each element of the Maritime Information Entities by creating a hierarchical topics structure.*

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

[T1-R780] *TRITON Middleware should publish each element of the Maritime Information Entities by initiating a message delivery corresponding to the topic.*

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

[T1-R781] *TRITON Middleware should publish each element of the Maritime Information Entities with an appropriate filtering syntax to allow consumers to subscribe to a subset of those Entities.*

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

[T1-R782] *TRITON Middleware should allow consumers to subscribe to Maritime Information Entities using the topic and filtering syntax.*

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

[T1-R783] *TRITON Middleware should provide for subscriptions to be either infinite (i.e. a subscription remains in force until it is cancelled) or subscriptions with predefined termination time, which automatically expire (i.e. the consumer is only a subscriber for a certain amount of time).*

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

[T1-R784] *TRITON Middleware should provide synchronisation capability to consumers with Core Data Store for a given time period using a synchronisation interface.*

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

4.2.9.3. Core Enterprise Services

In the frame of Core Enterprise Services (CES), the SOA platform relies on the Infrastructure Services and aids Enterprise Support Services in order to provide an integrated and coherent environment for user applications and Communities of Interest (COI). TRITON will therefore comply with CES definitions of Federated Mission Networking (FMN) Interoperability Standards Profile for Mission Execution Environment defined in NATO Interoperability Standards and Profiles, Version 8 (NISP V8).

Details of CES interfaces are given in Section 5, Interface Requirements.

4.2.9.4. TRITON Clients

"TRITON Clients" are User Applications that run in standard Web Browsers on Standard NATO Bi-SC AIS Workstations. TRITON User Applications provide the Graphical User Interface (GUI) for the users to interact with the system whereas the workstation provides the input/output devices. As a general term, a "Client" is a machine that runs a "TRITON Client".

4.2.9.4.1. Human-Machine Interface

TRITON Human-Machine Interface (HMI) consists of interface equipment and Graphical User Interfaces (GUI). The main user input devices are the standard keyboard and the available pointing device. Key

and pointing device button combinations can be used for shortcuts. The F-Keys of the keyboard can also be used to activate certain functions.

TRITON Clients will use office-type workstations compliant to NATO Bi-SC AIS Standard for user interaction. Deployable Kits will additionally have drawable keyboard-monitor module for local access. The main output device will be one or two high-resolution monitors, preferably two monitors. GUI provided by the User Applications accept user inputs from the keyboard and the pointing device, and present textual and graphical information.

[T1-R785] *TRITON Client shall provide the HMI as Web-based applications on a Standard NATO Bi-SC AIS Workstation.*

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

[T1-R786] *TRITON HMI shall handle user inputs from keyboard and the available pointing device and provide output to available displays (monitors).*

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

4.2.9.4.2. Web Browser Standards

TRITON will comply with the following standards for implementing the Web applications:

- HTTP [HTTP]
- URL [RFC 1738]
- URI [RFC 3986]
- OASIS Web Services for Remote Portlet Specification [OASIS-RPS]
- Common Gateway Interface (CGI) [RFC 3875]
- Asynchronous Javascript and XML (AJAX)
- HTML5 [HTML5]
- CSS [CSS]

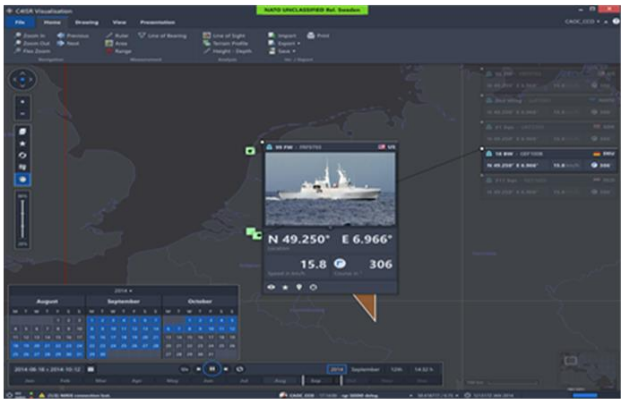
[T1-R787] *TRITON Client shall support the standards given in the Description for implementing the Web-based applications.*

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

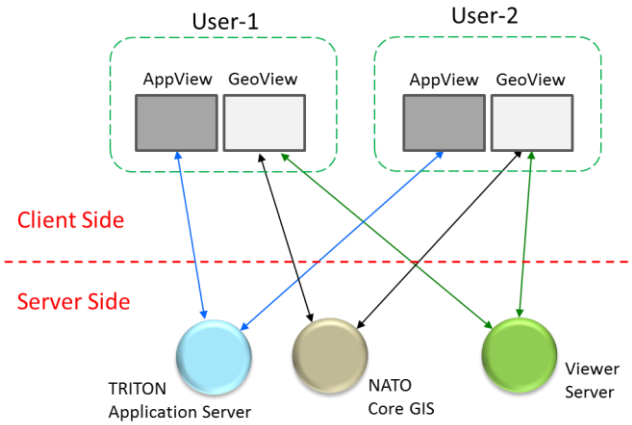
4.2.9.4.3. Visualisation

TRITON Visualisation Capability will be provided by TRITON Clients as applications running in Web browsers. There will be two Views: Application View and Geospatial View.

The Application View (AppView) will provide the HMI for TRITON Applications. The GeoView (GeoView), as part of the C4ISR Visualisation Component (VC) will provide the display of geospatial information on map. Both views will use the same look-and-feel. A sample representation of these Views (Dark Theme) is given below:

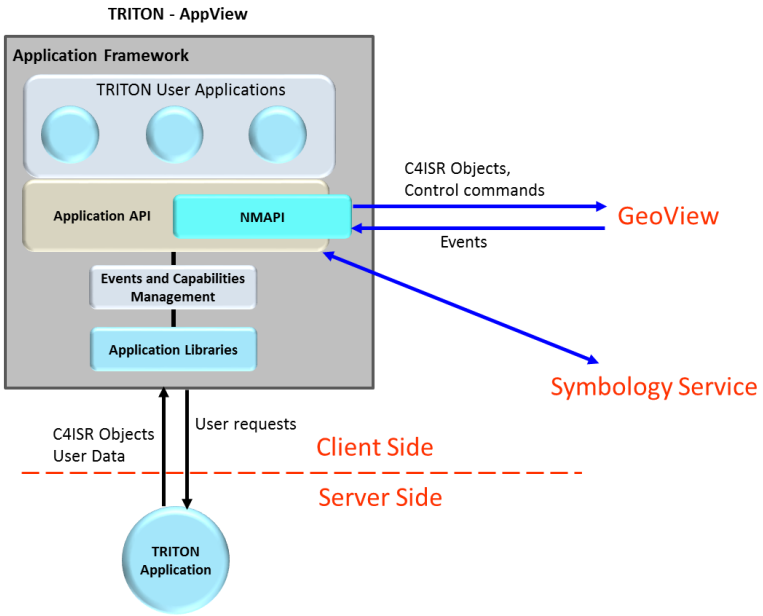


The figure below shows the general structure of the Functional Service Viewers, the interaction between the Clients and Servers. The details are given in Subsection 4.3.



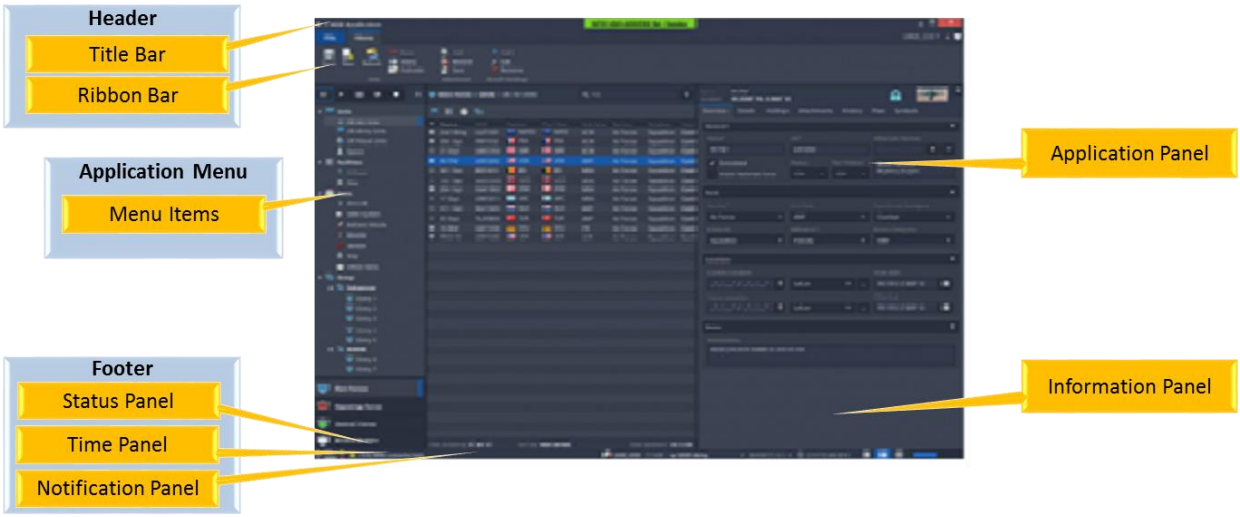
4.2.9.4.4. Application View

Application View (AppView) provides the main HMI as the User Applications for the TRITON Services. It provides the users to access individual TRITON Applications and interact with the services provided by the Functional Service. Authenticated users can launch authorised Applications as well as the GeoView. The AppView provides the management of the data specific to the domain, (e.g. Maritime data objects or Land data objects). The internal structure is given below:



The main GUI elements of the AppView will be lists and tables, hierarchical trees and detail panels, as well as dialogs to interact with the user. No map display functions will be performed by the AppView. NATO Common Map API is defined within C4ISR Visualisation Component Requirements, Subsection 4.5).

The AppView User Interface Layout is given below as an example:



The brief description and the content of the elements shown in the figure are described below:

Header:

Title Bar:

- Located at the top of the AppView
- Displays Application Name
- Displays Label of environment classification.

Ribbon Bar:

- A Command bar that organises the system functions of the selected User Application into a series of tabs
- Provides the user with the most important and most used tools for running User Applications.
- Context- and security-sensitive tabs (they change depending on the user logged in, what level of security role the user has, and what User Application is currently running).
- Displaying the currently logged-in user's name
- Displaying the Selected Operation Name
- Quick Access buttons (e.g. On-line Help).

Application Menu:

- Menu Items related to User Applications in a tree structure

Application Panel:

- A panel for displaying Application-specific information

Information Panel:

- A panel for displaying any information in tabular form (e.g. search results)

Footer:

Status Panel:

- Display the Connection status
- Displays the current TRITON Mode of Operation.

Time Panel:

- Displays the Current Time in three different Time Zones (local, operational theatre and UTC (Zulu))

Notification Panel:

- Displays errors and warnings.

[T1-R788] *TRITON shall have an Application View (AppView) which provides the HMI for User Applications per user.*

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

[T1-R789] *TRITON AppView shall be able to launch GeoView when the user wants to display geospatial data.*

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

[T1-R790] *TRITON AppView shall close the GeoView when the user terminates the AppView.*

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

[T1-R791] *TRITON AppView and GeoView shall interact with each other over the NATO Map API (NMAPI) as defined in the VC ICD.*

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

[T1-R792] *TRITON AppView shall have the general layout as given in the Description.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Demonstration
Comment : The outline of the Ribbon Bar will be determined during Software Design.

[T1-R793] *TRITON AppView shall have a Title Bar to provide the user with the Functional Service Name and the current classification level. The Title Bar Component from the VC shall be used.*

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

[T1-R794] *TRITON AppView shall have a Ribbon Bar as a series of tabs below the Menu Bar to provide the user with easy access to AppView functions. The Ribbon Bar Component from the VC shall be used.*

Requirement Property :

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

[T1-R795] *TRITON AppView shall allow the user to select a User Application to activate or deactivate.*

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

[T1-R796] *TRITON AppView shall have an Application Menu to provide the user with actions associated to User Applications.*

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

[T1-R797] *TRITON AppView shall display Application Information in tabular form inside Application Panel and Information Panel.*

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

[T1-R798] *TRITON AppView shall have a Status Panel to display the connection status and the current TRITON Mode of Operation. The Status Panel Component from the VC shall be used.*

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

[T1-R799] *TRITON AppView shall have a Time Panel which displays the current date and time in configurable zones. The Time Panel Component from the VC shall be used.*

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

[T1-R800] *TRITON AppView shall have a Notification Panel to display errors and warnings. The Notification Panel Component from the VC shall be used.*

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

4.2.9.4.5. Geospatial View

The Geospatial View (GeoView) displays map and C4ISR Objects with their geospatial information using common operational symbology. C4ISR Objects can be physical objects (e.g. units, equipment,

installations and meteorological occurrences) or non-physical entities (e.g. planning, control measures, or anticipated locations with temporarily assigned characteristics or temporary validity (APP-6)).

GeoView will be implemented by the C4ISR Visualisation Component as described in Subsection 4.3.

[T1-R801] *TRITON Client shall have a Geospatial View (GeoView) integrated with the Application View (AppView) running on a standard Client Workstation.*

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

[T1-R802] *TRITON shall only use the C4ISR Visualisation Component as the GeoView.*

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

[T1-R803] *TRITON GeoView shall be able to display maps, Maritime Operational Objects, external graphical information and images in Layers.*

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

4.2.9.5. User Support

TRITON User Support will provide the users with On-Line Help, printing and presentation support.

4.2.9.5.1. On-line Help

TRITON will be used by organizations in various time zones throughout NATO territories and other areas of NATO operations. During crisis, use of TRITON will be high and over extended working hours. An on-line help capability will be required to supplement the Help Desks. The TRITON users will be able to access On-line Help capability while operating the system. The On-Line Help will be organised in sections as given below:

Contents: Providing access to all help pages and organised in a logical manner by topic or procedure.

Index: Providing users with both the ability to search for keywords in all Help pages and retrieve a list of those pages in which those keywords appear and the ability to select and trigger such a query from a list of all keywords.

[T1-R804] *TRITON shall support On-line Help describing all functionality of the TRITON capability by using Contents, Index and associated Search.*

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

[T1-R805] *The TRITON On-line Help shall translate every use case and scenario into a browsing sequence. Every browsing sequence shall be structured according to the user workflow.*

Requirement Property :
- Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Inspection

[T1-R806] *TRITON shall allow the user to be able to access Help Function at any stage of execution of a function.*

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

[T1-R807] *TRITON On-line Help shall describe each TRITON function, the interrelationships between and the logical sequence of functions.*

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

[T1-R808] *TRITON On-line Help shall explain all menu items, dialog windows, data entry and query fields implemented in the TRITON Product Baseline.*

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

[T1-R809] *TRITON On-line Help shall include a glossary providing definitions of all terms and acronyms implemented in the TRITON Product Baseline.*

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

[T1-R810] *All definitions in the TRITON glossary shall be available in roll-over, pop-up windows linked to every appearance in On-line Help of the corresponding term or acronym.*

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

[T1-R811] *In TRITON, each dialogue, menu item, toolbar item, function, field or button (each item on the screen) shall have an On-line Help option. This shall be clearly visible, but not intrusive.*

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

[T1-R812] *TRITON On-line Help shall provide meaningful advice and hints to users appropriate to the actions they are trying to take.*

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

Baseline : BL 2
Qualific. Method : Inspection

[T1-R813] *TRITON On-line Help shall be concise, compact and clear to the user.*

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

[T1-R814] *TRITON On-line Help shall include screenshots of TRITON HMI. The screenshots shall be provided in a suitable lightweight format (e.g. GIF, PNG) approved by the Purchaser.*

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

[T1-R815] *Pictures in the TRITON On-line Help showing more than five (5) GUI elements/controls shall have a clickable image map describing each element.*

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

[T1-R816] *If the TRITON On-line Help topic requires a large picture that does not fit on a normal page, a reduced copy shall be additionally included on the Help page that will expand to its full size on user request.*

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

[T1-R817] *TRITON On-line Help shall be context-sensitive (i.e. based on a specific point in the state of the software and providing help for the situation that is associated with that state on action being performed).*

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

[T1-R818] *The Security Classification of any example data that is displayed in TRITON On-line Help shall not be higher than NATO UNCLASSIFIED.*

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

[T1-R819] *TRITON On-line Help context-sensitive GUI elements shall be linked to the relevant User Manual topics.*

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

Baseline : BL 2
Qualific. Method : Inspection

[T1-R820] *In TRITON, all source code elements shall be configured to link the GUI elements to their context-sensitive topics.*

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

[T1-R821] *TRITON On-line Help shall provide access to interactive training to guide users through procedures and functions.*

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

[T1-R822] *The TRITON On-line Help shall be given by a small pop-up screen or infotip screen. This screen shall appear quickly and be very easy to hide, for instance clicking anywhere within it.*

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

[T1-R823] *TRITON On-line Help shall open a dedicated Web page when the user requests access to the full content of the On-line Help. The On-line Help shall not be preventing the user to access TRITON functions.*

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

[T1-R824] *TRITON shall allow the user to hide the On-line Help screen just by clicking anywhere else, or there shall be another single action hiding mechanism.*

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

[T1-R825] *TRITON On-line Help shall include a searchable Index that allows the user to locate keywords or phrases (identified by enclosure within double-quotation marks) in the User Manual.*

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

[T1-R826] *TRITON shall support search queries for finding help items in the On-line Help.*

Requirement Property :
Domain for Static : Both

Domain for Afloat: Both
Baseline : BL 2
Qualific. Method : Demonstration

[T1-R827] *TRITON shall be able to display search query results for finding help items in the On-line Help in a list. TRITON shall display the help item when the user selects a query result in this list.*

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

4.2.9.5.2. Computer-Based Training

TRITON will provide a Computer-Based Training capability which allows the users give themselves self-training on business flows. The requirements below are applicable to any CBT development effort and will be compliant with [Bi-SC DIR 75-2] and will be designed by a certified instructional system designer and certified training specialist compliant with International Board of Standards for Training, Performance and Instruction (IBSTPI) [IBSTPI].

[T1-R828] *TRITON shall provide a Computer-Based Training (CBT) capability for both TRITON-NS and TRITON-NU.*

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

[T1-R829] *TRITON CBT shall provide interactive training by defining and explaining the key concepts and terminology of the TRITON features and functions.*

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

[T1-R830] *TRITON CBT shall complement the TRITON On-line Help function by defining and explaining key concepts and terminology of the TRITON operational process incorporated into TRITON features and functions.*

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

[T1-R831] *TRITON CBT packages shall be capable of conducting on-site, in-house initial and sustainment training of staff users.*

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

[T1-R832] *TRITON CBT shall include training functionality within and between each component to maintain user proficiency in TRITON.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R833] *TRITON CBT content package shall be compliant to Sharable Content Object Reference Model (SCORM) Edition 2004 or newer.*

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

[T1-R834] *TRITON CBT shall be integrated with TRITON On-line Help so that the users can switch back and forth between On-Line Help and the CBT without losing the navigation history.*

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

[T1-R835] *TRITON CBT shall be accessible from the On-line Help that is available in each User Application and shall allow the user to select the relevant chapter/paragraph of the CBT.*

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

[T1-R836] *TRITON CBT shall be accessible on any Bi-SC AIS workstation.*

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

[T1-R837] *The TRITON CBT shall provide links to applicable keywords in the TRITON On-line Help function.*

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

[T1-R838] *TRITON CBT shall provide lessons for a subject or group of related subjects for at least three (3) hours.*

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

[T1-R839] *TRITON CBT shall use the same general appearance of the GUI as the TRITON Functional Services itself.*

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

Baseline : BL 3
Qualific. Method : Inspection

[T1-R840] *TRITON shall establish a workflow to guide the users to the CBT feature and run the training program and record the results.*

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

[T1-R841] *TRITON CBT shall be limited to the allocated functions to the user positions and roles and the applicable security restrictions.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Inspection

[T1-R842] *TRITON CBT shall share the access rights given for TRITON Functional Services and these access rights shall be managed from the same User Management function.*

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

[T1-R843] *TRITON CBT "should" be easy to maintain without having to apply all HMI modifications.*

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

4.2.9.5.3. On-line Tutorials

TRITON will provide On-line Tutorials to enable TRITON end users and self-service users to perform the tasks associated with their roles. The On-line Tutorials will be integrated with TRITON On-line Help so that users can switch back and forth between help and tutorials without loss of navigation history. The On-line Tutorial will include at least the following:

- Key concepts and terminology
- Navigation through the information architecture
- Common data entry, query, and reporting tasks
- User interaction with the system
- Answers to frequently-asked questions, derived from student and user feedback, including the initial Baselines.

[T1-R844] *TRITON shall have On-line Tutorials integrated with TRITON On-line Help.*

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

[T1-R845] *TRITON On-line Tutorials shall be accessible from the TRITON Clients.*

Requirement Property :

Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 3
Qualific. Method : Demonstration

[T1-R846] *TRITON shall adhere to the Microsoft standard GUI methods for accessing on-line documentation resources.*

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

[T1-R847] *TRITON On-line Tutorials shall be integrated with TRITON On-line Help so that the users can switch back and forth between On-Line Help and the On-line Tutorial without losing the navigation history.*

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

4.2.9.5.4. Frequently Asked Questions

Frequently Asked Questions (FAQ) is a list of information to support the NCI Agency Service Desk and other support organizations. The TRITON FAQ List will be maintained by the authorised user and accessible to any user.

[T1-R848] *TRITON shall maintain a list of Frequently Asked Questions (FAQ).*

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

[T1-R849] *TRITON FAQ shall be integrated with On-line Help functionality.*

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

[T1-R850] *TRITON shall allow the authorised user to maintain (add, modify, delete) questions in the TRITON FAQ List.*

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

[T1-R851] *TRITON shall allow the user to perform search in the TRITON FAQ List and display the results in sortable tabular form.*

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

[T1-R852] *TRITON shall allow the user to ask questions to the NCI Agency Service Desk in electronic form by using the TRITON FAQ.*

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

[T1-R853] *TRITON shall support answering the user questions by sending back existing or newly-added FAQ entries.*

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

4.2.9.5.5. Printing

TRITON will enable the users to take printouts for the following:

- Query results
- Messages
- Screenshot of the AppView
- Screenshot of the GeoView.

[T1-R854] *TRITON shall support printing to local and network printers including printing into a file in Portable Document Format (PDF).*

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

[T1-R855] *TRITON shall ensure that the application maintains stability when printing if no printer is installed.*

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

[T1-R856] *TRITON shall be able to print user-selected Information Products and screenshot to the resolutions supported by the printer or output device.*

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

[T1-R857] *TRITON shall support printing documents that contain, text in various sizes, styles and colours using TrueType and Postscript fonts.*

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

[T1-R858] *TRITON shall support printing to printers with Long File Names (e.g. printer names include all legal Long File Name characters and are at least 128 characters long).*

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

[T1-R859] *TRITON shall support printing of landscape, portrait and all other supported paper sizes and layouts.*

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

[T1-R860] *TRITON shall allow the user to preview (Print Preview) a TRITON print product before it is printed.*

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

[T1-R861] *The VC Print Preview shall display the print content to the user with the selected printer settings.*

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

4.2.9.6. User Notification Management

User Notification includes warnings and alerts. TRITON will provide a mechanism to handle warnings and alerts for supporting Maritime Alerts Management. Modal and modeless dialog boxes will be used to notify the users depending on the type of notification.

4.2.9.6.1. Warnings

Warnings are critical and non-critical notifications with predefined types. Predefined warning types will have at least the following:

- Critical warning (e.g. system failure, database error, connection loss)
- Non-critical warning (Operational, System Management)

Critical warnings are non-maskable notifications while non-critical warnings can be masked by the user via filtering on warning types. TRITON will issue warnings when predefined events occur. For example, System Administrator will be notified with a critical warning when the database capacity threshold has been reached. When a technical error such as connection loss happens, all users will be notified with a critical warning. If a conflict in identity analysis is detected a non-critical warning will be issued to the authorised users (such as RMP Operators).

Critical warnings can be acknowledged or snoozed for a time period determined as a system parameter. Non-critical warnings can be removed from the system when an authorised user cancels it or the originating system component removes it.

[T1-R862] *TRITON shall issue a critical warning when a predefined event that effects the system operations occurs.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test
Comment : The predefined events will be determined during the Software Requirements Analysis.

[T1-R863] *TRITON shall use modal popup window with acknowledge option for critical warnings to notify the authorised user.*

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

[T1-R864] *TRITON shall allow the authorised user to acknowledge a critical warning with a popup window.*

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

[T1-R865] *TRITON shall remove a critical warning when the authorised user acknowledges it.*

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

[T1-R866] *TRITON shall postpone a critical warning if the authorised user snoozes it.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test
Comment : Snooze time will be system parameter.

[T1-R867] *TRITON shall issue a non-critical warning of a predefined type when a predefined event that needs to be escalated to user occurs.*

Requirement Property :
Domain for Static : Both
Domain for Afloat: Both
Baseline : BL 1
Qualific. Method : Test
Comment : The predefined events will be determined during the Software Requirements Analysis.

[T1-R868] *TRITON shall provide the authorised user with a listing of non-critical warnings with filtering on warning types.*

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

Qualific. Method : Test

[T1-R869] *TRITON shall allow the authorised user to cancel non-critical warnings.*

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

[T1-R870] *TRITON shall automatically remove non-critical warnings when the state of the originating component changes.*

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

[T1-R871] *TRITON shall use unique identification numbers for each event requiring notification and provide a brief explanation for the cause of the warning and the guidance to recover.*

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

4.2.9.6.2. Alerts

Alerts are non-maskable notifications when a user sets an alert for a predefined event. Predefined events may be operationally defined or manually defined by a user. Operational Alerts are defined as a function of the system. User defined alerts can be set by users depending on the GUI of the function and issued with the information set by the user. For example, a user may want to set an Area Alert for a particular track. A user may want to get notified if a track is timelate. Another user may want to set a Communication Alert when a new message is received giving the brief information of the message. Alerts will have priority values as High, Medium and Low. Users can set these priority values to Alerts to get notified accordingly.

An Alert will consist of at least the following attributes:

- Name
- Type
- Priority (high, medium, low)
- Associated event (e.g. timelate, deletion, Area Alert)
- User
- Notification method

[T1-R872] *TRITON shall maintain an Alert List for each authorised user.*

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

[T1-R873] *TRITON shall allow the authorised user to manage (create, modify, delete, set, cancel) the Alert List.*

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

Baseline : BL 1
Qualific. Method : Test

[T1-R874] *TRITON shall allow the user to set an Alert for a recognised event.*

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

[T1-R875] *TRITON shall allow the authorised user to view the Alert List in sortable tabular format.*

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

[T1-R876] *TRITON shall use modeless popup window with acknowledge option for notifying users.*

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

4.3. C4ISR Visualisation Component Requirements

The C4ISR Applications within the Bi-SC AIS Functional Services are based on Web technology. As the requirements in terms of visualisation capabilities are quite similar, a general C4ISR Visualisation Capability will be provided by TRITON Increment 1 Project and delivered as a set of re-usable software components. Visualization refers to portrayal of assets in a geospatial context utilizing a graphical user interface usually containing a map component.

A "component" is by definition an independently deliverable part of a system providing access to its strictly delineated functionality through well-defined interfaces using well-defined invocation mechanisms. A software component is an installable piece of software that performs a specific function. It has well-defined specifications and functions, conforms to the integrity perspective (fully responsible for ensuring integrity of its data) and offers a well-defined interface, hiding internal information and implementation details. It may be packaged and deployed alone. It can be instantiated multiple times with multiple, and differing, implementations.

This subsection specifies the requirements for the C4ISR Visualisation Component (VC) which will be designed and developed as a separate Build Process within the TRITON Project. The VC will be comprised of a number of sub-components. The requirements are associated to three Baselines:

- VC-BL 1
- VC-BL 2
- VC-BL 3

The deliveries at these Baselines will be aligned to the TRITON Baselines so that the each TRITON delivery can use the VC to meet the minimum requirements.

4.3.1. General Architecture

A typical generalized architecture for Web-based C4ISR Visualisation Capability consists of the following architectural building blocks:

Functional Service Application Server:

An Application Server that hosts the Functional Services which provides the business logic, calculations, user and data management. The Functional Service provides data to the AppView for consumption and receives commands, and data, from the AppView for further processing.

Mission Application Information Display (AppView):

The Client Side portion of the User Application through which the User interacts to engage the Functional Service. It is briefly called the "Application View" (AppView). It is driven by User interaction to display functional service data utilising specific service interfaces and UI components. Often the format of the Functional Service specific data is text or numeric and may be presented as lists or in tabular form.

C4ISR Objects:

A set of objects, physical and non-physical, events and tasks that have operational meaning and a geospatial representation. Typically these objects are presented to the User using a set of standardized symbols. Physical objects include tracks, units, equipment, installations, meteorological occurrences, etc. Non-physical objects include planned objects, control measures, or anticipated locations with temporarily assigned characteristics or temporary validity.

GIS Server:

A Geospatial Information Services (GIS) including map and processing services as required.

Geospatial Information Display (GeoView):

The Client Side portion of the User Application through which the user interacts to visualise C4ISR Objects in a geospatial context (map) using standardized military symbology. The UI component provides the means for the user to interact with the C4ISR Objects, including the means to visualize the properties of the object. This display is briefly called "Geospatial View" (GeoView). The GeoView provides user events to the AppView and receives commands and data from the AppView for processing. The GeoView will interact with the GIS Server to provide the geospatial context for the C4ISR Objects visualisation.

Viewer Server:

An Application Server that hosts the Server Side functionality of the GeoView. The Viewer Server provides the means to configure the GeoView for a specific Functional Service.

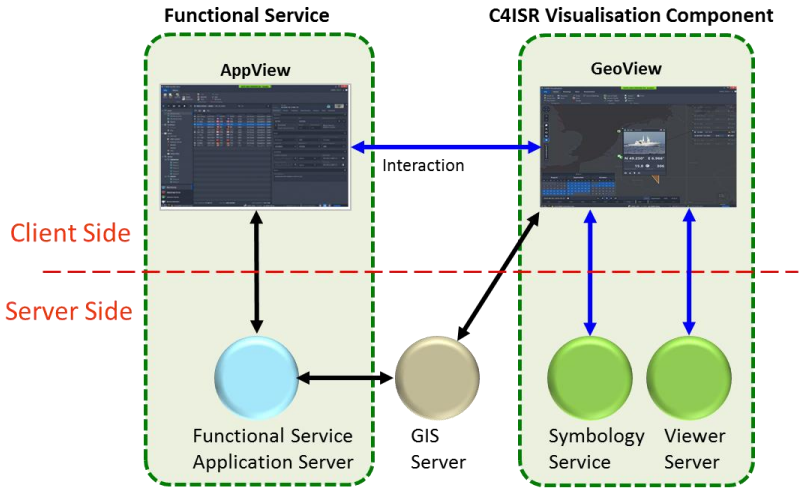
Symbology Service:

A service that provides an image representation of C4ISR Objects according to military symbology standards. The Symbology Service supports rendering of all point, line, area and multi-point based C4ISR Objects. The symbology related components of the AppView and GeoView are data driven and populated by the metadata provided by the Symbology Service of the supported symbologies standards and symbols.

C4ISR Visualisation Component:

The combination of GeoView, Viewer Server and Symbology Service is called the "C4ISR Visualisation Component". It will briefly be called the "VC".

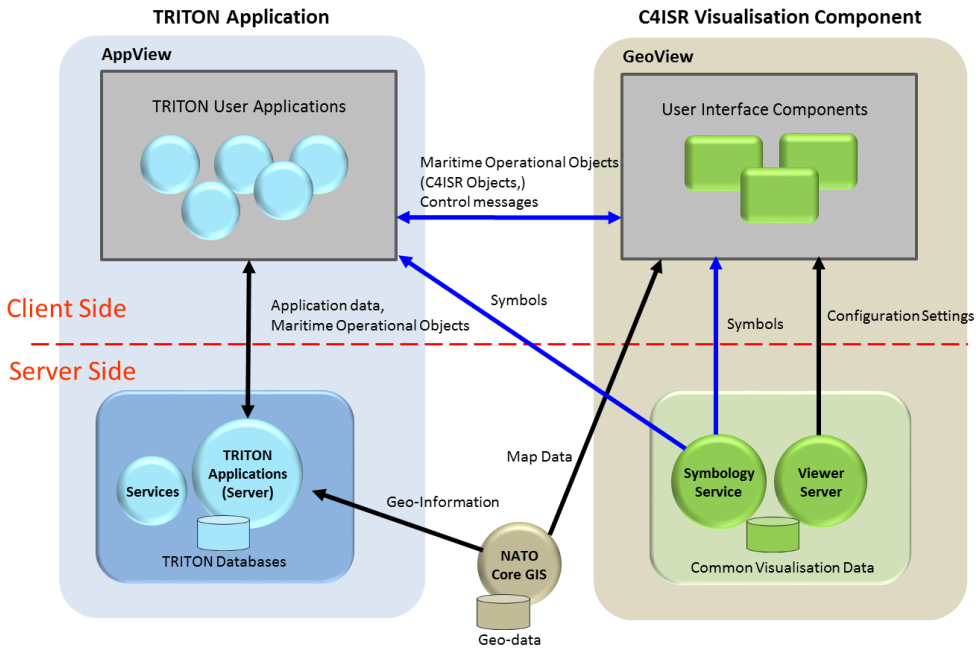
The relationship of the elements are shown below:



4.3.1.1. TRITON Architecture

The geospatial visualisation of the TRITON Functional Service will be implemented using the VC and NATO Core Services. The NATO Core GIS will be used as the default GIS Server. If necessary, The NATO Core GIS Server may be replaced by another GIS Server, complying with the same set of standardized interfaces.

The high-level architecture of the TRITON geospatial visualisation is illustrated in the figure below:



TRITON Applications on the Client Side interact with the Client Application Framework and the TRITON Applications on the Server Side. The TRITON AppView provides the user interface in a Web browser.

The GeoView, running on the Client side of the VC has a Client Visualisation Manager which interacts with the AppView and the NATO Core GIS as well as the Viewer Server and the Symbology Service.

4.3.1.2. Operational Modes

The VC can be used in two modes of operation:

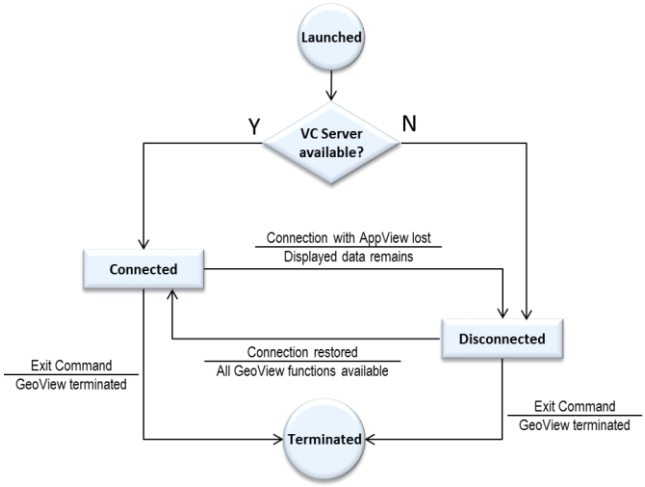
- Integrated Mode
- Standalone Mode

4.3.1.2.1. Integrated Mode

In Integrated Mode, the VC receives data from the Application Server of the Functional Service through the AppView. The Server Side of the VC (Viewer Server) is modeless. The Client-side of the VC, the GeoView, will have two states depending on the connectivity with the Viewer Server. These are:

- Connected : GeoView is connected to the Viewer Server.
- Disconnected: GeoView is not connected to the Viewer Server.

The state transition diagram for the Client Side of the VC is given below:



When the GeoView is instantiated by the AppView, it tries to connect to the Viewer Server. If it connects, then it enters the Connected State; if not, it enters the Disconnected State.

If the GeoView loses its connection to the Viewer Server, its state changes to Disconnected, losing its connectivity to the GIS Server as well. It will then keep displaying the existing maps and Objects using a local caching mechanism for a configurable time period. During this period, user data requests will not be accepted. When the network connection is restored, the GeoView switches to Connected State again. The VC GeoView can be terminated at any time with the user command and confirmation.

[T1-R877] *The VC GeoView (the Client-side of the VC) shall have Connected and Disconnected States in the Integrated Mode of operation.*

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

[T1-R878] *The VC GeoView shall be fully operational when it is in Connected State.*

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

[T1-R879] *The VC GeoView shall be able to store the visible C4ISR Objects and relevant geospatial information (received from the GIS Server) in a local cache to be used when it is switched to Disconnected State.*

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

[T1-R880] *The VC GeoView shall be able to continue to display the cached C4ISR Objects and their relevant geospatial information when it is in Disconnected State. The C4ISR Objects being displayed shall be deleted after a configurable time period with a notification to the user.*

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

[T1-R881] *The VC GeoView shall display the connectivity status and notify the user in case its connection to the VC Server is lost more than a configurable time period. The default time period to switch to Disconnected State shall be thirty (30) seconds.*

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

[T1-R882] *The VC GeoView shall be able to display, as a minimum, a Topographic Base Map covering the entire Earth surface when a higher scale map is not available.*

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

[T1-R883] *The VC GeoView shall be able to switch to Connected State automatically when the connection is restored.*

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

[T1-R884] *The VC GeoView shall be terminated when the user closes the browser or explicitly exits from the GeoView with confirmation. The GeoView external connections shall be reset at termination.*

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

[T1-R885] *The VC GeoView shall be terminated automatically when AppView is terminated.*

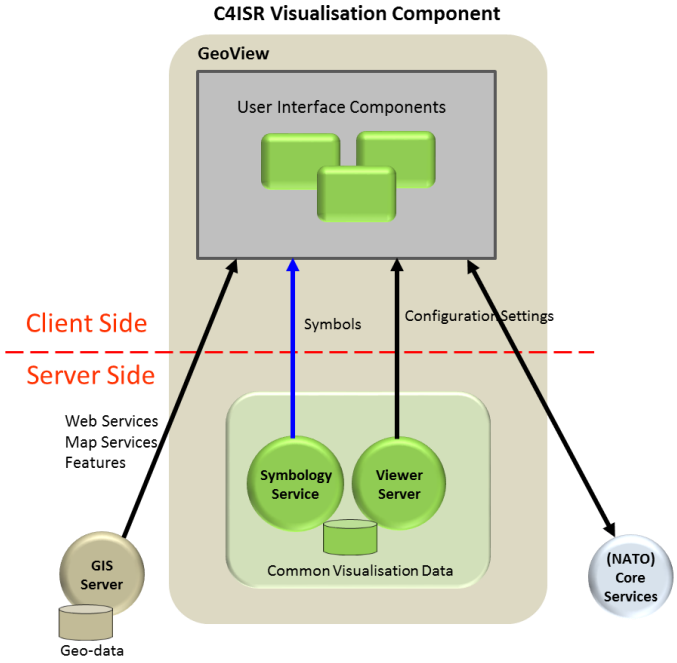
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R886] *The VC Viewer Server shall manage connections of GeoViews and handle the disconnected and terminated GeoViews.*

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

4.3.1.2.2. Standalone Mode

The VC can also be used as a standalone application without any Functional Service. When it is deployed as a standalone application, the users will be able to visualise maps, features and other data provided by the available services. A conceptual representation of Standalone Mode is given below:



The VC will be able to use NATO Core Services as required when it is deployed as a standalone application. For example, an Identity and Access Management service will handle the necessary authentication and access control. Similar services should be provided if NATO Core Services are not available.

[T1-R887] *The VC shall be able to run as a standalone application in Standalone Mode when it is packed as a component, deployed and configured. This type of operational use shall be limited to displaying the Geo-information provided by the GIS Server.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

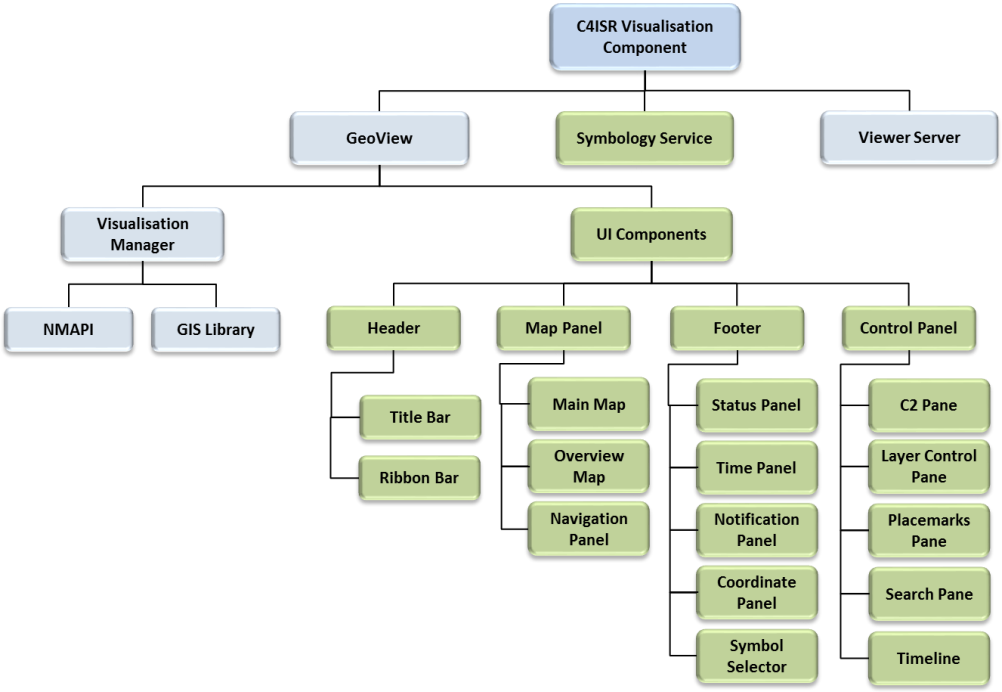
[T1-R888] *The VC shall be able to integrate NATO Core Services as required when it is deployed as standalone application.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.2. C4ISR Visualisation Component Elements

The VC consists of several sub-components as building blocks called "elements". Some of these elements need to be re-used in other systems/services in order to provide a uniform user experience across the all Functional Service Applications. Therefore, the VC will provide a suite of “Reusable Software Elements” having independent functions. These software elements will be designed at a granular level, supporting maximum re-use.

The initial set of Reusable Software Elements are shown in green in the diagram below:



The set of Reusable Software Elements may be added to, or individual elements extended, in the future. All elements will be documented as part of the VC ICD.

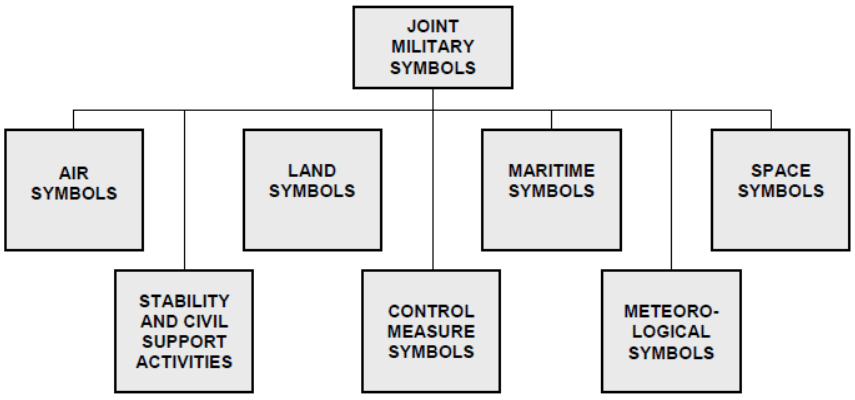
The VC Elements are described in the following paragraphs.

4.3.2.1. Symbology Service

All instances of the VC will use a single source for the provisioning of military symbology. The VC Symbology Service will provide the standard set of symbols to be primarily used by GeoViews, but also in support of AppViews (e.g. an icon in a tree). In order to improve network efficiency, the default and most used symbol sets will be transferred to the Client side during GeoView initialisation. The Service which will be implemented as a Web service (loose coupling), will provide Symbol Sets.

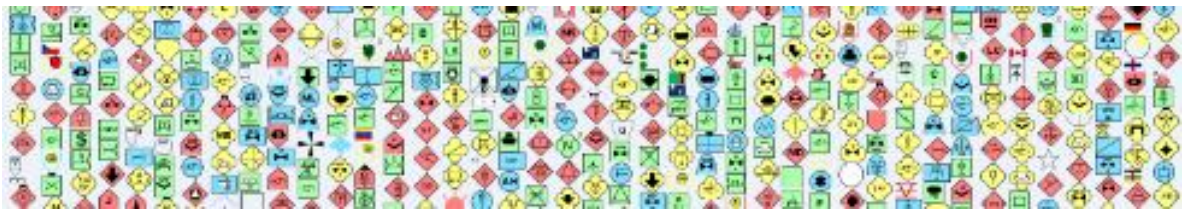
Symbol Set:

A Symbol Set encompasses the graphic representation of units, equipment, installations, and other elements and activities relevant to joint military operations. It contains the building blocks for joint military symbols from the domains air (chapter 2), land (chapter 3), sea/maritime (chapter 4), space (chapter 5) and the display of stability activities and civil support activities. A symbol may consist of text, image and vector to define an object. Following diagram shows the joint military symbol sets generated to support planning and conduct of joint operations described in [APP-6].



Sprite Sheet:

A Sprite Sheet is a single image containing all the point symbols for a given symbology standard. A small part of s typical Sprite Sheet is given below as a sample:



Portrayal Catalogue:

A Portrayal Catalogue, as defined in [ISO 19117], contains supported standard symbols and rules. It also includes labels, annotations and the publication of those definitions. The Symbology Service will provide a Portrayal Catalogue which includes the following standards:

- APP-6 (A)
- APP-6 (B)
- STANAG 2019 - APP-6 (C) (D when available) [APP-6]
- MIL-STD-2525D [MIL-STD-2525D]
- U.S. Naval Tactical Data System (NTDS) (OTH-T GOLD Specification) [OTH-T GOLD]
- IHO S-52 [IHO S-52]
- IHO S-4, INT 1 [IHO S-4]
- User-defined, customised symbol sets

Country Codes and Flags:

The VC will use the same country codes defined in the Functional Service (see TRITON Country Code Handling and NATO Standard Country Code Table). The Symbology Service will store the flags as indexed by the NATO Standard Country Codes Table. This table, also having the exercise countries and flags, will be shared by the Service and configured by the authorised user.

Interface:

The Symbology Service will also provide a separate interface to AppView in case symbols are used as an icon in a table or in a tree.

The Symbology Service Interface will be described in the VC ICD as a Service Interface Profile.

[T1-R889] *The VC shall have a Symbology Service as a Web service to provide standard symbol set to be used in the GeoView and AppView. In order to improve network efficiency, default and most used symbol sets will be transferred to the Client side during initialisation.*

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

[T1-R890] *The VC Symbology Service shall maintain a Portrayal Catalogue.*

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

[T1-R891] *The VC Symbology Service Portrayal Catalogue shall support the standards given in the Description. It shall include labels, annotations and the publication of those definitions. It*

"should" include Civil-Military Cooperation (CIMIC) symbology set as defined in [AM-86-1-1].

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

[T1-R892] *The VC shall allow the authorised user to configure the Symbology Service. For example, the most used symbols can be defined with respect to the Functional Service.*

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

[T1-R893] *The VC Symbology Service shall enable all GeoViews and AppViews to apply the supported symbol sets to features and C4ISR Objects in an automated fashion.*

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

[T1-R894] *The VC Symbology Service shall have mechanisms to improve network efficiency (e.g. providing a subset of the default and most used symbols during the initialisation, caching the used symbols).The caching of Sprite Sheets and tile maps shall also be supported by consumers and proxy services.*

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

[T1-R895] *The VC Symbology Service shall be able to provide one or more symbols upon request.*

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

[T1-R896] *The VC Symbology Service shall provide the means to retrieve a Sprite Sheet, as defined in the Description, as a single image containing all the point symbols for a given symbology standard.*

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

[T1-R897] *The VC Symbology Service shall provide the means to specify the general size of symbols provided in a Sprite Sheet.*

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

[T1-R898] *The VC Symbology Service shall provide the means to retrieve a tile map applicable to a Sprite Sheet for a given symbology standard.*

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

[T1-R899] *The VC Symbology Service shall be able to provide country flags, as icons, indexed by the NATO Standard Country Codes Table. The table shall be configured by the authorised user.*

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

[T1-R900] *The VC Symbology Service shall provide the means to add user-defined symbols to the Portrayal Catalogue.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R901] *The VC Symbology Service shall provide the means to add new Symbol Sets to the Portrayal Catalogue.*

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

[T1-R902] *The VC Symbology Service shall provide the means to retrieve metadata for a single symbol, including the semantic meaning of the symbol.*

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

[T1-R903] *The VC Symbology Service shall provide the means to retrieve metadata for the configured symbol sets and individual symbols, sufficient to support data driven UI components for finding and selecting symbology.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R904] *The VC Symbology Service shall have Service Interface Profile documented in the VC ICD.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.2.2. Viewer Server

The Viewer Server is the Application Server for the GeoView. It also stores, processes and provides configuration-related information needed to run the VC. The Configuration Management function provides the authorised user with a capability to configure the settings as required by a Functional Service. The Configuration Settings will include the following:

- Default GIS Server
- Map Store Settings
  - Map Service Request Timeout
  - Predefined WMS URL List
  - Predefined WFS URL List
  - Gazetteer Service URL List
  - WPS URL List
- Spatial Extent Settings
- Overview Map Ratio
- Start-up Settings
  - Layer Display (e.g. transparency, brightness, contrast)
  - View Scale Range (e.g. minimum, maximum, steps)
  - Clustering (e.g. on, off, radius, colour)
  - Labels (e.g. visibility, font, colour, text, position)
  - Tooltips (e.g. map tooltip font, size, colour))
  - Symbols (e.g. fill, size, show flag, standard)
  - Tinting
  - Grid (e.g. line style, colour, width, spacing, polar grid settings)
- Applicable themes
- Applicable rules for User Settings

All settings will have default values.

[T1-R905] *The VC Viewer Server shall provide the Application Server functionality.*

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

[T1-R906] *The VC shall store the internal Configuration Settings given in the Description inside the Viewer Server.*

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

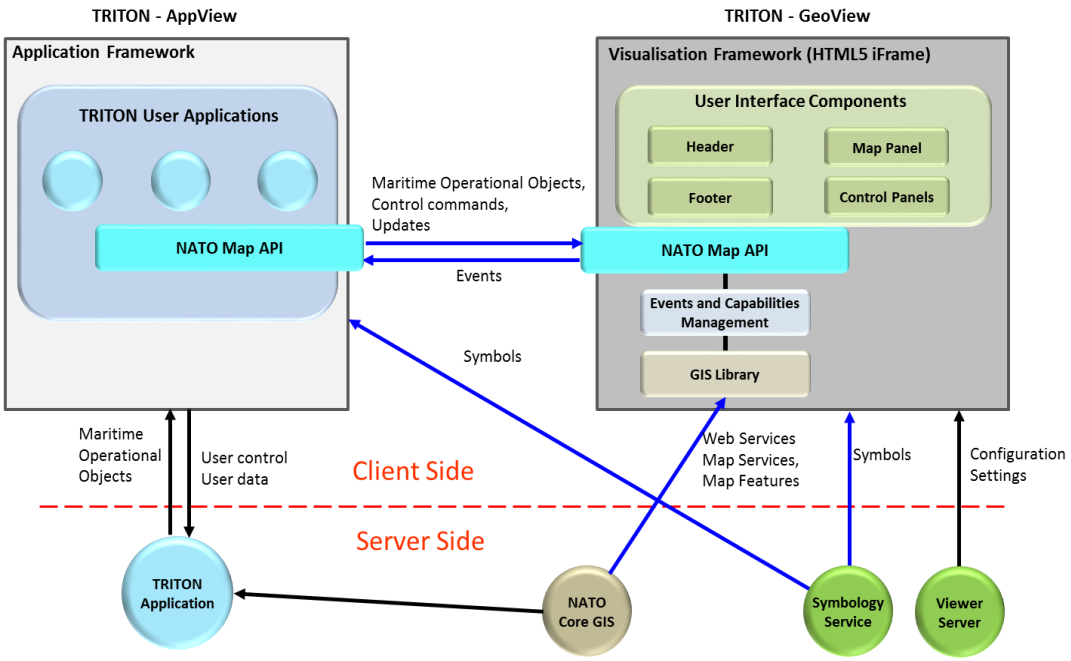
[T1-R907] *The VC shall allow the authorised user to manage the Configuration Settings.*

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

4.3.2.3. GeoView

The GeoView consists of a Client Visualisation Manager and a number of User Interface Components. The Client Visualisation Manager interacts with the AppView for the purpose of exchanging commands, events and data (e.g. C4ISR Objects) with the Functional Service Application. The Client Visualisation Manager subsequently interacts with Map Panel and other User Interface Components to achieve the desired user experience.

The internal structure of the GeoView for TRITON Functional Service is shown below as an example:



Visualisation Framework:

This framework implements the entire GeoView as a browser-based application.

User Interface Components:

The GeoView user interface is provided by a set of software modules grouped as Header, Map Panel, Control Panel and Footer. These components will be provided as "Reusable UI Components". They are defined in detail in the following paragraphs.

NATO Map Application Programming Interface (NMAPI):

The AppView will interact with the GeoView using the "NATO Map Application Programming Interface" (NMAPI) to send and receive commands, events and data (e.g. C4ISR Objects). The NMAPI will bind the commands, events and data to specific visualisation functions of the Map Panel, GIS Library and UI Components within the Client Visualisation Manager.

Events and Capabilities Management:

The commands, events and data received by the GeoView will be validated by the Events and Capabilities Management module for syntax, structure, completeness and validity, prior to processing by downstream components.

GIS Library:

The GIS Library provides the Client Side interface to the configured GIS Server for the purpose of consuming map-related Web Services. It will implement all necessary interfaces provided by the NATO Core GIS.

[T1-R908] *The VC Visualisation Framework shall implement the visualisation capability as a browser-based application.*

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

[T1-R909] *The VC shall provide a suit of re-usable software modules as "Re-usable UI Components".*

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

[T1-R910] *The VC Reusable UI Components shall have independent functionality which can be integrated into the application in which they are required.*

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

[T1-R911] *The VC Reusable UI Components shall have API documented in the VC ICD.*

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

[T1-R912] *The VC shall validate all data according to predefined syntax, structure, completeness and validity, types and limits received from external interfaces prior to processing.*

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

[T1-R913] *The VC shall manage the display-related events sent by the AppView to geospatially locate C4ISR Objects and to display them on the map using the Portrayal Rules.*

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

[T1-R914] *The VC GIS Library shall implement the Web services to interact with the NATO Core GIS.*

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

4.3.2.4. GeoView User Interface Components

The User Interface Components include the following:

- Header
- Map Panel
- Control Panels

- Footer

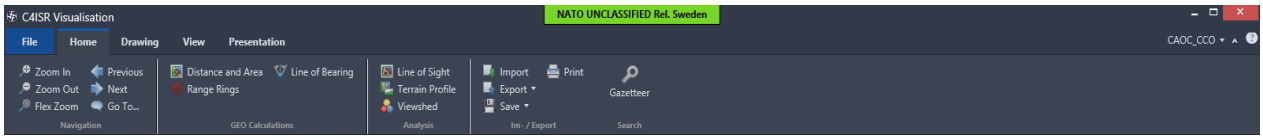
The details are described in following paragraphs.

4.3.2.4.1. Header

The Header Component consists of the following elements:

- Title Bar
- Ribbon Bar.

A sample layout of the Header is given below:



4.3.2.4.1.1. Title Bar

The Title Bar is the topmost element of the GeoView. It displays the following:

- Functional Service Application Name
- Label of environment classification (in colours specified in the Style Guide which will be provided by the Purchaser during implementation)
- Window controls.

[T1-R915] *The VC GeoView shall have a Title Bar to display the Functional Service Application Name and coloured label containing the environment classification (a.k.a. security policy, classification and release caveats).*

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

[T1-R916] *The VC GeoView Title Bar shall allow the user to control (minimise, maximise, close) the window associated with the Title Bar.*

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

4.3.2.4.1.2. Ribbon Bar

The Ribbon Bar is a command bar that organises the GeoView functions into a series of tabs. It displays the following:

- Tabs
- All GeoView function groups as tabs
- Selected Operation Name
- Currently logged-in user's name
- Quick Access Buttons (e.g. On-line Help)
- Ribbon hide/show button

[T1-R917] *The VC GeoView shall have a Ribbon Bar as a series of tabs to provide the user with easy access to all GeoView functions and control (show, hide) the Graphical Components.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration
Comment : The final layout of the Ribbon Bar will be determined during the Software Design.

[T1-R918] *The VC GeoView Ribbon Bar shall display the currently logged-in user's name and the selected Operation Name.*

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

[T1-R919] *The VC GeoView Ribbon Bar shall have Quick Access Buttons (e.g. On-line Help).*

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

[T1-R920] *The VC GeoView Ribbon Bar shall be configurable to show/hide tabs, panels, buttons and fields as required.*

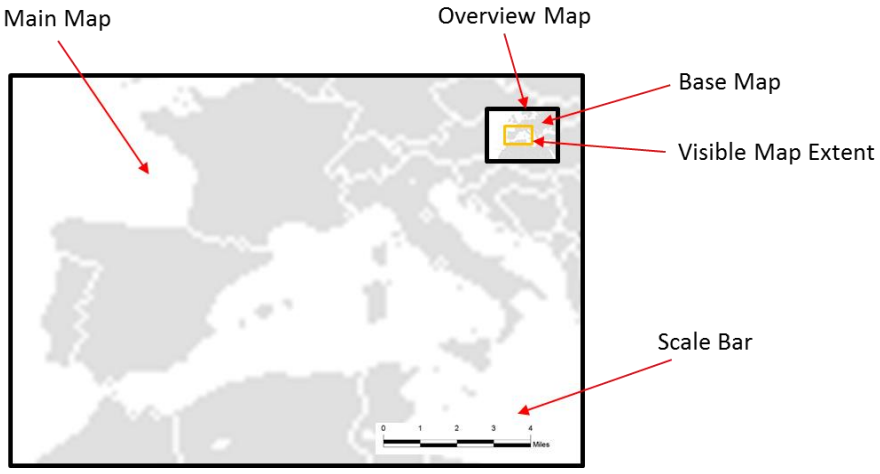
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R921] *The VC GeoView Ribbon Bar shall be configurable to add new ribbon components (buttons, tabs, panels, fields, combo-lists, etc.) as required.*

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

4.3.2.4.2. Map Panel

The Map Panel provides the visualisation of user-selected digital maps, charts, features and C4ISR Objects. A sample view of the Map Panel is given below:



4.3.2.4.2.1. Main Map

The VC will handle digital maps using standard interfaces and display them in its Map Panel. Following is the terminology to be used:

Chart:

A chart, especially a nautical chart, has special unique characteristics including a very detailed and accurate representation of the coastline, which takes into account varying tidal levels and water forms, critical to a navigator. Charts also provide detailed information on the area beneath the water surface, normally not visible to the naked eye, which can and is very critical for the safe and efficient navigation.

Map:

A map emphasizes land forms, including the representation of relief, with shoreline represented as an approximate delineation usually at mean sea level. It serves as a reference guide to provide predetermined course, usually a road, path, etc., to be followed.

Main Map:

A Main Map is the background, either a chart or a map, displayed inside the Map Panel.

Base Map:

A Base Map provides a user with context for a map. Any information can be added to a Base Map by overlaying additional layers and information on top of it. A Base Map may be topographic, imagery, elevation, air or maritime chart.

Map Legend:

A Map Legend is a box that displays the meaning of the symbols used in the map. They may be in vector or matrix (image) format.

[T1-R922] *The VC GeoView shall have a Map Panel to visualise user-selected maps, features and C4ISR Objects.*

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

[T1-R923] *The VC GeoView shall display a Base Map inside the Map Panel as generated by the selected GIS Server.*

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

[T1-R924] *The VC GeoView Map Panel shall display the Map Legend when enabled by the user.*

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

[T1-R925] *The VC GeoView Map Panel shall display restrictions for the visualized data, including copyright, limited distribution and releasability.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1

Qualific. Method : Demonstration

[T1-R926] *The VC GeoView Map Panel shall provide the means to visualise map, feature and C4ISR Object data as a set of Layers.*

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

[T1-R927] *The VC GeoView Map Panel shall provide the means to re-order the Layers to achieve the desired visualisation.*

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

[T1-R928] *The VC GeoView Map Panel shall be able to display multiple Layers allowing the user to switch between them (swipe) temporarily.*

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

4.3.2.4.2.2. Overview Map

The Overview Map is a miniature map, inset in the display, which shows the Base Map at a smaller scale. The current visible map extent is shown with a rectangle, allowing the user to navigate by dragging or resizing the extent rectangle.

The VC GeoView will align the navigation using the Overview Map with the Map Panel Navigation Functions. The selected Base Map colour scheme and the selected map projection will be applied to the Overview Map. When the map projection, the colour scheme or the extent of the Base Map is changed, the Overview Map will be updated accordingly. The user will be able to navigate through the Base Map using the rectangular indicator inside the Overview Map.

[T1-R929] *The VC GeoView shall display a configurable Overview Map inside the Map Panel, which shows the Base Map at a smaller scale indicating the current visible section with a rectangle. The rectangle shall indicate the extent of the Base Map in a user configurable ratio.*

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

[T1-R930] *The VC GeoView shall allow the user to navigate through the Base Map by dragging and resizing the rectangle in the Overview Map.*

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

[T1-R931] *The VC GeoView shall align navigation of the Overview Map with the Map Panel Navigation Functions and the selected Base Map projection.*

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

[T1-R932] *The VC GeoView shall allow the user to enable/disable and change the location of the Overview Map.*

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

4.3.2.4.2.3. Scale Bar

Scale Ratio is the scale of a map as the ratio of a distance on the map to the corresponding distance on the ground in particular map projection considering the Earth's curvature (e.g. 1:100,000). The VC GeoView Scale Bar indicates the Scale Ratio and distances at this scale. The Scale Bar can display two measurement units simultaneously as set in the user preferences. In order to keep the displayed distances of the Scale Bar in a reasonable range of not less than 1 or more than 1000, the distance units shall change from km to m or miles to yards and vice versa.

[T1-R933] *The VC GeoView shall have a Scale Bar which displays the Scale Ratio and distances at this scale with one or two measurement units as defined by the user preferences.*

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

[T1-R934] *The VC GeoView Scale Bar shall label the distances with the selected unit. Adequate units to keep the numbers in a reasonable range between 1 and 1000 should be used.*

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

[T1-R935] *The VC GeoView Scale Bar shall automatically be updated when the scale of the Map Panel is changed, i.e. with each zoom in or zoom out.*

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

[T1-R936] *The VC GeoView shall allow the user to enable/disable and change the location of the Scale Bar.*

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

4.3.2.4.2.4. Displaying Maps

The VC will display maps received from the available Map Server using WMS [OGC WMS] and WMTS [OGC WMTS]. The default Map Server is the NATO Core GIS. If it is not available, other Map Servers, compliat to [Core GIS SIP] can be used.

The VC GeoView will display a Base Map as a background for locational reference. The user will be able to select the Base Map and configure its settings (e.g. displaying the Map Legend).

[T1-R937] *The VC shall allow the user to select the Base Map from the Map Catalogue provided by the GIS Server.*

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

[T1-R938] *The VC Map Panel shall be able to use a WMS [OGC WMS] to get the maps. The VC shall support WMS Versions 1.0.0, 1.1.0, 1.1.1 and 1.3.0 as defined in [Core GIS SIP].*

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

[T1-R939] *The VC GeoView shall be able to display received maps in JPEG or PNG (with transparency). GIF and JPEG2K "should" be supported.*

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

[T1-R940] *The VC Map Panel shall be able to use a WMTS [OGC WMTS] to get the map tiles. The VC shall support WMTS Version 1.0.0.*

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

[T1-R941] *The VC Map Panel shall display the Base Map received via a WMS. If the WMS is not used as a Base Map, the background of the WMS Layer shall be displayed as transparent.*

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

[T1-R942] *The VC shall be able to add a WMS and WMTS to the Layer Manager.*

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

[T1-R943] *The VC shall be able to use Geospatial Web Map Services as defined in [Core GIS SIP]. The VC shall also be able to use other Geospatial Services like Gazetteer and Web Processing Services as provided by the GIS Server.*

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

[T1-R944] *The VC Map Panel shall use WGS84 as the default datum.*

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

[T1-R945] *The VC Map Panel shall be able to display a selected map within ten (10) seconds on a Client running on a Standard Workstation on a standard NATO Static Site Network.*

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

4.3.2.4.2.5. Displaying Map Labels

Map Labels are descriptive text for map functions displayed on the Map Panel. The Map Labels are dynamically positioned on the Map Panel. The Map Labels are subject to de-cluttering in case they are overlapping. Users can change their position with a user-defined angle and given at/along/inside direction as well as displaying or hiding them. The user will be able configure the Map Label Settings including the Label Text, fonts (True Type Fonts, Open Type Fonts, PostScript Fonts) and positions.

[T1-R946] *The VC GeoView Map Panel shall be able to display Map Label Text as provided by WFS, Shape File, Drawing Layers or C2 Layers.*

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

[T1-R947] *The VC GeoView Map Panel shall display or hide Map Labels according to the Label Settings of a Layer.*

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

[T1-R948] *The VC GeoView shall allow the user to configure Map Label, fonts (True Type Fonts, Open Type Fonts, PostScript Fonts) and position through the Map Label Settings.*

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

[T1-R949] *The VC Map Panel shall de-conflict overlapping Map Labels at the time of map creation.*

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

4.3.2.4.2.6. Coordinate Reference Systems

A Coordinate Reference System uses a set of coordinates (for position coordinates an ordered pair or 2-tuple) to uniquely determine the position of a geospatial element on a 2D manifold approximating the Earth's surface, usually through a rotational ellipsoid. A Coordinate Reference System is a combination of the Coordinate System and a Geodetic Datum. The datum defines the realisation of the reference ellipsoid in terms of shape, orientation and translation. The datum shall be fixed to WGS84. The VC GeoView will support the following Coordinate Reference Systems:

- Geographic (also called Ellipsoidal) Coordinates (Latitude / Longitude)
- Universal Polar System (UPS)
- Universal Transverse Mercator (UTM) Projection
- Military Grid Reference System (MGRS)
- Common Geographic Reference System (CGRS)
- Global Area Reference System (GARS)

[T1-R950] *The VC GeoView Map Panel shall support the Coordinate Reference Systems given in the Description.*

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

[T1-R951] *The VC GeoView shall allow the user to select a Coordinate Reference System to be used in the display of locations.*

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

[T1-R952] *The VC GeoView shall allow the user to select a Coordinate Reference System to be used for the input of locations.*

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

4.3.2.4.2.7. Map Projection

A Map Projection defines the function how the coordinates in a coordinate reference system shall be mapped to a flat surface, the map or in that case the flat computer screen. The VC GeoView Map Projection will be set by the Base Map on the Map Panel. The GeoView shall support the following Map Projections:

- Plate carree (Geographic Latitude / Longitude converted from angular to distance units)
- Mercator projections (conformal cylindrical mapping)
  - Universal Transverse Mercator (UTM)

- Transverse Mercator
- Web Mercator

- Universal Polar Stereographic (UPS) (North, South) (conformal stereographic mapping to a polar plane)
- Cylindrical Equidistant
- Lambert's Conformal Conic
- Polyconic.

[T1-R953] *The VC GeoView Map Panel shall support the Map Projections given in the Description.*

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

[T1-R954] *The VC GeoView shall allow the user to select the desired Projection from a list of supported Map Projections.*

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

4.3.2.4.2.8. Map Scaling

Map Scaling is the control of the View Scale of the Map Panel. Ribbon Bar and the View Scale Bar of the Navigation Panel can be used to set the View Scale. Following predefined Fixed View Scales will be supported:

- 1:100.000.000
- 1:50.000.000
- 1:20.000.000
- 1:10.000.000
- 1:5.000.000
- 1:2.000.000
- 1:1.000.000
- 1:500.000
- 1:250.000
- 1:100.000
- 1:50.000
- or larger in support of specific Areas of Interest.

[T1-R955] *The VC GeoView shall adjust the View Scale of the Map Panel according to the user selected View Scale. Any used Web services shall also be scaled accordingly.*

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

[T1-R956] *The VC GeoView Map Panel shall ensure that the expansion process during scaling occurs non-disruptively so that no outages are required, no reconfiguration of the existing storage is needed, and the user can continue working during scaling.*

Requirement Property :

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

[T1-R957] *The VC GeoView Map Panel shall compute the Cluster Distance of symbols in correlation with changing the View Scale and apply automatically.*

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

[T1-R958] *The VC GeoView shall allow the user to set the current View Scale of the Map Panel by selecting a Fixed View Scale with from a configurable list (the default values are given in the Description) on the Ribbon Bar, by entering a scale value manually or by using the View Scale Bar.*

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

[T1-R959] *The VC GeoView Map Panel shall apply de-cluttering of labels for every View Scale change if enabled by the user.*

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

[T1-R960] *The VC GeoView shall display the current View Scale of the Map Panel.*

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

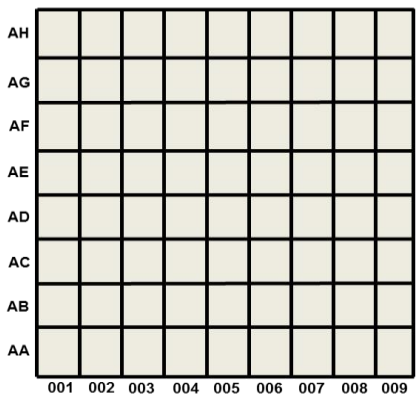
4.3.2.4.2.9. Grid Network

The Grid Network, also known as "graticule", displays the reference lines and labels on the Map Panel. The VC GeoView will support the following Grid Reference Systems:

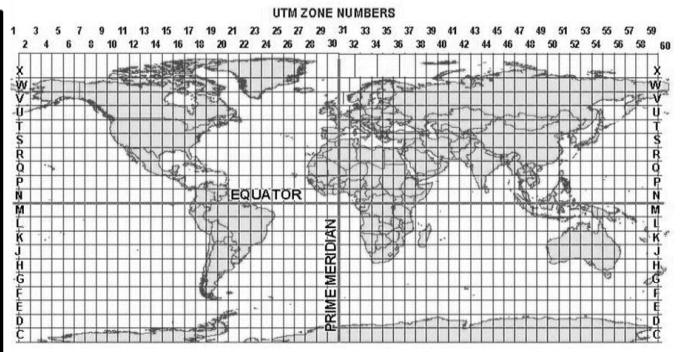
- Geographic Latitude-Longitude (parallels and meridians)
- Polar
- Universal Transverse Mercator (UTM)
- Military Grid Reference System (MGRS)
  - Grid zone designator
  - Area Identifier
  - Numerical location
- Common Geographic Reference System (CGRS)
  - Latitude
  - Longitude
- Global Area Reference System (GARS)
  - Cells and designators (30-minute)

- Quadrants (15-minute)
- Areas (5-minute)

Samples for GARS and MGRS are given below:



GARS



MGRS

The Base Map projection adapts the grids to the active projection. Attributes of the Grid Network are composed of graticule lines (i.e. lines where one coordinate value remains constant), labels and their styles. The VC GeoView will use the following Grid Parameters to structure the Grid Network:

- Bottom left location
- Top right location
- Row prefix
- Column prefix
- Labelling.

Grid Line Calculation:

The number of grid lines to be displayed will be calculated dynamically based on the map extent. Only grid lines of certain rounded values will be displayed (i.e. if in angular units multiples of 1°, 2°, 5°, 10°, 30° or 1', 2', 5', 10', 30' or 1", 2", 5", 10", 30" – whatever fits best into the map view). If the coordinates are in distance units, the grid lines to be displayed will be multiples of 1 * 10^n, 2.5 * 10^n, 5 * 10^n, where n is an integer number, whatever fits best.

[T1-R961] *The VC GeoView Map Panel shall support displaying the Grid Reference Systems given in the Description.*

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

[T1-R962] *The VC GeoView Map Panel shall comply with STANAG 2211 and [Bi-SC 80-4] for geodetic datum, Map Projections and Grid References.*

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

[T1-R963] *The VC GeoView Map Panel shall display a Grid Reference System when received from the AppView according to the parameters given in the Description.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R964] *The VC GeoView shall allow the user to show, hide, and configure the graticule ticks, lines and their colour for each Grid Reference System.*

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

[T1-R965] *The VC GeoView shall allow the user to show or hide the grid lines and show or hide the grid labels.*

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

[T1-R966] *The VC GeoView Map Panel shall use the Grid Line Calculation as explained in the Description to compute the number of grid lines to be displayed.*

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

4.3.2.4.2.10. Navigational Controls

Navigational Controls cover the user control of the Map Panel in spatial content. The user will be able move around the map, change its view and scale, and select objects for processing.

4.3.2.4.2.10.1. Navigation Icons

The Navigation Icons include a Panning Icon and a View Scale Icon. They allow the user to pan the Map Panel by pressing the direction buttons of the icon and changing the scale of the Map Panel. The user can move the visible extent of the map to four directions. A sample Panning Icon is given below:

[T1-R967] *The VC Map Panel shall have Navigation Icons for panning over the map and changing the View Scale.*

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

[T1-R968] *The VC Navigation Panel shall allow the user to pan and to change the View Scale through interaction with the Panning and View Scale icons.*

Requirement Property :

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

4.3.2.4.2.10.2. Cursor

The cursor is moved using the available pointing device. The cursor position is displayed continuously on the Coordinate Panel. When a location is clicked on the Map Panel that position is marked with special marker and the geographic information can be used for processing.

[T1-R969] *The VC GeoView shall allow the user to move the cursor with the available pointing device.*

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

[T1-R970] *The VC GeoView shall allow the user to pick a geospatial position by clicking on the Map Panel. This information can further be used for processing (e.g. copy to clipboard).*

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

4.3.2.4.2.10.3. Pan

The Pan Function allows the user to move around the Map Panel. The scale of the Map Panel will not change while panning. When the Pan Function is invoked, the cursor takes the shape of a hand over the Map Panel. When the user clicks and holds, the cursor changes to grabbing hand and moves the map together. The Navigation Icons or keyboard arrow keys can also be used to pan the Map Panel.

[T1-R971] *The VC GeoView shall pan the Map Panel according to the user control.*

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

[T1-R972] *The VC GeoView shall allow the user to pan the Map Panel with the pointing device (click and drag).*

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

[T1-R973] *The VC GeoView shall allow the user to pan the Map Panel by pressing the Navigation Icons.*

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

[T1-R974] *The VC GeoView shall allow the user to pan the Map Panel by using keyboard arrow keys.*

Requirement Property :

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

[T1-R975] *The VC GeoView shall allow the user to pan the Map Panel by using multi-touch gestures (i.e. drag) when a touch-screen device is used.*

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

4.3.2.4.2.10.4. Centre

The Centre Function provides the user to bring the selected position to the centre of the Map Panel. The user can invoke the Centre Function by either using the Ribbon Bar or keyboard Function Keys. The Centre Function will take the selected location or C4ISR Object as the reference.

[T1-R976] *The VC GeoView shall take the centre of the Map Panel to a position indicated by the user.*

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

[T1-R977] *The VC GeoView shall allow the user to take the selected position as the centre of the Map Panel.*

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

[T1-R978] *The VC GeoView shall allow the user to enter a geographic position as the centre of the Map Panel.*

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

[T1-R979] *The VC GeoView shall allow the user to use Own Position as the centre of the Map Panel with an option to follow. If that option is selected, the Map Panel centre shall follow the Object as it changes its position.*

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

[T1-R980] *The VC GeoView shall allow the user to use Ribbon Bar or keyboard Function key to invoke the Centre Function.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1

Qualific. Method : Test

[T1-R981] *The VC GeoView shall allow the user to select a C4ISR Object as the centre of the Map Panel with an option to follow the Object. If that option is selected, the Map Panel centre shall follow the Object as it changes its position.*

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

4.3.2.4.2.10.5. Select

The Select Function allows the user to select Objects or map features on the Map Panel. The user will be able to select more than one object (multi-select) by either selecting them one by one using a key (Shift or Ctrl) and button (left) combination or a circle or a polygon (shape-based selection). Selected Objects or features will be highlighted (e.g. a circle around it, altered font colour) with a user-configurable indication mark. The user will then be able to perform an action on the selected object.

[T1-R982] *The VC GeoView shall be able to apply a function to one or more selected Objects.*

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

[T1-R983] *The VC GeoView shall highlight the selected Objects or map features with a user-configurable indication mark.*

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

[T1-R984] *The VC GeoView shall allow the user to select one or more Objects or map features on the Map Panel.*

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

[T1-R985] *The VC GeoView shall allow the user to use a key-button combination (e.g. Control + Click) or a circle or a polygon to select more than one Object.*

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

[T1-R986] *The VC GeoView shall provide a manageable list for multi-selection of Objects. The user shall be able to add more Objects to the selection list or remove Objects from the list.*

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

4.3.2.4.2.10.6. Zoom

Zoom Function provides the user with an ability to "Zoom In" or "Zoom Out". Zoom In enables the user to display an area of the Map Panel in more detail by increasing the map scale. Zoom Out enables the user to display in a larger region by decreasing the map scale.

Zoom Function can be invoked by the following Zoom Control Actions:

- Pressing the Plus or Minus Icons on the Ribbon Bar
- Using the Navigation Icons
- Selecting one of the provided default zooming scales
- Entering a zoom factor
- Using keyboard combinations (e.g. Ctrl + '+' to zoom in and Ctrl + '-' to zoom out)
- Using keyboard and pointing device scroll function (e.g. Ctrl + Wheel)
- Invoking a selection area (by drawing a rectangular shape to include the area to be zoomed in)
- Using a grid (e.g. an applied CGRS is selected and the Map Panel zooms into it).

[T1-R987] *The VC GeoView shall change the Map Panel Viewing Scale as the user zooms in or out.*

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

[T1-R988] *The VC GeoView shall allow the user to control the zoom level of the Map Panel by using one of the Zoom Control Actions given in the Description.*

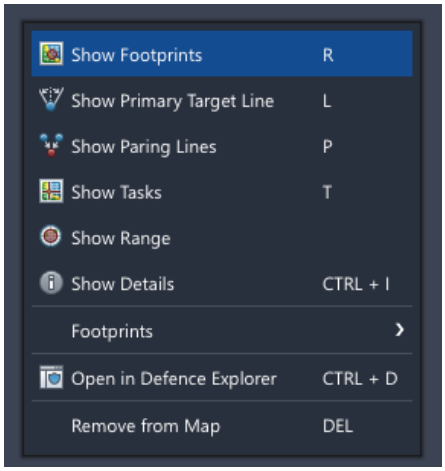
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R989] *The VC GeoView shall allow the user to control the zoom of the Map Panel through multi-touch gestures (i.e. pinch-to-zoom) when a touch-screen device is used.*

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

4.3.2.4.2.10.7. Context-sensitive Menus

The VC GeoView will display a Context-sensitive Menu when the right button of the pointing device is pressed. The content of the menu is determined according to the area of the component in which the cursor is positioned. A sample view of the Context-sensitive Menu is given below:



[T1-R990] *The VC GeoView shall display Context-sensitive Menus when the right button of the pointing device is pressed. The content of the menu shall be determined according to the area of the component in which the cursor is positioned.*

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

[T1-R991] *The VC GeoView Context-sensitive Menus shall activate the selected function.*

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

[T1-R992] *The VC GeoView Context-sensitive Menus shall be configurable to allow the addition of menu items, including sub-menus.*

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

[T1-R993] *The VC GeoView Context-sensitive Menus shall be configurable to allow the enabling or disabling of menu items.*

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

[T1-R994] *The VC GeoView Context-sensitive Menus shall be configurable to allow the hiding or showing of menu items.*

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

[T1-R995] *The VC GeoView Context-sensitive Menus shall be configurable to allow the association with a shortcut keystroke with a menu item.*

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

4.3.2.4.2.10.8. Goto

The Goto Function allows the user to mark a specified geographic position of a location. If the specified location is in the current Spatial Extent, the mark will be positioned on that location; if not the location will be brought to the centre of the Map Panel. The Goto function can be invoked from the Ribbon Bar.

[T1-R996] *The VC GeoView shall be able to mark an entered Goto location if it is in the current Spatial Extent; if not the location will be brought to the centre of the Map Panel (panning).*

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

[T1-R997] *The VC GeoView shall allow the user to enter a position of a location to be marked when the Goto Function is invoked.*

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

[T1-R998] *The VC GeoView shall allow the user to convert the entered value(s) from one Coordinate System to another.*

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

4.3.2.4.2.10.9. Bookmarks

A Bookmark is a one-click access capability for a particular display arrangement, including the area of interest. The selected Base Map, its settings, current area of interest, Layers, Panel and Display Settings are examples to the information to be saved as a Bookmark. When the user assigns a name and saves the current view of the GeoView as a Bookmark, it will be possible to retrieve the same view later on. There may be as many Bookmarks as the user wants to save. All Bookmarks are stored in the user Workspace as User Settings. Bookmarks can be accessed from the Ribbon Bar.

[T1-R999] *The VC GeoView shall be able to save the current view of the GeoView as a Bookmark.*

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

[T1-R1000] *The VC GeoView shall maintain a list of Bookmarks per user, accessible from the Ribbon Bar.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1001] *The VC GeoView shall allow the user to manage (add, retrieve, modify, delete) the Bookmark List.*

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

[T1-R1002] *The VC GeoView shall apply the settings of the selected Bookmark to the GeoView.*

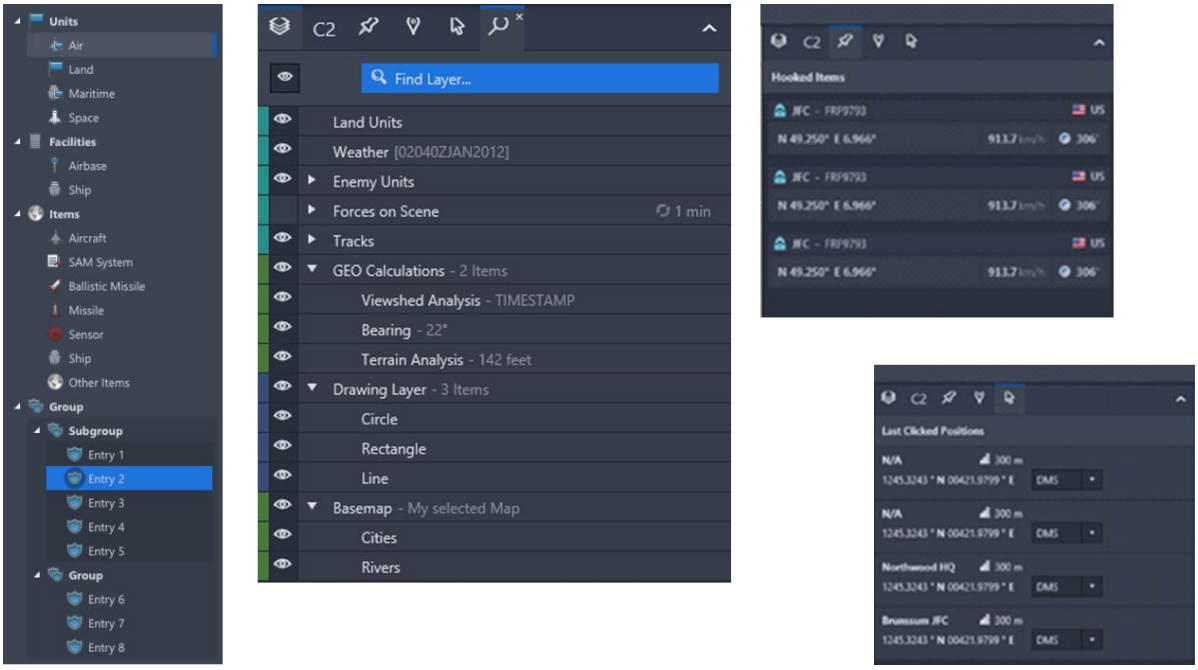
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.2.4.3. Control Panel

The Control Panel of the GeoView provides the user with the capability to control the display of C4ISR Objects and map features. It includes the following functions as separate Panes:

- C2 Pane
- Layer Control Pane
- Placemarks Pane
- Timeline
- Search Pane

A sample Control Panel with sample Panes is given below:



4.3.2.4.3.1. C2 Pane

The C2 Pane provides support to the user with command and control aspects of the visualisation. It lists the types or categories of C4ISR Objects that are currently displayed in the Layers of the Map Panel in a tree structure. This tree shows the entries by categories and is used to present hierarchical information. Each item within the tree may contain sub-items which are part of the next level of the

hierarchy. The tree items containing sub-items can be expanded and collapsed to show or to hide these items. A sample view is given below:

Following types of information can be displayed as C4ISR Objects and map features:

- C4ISR Objects with symbology
- NATO Vector Graphics (NVG) [NVG]
- KML/KMZ [OGC KML]
- Web Services related to Geo-information (OGC WMS and OGC WMTS according to Map Rendering Services SIP)
- Shape File (compatible to NATO Core GIS) (ESRI Shape File)
- Gazetteer data

The C2 Pane supports functions which are common to all tabular views such as grouping, filtering, arranging column visibility, copying selected items metadata to clipboard, printing and exporting the list functions.

When a filter is applied in the Pane, only the filtered items are displayed on the Map Panel.

[T1-R1003] *The VC GeoView shall have a C2 Pane to control the display of C4ISR Objects in Layers of the Map Panel.*

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

[T1-R1004] *The VC GeoView shall allow the user to configure the C2 Pane content.*

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

[T1-R1005] *The VC GeoView C2 Pane shall allow the user to group C4ISR Objects according to a common attribute (e.g. Country, Type) by applying a filter.*

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

[T1-R1006] *The VC GeoView C2 Pane shall display the content in a tree structure with at least eight (8) levels.*

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

[T1-R1007] *The VC GeoView C2 Pane shall allow the user to navigate within the tree structure by expanding and collapsing.*

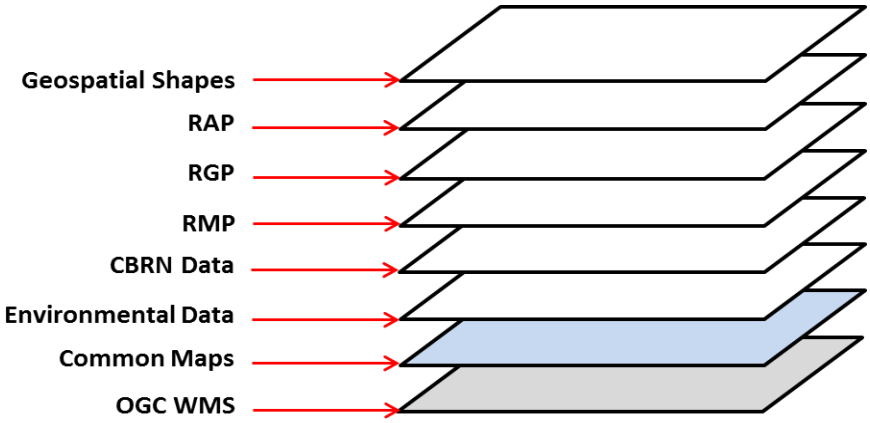
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1008] *The VC GeoView C2 Pane shall allow the user to make multiple selections of C4ISR Objects or feature types in the tree structure.*

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

4.3.2.4.3.2. Layer Control Pane

A "Layer" is a collection of geographic features which may consist of raster or vector data displayed on the Map Panel. "Overlay" is also another term used for indicating the graphical objects displayed in a Layer. All Layers have a source of data and managed by either the GeoView or AppView. Users can select which Layers are active at a time. A conceptual representation of layered display is given below:



AppView can send data to a specific Layer as a push. For example, CBRN Data can be displayed on a CBRN Layer as sent by the AppView . On the other hand, when a Layer is activated, its data can be requested from the AppView (as a pull).

The Layer Manager of the VC GeoView handles the data input for Layers and their display settings. The features of a Layer may come from different sources. They may be local data holdings or feeds from C4ISR Applications. C4ISR Application may be KML services, NVG services, Web Feature Services [OGC WFS], Web Mapping Services [OGC WMS], or Web Map Tiling Services [OGC WMTS]. A service itself may deliver geospatial data structured in a hierarchy of several layers.

The Layer Control Panel allows the user to view and edit the Layer Display Settings. Each Layer has its own Display Settings which include at least the following, if applicable by the resource:

- Identification
- Visibility (show/hide)
- Labelling status (on/off)
- Tinting
- Opacity
- Style
- Clustering Settings (see Displaying C4ISR Objects)
- Selected Object Attribute(s)
- Number of C4ISR Objects in the map extent

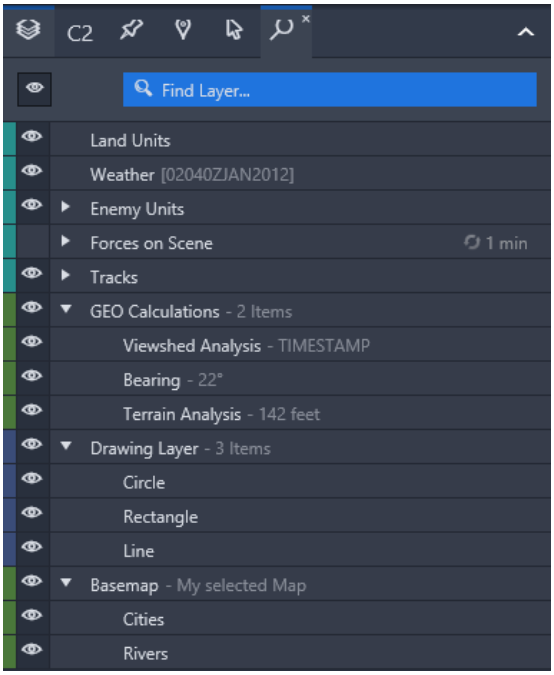
Indicator, if data is time-stamped to support animations

The priority for rendering the map is given by the order of levels in the Layer Control Pane. The lowest Layer has lowest priority. The metaphor is like looking at the layers from above with their visibility, transparency, opacity, and tinting settings applied.

The Layer Control Pane will have Table of Contents (TOC) functionality which provides management of all Layers and Web Services used in the Map Panel. The Pane the Web services, individual geospatial layers browsed and layers created/shared by users in a tree structure. The management capabilities include the following:

- Listing the Layers and Web services with thumbnails
- Adding, removing Layers and services
- Collapsing and expanding the tree structure.
- Changing the order of features in the tree
- Creating (or renaming) thematic groups to classify layers and services

A sample Layer Control Pane is given below:



[T1-R1009] *The VC GeoView shall be able to display C4ISR Objects and map features on separate Layers.*

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

[T1-R1010] *The VC GeoView shall maintain a list of Layers where each Layer is controlled by its own Display Settings.*

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

[T1-R1011] *The VC GeoView shall have a Layer Manager to control receiving data from an Application and displaying it on the specified Layer according to Layer Display Settings.*

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

[T1-R1012] *The VC GeoView Layer Control Pane shall allow the user to manage (add, modify, remove, configure) the Layers and Web services*

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

[T1-R1013] *The VC GeoView Layer Control Pane shall allow the user to configure the Layer Display Settings for each Layer as given in the Description.*

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

[T1-R1014] *The VC GeoView Layer Control Pane shall allow the authorised user to restrict general user access to certain Layers which are displayed on the Map Panel.*

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

[T1-R1015] *The VC GeoView Layer Control Pane shall allow the user to zoom to (or Goto) a selected feature. The scale of this zoom shall be customizable in the User Settings. The selection of the feature shall be possible either by a simple query or by identifying the feature or location by clicking at a location on the map.*

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

[T1-R1016] *The VC GeoView Layer Control Pane shall allow the user to set the Map Panel view to "fit to the full spatial extent" covering all features of a particular Layer.*

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

[T1-R1017] *The VC GeoView Layer Control Pane shall allow the user to temporarily switch off (flicker) a Layer to see what is underneath without having to hide it.*

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

[T1-R1018] *The VC GeoView Layer Control Panel shall allow the user to temporarily move a Layer onto another Layer (swipe). When the swipe function is invoked, the Map Panel shall display two Layers with a line to control the swiping to left or right.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 3
Qualific. Method : Test

[T1-R1019] *The VC GeoView Layer Control Panel shall display brief information about the metadata of each layer or service while hovering the cursor on it.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

4.3.2.4.3.3. Placemarks Pane

A Placemark is a geographic location having a name and symbol. The VC will maintain a Placemark List as a list of stored map context information for the user to quickly access different Areas of Interest. When the user wants to mark a Spatial Content, the VC will store it in the Placemark List. The user can then select one of those marks and invokes the Goto Function to mark the location on the Map Panel. The VC will also support sharing Placemarks among the users (by setting their visibility to private, shared, public), importing and exporting them in KML/KMZ format.

The Control Panel will have a list of Placemarks as a Pane allowing the user to access them easily.

[T1-R1020] *The VC GeoView shall maintain a Placemark List.*

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

[T1-R1021] *The VC GeoView shall allow the user to manage (add, delete, modify, search, set visibility, show, hide) the Placemark List.*

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

[T1-R1022] *The VC GeoView shall allow the user to export the selected Placemarks in the Placemark List to an exported Placemark file in KML/KMZ format.*

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

[T1-R1023] *The VC GeoView shall allow the user to import Placemarks from a exported Placemark file in KML/KMZ format.*

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

[T1-R1024] *The VC GeoView shall allow the user to select a Placemark and invoke the Goto Function to mark the location on the Map Panel.*

Requirement Property :
Domain for Static :
Domain for Afloat:

Baseline : VC-BL 1
Qualific. Method : Test

4.3.2.4.3.4. Timeline Panel

The Timeline Panel is the control of the Geo Player to display time-stamped geospatial data in chronological order. In that way changes in the situation can be visualised, for example to show the movement of C4ISR Objects. The user can specify the replay period via a date and time picker for the start and end time of the animation. The user can choose the speed and direction (forward or backward) of this animation. It may be in actual time or accelerated time or in slow motion. A timeline bar is used to control the animation with Play, Replay, Pause, Fast Forward, Fast Backward buttons. The date and time will be displayed and updated continuously.

The Timeline Panel will appear automatically when an animation is activated by the Geo Player.

[T1-R1025] *The VC GeoView shall have a Timeline Panel which controls the replaying a given set of geospatial data as explained in the Description.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1026] *The VC GeoView Timeline Panel shall allow the user to pick the date and time of the replay period.*

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

[T1-R1027] *The VC GeoView Timeline Panel shall appear automatically when an animation is activated by the Geo Player.*

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

4.3.2.4.4. Footer

The Footer has the following panels:

- Status Panel
- Time Panel
- Notification Panel
- Coordinate Panel

4.3.2.4.4.1. Status Panel

The Status Panel displays the current status of the VC. Examples to status information are given below:

- Network connection status
- Mode of Operation
- Current Operational State

[T1-R1028] *The VC GeoView shall have a Status Panel for displaying the status information given in the Description.*

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

[T1-R1029] *The VC GeoView Status Panel shall be able to display status information as received from the VC or AppView.*

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

4.3.2.4.4.2. Time Panel

The VC will display the current date and time in the Time Panel. The Panel will be able to display time in three different time zones. These are: Local, Operational Theatre Time and UTC (Zulu) Time. The default will be UTC.

[T1-R1030] *The VC GeoView shall have a Time Panel to display the current date and time in decimal units.*

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

[T1-R1031] *The VC GeoView Time Panel shall display the current time in local time zone, operational theatre time zone or UTC.*

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

[T1-R1032] *The VC GeoView Time Panel shall allow the user to select the time zone. The default shall be UTC.*

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

[T1-R1033] *The VC GeoView Time Panel shall allow the user to select the format for the display of the date time.*

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

4.3.2.4.4.3. Notification Panel

The Notification Panel will display any errors or warnings related to the VC (or Application). Only the non-critical errors which are not requiring user acknowledgment will be displayed.

[T1-R1034] *The VC GeoView shall have a Notification Panel to display non-critical errors or warnings.*

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

[T1-R1035] *The VC GeoView Notification Panel shall be able to display error or warning messages sent by the VC or Application.*

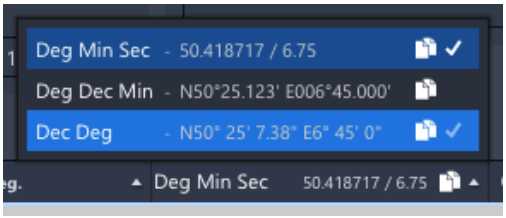
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.2.4.4.4. Coordinate Panel

The Coordinate Panel displays the coordinates of the cursor position. Following information related to the cursor position will be calculated and displayed:

- Geographic location (Latitude / Longitude)
- Grid location (with respect to the selected grid)
- Elevation/depth (based on a digital terrain or elevation model)
- Slope (based on a digital terrain or elevation model)

The values are updated as the cursor moved around the Map Panel. The Coordinate Panel will have configurable settings. A sample view is given below:



The user will be able to configure the display, units, and enabling/disabling each display.

[T1-R1036] *The VC GeoView shall have a Coordinate Panel to display the position information of the cursor position.*

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

[T1-R1037] *The VC GeoView shall display the elevation/depth and slope information based on the cursor position on the Coordinate Panel.*

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

[T1-R1038] *The VC GeoView shall use Web Services provided by the GIS Server to get the elevation/depth and slope information of an indicated position.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1

Qualific. Method : Inspection

[T1-R1039] *The VC GeoView shall allow the user to enable/disable the displaying of elevation/depth and slope information.*

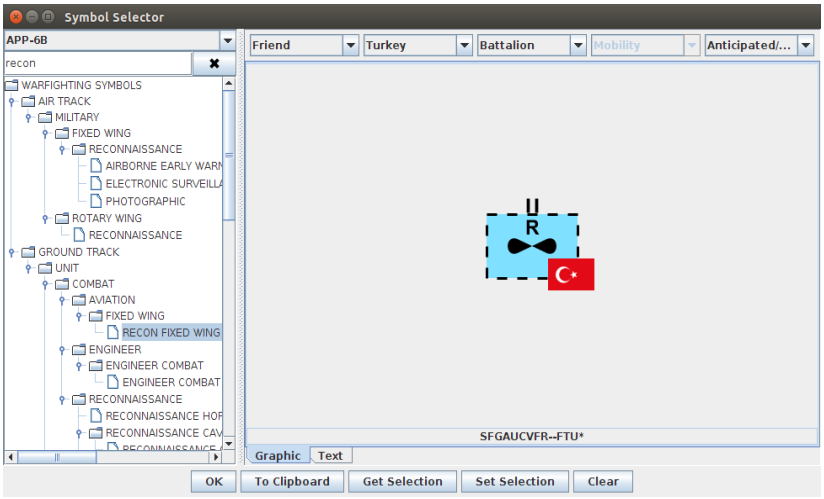
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

[T1-R1040] *The VC GeoView shall allow the user to configure the Settings of the Coordinate Panel.*

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

4.3.2.4.4.5. Symbol Selector

The Symbol Selector provides the user access to the symbol metadata from the Symbology Service for the purpose of selecting an appropriate symbol for a given C4ISR Object or C2 Drawing, or visualising the metadata of a specific symbol. A sample Symbol Selector user interface is given below:



[T1-R1041] *The VC GeoView shall provide a Symbol Selector.*

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

[T1-R1042] *The VC GeoView Symbol Selector shall allow the user to choose a symbol from those provided by the Symbology Service.*

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

[T1-R1043] *The VC GeoView Symbol Selector shall support all symbology standards available through the Symbology Service.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1044] *The VC GeoView Symbol Selector shall support all point, line, area and multi-point based symbology provided by the Symbology Service.*

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

[T1-R1045] *The VC GeoView Symbology Selector shall utilise the Symbology Service for the rendering of the symbols.*

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

[T1-R1046] *The VC GeoView Symbol Selector shall consume the Symbology Service metadata for the purpose of presenting the available symbology to the user.*

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

[T1-R1047] *The VC GeoView Symbol Selector shall display the symbol and metadata associated with a selected C4ISR Object or C2 Drawing.*

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

[T1-R1048] *The VC GeoView Symbol Selector shall provide the means to display the Symbology Service metadata in a tree format.*

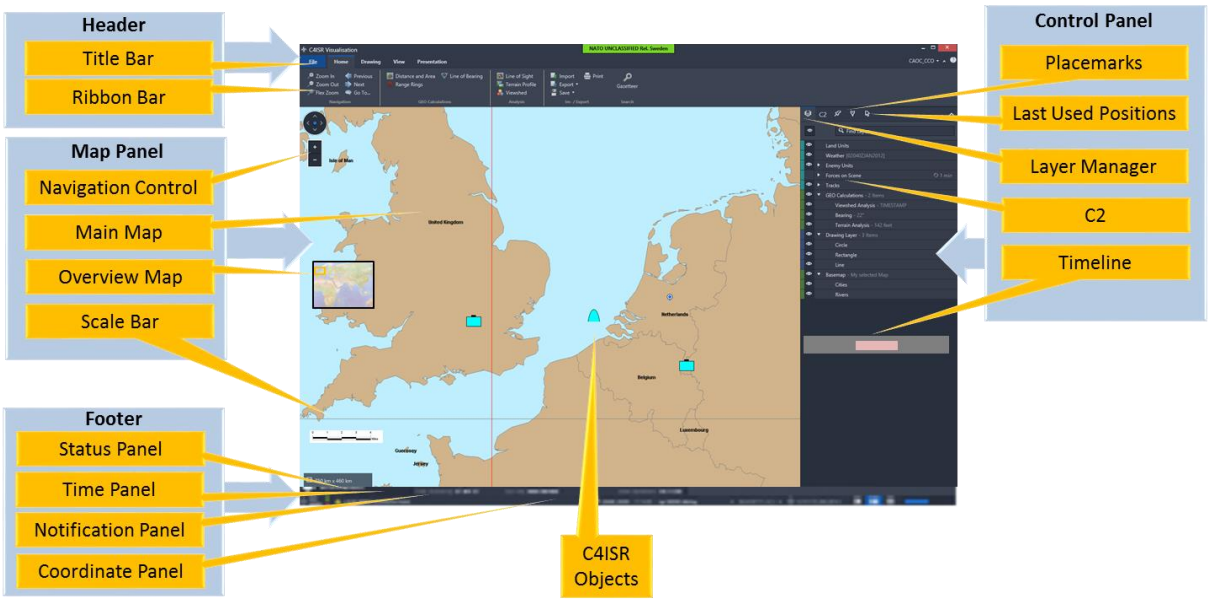
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 3
Qualific. Method : Demonstration

[T1-R1049] *The VC GeoView Symbol Selector shall provide the means to search for a symbol and display the results in a tree format.*

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

4.3.3. User Interface Layout

The GeoView User Interface Layout indicating the main groups of graphical components is given below as an example:



4.3.4. Handling Geospatial Objects

Geospatial Objects are entities having geographic data. The main objects that are subject to be displayed by the GeoView are C4ISR Objects (e.g. track symbols, figures) and geo-information (e.g. map features). These Objects are displayed in the GeoView according to user-selected criteria.

4.3.4.1. Displaying C4ISR Objects

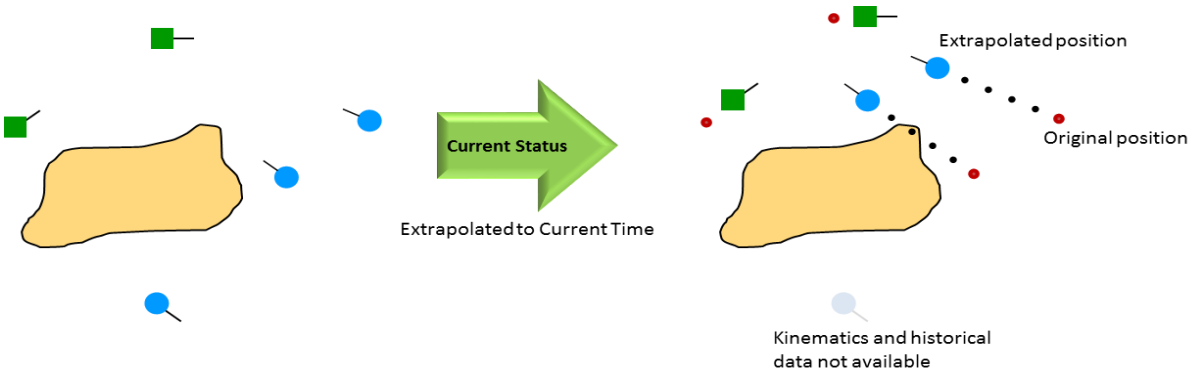
All C4ISR Objects, both military and non-military, will be displayed on the Map Panel with predefined symbols when they are sent by the AppView. The Map Panel extent will be adjusted according to the request issued by the AppView to display selected C4ISR Objects (e.g. Move Extent, Zoom to Object). The Symbol Set will be provided by the VC Symbology Service.

4.3.4.1.1. Object Display

The VC GeoView will receive the C4ISR Objects to be displayed from the AppView according to the current map extent. The Objects being displayed on the Map Panel will be updated when their attributes are updated by the AppView.

Current Status:

The GeoView will display Objects at their reported positions as received from the AppView. However, if the user wants to view the "Current Status", the GeoView will extrapolate the positions of all moving Objects to the current time using their last known kinematics (position and movement vectors, e.g. course and speed for dead reckoning). Objects will be displayed on the map after their future position is calculated without considering the geographical locations (e.g. ships may appear on land). Therefore, this tentative status will be displayed for a configurable amount of time (e.g. one minute) with an indication to the user (e.g. a warning on the Status Panel) and the markers at the original positions with trailing dots. An example is shown below:



[T1-R1050] *The VC GeoView shall request C4ISR Objects from the AppView to display on the Map Panel with their geospatial information. The request filter shall be derived from the current Map Extent.*

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

[T1-R1051] *The VC GeoView shall update the positions of the displayed C4ISR Objects when they are updated by the AppView.*

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

[T1-R1052] *The VC GeoView shall be able to extrapolate positions of the displayed C4ISR Objects to current time using the last known kinematics when the user wants to view the Current Status as defined in the Description.*

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

[T1-R1053] *The VC GeoView shall be able to extrapolate the positions of all visible C4ISR Objects when the user wants to view the Current Status, and display the Objects at their future positions as defined in the Description for a configurable amount of time.*

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

[T1-R1054] *The VC GeoView shall use the last known kinematics of C4ISR Objects for extrapolation to current time. If the movement vectors of an Object are not available at the last position update, then the VC shall derive movement vectors from the historical positions available within the last six (6) hours. If no historical position is available, then the Object will not be extrapolated to future position and displayed with faded symbol.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1

Qualific. Method : Test

[T1-R1055] *The VC GeoView shall be able to extrapolate the positions of all visible C4ISR Objects when the user wants to view the Current Status, and display the Objects at their future positions as defined in the Description for a configurable amount of time or until the user cancels.*

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

[T1-R1056] *The VC GeoView shall allow the user to view the Current Status as defined in the Description.*

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

[T1-R1057] *The VC GeoView shall allow the user to set duration to view the Current Status. The duration shall be configurable between five (5) seconds to one minute.*

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

4.3.4.1.2. Symbology

The VC will use symbols to display military and non-military Objects on the Map Panel. A sample symbol is given below:

The VC will also display the Speed Leader or Direction & Movement [APP-6] of a moving Object if enabled. A flag will be displayed if enabled by the user.

[T1-R1058] *The VC GeoView shall display the C4ISR Objects on the Map Panel using the symbology standards supported by the Symbology Service.*

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

[T1-R1059] *The VC GeoView shall allow the authorised user to manage (publish, update, delete) symbols and associated rules from the Portrayal Catalogue of the Symbology Service.*

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

[T1-R1060] *The VC GeoView shall allow the user to select a Symbol Set from the list of available sets provided by the Symbology Service and set it as a personal default.*

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

[T1-R1061] *The VC GeoView Map Panel shall apply the selected symbol set to all objects and features automatically.*

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

[T1-R1062] *The VC GeoView Map Panel shall be able to display symbols with faded colours when such a feature is functionally required. For example, when all Objects are extrapolated to future positions, those Objects not suitable for extrapolation will be displayed with faded symbols temporarily.*

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

[T1-R1063] *The VC GeoView Map Panel shall display the Speed Leader or Direction & Movement [APP-6] of a moving Object if enabled.*

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

[T1-R1064] *The VC shall use the mechanisms provided by the Symbology Service to improve network efficiency (e.g. receiving only a subset of the default and most used symbols during the initialisation, caching the used symbols and Sprite Sheets (see Symbology Service)).*

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

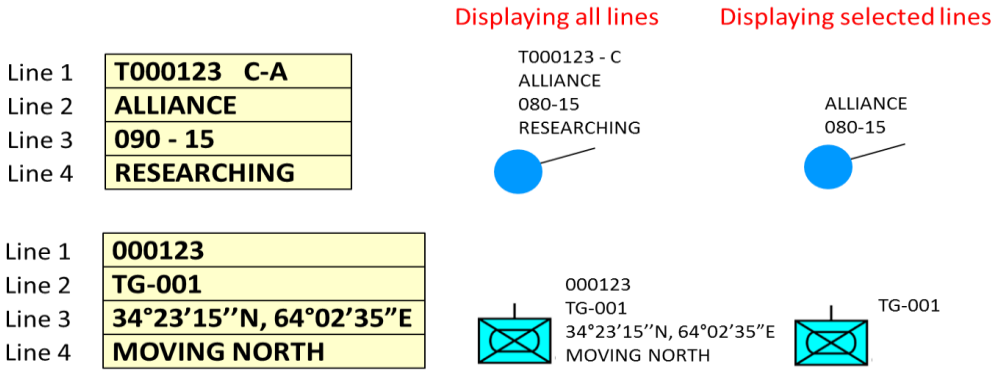
4.3.4.1.3. Object Labels

Object Label is a small text box for displaying a brief information related to a C4ISR Object. The size, background colour, text font/face/size and colour of Object Labels will be configurable. Their general positions with respect to the symbol are also configurable (e.g. top-right, right). The text box has a configurable number of lines and characters where each line can be addressed. The AppView determines what to be displayed on the Object Labels. Following information can be displayed on Object Labels as an example:

- Object Identification number (e.g. Track Number) (given by the Application)
- Special status indicator (e.g. correlated track indicator, associated track indicator)
- Name
- Kinematic information (e.g. Course, Speed)

- Special description

Sample Object Labels are given below:



The authorised user identifies the lines of the Object Labels. Any user can then select the lines to be displayed and configure their appearance.

Following font types will be supported as a minimum:

- True Type Fonts (Calibri, Arial, Helvetica as a minimum) (as available on the Client Workstation)
- Open Type Fonts
- PostScript Fonts.

[T1-R1065] *The VC GeoView shall display Object Labels as a configurable text box at a user-selected position with respect to the symbol.*

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

[T1-R1066] *The VC GeoView shall receive data to be displayed on Object Labels from the Application.*

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

[T1-R1067] *The VC GeoView shall support the Object Label fonts given in the Description.*

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

[T1-R1068] *The VC GeoView shall allow the authorised user to configure the general structure and size of the Object Labels.*

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

[T1-R1069] *The VC GeoView shall allow the user to configure the appearance (lines to be displayed, background colour, text type/size and colour) of the Object Labels.*

Requirement Property :
Domain for Static :

Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Test

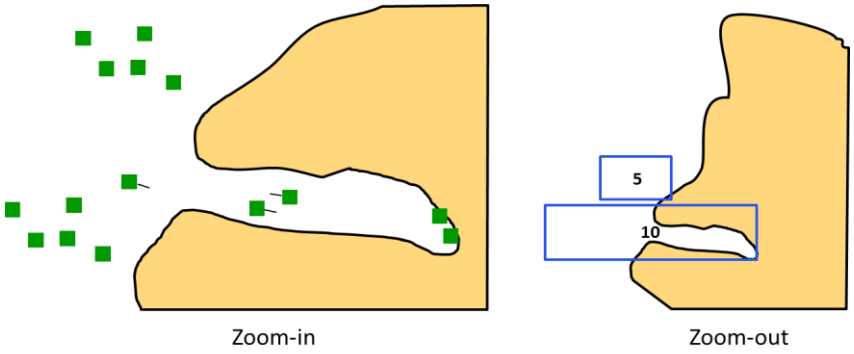
[T1-R1070] *The VC GeoView shall allow the user to re-position Object Labels by selecting, dragging and dropping at any position of the Map Panel.*

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

4.3.4.1.4. Clustering

Clustering is described as symbolising multiple C4ISR Objects with a single symbol. The purpose of this function is to delineate overlapping symbols in a limited area. Clustering provides a more aesthetic an efficient display with increased usability. Clustering identifies groups of objects in a Layer that are within a given Cluster Distance. The Cluster Distance is dependent on the scale at which the Map Panel is displaying and on the size of the symbol; as zoomed in, fewer points are clustered and as zoomed out, more points are clustered. The Clustering Function draws a graphical link between the overlapping objects and its cluster centroid. Following is an example for displaying clustered point objects with a distinguishable (e.g. yellow circle) indication and a label indicating the number of objects:

When the zoom scale becomes very high and not suitable for displaying even clustered object symbols, the number of objects within a rectangle will be displayed. The size of the rectangle will be determined using the scale factor and number of objects within that rectangle. A sample view is shown below:



The user will be able to configure Clustering settings which includes Clustering Distance, scale, number of allowable objects in one rectangular area and excluded features. When Clustering is enabled, the GeoView will automatically cluster objects according to the user settings. Disabling the Clustering will return the Map Panel to normal display with object symbols.

[T1-R1071] *The VC GeoView shall allow the user to enable/disable Clustering for a selected Layer.*

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

[T1-R1072] *The VC GeoView shall allow the user to configure Clustering settings which includes at least the clustering distance, scale, number of allowable objects in one rectangle and excluded features.*

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

[T1-R1073] *The VC GeoView shall automatically cluster overlapping point symbols displayed on the Map Panel according to the user settings when Clustering is enabled.*

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

[T1-R1074] *The VC GeoView shall provide an option to exclude an Object from clustering.*

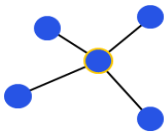
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

[T1-R1075] *The VC GeoView Map Panel shall re-cluster symbols when the content of the layer is changed.*

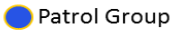
Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 1
Qualific. Method : Demonstration

4.3.4.1.5. Object Grouping

The C4ISR Objects displayed on the Map Panel can be grouped manually to indicate a logical connection between them. A combined symbol at the geometric centre of the group will be used to indicate the location of the group when Clustering is enabled. Following is an example to displaying grouped point objects with a distinguishable (e.g. yellow circle) indication and a label set by the user:

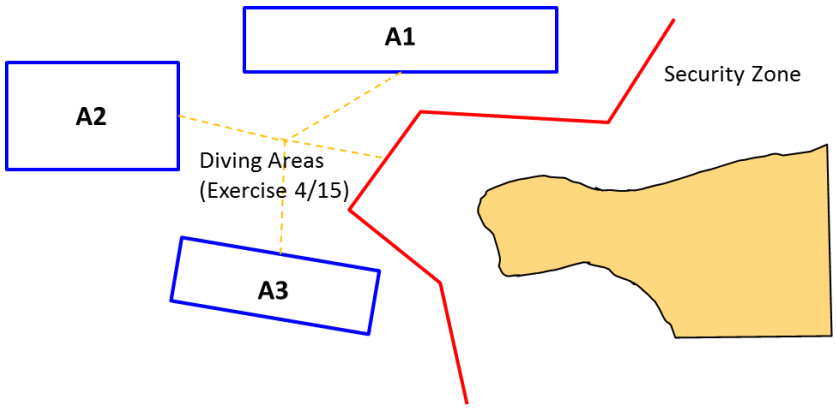


Zoom-in



Zoom-out

Following is an example to grouping of Areas:



When Clustering is enabled, the manually grouped objects will be taken into consideration.

[T1-R1076] *The VC GeoView shall display a group of Objects with a combined symbol at the geometric centre of the group. A single Object Label shall be used which includes the text of the individual Object Labels.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1077] *The VC GeoView shall display the grouped Objects when Clustering is enabled.*

Requirement Property :
Domain for Static :
Domain for Afloat:
Baseline : VC-BL 2
Qualific. Method : Demonstration

[T1-R1078] *The VC GeoView shall allow the user manage Object Grouping (e.g. selecting logically-related objects (e.g. tracks, areas), assigning a label and an annotation).*

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

[T1-R1079] *The VC GeoView shall update the centre of the object group when the object positions are updated.*

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

[T1-R1080] *The VC GeoView shall rearrange grouping if an object is deleted and disable grouping automatically when only one object remains.*

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