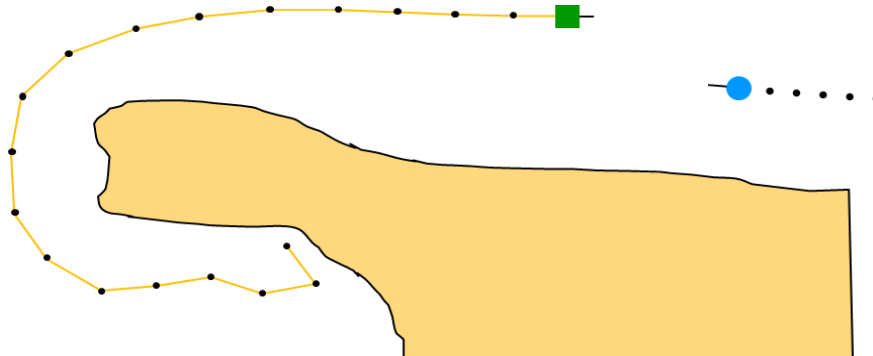


#### 4.3.4.1.6. Object History

The GeoView will be able to display historical positions of selected objects based on the user-selected duration and intervals. An example of displaying history is depicted below:



The GeoView will display the History Tail (the last positions within a configurable time with connection routes) for all moving Objects for their last known positions. The number of positions shall be user configurable. For example, the last five position will trail the Object as it moves.

[T1-R1081] *The VC GeoView shall be able to display historical positions of moving C4ISR Objects on the Map Panel when enabled.*

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

[T1-R1082] *The VC GeoView shall allow the user to configure historical position settings including duration and intervals for a set of selected C4ISR Objects.*

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

[T1-R1083] *The VC GeoView shall display the History Tail (the last positions within a configurable time) for all moving Objects for their last known positions. The number of positions shall be user configurable in the Display Settings.*

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

#### 4.3.4.1.7. Label De-confliction

The Label De-confliction Function provides the capability to de-conflict overlapping Object Labels and Map Labels on the Map Panel. All labels will be displayed without conflicting each other. If there is not enough space to display all labels belonging to all objects in the current view, then the size of the labels will be reduced.

This function applies to any object displayed with its corresponding label on the Map Panel.

If the function is enabled, then the GeoView will declutter the labels automatically when the Map Scale or the number of visible objects are changed. If the function is not enabled, the user can change the label locations manually. Re-enabling the function will override all manual changes.

[T1-R1084] *The VC GeoView shall be able to declutter Object Labels according to their position, number of visible objects and the available space in the current view.*

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

[T1-R1085] *The VC GeoView shall allow the user to enable/disable Label De-confliction for a selected layer.*

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

[T1-R1086] *The VC GeoView shall de-conflict the Object Labels and Map Labels automatically if the function is enabled for a selected layer.*

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

[T1-R1087] *The VC GeoView shall de-conflict the labels automatically when the Map Scale, position of objects, the number of visible objects in the layer or content, font and size of the labels are changed.*

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

[T1-R1088] *The VC GeoView shall allow the user to change the label locations manually if the function is not enabled.*

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

[T1-R1089] *The VC GeoView shall, when re-applying the declutter function, strive to keep the majority of the label locations constant. The intent is to avoid most labels jumping to a new location with each application of the declutter function.*

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

#### 4.3.4.1.8. Tinting

"Tinting" is to change the appearance of symbols and labels. The Tinting Function will allow the user to change the following attributes of the displayed symbols and labels:

- Colour
- Line pattern

- Line width
- Fill pattern
- Point symbol
- Text font
- Transparency
- Classification methods
  - Equal Range
  - Quantile
  - User-defined Ranges
  - Unique value.

The VC GeoView will be able to generate default groups like "grouping by equal interval" and "grouping by unique value tinting".

[T1-R1090] *The VC GeoView shall be able to apply tinting of symbols and labels as set by the user for each Layer.*

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

[T1-R1091] *The VC GeoView shall allow the user to change the attributes of the symbols and labels given in the Description.*

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

[T1-R1092] *The VC GeoView shall be able to generate default groups like "grouping by equal interval" and "grouping by unique value tinting".*

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

#### 4.3.4.1.9. Object Information Display

The VC GeoView will display following types of information when a C4ISR Object on the Map Panel is selected:

##### Simple Information:

When the cursor is hovered on a C4ISR Object symbol, only the Simple Information will be displayed as a tooltip. The Simple Information includes the following:

- Identification (Name, ID Number or blank)
- Kinematics (if moving) (Course/direction, Speed)

##### Default Information:

When the Object symbol is selected (double-clicked or a menu item selected from the Context-sensitive Menu) the Default Information will be displayed in a pop-up box called "Object Information Box" (also known as a Flyout). The content of this box will be configured according to Application needs.

The Default Information will include the following:

- Identification (Name, ID Number or blank)
- Country (if applicable)
- Standard Identity, Category (APP-20 for ships)
- Class/type
- Kinematics (Course/general direction, Speed)
- Position (Latitude / Longitude or a grid information)
- Location (e.g. port name, a city)
- Date-Time Group (DTG) of update
- Link for further information

**Detailed Information:**

When the user needs more detailed information about a selected C4ISR Object, the GeoView will augment the detailed information according to the type of the Object and display it in the Object Information Box. The Detailed Information will include the following:

- Identification (Name, ID Number)
- Country (if applicable)
- Standard Identity and Amplification, Category (APP-20 for ships)
- Kinematics (Course/general direction, Speed)
- Position (Latitude / Longitude or a grid information)
- Location (e.g. port name, a city)
- Operational Information (e.g. Mission/Campaign/Operation, Task, Activity, Status, Destination, Last Port)
- Object-specific Information (specific data for vessels, battle-space objects)
- Image (photo of the vessel)
- DTG of update
- Figure supported by the Application.

Object Information Box will be configured by the Application according to the type of the Object. It will be able to display all detailed information in grouped tabs enabling the user to directly access a group. A Box will stay on the Map Panel until it is closed by the user.

[T1-R1093] *The VC GeoView shall display the Simple Information, given in the Description, for a selected C4ISR Object, as a Tooltip when the cursor is hovered on its symbol.*

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

[T1-R1094] *The VC GeoView shall display an Object Information Box as a flyout when the user selects a symbol. The Box can be docked on the GeoView.*

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

[T1-R1095] *The VC GeoView shall allow the user to activate an Object Information Box as a flyout by either double-clicking on a symbol or selecting from the Context-sensitive Menu or pressing an Function Key.*

Requirement Property :  
 Domain for Static :

Domain for Afloat:  
Baseline : VC-BL 1  
Qualific. Method : Test

- [T1-R1096] *The VC GeoView shall be able to display a configurable number of separate Object Information Boxes simultaneously with indications (e.g. lines to the symbols) to the related Objects.*

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

- [T1-R1097] *The VC GeoView shall configure the content of the Object Information Box as defined by the AppView according to the type of the selected C4ISR Object.*

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

- [T1-R1098] *The VC GeoView shall display the Default Information, given in the Description, in an Object Information Box when a C4ISR Object is selected.*

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

- [T1-R1099] *The VC GeoView shall display the Detailed Information, given in the Description, in the Object Information Box when detailed information for the C4ISR Object is requested by the user.*

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

- [T1-R1100] *The VC GeoView shall be able to retrieve the augmented information from the AppView and display it in the Object Information Box as defined by the AppView.*

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

- [T1-R1101] *The VC GeoView shall allow the user to adjust the update rate of a C4ISR Object being displayed in the Object Information Box. When the user quits the Box, the update rate shall be reset to its configured parameter.*

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

#### 4.3.4.1.10. Tooltips

Tooltips will provide brief information about the C4ISR Objects or Map Features when the cursor is positioned on an object symbol. Tooltips can be enabled or disabled.

[T1-R1102] *The VC shall display a Tooltip for a C4ISR Object or a Map Feature when the cursor is hovered on its symbol for more than five-hundred (500) milliseconds. The Tooltip shall be removed when the cursor is moved away or when a duration given in the Configuration Settings has elapsed. The default shall be five (5) seconds.*

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

[T1-R1103] *The VC GeoView shall allow the user to configure Tooltip text format (e.g. font, size, colour) as part of the User Settings.*

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

[T1-R1104] *The VC GeoView shall allow the user to configure Tooltip text as part of the related Object attributes. Same structure as Object Labels shall be used for Tooltips.*

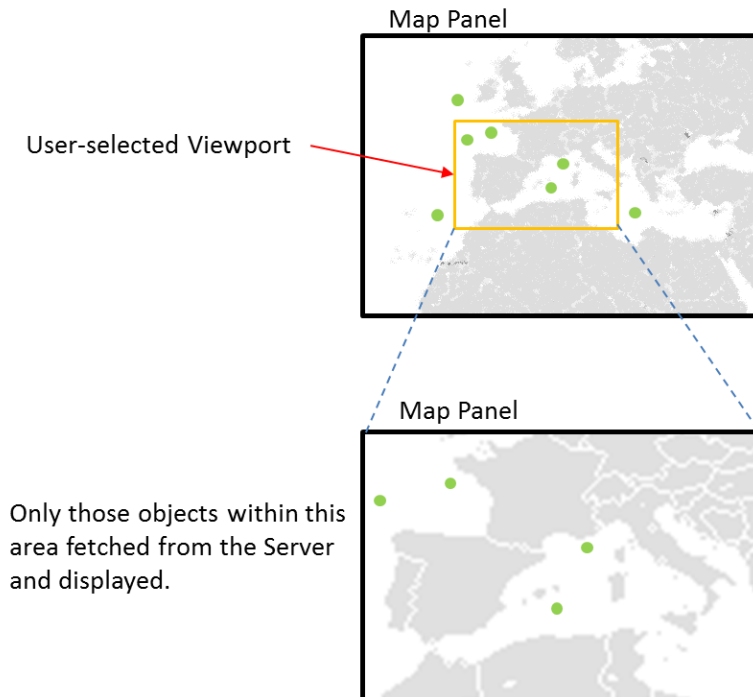
Requirement Property :  
 Domain for Static :  
 Domain for Afloat:  
 Baseline : VC-BL 1  
 Qualific. Method : Test

#### 4.3.4.2. Managing Spatial Extent

A Spatial Extent is a rectangular area calculated using the screen coordinates in pixels, grain and extent (the size of a pixel and resolvable unit). Once the geographical area is determined with respect to the current View Scale and the screen resolution, a geographical filter is applied on the Objects and only those Objects passing the filter are processed. The user can either zoom in around the centre point of the Map Panel or by drawing a rectangle to indicate the new map extent.

The VC GeoView will automatically adjust the content according to the Map Panel scale and its size, and manage the data to be displayed. As the scale or size of the Map Panel changes, the GeoView will automatically calculate the Extent size in terms of pixels on horizontal and vertical axis, which maps onto distances from the centre location, and then request the data within that area. As the scale of the Map Panel gets smaller, the number of Objects increases.

When the user draws a rectangle on the Map Panel and sets a coverage area, this area will then be used to request only the relevant data from the AppView. The size of coverage area, consequently the number of Objects, will not be affected by the size and scale of the Map Panel. The selection method is illustrated below:



Diagonal coordinates of the Extent rectangle will be sent to the AppView via a NMAPI to make the Functional Service Application clip the C4ISR Objects falling into the defined area (applying geo-filter). The list of clipped Objects will then be sent to the GeoView to be rendered on the Map Panel.

[T1-R1105] *The VC GeoView shall manage the Spatial Extent when the user zooms in or zooms out or draws an extent rectangle.*

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

[T1-R1106] *The VC GeoView shall send the calculated rectangular coverage area to the AppView via NMAPI and shall render the returned features and C4ISR Objects.*

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

[T1-R1107] *The VC GeoView shall allow the user to set the Spatial Extent Mode with an area selection.*

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

[T1-R1108] *The VC GeoView shall adjust the Spatial Extent according to the request defined by the AppView for displaying selected C4ISR Objects.*

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

[T1-R1109] *The VC GeoView shall be able to update the default data of the C4ISR Objects in the current Spatial Extent with a rate of at least one-thousand (1000) Objects per minute for 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 : Demonstration

### 4.3.4.3. Displaying Geo-Information

Geo-Information includes the following:

- Geo features
- Topographic features
- Political features
- Meteorological features
- Place names (Gazetteer data)

Map Rendering Service refers to Geospatial Services that return map graphics, primarily as images, portraying a specific geospatial region. It covers:

- User-specific electronic maps, like portrayals of a specific geospatial region (e.g. formatted as media types image (jpeg, gif, svg+xml)).
- Service metadata as a machine readable description (e.g. formatted as media type text/xml) of the information content provided by the service, and the corresponding request parameter.

[T1-R1110] *The VC GeoView shall be able to display Geo-information given in the Description.*

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

[T1-R1111] *The VC GeoView shall be able to display Application-specific features provided by the NMAPI.*

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

[T1-R1112] *The VC GeoView shall be able to interrogate the GIS Server for OGC compliant Web Services, list the available Services and display the selected services as Layers.*

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

[T1-R1113] *The VC GeoView shall allow the user to select the Web Services for displaying as Layers.*

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

[T1-R1114] *The VC GeoView shall display attribute data associated with the displayed Geo-features and AppView-features.*

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

[T1-R1115] *The VC GeoView shall be able to apply filter to the Geo-information features based on attribute data.*

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

[T1-R1116] *The VC GeoView shall display Geo-information according to the current Projection and Coordinate System.*

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

#### 4.3.4.4. Displaying KML and KMZ

Keyhole Markup Language (KML) [OGC KML] is an XML tag based syntax that holds geographic information (geospatial drawings, symbology and attributes) in a file with the ".kml" extension. KML files and their related images (if any) can be compressed using the ZIP format into KMZ archives. The VC GeoView Map Panel will be able to display KML/KMZ data in Layers.

[T1-R1117] *The VC GeoView shall be able to display data given in KML/KMZ format in a Layer of the Map Panel with their descriptions and tags.*

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

[T1-R1118] *The VC GeoView shall be able to add a KML/KMZ Layer to the Control Panel.*

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

[T1-R1119] *The VC GeoView Map Panel shall be able to process a file in KML/KMZ format indicated by the user.*

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

[T1-R1120] *The VC GeoView shall allow the user to select a KML/KMZ file or a drag the file and drop it over the Map Panel to display the content. If the file format is incorrect the user shall be notified.*

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

[T1-R1121] *The VC GeoView shall be able to export the contents of a Layer to a KML/KMZ file as indicated by the user.*

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

#### 4.3.4.5. Displaying NVG

NATO Vector Graphics (NVG) data file format is an XML document defined by NATO [NVG]. The document has a prescribed structure that is defined by the XSD file. Graphics primitives are only a small set and represent only the geometric primitives with a unique structure (e.g. point, line, polyline, polygon, ellipse, etc.). The VC GeoView will be able to display NVG data in Layers as indicated by the AppView. For example, displaying RAP and RGP in separate Layers.

[T1-R1122] *The VC GeoView shall be able to display NVG data in Layers of the Map Panel indicated by the Application. The Layer Manager shall control the flow of data.*

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

[T1-R1123] *The VC GeoView shall be able to display description and tag of NVG data as detail.*

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

[T1-R1124] *The VC GeoView shall be able to add a NVG Layer to the Control Panel.*

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

[T1-R1125] *The VC GeoView shall allow the user to select a file having NVG data or a drag the file and drop it over the Map Panel to display the content. If the file format is incorrect the user shall be notified.*

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

[T1-R1126] *The VC GeoView shall be able to process a file having NVG data indicated by the user.*

Requirement Property :  
 Domain for Static :  
 Domain for Afloat:

Baseline : VC-BL 1  
 Qualific. Method : Demonstration

[T1-R1127] *The VC GeoView shall be able to export the contents of a Layer to a NVG file as indicated by the user.*

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

#### 4.3.4.6. Displaying Media

The VC GeoView will be able to display images in Recognised Graphics File Format. The user will be able to edit (resize, adjust brightness etc.) an image file in Recognised Graphics File Format by using an Image Viewer. If the image file has geodetic information, like GeoTIFF [GeoTIFF], the VC will use the GIS Server to convert it into WMS and display it on the Map Panel. An example to this usage is an ortho-image taken from air.

If an object is associated with an image or a video file, the image can be displayed in the Object Information Box and the video can be displayed in a pop-up player allowing the user to control the replay.

[T1-R1128] *The VC GeoView shall have an Image Viewer to display image files in Recognised Graphics File Format.*

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

[T1-R1129] *The VC GeoView Image Viewer shall allow the user to manage (open, resize, adjust colour and brightness, save) image files.*

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

[T1-R1130] *The VC GeoView shall be able to display images related to C4ISR Objects in the Object Information Box of that object.*

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

[T1-R1131] *The VC GeoView shall have a Media Player to display video allowing the user to control the replay.*

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

[T1-R1132] *The VC GeoView shall be able to display the content of a GeoTIFF file which is processed by the GIS Server and served as WMS.*

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

[T1-R1133] *The VC GeoView shall allow the user to manage (load, edit geodetic information, adjust colour, save, send to GIS Server) GeoTIFF files and have them displayed on the Map Panel.*

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

#### 4.3.4.7. Animating C4ISR Objects

The VC GeoView will be able to animate a given set of moving C4ISR Objects in a given time period using the Geo Player function. The data set will be provided by the AppView. The history of one or more selected tracks, Waterspace Management Area animation are examples. The Timeline Panel will allow the user to control the Geo Player, including starting/stopping/pausing the play, adjusting the play speed.

[T1-R1134] *The VC GeoView shall have a Geo Player which can animate a given set of C4ISR Objects with geospatial, date and time data. The data set shall be received from the AppView.*

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

[T1-R1135] *The VC Geo Player shall perform the object animation on a separate layer of the Map Panel.*

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

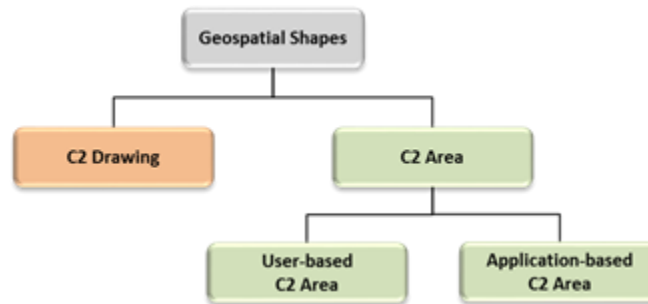
[T1-R1136] *The VC Geo Player shall be controlled by the Timeline Panel.*

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

#### 4.3.5. Handling Geospatial Drawings

Geospatial Drawings (Geo-drawings) are graphical drawing objects, with geometry and other properties which can be managed by users or applications. These Geo-drawings can be processed by AppView. Users can create Geo-drawings and digitize their geometry using drawing primitives, assign values to their attributes, save them and retrieve them for displaying in a Layer.

The VC GeoView will be able to handle the following types of Geo-drawings:



### 4.3.5.1. C2 Drawings

C2 Drawings are graphical objects created by users with the pointing device. Users can draw any kind of shape (open, closed or composite) on a selected Layer of the Map Panel using the Drawing Primitives. The Drawings are then used to visually enhance the Operational Picture and their geospatial data can be processed by the Functional Service Application.

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, flight line, ship course, attack direction, movement indication)
- Areas (e.g. Exclusive/Inclusive Areas, fishing zone, danger areas).

#### 4.3.5.1.1. C2 Drawing Primitives

C2 Drawings can be created using the Drawing Palette which allows the user to draw on the Map Panel using Drawing Primitives and the pointing device. The Palette includes the following Basic Drawing Primitives:

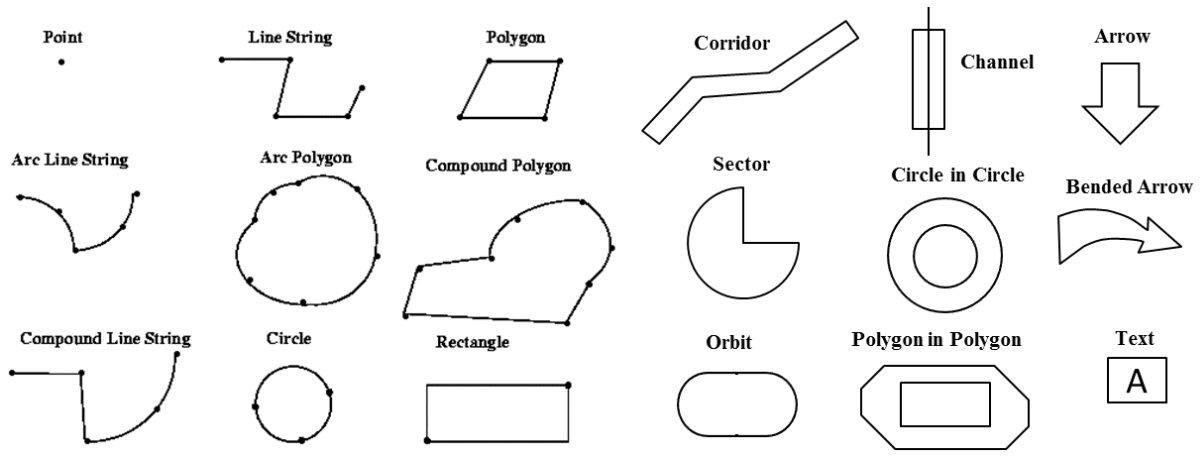
- Point
- Point cluster
- Multi-point
- Line
- Arrow (Line based or as a directed corridor)
- Bended Arrow
- Polygon
- Arc (Circular Arc, Elliptic Arc)
- Arc line string
- Arc polygons
- Compound polygon
- Compound line string
- Circles
- Ellipse
- Orbit [\(see \[NVG\]\)](#)
- Optimized rectangle
- Fan area (aka ArcBand)
- Freehand drawing
- Composite (a group of primitives)
- Text

In addition to these Basic Drawing Primitives, Complex Drawing Primitives can also be used. An example to this is an indication of Fishing Zones (as an Area) within National Waters (as Lines). Following is an example list of Complex Drawing Primitives:

- 2D Corridor (a closed area with legs)

- Channel (a corridor with a centre line)
- Sector
- Circle in circle
- Polygon in polygon
- Control Measures (e.g. large arrows)
- When 3D Display is implemented, following 3D Primitives will be included:
- Surface Volume (Polygon, Ellipse, etc.)
- 3D Corridor
- Sphere / hemisphere
- Cone Volume

Samples of the Drawing Primitives are shown below:



[T1-R1137] *The VC GeoView shall support a drawing capability on the Map Panel by using a Drawing Palette and the pointing device.*

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

[T1-R1138] *The VC GeoView shall allow the user to create a C2 Drawing on the Map Panel using the Drawing Palette and the pointing device.*

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

[T1-R1139] *The VC GeoView shall allow the user to associate symbology with individual Drawing Primitives in the C2 Drawing.*

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

[T1-R1140] *The VC GeoView shall allow the user to undo and redo for the drawing actions while creating a C2 Drawing using the Primitives and the pointing device.*

Requirement Property :  
 Domain for Static :

Domain for Afloat:  
 Baseline : VC-BL 1  
 Qualific. Method : Test

[T1-R1141] *The VC GeoView shall allow the user to associate descriptive text (annotation) with each Drawing Primitive.*

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

[T1-R1142] *The VC GeoView shall allow the user to create Complex Drawings by combining Drawing Primitives from the Drawing Palette.*

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

[T1-R1143] *The VC GeoView shall allow the user to create a composite Drawing Primitive composed of multiple Drawing Primitives. The composite Drawing Primitive indicates that all contained Drawing Primitives are treated as a single representation of the concept being expressed.*

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

[T1-R1144] *The VC GeoView shall allow the user to associate metadata with each Drawing Primitive.*

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

[T1-R1145] *The VC GeoView shall allow exclusion areas to be specified on all area based Drawing Primitives.*

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

[T1-R1146] *The VC GeoView shall allow Min and Max Altitude to be specified on all area based Drawing Primitives.*

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

#### 4.3.5.1.2. C2 Drawing Properties

C2 Drawings will have attributes called "Properties". When the user creates a C2 Drawing, the Properties will be available with defaults. If the user wants to manage the C2 Drawing, its Properties must be filled in. C2 Drawing Properties include at least the following:

- Identification
- Label
- Description
- Tooltip text
- Security classification
- Releasability label
- Owner
- Visibility (private, shared, public)
- Group of primitives (to form a complex C2 Drawing)
- Geographical position of the geometric centre
- Layer to display
- Status (active/inactive)
- AppView Defined Metadata
- User Defined Metadata

When multiple Drawings are combined to form a new C2 Drawing, the properties of the final C2 Drawing will be used for processing.

[T1-R1147] *The VC GeoView shall maintain a list of Properties for each C2 Drawing as given in the Description.*

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

[T1-R1148] *The VC GeoView shall allow the user to assign values to the C2 Drawing Properties.*

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

[T1-R1149] *The VC GeoView shall allow the user to modify a C2 Drawing by changing its Properties.*

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

#### 4.3.5.1.3. Handling C2 Drawings

A user can create a C2 Drawing using the Drawing Primitives on a user-indicated Drawing Layer of the Map Panel if the Layer is set to Editable. If the C2 Drawing is to be used for visualisation purposes temporarily, the C2 Drawing will be deleted at log-out. If the C2 Drawing is intended to be used for processing, the user has to fill in its Metadata, including the Properties, and saves it. The VC GeoView will pass this Metadata to the AppView for further management and processing. The AppView then manages (create, save, modify, delete, activate/deactivate, export, import) the C2 Drawing as operationally needed.

C2 Drawings can be exported or imported in the following formats:

- SVG
- NVG
- KML/KMZ.

The VC GeoView will be able to render the imported C2 Drawings.

[T1-R1150] *The VC GeoView shall allow the user to manage (create, modify, delete) the C2 Drawings.*

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

[T1-R1151] *The VC GeoView shall allow the user to select an Editable Layer as an active Drawing Layer. Only the selected Drawing Layer shall be used for creating a new C2 Drawing.*

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

[T1-R1152] *The VC GeoView shall be able to send the Metadata of a C2 Drawing to the AppView, using the NMAPI, for further management and processing.*

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

[T1-R1153] *The VC GeoView shall be able to receive the Metadata of a C2 Drawing, from the AppView, using the NMAPI, and display it on the indicated Layer of the Map Panel according to the current Map Projection.*

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

[T1-R1154] *The VC GeoView shall allow the user export a selected C2 Drawing into a file of type SVG, NVG, KML or KMZ.*

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

[T1-R1155] *The VC GeoView shall allow the user import a previously exported C2 Drawing from a file, in SVG, NVG, KML or KMZ format, and display it on the Map Panel according to its Properties.*

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

### 4.3.5.2. C2 Areas

C2 Areas are predefined Drawings created automatically based on "Templates" when the necessary Metadata and Properties are provided. This type of Drawing can be created by either a user or by an Application.

#### 4.3.5.2.1. C2 Area Templates

C2 Area Templates contains the definition of predefined C2 Drawings. They are used to create instances of C2 Areas according to operational needs. A C2 Area Template holds all the necessary information to render a new C2 Area with default settings.

C2 Area Templates can be defined by means of a "Template Editor" within the VC. An authorised user creates a C2 Area Template by adding attributes to a Drawing structure. The Template Metadata is then created and the Template is saved in the Functional Service context. A Template may have the following attributes as a minimum:

- Identification
- Label
- Description
- Tooltip text
- Security classification
- Releasability label
- Owner
- Visibility (private, shared, public)
- List of Drawing Primitives (to form the C2 Area)
- Geographical position
- Layer to display
- Status (active/inactive)
- Time data

When a Functional Service wants to create an instance of an existing C2 Area Template can, its AppView will use the structured Metadata file to send the information the GeoView where it will be rendered. New instances of C2 Areas are managed (create, save, edit, delete, activate/deactivate, export, import) by the Functional Service internally.

[T1-R1156] *The VC GeoView shall be able to generate C2 Areas from predefined Templates.*

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

[T1-R1157] *The VC GeoView shall provide a Template Editor to build C2 Area Templates.*

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

[T1-R1158] *The VC GeoView shall allow the authorised user to manage (create, edit, save, delete) the C2 Area Templates.*

Requirement Property :  
 Domain for Static :  
 Domain for Afloat :  
 Baseline : VC-BL 2

Qualific. Method : Test

#### 4.3.5.2.2. User-based C2 Areas

"User-based C2 Areas" are generated by users by means of a User Application having interaction with the VC Drawing capability. A user selects a C2 Area Template from the list, fills in the attributes and creates a C2 Area which can be displayed on the Map Panel when activated.

The VC will provide the following Default User-based C2 Area Templates as a minimum:

- Simple Area (with or without inner/outer borders)
- Maritime Disposition Four-Whiskey (4W)
- 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)

[T1-R1159] *The VC GeoView shall implement the Default User-based C2 Area Templates given in the Description for TRITON Increment 1.*

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

[T1-R1160] *The VC GeoView shall be able to create a User-based C2 Area from a Template and display it on the indicated Layer of the Map Panel.*

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

[T1-R1161] *The VC GeoView shall allow the user to create a User-based C2 Area using a Template.*

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

[T1-R1162] *The VC GeoView shall be able to receive the Metadata of a User-based C2 Area, from the AppView using NMAPI, and display it on the indicated Layer of the Map Panel.*

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

[T1-R1163] *The VC GeoView shall be able to update a User-based C2 Area automatically when its Metadata is modified by the user or AppView.*

Requirement Property :  
 Domain for Static :  
 Domain for Afloat :  
 Baseline : VC-BL 2

Qualific. Method : Demonstration

#### 4.3.5.2.3. Application-based C2 Areas

"Application-based C2 Areas" are generated and managed by Functional Service Applications. An Application can create a C2 Area according to the Template, passes the Metadata to the GeoView over AppView, using the NMAPI. This type of C2 Areas cannot be modified by the users, only the originating Application can modify the attributes such as the new location according to a calculated course and speed or the new shape.

The VC will provide the following Default Application-based C2 Areas as a minimum:

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

[T1-R1164] *The VC GeoView shall implement the Default Application-based C2 Area Templates given in the Description.*

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

[T1-R1165] *The VC GeoView shall be able to receive the Metadata of an Application-based C2 Area, from the AppView using NMAPI, and display it on the indicated Layer of the Map Panel.*

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

[T1-R1166] *The VC GeoView shall be able to update an Application-based C2 Area automatically when its Metadata is updated by the AppView over the NMAPI.*

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

#### 4.3.5.2.4. Displaying C2 Areas

Users or Functional Service Applications can create C2 Areas using the Area Templates. Their metadata, visibility, security classification and releasability labels as set by the Applications are used for displaying them on the Map Panel. If the C2 Area is activated, then it can be processed by the Application. For example, a WSM Area can be created by a user, saved, but not activated. When it is necessary to use the Area during an operation/mission, it can be activated.

### 4.3.6. Handling Geospatial Information

The VC will be able to import or export data files having geospatial information.

#### 4.3.6.1. Gazetteer

A gazetteer is a geographical dictionary or directory used in conjunction with a map or atlas. They typically contain information concerning the geographical makeup, social statistics, and physical

features of a country, region, or continent. Content of a gazetteer can include location of objects, dimensions of peaks and waterways, population and literacy rate.

The gazetteer data can be provided through the following means:

- Gazetteer Service of the NATO Core GIS
- A separate Gazetteer Web Service
- Gazetteer data to be loaded.

The service should be compliant to OGC Gazetteer Specification / Recommendation Paper / Discussion Paper, which is currently the OGC Discussion Paper "Gazetteer Service Profile of the Web Feature Service Implementation Specification".

The GeoView will provide access to Gazetteer Function via the Ribbon Bar.

[T1-R1167] *The VC GeoView shall be able to use the Gazetteer Service of the NATO Core GIS.*

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

[T1-R1168] *The VC GeoView shall be capable of utilising the gazetteer data via an available Gazetteer Web Service.*

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

[T1-R1169] *The VC GeoView shall allow the user to load the gazetteer data from a selected source.*

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

[T1-R1170] *The VC GeoView shall allow the user to search for features in the gazetteer.*

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

[T1-R1171] *The VC GeoView shall display the gazetteer search results in sortable tabular format with an option to indicate the selected item on the map.*

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

[T1-R1172] *The VC GeoView shall hold gazetteer dataset as a vector dataset, with the place names as attributes.*

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

### 4.3.6.2. Search

The VC GeoView will provide the user with a search capability to look for particular C4ISR Objects or map features using queries. The Search Results will be displayed in sortable tabular format with options to find a particular Object and display it on the Map Panel.

The GeoView will provide access to the Search Function via the Ribbon Bar.

[T1-R1173] *The VC GeoView shall provide a Search capability to allow the user to look for a C4ISR Object or map feature using a query.*

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

[T1-R1174] *The VC GeoView Search shall display the Search Results in sortable tabular format with an option to find and display an item on the Map Panel. The search results shall enable hyperlinks within attributes.*

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

[T1-R1175] *The VC GeoView Search shall allow the user to constrain the search to a geographic area defined by the user, a feature or C4ISR Object.*

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

### 4.3.6.3. Geo-Data Export and Import

The VC will be able to export and import data for Layers.

**Recognised Geo-Output File Format:**

The VC will be able to export the data of a Layer into a file with the following formats:

- NATO Vector Graphics (NVG) [NVG]
- Keyhole Markup Language (KML/KMZ) [OGC KML]
- Office Open XML Workbook (xlsx)
- Shape File

If indicated, the exported data can be saved into Recognised Graphics File Format (as defined previously).

**Recognised Geo-Input File Format:**

The VC will be able to import data from a file in the following formats into a Layer:

- NVG
- KML/KMZ
- csv
- Text (with specified delimiters)
- Shape File

The VC will be able to activate the import process when the user drags a file into GeoView and drops it.

[T1-R1176] *The VC shall be able to export components (i.e. the current view including all Layers, symbology, annotations, etc.) of the Map Panel into a file in Recognised Geo-Output File Format (including a reloadable file format compatible with the NATO Core GIS and data exchange formats) as defined in the Description or in Recognised Graphics File Format (as defined in Paragraph 1.5).*

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

[T1-R1177] *The VC shall be able to export selected layers into a single file for NVG and KML/KMZ.*

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

[T1-R1178] *The VC shall be able to export and losslessly compress all files referring to the same Shape File into an archived file (e.g. zip).*

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

[T1-R1179] *The VC shall keep classification, releasability, user name and timestamp information in NVG and KML/KMZ files as a key-value pair while exporting. For Shape File, classification shall be kept as a "zip" file name. Timestamp and user name of a Shape File shall be kept in geospatial metadata in XML format compliant to [STANAG 2586].*

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

[T1-R1180] *The VC shall be able to export individual or selected set of features as an NVG or KML file.*

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

[T1-R1181] *The VC shall be able to import active elements from a Recognised Geo-Input File Format as defined in the Description into a Layer indicated by the user.*

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

[T1-R1182] *The VC shall be able to activate the import process when the user drags a file and drops it into the GeoView. If the process cannot be completed, the user shall be notified.*

Requirement Property :

Domain for Static :  
 Domain for Afloat:  
 Baseline : VC-BL 2  
 Qualific. Method : Test

[T1-R1183] *The VC GeoView shall allow the user to select the elements to be exported into a Recognised Geo-Output File Format as defined in the Description and provide the file name and path.*

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

#### 4.3.6.4. Screenshot

The Screenshot Function allows the user to capture part or whole of the Map Panel and all its visible layers and save it in a Recognised Graphics File Format (as defined in Paragraph 1.5). The function asks a file name and file path from the user to save the screenshot. Only the Base Map or map features indicated by the user and the visible layers can be captured and saved.

[T1-R1184] *The VC GeoView shall be able to capture the Map Panel and all its visible layers as a screenshot and save it in a file in Recognised Graphics File Format given in Paragraph 1.5.*

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

[T1-R1185] *The VC GeoView shall allow the user to select only the Base Map or indicated Map Features including the visible Layers to be captured as a Screenshot.*

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

[T1-R1186] *The VC GeoView shall allow the user to save the Screenshot into a file with a user-provided name and path.*

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

[T1-R1187] *The VC GeoView shall allow the user to send the Screenshot directly to a printer.*

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

#### 4.3.6.5. Printing

The VC will enable the users to take printouts for at least the following:

- Screenshot of the Map Panel

- Selected map in the selected scale with a selected set of features, Map Legend and copyright information in high quality with any resolution the output device supports
- Selected Layer with selected C4ISR Objects and map features

[T1-R1188] *The VC shall support printing to local and network printers including printing into a file in Portable Document Format (PDF) at a user defined resolution.*

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

[T1-R1189] *The VC shall ensure that it maintains stability when printing if no printer is installed.*

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

[T1-R1190] *The VC shall be able to print Map Panel Screenshot to the resolutions supported by the printer or output device.*

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

[T1-R1191] *The VC 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 :  
 Domain for Afloat:  
 Baseline : VC-BL 2  
 Qualific. Method : Test

[T1-R1192] *The VC shall support printing of landscape, portrait and all other supported paper sizes and layouts.*

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

[T1-R1193] *The VC shall allow the user to preview (Print Preview) the print content before it is printed.*

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

[T1-R1194] *The VC Print Preview shall display the print content to the user with the selected printer settings.*

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

### 4.3.6.6. Presentation Support

The VC will be able to generate presentation slides based on user-selected areas on the Map Panel including the C4ISR Objects and export them into Office Open XML Presentation (pptx) files.

**Presentation Options:**

The user will be able to select at least the following options for generating slides:

- Each active Layer, as seen by the user, to be included in one slide as one single image
- Each active Layer, as seen by the user, to be included in separate slides as individual images
- Each C4ISR Object symbol as an individual image in the slide in the order same as the selected Layers.

[T1-R1195] *The VC shall be able generate presentation slides and export them into an Office Open XML Presentation (pptx) file.*

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

[T1-R1196] *The VC shall allow the user to configure the presentation slide master outline, select the Presentation Options given in the Description, and initiate the export.*

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

[T1-R1197] *The VC shall allow the user to define a coverage area on the Map Panel, select the C4ISR Objects and geospatial information to be included in the presentation slides.*

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

### 4.3.7. Geo Processing Tools

Geo Processing Tools allow the user to calculate geographic distances (as a line or a path), forward azimuth, area, line of sight, and depth analysis. Calculations are performed for the current projection.

#### 4.3.7.1. Distance Measurement

The Distance Measurement Function will provide the user with capability to measure distances between two points on the Map Panel as a straight line in the projected plane map or as geodesic line on the spheroid surface (i.e. the shortest connection of the two points on the Earth’s best fitting ellipsoid).

It will also be possible measure distance as a path. A path may consist of several sections of geodesics (great circles). The geodesic in a map projection is a curve (for lines) or for multiple segments a curve set (for path).

Distance calculations between two geographical points will be performed on the surface of the earth, i.e. the height attributes will not be taken into account. However, if the distance calculation is performed with a C4ISR Object, the height or depth of the Object will be taken into account and the slant range (shortest straight distance) will be displayed separately.

The user will be able to move the vertices of the measurement line or line string to new positions for new measurements.

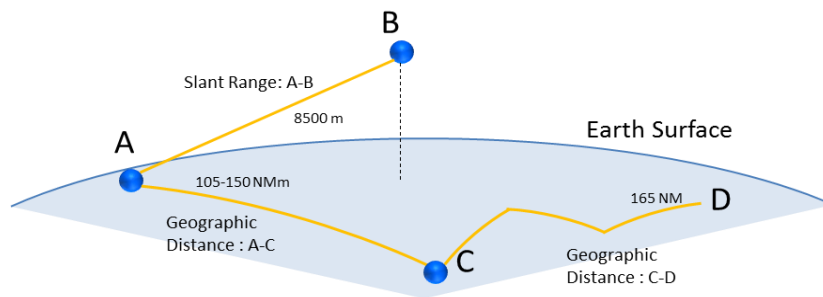
Distances will be presented in common units like Data Mile, Nautical Mile, Metres, Kilometres, Yards as selected by the user. The visualisation of the line, line string, curve or curve set will be adjusted according to the map projection in use in the Map Panel.

**Base Lines:**

Following Base Lines will be used for azimuth (bearing) calculation:

- True North
- Magnetic North (if World Magnetic Model is available)
- Grid North.

A sample distance measurement concept is illustrated below:



[T1-R1198] *The VC GeoView shall allow the user to measure the horizontal distance between two user-selected points as a line in the projected map plane.*

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

[T1-R1199] *The VC GeoView shall calculate and display the horizontal distance between two points and the bearing from the starting point using the selected Base Line (as given in the Description) for grid bearing calculation.*

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

[T1-R1200] *The VC GeoView shall allow the user to measure the horizontal distance and the slant range (if applicable) between two selected C4ISR Objects.*

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

[T1-R1201] *The VC GeoView shall calculate the distance between two selected C4ISR Objects based on their last known positions and display the true bearing from the first object to the second and the distance. The height or depth attribute of the Objects shall be taken into account for slant range calculations and displayed separately.*

Requirement Property :  
 Domain for Static :  
 Domain for Afloat :

Baseline : VC-BL 1  
 Qualific. Method : Test

[T1-R1202] *The VC GeoView shall allow the user to measure the horizontal distance between two points following a path with any number of waypoints.*

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

[T1-R1203] *The VC GeoView shall calculate and display the total distance of a path with waypoints according to the current map projection.*

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

[T1-R1204] *The VC GeoView shall allow the user to move any vertex of the measurement line or of the path to a new position by using the pointing device.*

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

[T1-R1205] *The VC GeoView shall adjust the visualisation of the moved measurement line or path according to the current projection and re-compute the projected curve and the values for starting and end bearing.*

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

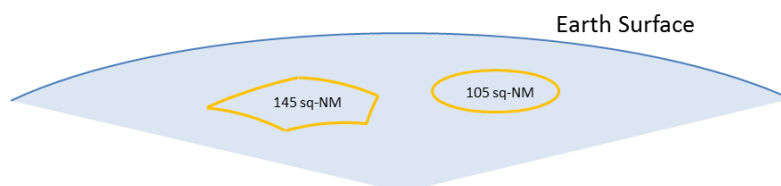
[T1-R1206] *The VC GeoView shall display the measured path on the Map Panel, in units selected by the user, until it is cleared or a new measurement is started.*

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

### 4.3.7.2. Area Measurement

The Area Measurement Function will provide the user with a capability to measure areas within a polygon or circle. The area will be calculated as a footprint on the spheroid considering the current projection.

A sample area measurement concept is illustrated below:



[T1-R1207] *The VC GeoView shall allow the user to measure an area determined by a polygon or a circle drawn by the pointing device.*

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

[T1-R1208] *The VC GeoView shall compute the area of the footprint based on the current projection system and display it in units selected by the user. The area of a polygon shall be calculated when the polygon shape is completed (closed), and the area of circle shall be calculated continuously as the pointer is moved.*

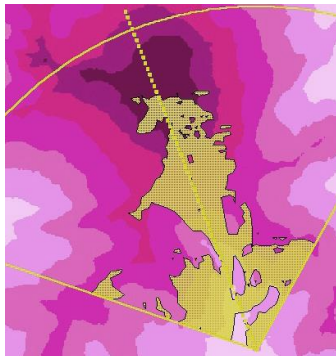
Requirement Property :  
 Domain for Static :  
 Domain for Afloat :  
 Baseline : VC-BL 1  
 Qualific. Method : Test

### 4.3.7.3. Line of Sight Analysis

The Line of Sight (LOS) Analysis Function displays visible locations, using land elevation data, in a defined circle centred at an observation point or a sector of the circle. The VC GeoView uses the LOS Service and Elevation Service provided by the available GIS Server and displays the returned values.

Currently, NATO Core GIS provides the LOS and Elevation Service using the ArcGIS Server technology. The Client can consume the WPS hosted by ArcGIS Server.

As additional parameters the observer's height and the height of the target above ground shall be provided. A sample view is given below:



The calculation is performed by the GIS Server according to user settings including the centre point, height, distance and sector.

[T1-R1209] *The VC GeoView shall allow the user to perform LOS Analysis if the available GIS Server can provide it as a service.*

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

[T1-R1210] *The VC GeoView shall be able to use LOS Service and Elevation Service provided by the GIS Server.*

Requirement Property :  
 Domain for Static :  
 Domain for Afloat :

Baseline : VC-BL 1  
 Qualific. Method : Demonstration

[T1-R1211] *The VC GeoView shall allow the user to set the parameters of a LOS Analysis by manually entering values.*

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

[T1-R1212] *The VC GeoView shall allow the user to set the centre point of a LOS Analysis by selecting a geographical point on the map. If the height information is available on the map, it shall be used in the calculation.*

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

[T1-R1213] *The VC GeoView shall allow the user to perform more than one LOS Analysis and display them on the Map Panel as layers.*

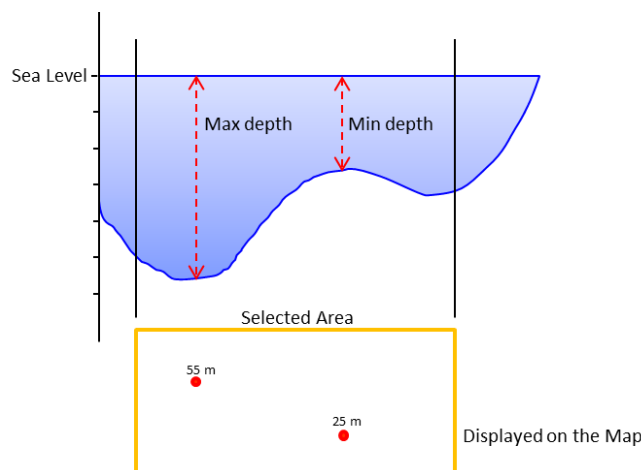
Requirement Property :  
 Domain for Static :  
 Domain for Afloat :  
 Baseline : VC-BL 1  
 Qualific. Method : Test

[T1-R1214] *The VC GeoView shall allow the user to delete the selected LOS illustration from the Map Panel.*

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

### 4.3.7.4. Depth Analysis

The Depth Analysis Function determines the maximum and minimum depths in a user specified area, and displays them. The maximum depth is the highest depth value and the minimum depth is the lowest depth value below the sea level within a given area. The following figure shows how the calculation is displayed:



For depth calculations, the function uses an Elevation Service of the available GIS Server and displays the result in all supported Map Projection. Currently, NATO Core GIS provides the Depth/Elevation Service using the ArcGIS Server technology. The Client can consume the OGC-compliant WPS hosted by ArcGIS Server.

[T1-R1215] *The VC GeoView shall be able to use Depth/Elevation Service provided by the GIS Server for depth analysis.*

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

[T1-R1216] *The VC GeoView shall allow the user to perform Depth Analysis if the available GIS Server can provide it as a service.*

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

[T1-R1217] *The VC GeoView shall allow the user to set the parameters of a Depth Analysis by manually entering area values or drawing a circle or polygon on the Map Panel.*

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

[T1-R1218] *The VC GeoView shall allow the user to perform more than one Depth Analysis and display them on the Map Panel as Layers.*

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

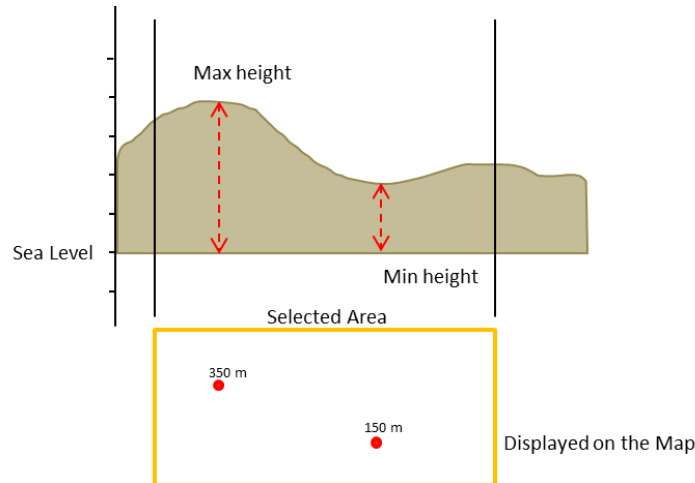
[T1-R1219] *The VC GeoView shall display the minimum and maximum depth values of the selected area on the Map Panel.*

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

#### 4.3.7.5. Height Analysis

The Height Analysis Function determines the maximum and minimum height in a user specified area, and displays them. The maximum height is the highest elevation value and the minimum height is the lowest elevation value within a given area. The height values are measured against the mean sea level.

The following figure shows how the calculation is displayed:



For height calculations, the function uses an Elevation Service of the available GIS Server and displays the result in all supported Map Projection. Currently, NATO Core GIS provides the Depth/Elevation Service using the ArcGIS Server technology. The Client can consume the OGC-compliant WPS hosted by ArcGIS Server.

[T1-R1220] *The VC GeoView shall be able to use Depth/Elevation Service provided by the GIS Server for height analysis.*

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

[T1-R1221] *The VC GeoView shall allow the user to perform Height Analysis if the available GIS Server can provide it as a service.*

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

[T1-R1222] *The VC GeoView shall allow the user to set the parameters of a Height Analysis by manually entering area values or drawing a circle or polygon on the Map Panel.*

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

[T1-R1223] *The VC GeoView shall allow the user to perform more than one Height Analysis and display them on the Map Panel as Layers.*

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

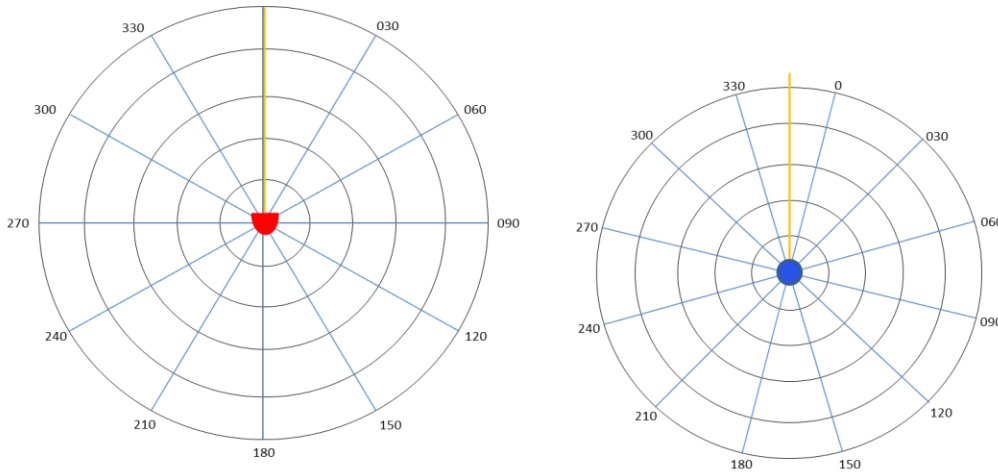
[T1-R1224] *The VC GeoView shall display the minimum and maximum height values of the selected area on the Map Panel.*

Requirement Property :  
 Domain for Static :  
 Domain for Afloat :

Baseline : VC-BL 2  
 Qualific. Method : Demonstration

### 4.3.7.6. Range Rings

Range Rings are a number of concentric circles with bearing indications on the outer circle. There are bearing lines at every 30 degrees. These circles and bearings are displayed as a layer using a selected position or a C4ISR Object as the centre. Sample Range Rings are shown below:



A set of Range Rings will have at least the following attributes:

- Position of the centre
- Radius (in yards, nautical miles, metres, kilometres)
- Number of rings
- Orientation (given in degrees or match to heading)
- Drawing colour

The display helps to build quick orientation when concentrating on a special object at operational level. There may be more than one set of Range Rings displayed on the Map Panel, each having different centre and different orientation (True North to 359 degrees True).

[T1-R1225] *The VC GeoView shall allow the user to configure the settings related to the Range Rings.*

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

[T1-R1226] *The VC GeoView shall allow the user to initiate displaying Range Rings by selecting its position on the map or selecting a C4ISR Object.*

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

[T1-R1227] *The VC GeoView shall display Range Rings according to user defined parameters on the Map Panel as a separate layer. The distances are referring to geodesic distances on the Earth ellipsoid (potentially a spherical approximation) and shall be rendered in the map in the map projection.*

Requirement Property :  
 Domain for Static :

Domain for Afloat:  
 Baseline : VC-BL 2  
 Qualific. Method : Demonstration

[T1-R1228] *The VC GeoView shall adjust the size of the Range Rings with respect to the current map scale.*

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

[T1-R1229] *The VC GeoView shall display the Range Rings with orientation from True North to three-hundred fifty-nine (359) degrees True.*

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

[T1-R1230] *The VC GeoView shall display the Range Rings with orientation which dynamically matches with the heading of the selected (slaved) object if it has heading value.*

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

### 4.3.8. 3D Visualisation

Symbols are used to convey information about objects in space. In most C2 applications, this has been accomplished by an orthogonal (directly overhead) view, such as when looking at a map. C2 symbols have been overlaid on top of geospatial information or a “map background” to provide a geospatial context to locate the military object of interest at a geographic position. Attributes of the object are visually encoded in the symbol to communicate information about the object to the observer.

As C2 symbology has evolved from hand-annotated paper maps to automated computer display screens, views other than orthogonal (2D) have become practical. Non-overhead views or dynamic viewing positions such as “fly-through” displays provide new ways in which a warfighter can better perceive and understand the operational environment.

3-Dimensional (3D) visualisation of operational theatre which gives the illusion of depth or varying distances with elevated symbols is becoming a growing demand for both operational and tactical level C2 systems. They support decision makers to better understand the tactical situation. Following are examples to using 3D in operational environment:

Air/Land/Maritime C2 Systems:

- Tactical data display (Air, Land, Maritime Picture)
- Sensor/weapon coverages
- Flight corridors
- Air defence design
- Air strike design
- Underwater bathymetry

Tactical Ballistic Missile Defence (TBMD):

- Viewing Defence Design Data (e.g. Missile Operating Areas, Weapon Volumes, Sensor Volumes, Areas)
- Track Data (e.g. ballistic missile tracks and trajectories, impact point)
- Viewing Defence Design Analysis for TBMD (supporting planning)
- Play-back of real-time events (supporting after-action analysis and reporting of TBMD)
- Defence Design Surveillance coverage viewing (supporting planning)
- TBMD real-time viewing (supporting current operation, test events and demonstration).

The VC will provide a foundation for 3D visualisation with future growth capability. It is expected that terrain data maps [DTED] will be used as provided by the GIS Server and the C4ISR Objects will be displayed with symbols using their height/depth attributes on the Map Panel.

### 4.3.8.1. 3D Display Framework

Since the earth surface is not entirely modelled in 3D, the VC is expected to support Pseudo-Three-Dimensional (2.5D) Display which refers to the presentation of information that gives the perception of depth or varying distance, as in a non-orthogonal viewing angle. In other words, a viewing angle that is not perpendicular to the surface of the earth. C4ISR Objects are displayed with symbols in a 2.5D display of the surrounding environment.

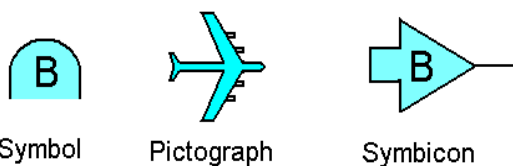
The VC GeoView will be able to display C4ISR Objects having 2D symbols in a 2.5D display of the surrounding environment. The definitions and approach for 2.5D defined in MIL-STD-2525D Appendix K [MIL-STD-2525D] may be used to build a 3D Display Framework for the VC GeoView.

The user will be able to switch between 2D and 3D on the Map Panel. The 3D Display of the Map Panel will be able to display maps with terrain data as received from the GIS Server. Object symbols will be provided by the Symbology Server. Guidance for handling the objects in 2.5D environment is provided in the standard. For example, the use of Terrain Draping is given below:

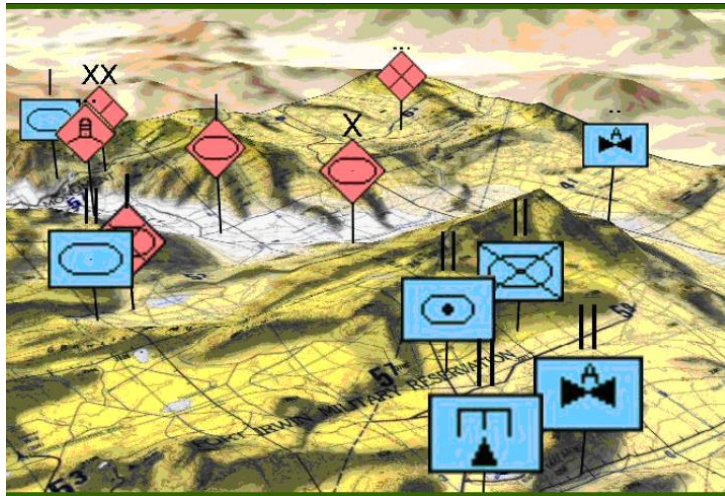


#### Symbols:

In addition to 2D symbols, as defined MIL-STD-2525D or APP-6, a new approach, a combination of symbols and icons called "symbicon" can be used in 3D Display. Following is an example to symbicon:

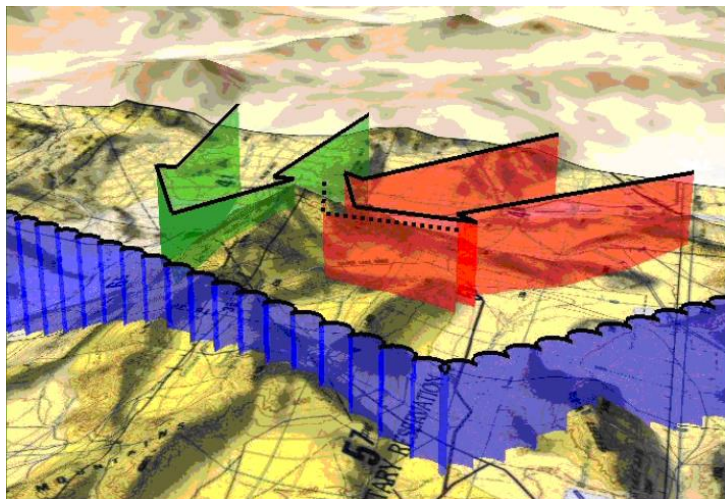


For displaying the C4ISR Objects in an operational environment, billboarding technique or symbicons can be used as shown below:

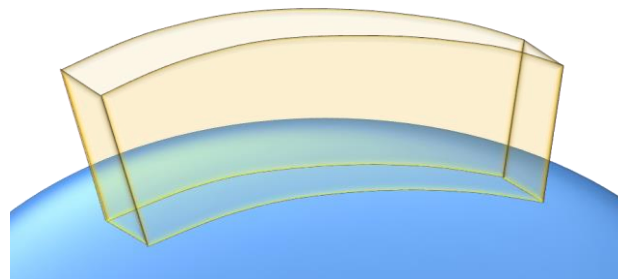


**Control Measures:**

The control measure symbols can be displayed over the terrain as draped or extruded. The extruded measures are shown below:



When control measures are implemented, vertical planes such as walls of corridors, will be drawn perpendicular to the earth's surface, resulting in different distance values between the lower edges and the higher edges due to the curvature of the earth. The figure below illustrates a volume of Air Space.



**Fly-through:**

The 3D Display will provide the user with a capability to fly over the terrain at a configurable direction and speed, also controllable by the pointing device and keyboard.

[T1-R1231] *The VC shall provide infrastructure for supporting Three-Dimensional (3D) or Pseudo-Three-Dimensional (2.5D) Display capability. The guidance in [MIL-STD-2525D] should be used.*

Requirement Property :

Domain for Static :

Domain for Afloat:

Baseline : VC-BL 1

Qualific. Method : Demonstration

Comment : This qualification test will be executed as a demonstration of displaying maps with terrain data and objects in 3D environment as a proof of concept. The other requirements are provided for guidance, but will be preferred to have at the time of delivery. Acceptance tests will be executed at VC-BL3 according to the demonstrated capability.

[T1-R1232] *The VC GeoView "should" allow the user to select 2D or 3D Display in the Map Panel. The 3D Display should be used in the Map Panel with configurable settings (e.g. default height of the Viewpoint, perspective ratio).*

Requirement Property :

Domain for Static :

Domain for Afloat:

Baseline : VC-BL 3

Qualific. Method : Inspection

[T1-R1233] *The VC "will" receive maps with terrain data from the GIS Server, display them in a 2.5D environment as guided in [MIL-STD-2525D].*

Requirement Property :

Domain for Static :

Domain for Afloat:

Baseline : VC-BL 3

Qualific. Method : Inspection

[T1-R1234] *The VC 3D Display "should" be able to display C4ISR Objects in a 2.5D environment as described in [MIL-STD-2525D] using Symbicons and Marker Posts.*

Requirement Property :

Domain for Static :

Domain for Afloat:

Baseline : VC-BL 3

Qualific. Method : Inspection

[T1-R1235] *The VC 3D Display "should" be able to provide fly-through over the terrain.*

Requirement Property :

Domain for Static :

Domain for Afloat:

Baseline : VC-BL 3

Qualific. Method : Inspection

[T1-R1236] *The VC 3D Display "should" allow the user to control the fly-through using the pointing device and keyboard.*

Requirement Property :

Domain for Static :

Domain for Afloat:

Baseline : VC-BL 3

Qualific. Method : Inspection

#### 4.3.8.2. Navigation

When users navigate around a 3D display, they can very easily lose any understanding of their current geographical location and perspective. Orientation and navigation control are required to facilitate the

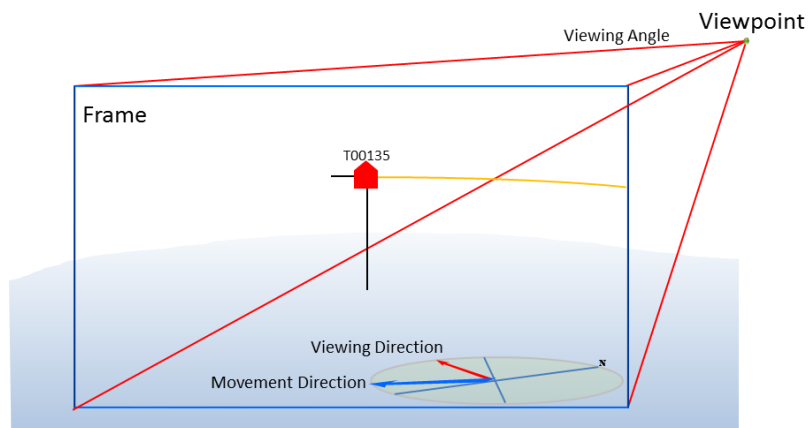
operational use of a 3D display, such that when an operator navigates through 3D space (e.g. moves along a flight corridor or rotates around the globe) the display provides an indication of the geographical location of the user (based on the current cursor position), alignment (looking north or otherwise) as well as providing the ability for the user to return easily to a known default location.

**Navigation Controls:**

The VC 3D Display will allow the user to control navigation on the Map Panel using the available pointing device and keyboard. Navigation Controls will include the following:

- Viewpoint : A geographic position with adjustable height.
- Viewing Angle : The direction originated from the Viewpoint with azimuth and tilt (usually between 25 and 65 degrees from horizon).
- Viewing Direction : The direction which the centre line of the view is looking.
- Movement Direction: Angle of movement with respect to True North in a fly-through.
- Movement Speed : Movement speed on a Movement Direction at a fixed height in a fly-through.
- Perspective : The ratio of near and far frames to give the depth of view (a configuration setting).

Some of these definitions are illustrated in the figure below:



The 3D Display will be able to apply different Viewing Angles and Movement Direction (e.g. looking towards North, but moving towards East) in a fly-through. The 3D Display will also show the Direction Indicators including the Viewing Direction and Compass Directions (North, South, East, West). The user will be able to save a View Point and Viewing Angle as the Default Viewpoint which can be accessed quickly during a fly-through.

**Slaving:**

The Viewpoint can be slaved to a moving C4ISR Object (e.g. an aircraft) at a configurable distance and angle. It is updated automatically as the kinematics of the object is updated. The position of the slaved object should be extrapolated according to a configurable frame rate to achieve the illusion of a smooth animation.

[T1-R1237] *The VC 3D Display "should" provide navigation control by adjusting the Navigation Controls given in the Description.*

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

[T1-R1238] *The VC 3D Display "should" allow the user to navigate through the Map Panel by changing the Navigation Controls given in the Description with the combination of the pointing device and the keyboard.*

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

- [T1-R1239] *The VC 3D Display "should" allow the user to return to the Default Viewpoint using the Navigation Controls.*

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

- [T1-R1240] *The VC 3D Display "should" be able to render the display, including the terrain data and movement of C4ISR Objects at a rate of at least fifteen (15) frames per second at a display resolution of at least 1280x1024 when navigation is started.*

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

- [T1-R1241] *The VC 3D Display "should" be able to initiate a fly-through over the terrain by setting the Navigation Controls given in the Description.*

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

- [T1-R1242] *The VC 3D Display "should" display the Direction Indicators in a fly-through.*

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

- [T1-R1243] *The VC 3D Display "should" allow the user to change the settings during a fly-through.*

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

- [T1-R1244] *The VC 3D Display "should" be able to slave the Viewpoint to a selected C4ISR Object so that it moves together with the Object from a user-selected distance during the lifecycle of the Object. For example, the Viewpoint can be slaved to an aircraft and updated as the kinematics of the aircraft is updated. The Object motion "should" be extrapolated according to a configurable frame rate with a default of fifteen (15) Hertz.*

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

[T1-R1245] *The VC 3D Display "should" allow the user to select a C4ISR Object, select a distance, Viewing Angle, Viewing Direction relative to the Object motion, and initiate a fly-through. The fly-through "should" be stopped when the users stops it or the Object is deleted.*

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

### 4.3.8.3. Animation

The 3D Display will be able to animate the motion of selected C4ISR Objects with the geospatial data provided by the AppView in a 2.5D environment. The animation can be controlled with the GeoView Timeline and watched at a default distance computed with respect to the speed of the Object. The history tail of the Object can be displayed as an option. The user will be able change the Viewpoint during the animation.

[T1-R1246] *The VC 3D Display "should" be able to animate the motion of selected C4ISR Objects with the geospatial data provided by the AppView.*

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

[T1-R1247] *The VC 3D Display "should" allow the user to control the animated motion using the GeoView Timeline.*

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

### 4.3.9. User Settings

The VC GeoView will provide the user with the capability of applying User Settings as personal preferences. The User Settings will be stored in the Functional Service context and transferred to the GeoView over the AppView using the NMAPI. The user will be able to modify personal preferences and save them in the Workspace. When the user logs out, all of the current settings will be saved automatically.

#### 4.3.9.1. Theme Selection

The VC GeoView will allow the user to select one of the predefined set of display themes. Style Sheets will be used in common to provide the same look-and-feel with the AppView.

[T1-R1248] *The VC GeoView shall support configurable Themes for the GUI elements.*

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

[T1-R1249] *The VC GeoView shall provide a Dark Theme and Light Theme as the default.*

Requirement Property :  
 Domain for Static :

Domain for Afloat:  
 Baseline : VC-BL 3  
 Qualific. Method : Demonstration

[T1-R1250] *The VC GeoView shall maintain a list of Personal Themes.*

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

[T1-R1251] *The VC GeoView shall be able to use Style Sheets.*

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

[T1-R1252] *The VC GeoView shall allow the user to manage (load, modify, save) the Personal Theme List.*

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

[T1-R1253] *The VC GeoView shall allow the user to select a predefined Theme.*

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

#### 4.3.9.2. Most Used Functions

The VC GeoView will provide the user a list of last most used functions where applicable. Examples of use are: Search queries, hot functions of the Ribbon Bar. The most used functions are determined over the last 200 functions invocations and will therefore dynamically changed based on the user behaviour. The number of functions in the stack should be configurable.

[T1-R1254] *The VC GeoView shall have a list of the last used functions, if applicable, the Most Used Functions.*

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

[T1-R1255] *The VC GeoView shall allow the user to manage (add, modify, delete) the Most Used Functions List.*

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

[T1-R1256] *The VC GeoView shall execute the function when the user selects it from the Most Used Function List.*

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

#### 4.3.9.3. Own Position

A geographic position can be entered as Own Position or a C4ISR Object can be selected as Own Position. If a C4ISR Object designated as Own Position received from the API (from AppView), Own Position will be set to this Object. If it is not defined, the user will be able to enter any geographic location or any Object as Own Position.

[T1-R1257] *The VC GeoView shall be able to receive a C4ISR Object designated as Own Position from the AppView (as part of the API) as an option.*

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

[T1-R1258] *The VC GeoView shall allow the user to set Own Position to a geographic position or to a selected C4ISR Object.*

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

#### 4.3.9.4. Display Settings

The VC will allow the user to change preference settings for display. The Display Settings will include the following:

- Map Settings (Base Map)
- Coordinate Panel Settings
- Map Query Result Settings
- Selection Display Settings
- Measurement Settings
- Spatial Extent Settings
- Overview Map Ratio
- Layer Display Settings
- View Scale Range Settings
- Scale Bar Units
- Clustering Settings
- Object Display Settings (e.g. update rate, duration of extrapolation)
- Object Label Settings
- Map Label Settings
- Symbol Settings
- Tint Settings (e.g. percentage)
- Grid Settings (e.g. on, off)
- Navigation Mode Settings
- Theme Settings
- Locale Settings

- 3D Display Settings

Each setting will have its own defaults.

[T1-R1259] *The VC shall be able to retrieve the personal Display Settings given in the Description from the AppView using the NMAPI and apply them.*

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

[T1-R1260] *The VC shall allow the user to configure the Display Settings according to personal preferences and send them to the AppView using the NMAPI to be saved in the Functional Service Application context.*

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

[T1-R1261] *The VC shall automatically save the Display Settings when the user terminates the GeoView or logs out from the AppView.*

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

[T1-R1262] *The VC shall provide the defaults for the Display Settings as set by the authorised user.*

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

### 4.3.10. Security

The security aspects of the GeoView will be inherited from the Functional Service Applications over the AppView. The general security requirements given in Subsection 5.2 will be applicable.

[T1-R1263] *The VC shall conform the security requirements defined for TRITON in Subsection 5.2.*

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

### 4.3.11. Error Handling

The VC will handle errors and report them to the AppView. It is the AppView's responsibility to take the necessary action depending on the type and severity of the reported error. The VC errors will be documented in the VC ICD.

[T1-R1264] *The VC shall handle all occurring errors and report them to the AppView.*

Requirement Property :  
 Domain for Static :  
 Domain for Afloat :

Baseline : VC-BL 1  
 Qualific. Method : Demonstration

[T1-R1265] *The VC shall notify the user when an error occurred within the sub-components of the VC.*

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

### 4.3.12. On-line Help

The VC will have an on-line help capability to assist the user for both Integrated and Standalone Mode of operation. The On-Line Help will be limited to basic functions of the VC, and will not include the AppView functions. It 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.

**Application:** A link to On-line Help provided by the AppView (if exists).

[T1-R1266] *The VC shall support On-line Help describing the basic functionality of the VC by using Contents, Index with its associated Search and a link to the On-line Help provided by the AppView (if exists).*

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

[T1-R1267] *The VC On-line Help shall translate every use case and scenario into a browsing sequence. Every browsing sequence shall be structured according to a generic user workflow.*

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

[T1-R1268] *The VC shall allow the user to access the On-line Help function at any stage of execution of a function.*

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

[T1-R1269] *The VC On-line Help shall describe each basic VC function, the interrelationships between and the logical sequence of functions.*

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

[T1-R1270] *The VC On-line Help shall explain all menu items, dialog windows, data entry and query fields implemented in the VC Product Baseline.*

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

[T1-R1271] *The VC On-line Help shall include a glossary providing definitions of all terms and acronyms implemented in the VC Product Baseline.*

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

[T1-R1272] *All definitions in the VC 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 :  
 Domain for Afloat:  
 Baseline : VC-BL 2  
 Qualific. Method : Demonstration

[T1-R1273] *The VC shall provide On-line Help option for each dialogue, menu item, toolbar item, function, field or button (each item on the screen). This shall be clearly visible, but not intrusive.*

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

[T1-R1274] *The VC On-line Help shall provide meaningful advice and hints to the users appropriate to the actions they are trying to take.*

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

[T1-R1275] *The VC On-line Help shall be concise, compact and clear to the user.*

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

[T1-R1276] *The VC On-line Help shall include screenshots of the GeoView. The screenshots shall be provided in a suitable lightweight format (e.g. GIF, PNG) approved by the Purchaser.*

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

[T1-R1277] *Pictures in the VC 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 :  
Domain for Afloat:  
Baseline : VC-BL 2  
Qualific. Method : Inspection

- [T1-R1278] *If the VC 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 :  
Domain for Afloat:  
Baseline : VC-BL 2  
Qualific. Method : Demonstration

- [T1-R1279] *The VC 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 :  
Domain for Afloat:  
Baseline : VC-BL 2  
Qualific. Method : Demonstration

- [T1-R1280] *The Security Classification of any example data that is displayed in VC On-line Help shall not be higher than NATO UNCLASSIFIED.*

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

- [T1-R1281] *The VC On-line Help context-sensitive GUI elements shall be linked to the relevant User Manual topics.*

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

- [T1-R1282] *The VC 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 :  
Domain for Afloat:  
Baseline : VC-BL 2  
Qualific. Method : Demonstration

- [T1-R1283] *The VC 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 perform on the GeoView.*

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

[T1-R1284] *The VC GeoView 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 :  
 Domain for Afloat:  
 Baseline : VC-BL 2  
 Qualific. Method : Test

[T1-R1285] *The VC 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 :  
 Domain for Afloat:  
 Baseline : VC-BL 2  
 Qualific. Method : Demonstration

[T1-R1286] *The VC shall support search queries for finding help items in the On-line Help.*

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

[T1-R1287] *The VC On-line Help shall be able to display search query results for finding help items in the On-line Help in a list. The VC GeoView shall display the help item when the user selects a query result in this list.*

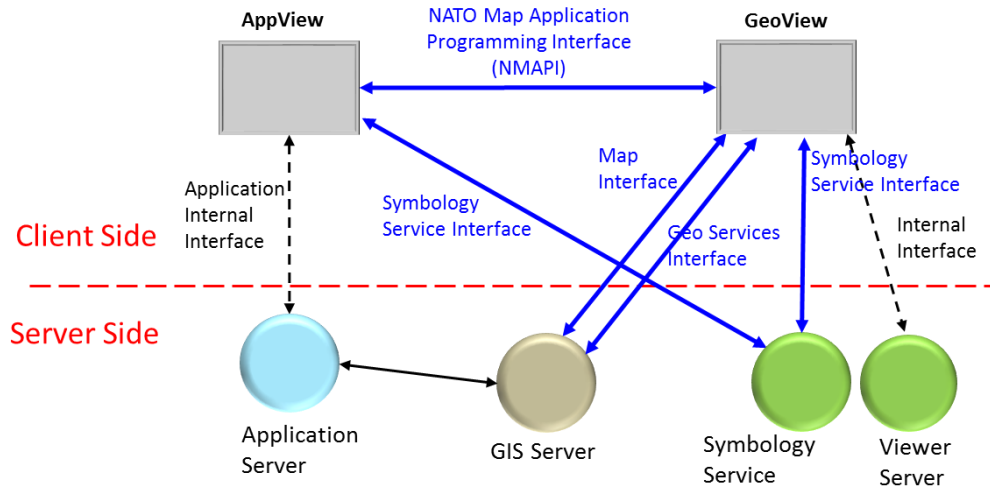
Requirement Property :  
 Domain for Static :  
 Domain for Afloat:  
 Baseline : VC-BL 2  
 Qualific. Method : Demonstration

[T1-R1288] *The VC On-line Help shall be prepared as a compiled/scripted HTML help file (.chm) which shall include all project-related source elements and graphics.*

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

### 4.3.13. External Interfaces

The external interfaces of the VC are indicated with red lines in the figure given below:



These interfaces are described below and will be defined in an Interface Control Description (ICD).

### 4.3.13.1. Application Programming Interface

The Client Side of the VC, the GeoView, will utilise built-in browser technology such as HTML5, Javascript. It provides a messaging interface between the AppView and GeoView. The user interface events received from the AppView will then be converted to map management and geo-information management functions in the GeoView.

The VC will implement an Application Programming Interface (API) documented in the VC ICD.

#### 4.3.13.1.1. NATO Map API

The interface between the AppView and the GeoView will be compliant to Common Map Application Programming Interface 1.3.0 (CMAPI) [CMAPI]. As there may be extensions to this API, the NATO-specific CMAPI will be renamed as NATO Map Application Programming Interface (NMAPI). One major extension is the definition of C4ISR Objects which include as least the following attributes:

- TRITON Track Definition
- TRITON Reference Object Definition (Reference Point, Line, Area)
- Own Position (to be received as Own Ship track from TRITON AppView)
- Geospatial Shape Definition (Point, Line, Area, Volume)
- Object Management Commands (e.g. create/update/delete object, request information)

[T1-R1289] *The VC shall provide an API named as "NATO Map API" for interfacing between the AppView and GeoView.*

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

[T1-R1290] *The VC shall implement CMAPI v1.3.0 for the NMAPI.*

Requirement Property :  
 Domain for Static :  
 Domain for Afloat :  
 Baseline : VC-BL 1  
 Qualific. Method : Demonstration  
 Comment : If a newer version is published, its implementation will be considered at Software Requirements Review.

[T1-R1291] *The VC NMAPI shall include definition of C4ISR Objects and their data model.*

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

[T1-R1292] *The VC NMAPI and integration issues shall be defined and documented in the VC ICD for enabling the use of the VC within other Functional Services.*

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

#### 4.3.13.1.2. Application Framework

Any AppView interfacing with the VC will implement the NMAPI in its own framework. The VC documentation will provide the necessary standards and specifications to implement the NMAPI.

[T1-R1293] *The VC shall provide the necessary implementation details in its documentation to implement the API within the interfacing Application.*

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

#### 4.3.13.2. Map Interface

The Map Interface contains the following profiles:

- Web Map Service (WMS) Standard Version 1.3.0, 2006 [OGC WMS]
- Open Geospatial Consortium (OGC) Web Map Tile Service (WMTS) Version 1.0.0, 2010 [OGC WMTS]
- OGC Web Processing Service (WPS) Version 1.0.0, 2010 [OGC WPS]
- Web Services Common Standard Version 2.0.0, 2010 [OGC WSCCommon]

The profiles consist of amendments, restrictions and exceptions that further refine the WMS, WMTS and WPS Standards, in order to meet the specific needs of a Map Rendering Service and WPS.

Any Map Rendering Service must implement the profile of the WMS and WMTS.

[T1-R1294] *The VC shall have an interface with the NATO Core GIS relying on file and information exchange formats described in GIS Services Standards and File Formats [Core GIS SIP].*

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

[T1-R1295] *The VC shall have interfaces compliant with Web Services Common Standard [OGC WSCCommon].*

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

[T1-R1296] *The VC shall be able to receive data in NVG and KML format, and display them.*

Requirement Property :

Domain for Static :

Domain for Afloat:

Baseline : VC-BL 1

Qualific. Method : Demonstration

#### 4.3.13.2.1. Web Map Service

Web Map Service (WMS) is a service type defined by the Open Geospatial Consortium, Inc. (OGC) via OGC WMS Standard for serving collections of layers as map images. WMS focuses on flexibility in Client request enabling clients to obtain exactly the final image they want. A WMS client can request that the server creates a map by overlaying an arbitrary number of map layers offered by the server in any supported coordinate reference system.

WMS operations can be invoked using a standard web browser by submitting requests in the form of Uniform Resource Locators (URLs). To connect to a WMS, the URL needs to be known. The content of such URLs depends on which operation is requested. In particular, when requesting a map the URL indicates:

- what information is to be shown on the Map Panel,
- what portion of the Earth is to be mapped,
- the available coordinate reference system,
- the output image width and height.

The client may request that the map layers be rendered using a specific server advertised style or even use a style provided by the client when the WMS server implements the OGC Styled Layers Descriptor (SLD) standard.

The VC will use the WMS which reads the following formats:

- Vector
  - ESRI Shapefile
- Raster:
  - Multiresolution Seamless Image Database (MrSID)
  - Enhanced Compression Wavelet (ECW)
  - JPEG
  - JPEG2000
  - PNG
  - GeoTIFF
  - Compressed ARC Digitized Raster Graphics (CADRG)
  - ARC Digitized Raster Graphics (ADRG)
  - Controlled Image Base (CIB)
- Digital Terrain Elevation Data (DTED) [DTED]
- Maritime Charts:
  - Digital Nautical Chart (DNC)
  - Electronic Navigational Chart (ENC)
  - S-57
  - Additional Military Layers (AML)

[T1-R1297] *The VC shall be able to consume OGC-compliant, WMS defined by the OGC specifications [OGC WMS].*

Requirement Property :

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

[T1-R1298] *The VC shall be able to display the maps in JPEG and PNG (with transparency) provided by the WMS. The map formats given in the Description shall be applicable.*

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

#### 4.3.13.2.2. Web Map Tile Service

The function describes the display of a Web Map Tile Service (WMTS) map service received from a map server. WMTS Implementation Standard provides a standard based solution to serve digital maps using predefined image tiles. The WMTS serves a single tile of a single layer of a map. WMTS is a service type defined by the Open Geospatial Consortium, Inc. (OGC) via OGC WMTS Standard.

WMTS operations can be invoked using a standard web browser by submitting requests in the form of Uniform Resource Locators (URLs).

Strategy of the WMTS forces to perform image overlays on the client side by requesting map images which are in general not exactly at the right position thereby forcing the clients combine the geo-referenced mosaic tiles obtained from the server and clip the mosaic to the map image of interest. This restriction of image requests to a fixed, predefined set allows for servers to scale based on communication processing abilities rather than image processing abilities because servers can pre-render the images and can use image caching strategies. The fixed set of images also enables network providers to cache images between the client and the server, reducing latency and bandwidth use.

The WMTS standard complements the existing Web Map Service (WMS) standard of the OGC, targeting to improve the response time of a server by trading in the flexibility in the request, and shifting some of the functionality to the client.

The goal of providing a WMTS enabled service is performance orientation and scalability.

[T1-R1299] *The VC shall be able to use OGC-compliant, WMTS-based services defined by the OGC specifications [OGC WMTS].*

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

#### 4.3.13.2.3. Web Processing Service

Web Processing Service (WPS) interface provides rules for standardizing how inputs and outputs (requests and responses) for invoking geospatial processing services, such as polygon overlay, as a Web service. The WPS defines how a client can request the execution of a process, and how the output from the process is handled. It defines an interface that facilitates the publishing of geospatial processes and clients' discovery of and binding to those processes. The data required by the WPS can be delivered across a network or they can be available at the server. WPS can describe any calculation (i.e. process) including all of its inputs and outputs, and trigger its execution as a web service. WPS supports simultaneous exposure of processes via HTTP GET, HTTP POST and SOAP, thus allowing the client to choose the most appropriate interface mechanism. The specific processes served up by a WPS

implementation are defined by the owner of that implementation. Although WPS was designed to work with spatially referenced data, it can be used with any kind of data.

In many cases geospatial or location data, including data from sensors, must be processed before the information can be used effectively. The OGC WPS Interface Standard provides a standard interface that simplifies the task of making simple or complex computational processing services accessible via web services. Such services include well-known processes found in GIS software as well as specialized processes for spatio-temporal modelling and simulation. While the OGC WPS standard was designed with spatial processing in mind, it can also be used to readily insert non-spatial processing tasks into a web services environment.

The WPS standard provides a robust, interoperable, and versatile protocol for process execution on web services. It supports both immediate processing for computational tasks that take little time and asynchronous processing for more complex and time consuming tasks. Moreover, the WPS standard defines a general process model that is designed to provide an interoperable description of processing functions. It is intended to support process cataloguing and discovery in a distributed environment.

[T1-R1300] *The VC shall be able to use OGC-compliant, WPS-based services defined by the OGC specifications [OGC WPS].*

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

### 4.3.13.3. Geo Services Interfaces

The Geo Services Interfaces are programmatic interface specifications describing the available Geo Services. The Geo Services Interfaces describe how to use a service via its network address, interfaces, data model and transport methods. The Geo Services Interfaces include the following:

- Web Processing Service (WPS)
- Web Map Service (WMS)
- Web Map Tile Service (WMTS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- Catalogue Service for Web (CSW)
- Gazetteer Service

The Map Rendering Service covers both WMS and WMTS.

[T1-R1301] *The VC shall be able to use the Geo Services given in the Description as Geo Services Interfaces.*

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

[T1-R1302] *The VC shall provide feedback to the user within five (5) seconds in a static network environment when a Geo Service is invoked by the user. If the data cannot be made available within ten (10) seconds, the user shall be notified with an option to cancel the request.*

Requirement Property :  
 Domain for Static :  
 Domain for Afloat:  
 Baseline : VC-BL 3

Qualific. Method : Test

#### 4.3.13.4. Symbology Service Interface

While the GeoView is displaying the C4ISR Objects using the symbols provided by the Symbology Service, some User Applications on the AppView may also display C4ISR Objects with appropriate symbols within its tabular format. In that case, the AppView can access the Symbology Service to get the user-selected set of symbols.

The Symbology Service will provide a Service Interface Profile (SIP) to define its external interface.

[T1-R1303] *The VC Symbology Service shall have a Web service for its interface defined in its Service Interface Profile.*

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

[T1-R1304] *The VC ICD shall include the Service Interface Profile for the Symbology Service.*

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

#### 4.3.13.5. Interface Control Description

The Interface Control Description (ICD) of the VC will cover all interfaces given below:

- NMAPI defining the AppView and GeoView interactions
- Interfaces with the GIS Server
- Symbology Service - SIP
- Data handling
- Error handling
- User Settings
- Applicable standards.

The ICD will be developed incrementally.

[T1-R1305] *The VC shall have an ICD describing all the API, integration procedures, and interfaces with the GIS Server and Symbology Server, data and error handling mechanisms and applicable standards.*

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

[T1-R1306] *The VC ICD shall be developed and made available in increments.*

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

### 4.3.13.6. Conformance Test Kit

The VC will have a Conformance Test Kit which will allow testing the external interfaces and correctness of computations. This Kit will include the following:

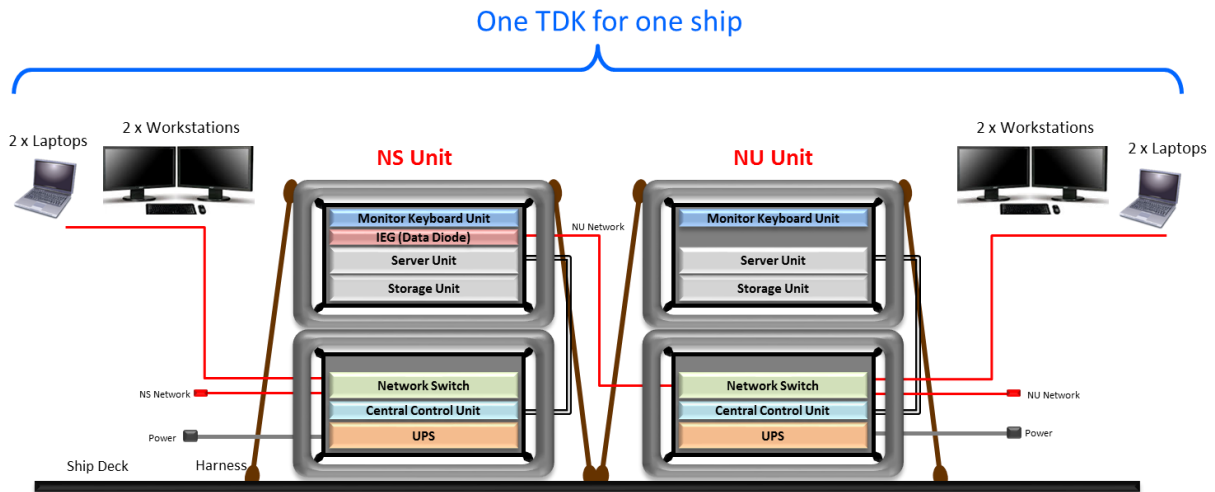
- Test Harness (e.g. simple interface simulators, value generators)
- Test Procedures (e.g. how to test a function subject to conformance)
- Test Data
- Test Results

[T1-R1307] *The VC shall have a Conformance Test Kit to allow testing the external interfaces and correctness of the computations.*

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

## 4.4. TRITON Deployable Kit Requirements

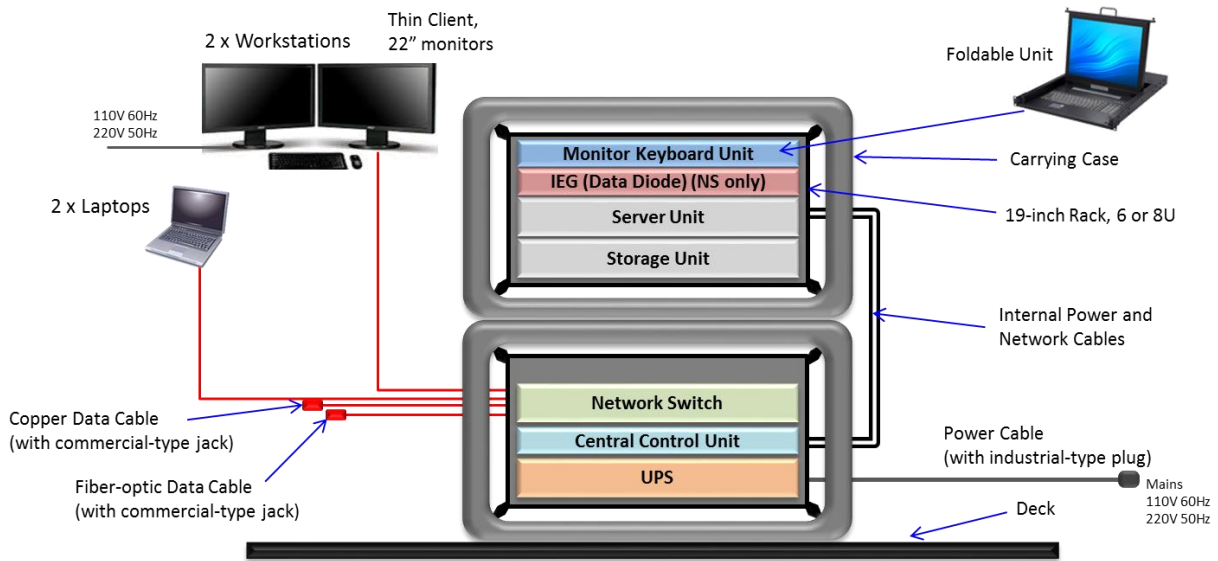
TRITON Deployable Kits (TDK) will be used on board the Afloat Command Platforms (ACP) to provide computing platform for TRITON Operational Software in both Normal and Standalone Mode. TDK will be transferred to a ship in special carrying cases, installed in a designated, sheltered compartment on board, and fixed to deck by means of special installation harnesses. A complete TDK for one ship consisting of one NS Unit and one NU Unit is shown below:



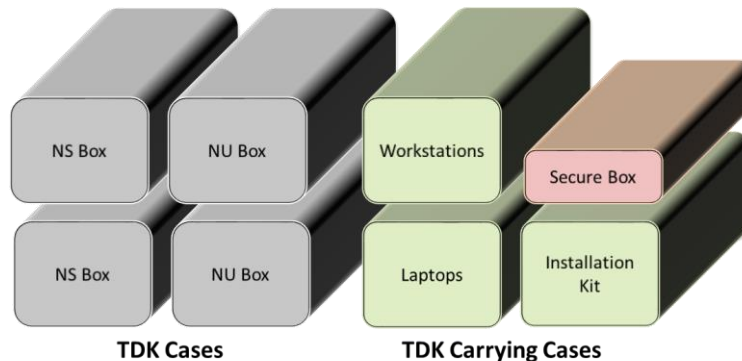
The main components of one TDK Unit are specified in the following paragraphs.

### 4.4.1. TDK Hardware

One TDK consists of two units: NS Unit and NU Unit. Each Unit consists of one or two cases, each enclosing a 6 or 8 RU (1 Rack Unit = 4.4 cm) rack to hold the computing hardware and other units. TDK Units will have the same hardware and infrastructure software with an exception of IEG (Data Diode). A notional representation of single TDK Unit is given in the picture below:



The TDK Hardware consists of computing hardware, network elements and power supply units placed in portable, ruggedized cases. Workstations and other material will be placed in special carrying cases. The size of ship hatches or openings restricts the location where the TDK is mounted. Therefore the TDK will use portable carrying cases easy to carry with a not-to-exceed size and weight, allowing assembling and dismantling inside a ship compartment. The TDK design should consider the total size to be as small as possible due to ship passage ways. A possible packing of one complete TDK is notionally illustrated below:



#### 4.4.1.1. TDK Case

TDK Cases will be used to host the Computing Hardware, network and support units. The number of TDK Cases for one TDK Unit should not be more than two.

[T1-R1308] *TDK Case shall enclose a 19-inch rack with height not exceeding eight (8) Rack-Unit (RU).*

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

[T1-R1309] *TDK Case shall be watertight, dust proof, crush proof, equipped with anti-vibration shock mounts and Automatic Pressure Equalization Valve (suitable for transportation with air cargo).*

Requirement Property :  
 Domain for Static : N/A  
 Domain for Afloat: Both

Baseline : BL 4  
 Qualific. Method : Inspection

[T1-R1310] *TDK Case size shall not exceed one hundred and twenty (120) cm long X seventy (70) cm wide X sixty (60) cm high.*

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

[T1-R1311] *TDK Case weight including the content shall not exceed sixty (60) kg in total.*

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

[T1-R1312] *TDK Case shall have handles or special harnesses both on their sides and on top (in order to be able to carry in vertical position over ship ladders and durable enough to use crane).*

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

[T1-R1313] *TDK Case shall have detachable wheels with locking mechanism.*

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

[T1-R1314] *TDK Case shall have front and end lids with securing locks and keys.*

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

#### 4.4.1.2. Carrying Case

TDK Client Workstations, Installation Kit, small spare parts and other material such as user manuals will be placed in additional ruggedized Carrying Cases with protective inner cushions.

The TDK Cases can also be used to store the Installation Kits during transportation.

[T1-R1315] *TDK Carrying Case shall be watertight, dust proof, crush proof and lockable, equipped with inner cushions, Automatic Pressure Equalization Valve (suitable for transportation with air cargo), handles and wheels.*

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

[T1-R1316] *TDK Carrying Case size shall not exceed one hundred and twenty (120) cm long X seventy (70) cm wide X sixty (60) cm high.*

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

[T1-R1317] *TDK Carrying Case weight including the content shall not exceed sixty (60) kg in total.*

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

[T1-R1318] *TDK Carrying Case interior design shall be configurable.*

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

[T1-R1319] *TDK Carrying Case used as the Secure Box shall have security labels and locks.*

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

#### 4.4.1.3. Uninterruptible Power Supply

Each TDK will be able to operate on board ships that may have different power options. Due to the nature of ship environment, continuous power needs to be maintained using an internal Uninterruptible Power Supply (UPS). TDK UPS will provide continuous operation for a short time and orderly shutdown possibility for a non-determined outage period.

[T1-R1320] *TDK UPS shall support all components within a TDK Unit for at least thirty (30) minutes after the main power is gone.*

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

[T1-R1321] *TDK UPS shall be able to operate using both 110 VAC 60Hz and 220 VAC 50Hz as the main power input.*

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

[T1-R1322] *TDK UPS shall have replaceable batteries.*

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

#### 4.4.1.4. Central Control Unit

The start-up and shut-down sequence of the components of a TDK Units will be controlled by a Central Control Unit (CCU). The CCU will distribute power to all units and send automatic control commands to start-up and orderly shut-down the units in case UPS limit is exceeded. Authorised users will also be able to issue shut-down command to completely turn-off all units via the Client. The workstations will use other power sources available at their compartments.

CCU will be able to utilise Simple Network Management Protocol (SNMP) to communicate with other units.

[T1-R1323] *Each TDK Unit shall have a Central Control Unit (CCU).*

Requirement Property :

Domain for Static: N/A  
Domain for Afloat: Both  
Baseline : BL 4  
Qualific. Method : Inspection  
Comment : COTS component will be preferred.

[T1-R1324] *TDK CCU shall have power distribution capability to all components inside the TDK Cases.*

Requirement Property :

Domain for Static: N/A  
Domain for Afloat: Both  
Baseline : BL 4  
Qualific. Method : Inspection

[T1-R1325] *TDK CCU shall monitor the main power and the UPS status continuously.*

Requirement Property :

Domain for Static: N/A  
Domain for Afloat: Both  
Baseline : BL 4  
Qualific. Method : Demonstration

[T1-R1326] *TDK CCU shall be able to detect main power loss within one second and provide a visual and an audible notification (e.g. beep and flashing light).*

Requirement Property :

Domain for Static: N/A  
Domain for Afloat: Both  
Baseline : BL 4  
Qualific. Method : Demonstration

[T1-R1327] *TDK CCU shall have a control switch to initiate the start-up and shut-down sequences.*

Requirement Property :

Domain for Static: N/A  
Domain for Afloat: Both  
Baseline : BL 4  
Qualific. Method : Inspection

[T1-R1328] *TDK CCU shall provide the System Management with the current power status (i.e. power source as external or UPS, UPS power percentage and remaining time to auto shut-down) using SNMP.*

Requirement Property :

Domain for Static: N/A  
Domain for Afloat: Both  
Baseline : BL 4  
Qualific. Method : Demonstration

[T1-R1329] *TDK CCU shall provide a single Grounding Point for all components inside the TDK Cases using grounding cables (sheets).*

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

[T1-R1330] *TDK CCU shall be able to receive a shut-down command from the server unit and initiate the orderly shut-down process for all components.*

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

[T1-R1331] *TDK CCU shall issue an automatic shut-down command to all components if the UPS remaining power gets below the critical threshold.*

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

#### 4.4.1.5. Monitor Keyboard Unit

A 19-inch, slide-out keyboard and a fold-down LCD monitor and a built-in Keyboard Video Mouse (KVM) Switch will be used for maintaining the TDK computing hardware. A sample view of this unit is given below:



[T1-R1332] *Each TDK Unit shall have a 19-inch, one (1) RU, slide-out standard English QWERTY keyboard with built-in two-button pointing device and a fold-down colour LCD monitor with at least Full HD resolution connected to the Server Unit.*

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

#### 4.4.1.6. Installation Kit

TDK will have an Installation Kit including a fixing gear, power cables, grounding cables and data cables.

[T1-R1333] *TDK shall have an Installation Kit including a fixing gear, power cables, grounding cables and data cables.*

Requirement Property :  
 Domain for Static : N/A  
 Domain for Afloat: Both  
 Baseline : BL 4

Qualific. Method : Inspection

[T1-R1334] *TDK Installation Kit shall have harnesses and gears to securely fix the TDK Cases on the deck allowing both vertical (one case on top of the other one) and horizontal (side-by-side) orientation.*

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

[T1-R1335] *TDK Installation Kit shall allow the installation crew to fasten the TDK Cases on the deck to withstand ship movements at Sea State seven (7).*

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

[T1-R1336] *TDK Installation Kit shall allow the installation crew to unfasten the TDK Cases, move them to another compartment and fasten them there in case of a re-planning or an emergency.*

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

[T1-R1337] *TDK Installation Kit shall have at least ten (10) metres of power cable with an industrial type plug and potential adapters for each of the NS and NU Unit.*

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

[T1-R1338] *TDK Installation Kit shall have at least twenty (20) metres of both fibre-optic and copper Gigabit Ethernet cables (CAT-6) with commercial-type jacks (i.e. RJ-45) for each of the NS and NU Unit.*

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

[T1-R1339] *TDK Installation Kit shall have a grounding cable (sheet) to connect the TDK Unit Grounding Point to the ship grounding point. A combined grounding cable can be used for both units.*

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

### 4.4.1.7. Computing Hardware

TDK computing hardware will consist of Server Unit and a Storage Unit to provide the computation services described in Subsection 5.4. Depending on the available COTS products, Server and Storage Units may be combined.

#### 4.4.1.7.1. Server Unit

The TDK Server Unit will provide the server capabilities. If the product selected as Server Unit cannot handle the required storage capacity locally, then a separate Storage Unit will be used. The specifications given in Subsection 5.4 for static site Server Unit can be used after scaling down for TDKs.

[T1-R1340] *TDK Server Unit shall host the TRITON Operational Software configured for ACP.*

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

[T1-R1341] *TDK Server Unit shall be 19-inch rack type whose chassis height does not exceed two (2) RU.*

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

[T1-R1342] *TDK Server Unit shall have at least two (2) physical CPUs each having at least four (4) cores.*

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

[T1-R1343] *TDK Server Unit shall have at least one-hundred-and-twenty-eight (128) Gigabytes of memory.*

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

[T1-R1344] *TDK Server Unit shall have graphics support capability for the local fold-down KVM.*

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

[T1-R1345] *TDK Server Unit shall have at least five (5) Terabytes of storage. If SAN is used, one (1) Terabytes of local storage shall be included in the Server Unit.*

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

[T1-R1346] *TDK Server Unit shall be compliant to the general specifications for the static site Server Unit.*

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

[T1-R1347] *In case processing capacity for the TDK Server Unit is considered to be less than the required level, then additional components shall be provided and integrated into the existing infrastructure, including the management features.*

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

#### 4.4.1.7.2. Storage Unit

If the selected TDK Server Unit does not have sufficient storage capability then a Storage Area Network (SAN) will be used. The specifications given in Subsection 5.4 for static site Storage Unit can be used after scaling down for TDKs.

[T1-R1348] *TDK Storage Unit shall be 19-inch rack type whose chassis height does not exceed two (2) RU.*

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

[T1-R1349] *TDK Storage Unit shall have a capacity of at least five (5) Terabytes.*

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

[T1-R1350] *TDK Storage Unit shall be compliant to the general specifications for the static site Storage Unit.*

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

[T1-R1351] *In case storage capacity of the TDK Storage Unit (including I/O performance, Storage Network Capacity and licences) is considered to be less than the required level, then additional components shall be provided and integrated into the existing infrastructure, including the management features.*

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

#### 4.4.1.7.3. Network Elements

TDK will use a Network Switch to establish connection with external Local Area Network and internal units, also supporting the Storage Area Network. Client workstations will be connected to this local switch to access TRITON services. External access will use Unshielded Twisted Pair (UTP) or fibre cables. The specifications given in Subsection 5.4 for static site Network Switches can be used after scaling down for TDKs.

[T1-R1352] *TDK Network Switch shall be 19-inch rack type whose chassis height does not exceed two (2) RU.*

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

[T1-R1353] *TDK Network Switch shall support at least 10/100/1000 Mbps UTP and 1/10 Gbps fibre channels.*

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

[T1-R1354] *TDK Network Switch shall have at least eight (8) UTP and eight (8) fibre ports.*

Requirement Property :  
 Domain for Static : N/A  
 Domain for Afloat: Both  
 Baseline : BL 4  
 Qualific. Method : Inspection  
 Comment : Fibre port type will be determined at HwRR.

[T1-R1355] *TDK Network Switch shall have manageability, routing and Quality of Service capability.*

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

[T1-R1356] *In case networking capacity (ports, bandwidth or other performance levels, licences) for the Network Elements is considered to be less than the required level, then additional components shall be provided and integrated into the existing infrastructure, including the management features.*

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

#### 4.4.1.7.4. IEG-Data Diode

Data Diode is a piece of equipment which provides one-way, secure information transfer. The TDK-NS will have an IEG-Data Diode. An approved commercial product which can be found in NATO Information Assurance Product Catalogue (NIAPC) (<http://www.ia.nato.int>) can be used.

[T1-R1357] *The IEG-Data Diode shall provide secure, one-way data transfer from the NU Domain to the NS Domain.*

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

[T1-R1358] *The IEG-Data Diode shall be compliant to the specification provided by the Purchaser.*

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

[T1-R1359] *The IEG-Data Diode shall be in a form of 19-inch rack type whose chassis height does not exceed one (1) RU.*

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

#### 4.4.1.7.5. Client Workstations

TDK will include Workstations to host TRITON Clients. As a standard, each Workstation will be a Thin Client with one or two monitors. Each TDK Unit will have two Workstations. In addition, laptops can be used for smaller compartments. Each TDK Unit will have two laptops.

The current minimum requirements are given below:

##### Thin Client:

- Processor : 2 or more cores (64-bit OS support)
- Memory : 8GB
- Display Output : Dual Display (capable of 1920x1200@60Hz on each display)
- Network Interface : 1000 Base-SX ability to support 1000Base-T
- Peripheral : Monitor, keyboard, mouse
- Optional : Audio input/output, Webcam

##### Laptop:

- Processor : 2 or more cores (64-bit OS support)
- Memory : 8GB, expandable to 16GB
- Local Storage : 240GB
- Graphics : Triple display capable of 1920x1200@60Hz on each display, compatible with DirectX12 and OpenGL 4.4
- Network Interface : 1000Base-T Gigabit Ethernet RJ45, WiFi IEEE802.11 n/ac
- Peripheral : External mouse
- Additional : Webcam, microphone array, smart card reader

The detailed configuration will be determined according to the proposed design, technical availability and NATO Standard Workstation definition at time of TDK HwRR.

[T1-R1360] *TDK Unit shall have two (2) Workstations and two (2) Laptops to be used as TRITON Clients.*

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

[T1-R1361] *TDK Client Workstation shall have a similar configuration to the NATO Workstation Hardware Configuration as a Thin Client. The Server Unit shall provide the computing platform for the Thin Clients.*

Requirement Property :

Domain for Static: N/A

Domain for Afloat: Both

Baseline : BL 4

Qualific. Method : Inspection

Comment : The detailed computer specifications will be determined during the HwDR of TDK.

[T1-R1362] *TDK Client Workstation shall have two (2) twenty-two (22) inch monitors with at least Full HD (1920 x 1080) resolution, one standard English QWERTY keyboard and one mouse with two buttons and a wheel.*

Requirement Property :

Domain for Static: N/A

Domain for Afloat: Both

Baseline : BL 4

Qualific. Method : Inspection

[T1-R1363] *TDK Client Workstation and Laptop "should" have small form factor, preferably in industrial standards, suitable to be used on board ships in small, air-conditioned compartments with 110/220V 50/60Hz.*

Requirement Property :

Domain for Static: N/A

Domain for Afloat: Both

Baseline : BL 4

Qualific. Method : Inspection

Comment : The Bidder shall propose options compliant to the Purchaser's approved computer specifications.

[T1-R1364] *TDK Client Laptop shall have a similar configuration to the NATO Laptop Hardware Configuration with at least Full HD (1920 x 1080) screen resolution, standard English QWERTY keyboard and touch-pad with two buttons.*

Requirement Property :

Domain for Static: N/A

Domain for Afloat: Both

Baseline : BL 4

Qualific. Method : Inspection

Comment : The detailed laptop specifications will be determined during the HwDR of TDK.

## 4.4.2. TDK Software

The TDK Software includes the infrastructure software and TRITON Operational Software.

### 4.4.2.1. Infrastructure Software

The Infrastructure Software for the TDK Server consists of the following:

- Virtualisation Software
- Operating System
- Database Server
- Web Server
- Security and Support Software.

These components will be compliant to the Computer Resource Requirements given in Subsection 5.4.

Each TDK Unit will have additional software packages and Infrastructure Services to provide functionality in Standalone Mode. Core Enterprise Services will be replicated if possible, otherwise similar functionality will be provided. The local Core Services will include at least the following packages and services:

- Domain Services
- Directory Services
- Security Services
- Local Geospatial Services (GIS Server).

[T1-R1365] *TDK Infrastructure Software shall be identical to the static site Infrastructure Software.*

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

[T1-R1366] *TDK Infrastructure Software shall be configurable according to the operational use of TDK.*

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

[T1-R1367] *TDK Infrastructure Software shall have its own Core Services to be able to operate in Standalone Mode. Instances of NATO Core Enterprise Services shall be used.*

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

[T1-R1368] *TDK Infrastructure Software shall support automated monitoring of devices and services via Simple Network Management Protocol (SNMP).*

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

[T1-R1369] *TDK Infrastructure Software on each TDK Unit shall be able to support at least fifty (50) concurrent users.*

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

#### 4.4.2.2. Local Geospatial Services

TRITON will normally use the NATO Bi-SC AIS Core GIS as the Geospatial Services at static sites. The Deployable Kits, on the other hand, will have Local Geospatial Services (GIS Server) to support Standalone Mode of operation. In case NATO Core GIS is not available for Deployable Kits, an Interim Local Geospatial Service will be provided for each TDK Unit. If the NATO Core GIS becomes available for deployed platforms, the Interim Local Geospatial Service will be replaced.

The Interim Local Geospatial Service will provide, as a minimum, map handling capability with an interface compliant with the Service Interface Profile that NATO Core GIS provides.

If NATO Core GIS is not available on the NU Domain for even static sites, the Interim Service to be developed for BL2 on the NU Domain can also be used in TDKs.

[T1-R1370] *TDK shall utilise a Local Geospatial Service in both Networked and Standalone Modes for each Unit.*

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

[T1-R1371] *TDK shall use the NATO Bi-SC AIS Core GIS as the default Local Geospatial Service if available. If the NATO Core GIS is not available for TDKs, an Interim Local Geospatial Service shall be provided. This interim solution can be replaced by the NATO Core GIS when it becomes available.*

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

[T1-R1372] *TDK Interim Local Geospatial Service shall provide, as a minimum, map handling capability with an interface compliant with the Service Interface Profile that NATO Core GIS provides [Core GIS SIP].*

Requirement Property :  
 Domain for Static: N/A  
 Domain for Afloat: Both  
 Baseline : BL 4  
 Qualific. Method : Test  
 Comment : The detailed functions of the Interim Local Geospatial Service will be determined at SRR and the capability definition will be finalised at CDR.

[T1-R1373] *TDK Interim Local Geospatial Service shall be able to use the geo-information exported from the NATO Core GIS.*

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

[T1-R1374] *TDK Interim Local Geospatial Service shall provide means to import the geo-information and Geospatial Service configurations already exported from the NATO Core GIS.*

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

[T1-R1375] *TDK Interim Local Geospatial Service shall be readily available as a re-usable component in any context in both NS and NU Domains with no additional license cost if open source or custom-developed components are used.*

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

Baseline : BL 4  
 Qualific. Method : Inspection

### 4.4.2.3. TRITON Operational Software

TRITON Operational Software configured for ACPs will be used on TDK. The Operational Software for TDK will meet the requirements marked as "BL 4" and "Domain for Afloat". The requirements marked as "NS" for Domain are applicable to the NS-Unit, and those marked with "NU" are applicable to the NU-Unit. Each TDK Unit will also provide capabilities for interfacing ship systems if there are any available ones. The ACP interfaces are specified in Section 5 in detail.

[T1-R1376] *TDK shall host the TRITON-NS Operational Software configured for ACP on the NS-Unit.*

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

[T1-R1377] *TDK shall host the TRITON-NU Operational Software configured for ACP on the NU-Unit.*

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

[T1-R1378] *TDK shall have its own installation tools and configuration procedures to install and operate the TRITON Operational Software.*

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

## 4.5. TRITON Support Systems Requirements

During the development and maintenance of the TRITON Operational Software, Test Systems and Reference Systems will be used as Support Systems. These Support Systems will be installed at the NCI Agency premises, PMIC or an indicated Data Centre. They will be accessible by developers and maintainers.

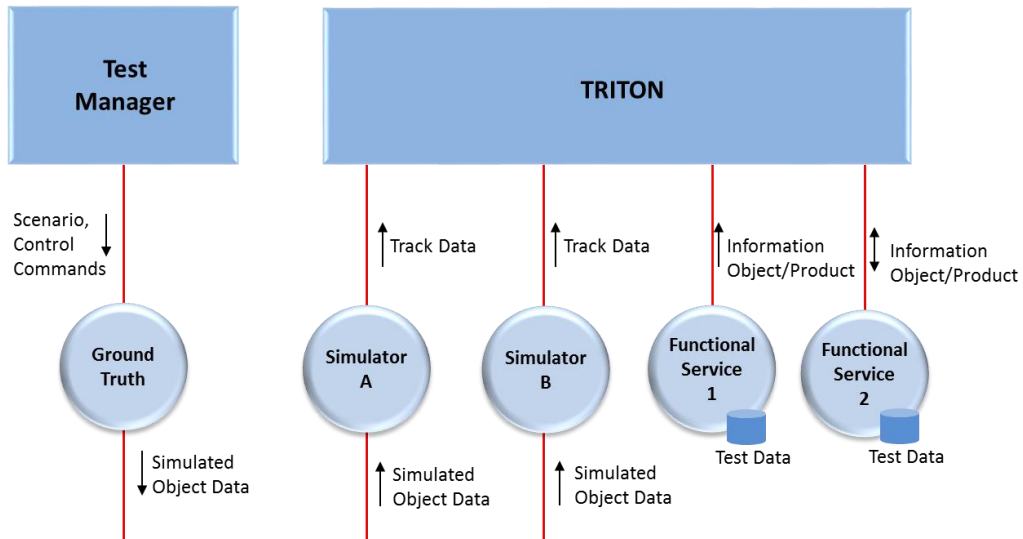
Training Systems as another type of Support System, will be used to provide training courses to operational users.

All Support Systems will be installed on the NU Domain at either PMIC or Data Centre. They will be configured to represent the NS and NU Domain systems.

The general guidance and requirements given in Subsection 5.4 (Computer Resource Requirements) will be valid for all Support Systems.

### 4.5.1. TRITON Test Systems

The TRITON Test System provides a Test Environment (test-bed capability) for developers and maintainers. The Test System will also be used for System Integration Test and User Assessment Tests before the site installation and delivery of each Baseline or maintenance releases. There will be two separate Test Systems, one for testing the TRITON-NS Functional Services and one for testing the TRITON-NU Functional Services. The conceptual configuration of the Test System is illustrated below:



If the TRITON Operational Software under test requires external data, the Test Environment will provide either the systems themselves or their simulators. While testing certain functions, the Test Manager shown in the picture will provide scenario to configure the Ground Truth to inject realistic data. For example, Track Correlation function requires more than one data source reporting the same vessel. The test of this function will be performed using Simulated Object Data generated by the Ground Truth at the same time domain and fed into the Track Simulators.

The Test Systems will also be used as TRITON Interoperability Test Centre (TITC) to support testing Nation Interfaces with each Nation.

#### 4.5.1.1. Operational Software

The TRITON Operational Software configured as TRITON-NS and TRITON-NU will be used in the Test Systems. TRITON-NS configuration and TRITON-NU configuration will be installed on separate Test Systems running on the NU Domain.

The software configuration will provide the necessary test environment to support official acceptance tests.

[T1-R1379] *TRITON Test Systems shall have the TRITON Operational Software Baseline to be tested.*

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

[T1-R1380] *TRITON Test Systems shall provide interface simulators and test data to test the interfaces for any external system.*

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

#### 4.5.1.2. Infrastructure

TRITON Test Systems will have the same infrastructure as TRITON Functional Services on the NS and NU Domains.

[T1-R1381] *TRITON Test Systems shall have their own Virtualised Environment including operating systems and any other required third party software.*

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

[T1-R1382] *TRITON Test Systems shall have the same Infrastructure Software as the TRITON Functional Services at static sites.*

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

[T1-R1383] *Each TRITON Test System shall be able to support at least one-hundred (100) concurrent users.*

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

## 4.5.2. TRITON Reference Systems

The TRITON Reference Systems will be identical to the TRITON Test Systems. They will be kept operational through the system operational life. There will be two separate Reference Systems, one for the TRITON-NS Functional Services and one for the TRITON-NU Functional Services. Both systems will be installed on the NU Domain at the Purchaser's test facilities.

### 4.5.2.1. Operational Software

TRITON Operational Software configured as TRITON-NS and TRITON-NU will be used in the Reference Systems. TRITON-NS configuration and TRITON-NU configuration will be installed on separate Reference Systems running on the NS and NU Domains respectively.

The software configuration will provide the necessary test environment to support formal acceptance tests.

[T1-R1384] *TRITON Reference Systems shall have the TRITON Operational Software Baseline to be tested.*

Requirement Property :  
 Domain for Static: NU  
 Domain for Afloat: N/A  
 Baseline : BL 2  
 Qualific. Method : Inspection

[T1-R1385] *TRITON Reference Systems shall provide interface simulators and test data to test the interfaces for any external system.*

Requirement Property :  
 Domain for Static: NU  
 Domain for Afloat: N/A  
 Baseline : BL 2  
 Qualific. Method : Demonstration

### 4.5.2.2. Infrastructure

TRITON Reference Systems will have the same infrastructure as TRITON Functional Services on the NS and NU Domains.

[T1-R1386] *TRITON Reference Systems shall utilise the Virtualised Environment provided by the Purchaser.*

Requirement Property :  
 Domain for Static : NU  
 Domain for Afloat: N/A  
 Baseline : BL 2  
 Qualific. Method : Inspection

[T1-R1387] *TRITON Reference Systems shall have the same Infrastructure Software as TRITON Functional Services at static sites.*

Requirement Property :  
 Domain for Static : NU  
 Domain for Afloat: N/A  
 Baseline : BL 2  
 Qualific. Method : Inspection

[T1-R1388] *Each TRITON Reference System shall be able to support at least one-hundred (100) concurrent users.*

Requirement Property :  
 Domain for Static : NU  
 Domain for Afloat: N/A  
 Baseline : BL 2  
 Qualific. Method : Demonstration

### 4.5.3. TRITON Training Systems

The TRITON Training Systems will be similar to the TRITON Test Systems. There will be two separate Training Systems, one for the TRITON-NS Functional Services and one for the TRITON-NU Functional Services. Trainers and trainees will be able to access the TRITON Training Systems installed on the NU Domain.

The Training Systems will have the Training Environment as defined in Paragraph 4.2.8.

#### 4.5.3.1. Operational Software

The TRITON Training Software will be similar to the TRITON Operational Software with an addition of simulators. The TRITON Simulators will be used to provide simulated data for training purposes while TRITON is in Training Mode.

[T1-R1389] *TRITON Training Systems shall have the TRITON Operational Software installed as Operational Baseline.*

Requirement Property :  
 Domain for Static : NU  
 Domain for Afloat: N/A  
 Baseline : BL 2  
 Qualific. Method : Inspection

[T1-R1390] *TRITON Training Systems shall have the Training Environment to simulate external systems and services based on user-based scenario.*

Requirement Property :  
 Domain for Static : NU  
 Domain for Afloat: N/A

Baseline : BL 2  
Qualific. Method : Inspection

### 4.5.3.2. Infrastructure

TRITON Training Systems will have the same infrastructure as TRITON Functional Services of the NS and NU Domains.

[T1-R1391] *TRITON Training Systems shall utilise the Virtualised Environment provided by the Purchaser.*

Requirement Property :  
Domain for Static: NU  
Domain for Afloat: N/A  
Baseline : BL 2  
Qualific. Method : Inspection

[T1-R1392] *TRITON Training Systems shall have the same Infrastructure Software as TRITON Functional Services at static sites. Instances of NATO Core Services shall be used to the extent possible.*

Requirement Property :  
Domain for Static: NU  
Domain for Afloat: N/A  
Baseline : BL 2  
Qualific. Method : Inspection

[T1-R1393] *Each TRITON Training System shall be able to support at least one-hundred (100) concurrent users.*

Requirement Property :  
Domain for Static: NU  
Domain for Afloat: N/A  
Baseline : BL 2  
Qualific. Method : Demonstration

## 5. NON-FUNCTIONAL REQUIREMENTS

### 5.1. Quality Requirements

The quality requirements include system/software product quality model as defined in [FDIS 25010]. The TRITON Operational Software needs to be developed considering modern software quality aspects and verified during the development process.

Product quality properties are reliability, performance efficiency, usability, security, compatibility, maintainability and portability. Each characteristic is composed of a set of related sub-characteristics and described in the following paragraphs.

#### 5.1.1. Performance Efficiency

Performance efficiency is the performance of a system relative to the amount of resources used under stated conditions. Performance efficiency for the TRITON Operational Software is considered for both Server and Client.

The Client hardware should be able to provide sufficient non-real time performance and graphics display capability with appropriate hardware and communication infrastructure.

Performance characteristics will be measured by taking into consideration only the network load arising from TRITON; the communication delays on the underlying network due to other Bi-SC Functional Services will not be included in the measurement.

##### 5.1.1.1. Performance by Time Behaviour

Time behaviour is the degree to which the response and processing times and throughput rates of a product or system, when performing its functions, meet requirements. In case of failure, which is defined as an error or cessation in the operation of the software requiring, as a minimum, a restart of the application, TRITON will be able to switch to the dedicated Static Backup Server.

TRITON will become available after its first start-up according to the Initial Availability Criteria given below:

**Initial Availability Criteria:**

- Application server and all necessary services are active
- Server is ready to receive external data from its interface services
- User login window becomes available on the Client.

[T1-R1394] *TRITON Functional Services shall become available according to the Initial Availability Criteria as given in the Description within ten (10) minutes after the operating system of the TRITON Server is started up.*

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

[T1-R1395] *TRITON shall complete mode changes in less than five (5) minutes and become ready to accept user input in less than ten (10) minutes for both static and afloat Servers.*

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

[T1-R1396] *In case a critical failure in the TRITON Static Server is detected, the authorised user shall be notified, and TRITON Functional Services shall be switch to the specified secondary Static Server within five (5) minutes after the authorised user acknowledgement. The authorised user shall continuously be informed about the status of the server change process.*

Requirement Property :  
 Domain for Static: Both  
 Domain for Afloat: Both  
 Baseline : BL 3  
 Qualific. Method : Test  
 Comment : Further conditions for switching servers will be determined during the Software Requirements Analysis.

[T1-R1397] *TRITON shall be available for accepting user commands within thirty (30) seconds after accessing or starting a user application via a Client at a static site.*

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

[T1-R1398] *TRITON shall be available for accepting user commands within sixty (60) seconds after accessing or starting a user application via a Client at an afloat site.*

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

[T1-R1399] *TRITON shall be able to support at least twenty (20) concurrent update events per node.*

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

[T1-R1400] *TRITON shall be able to update the Maritime Operational Objects to be displayed at Clients with a rate of at least one-thousand (1000) tracks per minute.*

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

[T1-R1401] *TRITON shall provide a response to a user, in either AppView or GeoView, in any environment, for any action, in less than five (5) seconds.*

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

### 5.1.1.2. Performance by Bandwidth Efficiency

Bandwidth is still an important performance bottleneck for afloat platforms. TRITON will be able to perform its functions under low bandwidth conditions such as less than 500 Kbps. The bandwidth

considerations will be applicable for both server-to-server communications and client-server interactions.

Caching mechanisms and compression methods will be used to increase efficiency.

[T1-R1402] *TRITON shall be designed and implemented to minimise the use of network bandwidth (e.g. caching, light-weight previewing, metadata exchange, lazy loading, query paging) and computational resources.*

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

[T1-R1403] *TRITON shall implement a caching mechanism to improve user performance and minimise bandwidth utilisation wherever possible.*

Requirement Property :  
 Domain for Static: Both  
 Domain for Afloat: Both  
 Baseline : BL 3  
 Qualific. Method : Inspection  
 Comment : Further details for performance figures will be determined during System Requirements Analysis and finalised at CDR.

[T1-R1404] *TRITON shall use data compression methods to reduce bandwidth usage by at least twenty-percent (20%) during information exchange between TRITON Servers.*

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

[T1-R1405] *TRITON Clients shall be able to operate with selected static TRITON Servers using network bandwidth as low as five-hundred (500) Kbps and network latency as high as five-hundred (500) milliseconds. The efficiency shall be tested on the Test System simulating the bandwidth and latency characteristics.*

Requirement Property :  
 Domain for Static: Both  
 Domain for Afloat: Both  
 Baseline : BL 3  
 Qualific. Method : Test  
 Comment : The operation criteria shall be finalised at SRR.

[T1-R1406] *TRITON ACP Server shall be able to synchronise itself with a selected static Server using five-hundred (500) Kbps of network bandwidth on the Test System. The test shall be executed in a test environment simulating the bandwidth.*

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

### 5.1.1.3. Performance by Network Status

When there is a reduced level of service that may impact one or more of the TRITON Operation Services (e.g. reduction in service due to bandwidth limitations or a communication degradation affecting some part of the LAN and/or WAN), TRITON Server will change its operational state to "Degraded".

TRITON Deployable Kit will be able to operate with local sources when disconnected from WAN, switch to "Standalone" mode, and continue providing services with local data and resources. The authorised user will be able to change the operational state manually. When the state becomes Normal again, the Kit will synchronise itself with a static server.

[T1-R1407] *When the LAN is degraded by more than fifty percent (50%), TRITON shall automatically change its operational state to "Degraded" and shall be capable of providing the same range and level of services to individual users with a reduction in performance not more than fifty percent (50%).*

Requirement Property :

Domain for Static : Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

Comment : The performance level in degraded state will be defined at CDR.

[T1-R1408] *TRITON Deployable Kit shall be able to operate in Standalone Mode when WAN connectivity is lost more than a configurable time period. The detection of the loss of WAN connectivity will be subject to the network infrastructure located on board.*

Requirement Property :

Domain for Static : N/A

Domain for Afloat: Both

Baseline : BL 4

Qualific. Method : Demonstration

#### 5.1.1.4. Resource Utilisation

Resource utilisation is the degree to which the amounts and types of resources used by a product or system when performing its functions meet requirements.

The hardware resources provided to TRITON will be utilised in the most efficient way by the application software. Therefore its design and implementation must consider minimising the use of computational resources.

[T1-R1409] *TRITON shall notify the authorised user when seventy-five percent (75%) of the allocated storage is reached.*

Requirement Property :

Domain for Static : Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

[T1-R1410] *TRITON shall not exceed fifty percent (50%) of the dedicated processor capacity in average.*

Requirement Property :

Domain for Static : Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

#### 5.1.1.5. Capacity

Capacity is the degree to which the maximum limits of a product or system parameter meet requirements.

TRITON will have databases to store Maritime Information Entities and some lists. This SRS does not define a capacity limit for any storage or processing. The figures given in this SRS to indicate database

capacity or list sizes will only be used for test purposes. They will not be considered as limitation to the general capacity of the system or any of its functions.

Each TRITON Instance at the static sites will have a scalability of service from a single user up to a number of concurrent users with sufficient data storage capability. The initial number of users for each TRITON instance are provided in SOW. However, these figure shall not be used as limiting factor for the capacity.

[T1-R1411] *TRITON shall be able to provide service for at least five-hundred (500) concurrent users per Instance at static sites. The test shall be executed in a test environment with virtual users.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Test

[T1-R1412] *TRITON shall not have any licensing restrictions on the number of users who can simultaneously access a particular functionality.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Inspection

[T1-R1413] *TRITON shall be able to support at least twenty percent (20%) increase in users with no performance degradation during surge situations.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Demonstration

[T1-R1414] *TRITON shall be able to support storage size of at least ten (10) Terabytes per Instance at static sites.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Inspection

[T1-R1415] *TRITON shall have growth potential beyond the figures given to indicate data storage capacity, database or list sizes, and shall not deem any limitation on design.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Demonstration

### 5.1.2. Compatibility

Compatibility is the degree to which a product, system or component can exchange information with other products, systems or components, and/or perform its required functions, while sharing the same hardware or software environment.

### 5.1.2.1. Co-existence

Co-existence is the degree to which a product can perform its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact on any other product.

TRITON, as a full Functional Service, is expected to work with other Functional Services on the same network environment. No error condition must be raised due to co-existence.

[T1-R1416] *TRITON shall operate with other Bi-SC AIS Functional Services in the same environment without causing any error condition in itself or in other systems.*

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

### 5.1.2.2. Interoperability

Interoperability is the degree to which two or more systems, products or components can exchange information and use the information that has been exchanged.

Interoperability for TRITON is the ability to act together coherently, effectively and efficiently to achieve Allied tactical, operational and strategic objectives as defined in AAP-6.

TRITON will be able to receive automated, near real-time multi-format track feeds, and force element data from other automated C2 information systems and process them. It can also accept operational pictures produced by other NATO Commands and Joint Headquarters to produce a complete Recognised Maritime Picture. This includes support for aggregation tools to merge NATO, national, and non-NATO data and services as required by the operations in progress.

The capabilities delivered under Project TRITON will be the primary source of the NATO RMP. This capability will be interoperable with the NATO Functional Services as well as with the latest version of MCCIS available at the time of interfacing. As a key rule, TRITON will keep the existing interfaces that the legacy systems use for backward compatibility and interoperability. It will also strive to use existing interoperability profiles for MSA and intends to provide any new profiles into the NATO Interoperability Standards and Profiles (NISP) volumes [ADatP-34].

TRITON will provide the necessary mechanisms to ensure complete, accurate, timely, confidential, consistent and coherent information between the distributed Data Centres. Data will be replicated automatically in all databases whenever it is changed, and that is recognised by the replication mechanism.

[T1-R1417] *TRITON shall provide coherent interfaces for others to access its services. The External Interfaces are described in Section 6.*

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

[T1-R1418] *TRITON shall be compliant to the standards given in the NISP [ADatP-34].*

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

### 5.1.3. Usability

Usability is the degree to which TRITON can be used by the operators to achieve the defined goals with effectiveness, efficiency and satisfaction in the context of general use. TRITON Operational Software needs to be understood, learned, used and attractive to the user, when used under specified conditions.

#### 5.1.3.1. Appropriateness Recognisability

Appropriateness recognisability is the degree to which users can recognise whether a product or system is appropriate for their needs. It will depend on the ability to recognise the appropriateness of the product or system's functions from initial impressions of the product or system and/or any associated documentation.

[T1-R1419] *TRITON "should" provide the user with capabilities that are easy to understand to perform user functions.*

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

#### 5.1.3.2. Learnability

Learnability is the degree to which a product or system can be used by specified users to achieve specified goals of learning to use the product or system with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.

Learnability relates to the amount of training needed by users to allow them to use the system efficiently and effectively. Features that minimise training needs are therefore highly desirable. The training should follow as closely as possible the procedures that will be used in the real-world subject areas.

The learnability of TRITON is the capability of TRITON Functional Services to be understood, learned, used and attractive to the user, when used under specified conditions. TRITON is expected to have a high degree of learnability, making it very easy to use even the first time. TRITON will be compliant with [Bi-SCD 75-2] and [MC458/2] and accredited in accordance with [Bi-SCD 75-7].

It is expected that any user with basic computer skills can operate TRITON with a brief training. Specialist training in operational procedures and advanced GIS functionality may require additional training time.

During the GUI design, generally-accepted best practices as well as the Purchaers's HMI Style Guide will be used to ensure usability.

[T1-R1420] *TRITON shall have role-based access control to authorise users on functionalities according to certain expertise (e.g. WSM Operator, RMP Operator).*

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

[T1-R1421] *Any user with basic computer skills shall be able to operate TRITON general user functions with no more than two (2) days of training.*

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

Baseline : BL 1  
 Qualific. Method : Inspection

[T1-R1422] *A user with basic system administrator skills (i.e. MS Windows system administrator) shall be able to install the TRITON Infrastructure and Operational Software, and configure it, perform node administration tasks (e.g. manage users, manage domain values) with a maximum of one (1) week of System Administrator Training.*

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

### 5.1.3.3. Operability

Operability is the degree to which a product or system has attributes that make it easy to operate and control. Operability corresponds to controllability, (operator) error tolerance and conformity with user expectations as defined in [ISO 9241-110].

[T1-R1423] *TRITON shall allow the user to control all the functionality associated to a specific application.*

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

[T1-R1424] *TRITON shall provide the user to always enter data with correct type and format.*

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

[T1-R1425] *TRITON shall provide the user with error tolerance by restricting inappropriate function execution (e.g. the user shall be prevented to press a button which is not allowed at a certain stage of a function).*

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

### 5.1.3.4. User Error Protection

User error protection is the degree to which a system protects users against making errors. TRITON will have the following Error Management capabilities in AppView and GeoView:

- System malfunctions due to a software or hardware failure (e.g. a problem with the disk drive)
- User inputs not recognised by the system
- Data entry or logical errors on the part of the user
- Unexpected consequences resulting from user inputs.

[T1-R1426] *TRITON shall be tolerant to input errors. Users shall be given guidance and suggestions to help them correct or overcome mistakes they have already made.*

Requirement Property :  
 Domain for Static: Both

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

[T1-R1427] *TRITON shall provide Error Management capability which is readily distinguishable from other displayed information (e.g. Pop-up Error Window).*

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

[T1-R1428] *TRITON shall provide the users with meaningful error messages and informed about the actions they need to take in order to fix or at least to report the problem.*

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

### 5.1.3.5. User Interface Aesthetics

User interface aesthetics is the degree to which a GUI enables pleasing and satisfying interaction for the user.

#### 5.1.3.5.1. User Friendliness

TRITON must provide a user-friendly interface for operational users who vary considerably in their experience in the operational domain, technical skills, and frequency and time spent using the system. In order to help the user feel at ease with the system, some general principles are to be followed. They ensure that the GUI is as close as possible to common applications that the users are used to manipulate on their personal computers. These principles are mainly the ones standardised in [ISO 9241-210], particularly in parts 10 to 17.

The following requirements represent the main aspects of the norm to be respected by TRITON. They deal with dialogue principles along with data presentation and availability of accurate guidance information.

The TRITON GUI (both AppView and GeoView) will comply with the following criteria and guidance:

#### User Guidance Information:

- Prompts indicate that the system is available for input.
- Feedback provides information in response to the user's input.
- Status is user guidance information that indicates the current state of components in the system hardware and/or software.

#### Menu Aspects:

- Menu structure, such as logical categories, grouping options and ordering items
- Menu navigation, including titles and access time
- Option selection and execution, including selection methods, use of the keyboard
- Menu presentation, including placement and use of icons

#### Dialogue Principles:

- Suitability for the task: The dialogue will be suitable for the user's task and skill level.
- Self-descriptiveness: The dialogue will make it clear what the user shall do next.
- Controllability: The user will be able to control the pace and sequence of the interaction.

- Conformity with user expectations: The dialogue will be consistent and correspond to the user characteristics, such as task knowledge, education and experience, and to commonly accepted conventions.
- Error tolerance: The dialogue will be forgiving, which means that despite evident errors in input, the intended result shall be achieved with either no or minimal corrective action by the user.
- Suitability for individualization: The dialogue will be able to be customized to suit the user needs.
- Suitability for learning: The dialogue will support and guide the user in learning how to use of the system.

**Information Presentation Criteria:**

- Clarity: Information will be conveyed quickly and accurately.
- Discriminability: Information will be able to be distinguished accurately.
- Conciseness: The system will provide only the information necessary to complete the task.
- Consistency: The same information will be presented in the same way throughout the application.
- Detectability: The user's attention will be directed to the information required.
- Legibility: Information will be easy to read.
- Comprehensibility: The meaning of the information will be clearly understandable.
- Unambiguity: The information will not be open to varying interpretation. Units of measure will be displayed where appropriate.

[T1-R1429] *TRITON shall provide User Guidance Information, given in the Description, which is readily distinguishable from other displayed information.*

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

[T1-R1430] *TRITON shall use menu dialogues with the Menu Aspects, given in the Description, when use of the system is infrequent and the user does not know what options are available and shall be considered in order to provide the user with useful information in due time and low effort.*

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

[T1-R1431] *TRITON shall comply with the Dialogue Principles given in the Description.*

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

[T1-R1432] *TRITON shall comply with the Information Presentation Criteria given in the Description.*

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

[T1-R1433] *TRITON shall keep page size limited on one screen and in order to reduce the need for scrolling to see the submit button.*

Requirement Property :

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

[T1-R1434] *Interactions with TRITON with a pointing device or keyboard shall produce similar results in and throughout all applications.*

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

[T1-R1435] *TRITON shall maintain changes of data entered on any form and inform the user on cancellation of change (or browse away from form) for loss of data.*

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

[T1-R1436] *TRITON shall notify the user who has initiated an action that processing of the action has started and convey the sense of processing progress (by means of a progress indicator, dialog boxes).*

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

### 5.1.3.5.2. Ease of Navigation

TRITON will provide user ease of navigation through menus and standardised GUI widgets, following logical orders. It will always be possible to access more detailed information via drill-down features. For example, a summary of Track Label can be available on the GeoView, and more information can be accessed by initiating a detailed Track Information dialog box. Even more detailed augmented information can be accessed if the track is already associated to a vessel.

[T1-R1437] *TRITON shall make navigation possible with both keyboard and pointing device and both shall be self-explanatory.*

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

[T1-R1438] *TRITON shall provide on-screen "drill-down" features to view lower-level details (where and whenever lower level details are available).*

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

[T1-R1439] *TRITON shall reflect the updated information to all levels while a user is in drill-down process.*

Requirement Property :

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

[T1-R1440] *TRITON table columns shall be selectable and switchable so as to present data in any desired form, complex sorting and filtering capabilities shall be provided on the table rows.*

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

[T1-R1441] *TRITON shall support editing of displayed information in a logical order. The GUI forms shall allow navigation using the tab key in a logical order. This means that the tab order shall represent the same logical order shown on screen.*

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

[T1-R1442] *TRITON shall disable the submit button for a form on click and re-enabled after any change to the entry content. This prevents clicking twice or more resulting in duplicate entries.*

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

[T1-R1443] *TRITON shall provide GUI layouts which are uniform and standardised.*

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

[T1-R1444] *TRITON shall disable the submit button for a form after it is clicked, and re-enable it after any change to the entry content is made (This prevents clicking twice or more times resulting in duplicate entries).*

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

[T1-R1445] *TRITON shall not use the ENTER key to trigger form submission, especially in cases where forms are too long to display on one screen (e.g. where the submit button may fall below the initially visible area).*

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

[T1-R1446] *TRITON shall automatically display scrolling bars (horizontal and vertical) when information does not fit onto one screen.*

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

[T1-R1447] *TRITON shall provide Breadcrumbs on the GUI to indicate the current location of the user within the system functions.*

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

### 5.1.3.5.3. Appearance

The look of the TRITON GUI is expected to resemble the interfaces of existing operational systems or operational prototypes, with which users are already familiar. The existing capabilities have been evolved based on user feedback and the requirement is intended to reduce disruption to operational missions, to minimise training costs, and to increase the likelihood of user acceptance and satisfaction.

[T1-R1448] *The look of the TRITON GUI shall resemble the interfaces of existing operational systems or operational prototypes, with which users are already familiar.*

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

[T1-R1449] *The design of the TRITON GUI shall be based on a single theme with variations. TRITON shall have a common look and feel carried across the entire application's GUI within which a small number of similar but easily distinguished layouts are used. Similar parts of the application should have similar GUIs and layouts throughout the application.*

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

[T1-R1450] *Visual elements and interaction schemes of the TRITON GUI shall be reused on similar functions and features. Uniformity is created this way, which helps users to understand where they are and what they can do.*

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

[T1-R1451] *TRITON GUI shall use a consistent font across Applications.*

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

[T1-R1452] *TRITON GUI shall be structured so that options, features and functions of the application are organised in a way that reflects their relationships.*

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

- [T1-R1453] *The presence of required fields and their styling shall always be noted in advance. Although it is common to flag required fields with an asterisk, this shall be noted at the top of the form, not as a footnote at the bottom. Redundant flagging of required fields with a special character or glyph plus bolding, highlighting, outlining, or a distinct colour shall be considered as the best practice.*

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

- [T1-R1454] *TRITON shall support the display of textual data in tabular displays with backgrounds, tabs, buttons and borders that are semi opaque. Transparency of a panel in the display shall be configurable by the user.*

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

- [T1-R1455] *Web-based functionality under TRITON "should" be designed with a GUI conforming [W3C MWBP] which can be customised for viewing on mobile devices.*

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

#### 5.1.3.5.4. Menus, Pointing Device Actions and Shortcuts

TRITON GUI will have a standard approach for using menus, pointing device actions and keyboard shortcuts to control the GUI.

TRITON will use the following options:

- Selections Options:
  - Menu (Select All)
  - Context-sensitive menu (right button)
  - Accelerators (Ctrl+A)
  - Pointing device (click, drag)
  - Arrow keys
- MS Windows Accelerators:
  - CTRL+C (Copy)
  - CTRL+X (Cut)
  - CTRL+V (Paste)
  - CTRL+Z (Undo)
  - DELETE (Delete)
- Selection Functions:

- Select All
- Deselect All
- Invert Selection

[T1-R1456] *TRITON GUI shall produce similar results for actions initiated by a pointing device (mouse of trackball) or keyboard throughout all applications. The options given in Description shall be used.*

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

[T1-R1457] *TRITON GUI shall provide clickable (selectable) links and buttons that are clearly distinguishable from non-clickable text.*

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

[T1-R1458] *TRITON GUI shall make keyboard shortcuts available to access functions.*

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

[T1-R1459] *TRITON GUI shall support Selection Options as given in the Description and extended selection by Ctrl (i.e. individual selected items) and Shift (i.e. select from-to) keys.*

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

[T1-R1460] *TRITON GUI shall support normal MS Windows Accelerators given in the Description.*

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

[T1-R1461] *TRITON GUI shall support context (i.e. right-button) menus. The use of context menus shall be limited for advanced options only. General and common functions shall also be accessible through the Ribbon, view or dialog buttons.*

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

[T1-R1462] *TRITON GUI shall support the Selection Functions given in the Description unless otherwise specified.*

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

Baseline : BL 1  
 Qualific. Method : Demonstration

**5.1.3.5.5. Role-based Presentation**

TRITON GUI will present the data according to the privileges of the user role and adopts its menus. It will hide or clearly disable (e.g. grey out) functionality not appropriate at the time, including items on second-level and lower-level menus and dialogue boxes.

[T1-R1463] *TRITON GUI shall work on the principle of "visibility" which means the application shows Users whatever they need for the current task without distracting or overwhelming them with unrelated tasks or options.*

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

[T1-R1464] *TRITON GUI shall filter user-accessed information according to the user's authorisation, so that users can only see what they are allowed to view and/or change (including both data and functionality).*

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

[T1-R1465] *TRITON GUI shall only show functionality (e.g. menu items, buttons, selections) that is appropriate to the situation based on user role and permissions and object status. TRITON shall hide or clearly disable (e.g. grey out) functionality not appropriate at the time, including items on second-level and lower-level menus and dialogue boxes.*

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

[T1-R1466] *TRITON GUI shall be minimised according to what the user can do. The GUI shall only show entities and attributes (e.g. forms and fields) and functions (e.g. menus and buttons) that are actually available within the security authorisation of the user. Disabled functions due to permissions shall not be shown at all.*

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

**5.1.3.5.6. Data Entry**

TRITON GUI will provide coherency checks for data entry provided by its Applications' GUI.

**Location Information Entry:**

TRITON will identify and parse the location information entered by the user in the following formats:

- Degrees/Minutes/Seconds
- Decimal Degrees
- Degrees and Decimal Minutes

- Degrees, Minutes and Decimal Seconds
- Military Grid Reference System (MGRS)
- Universal Transverse Mercator (UTM).

[T1-R1467] *TRITON GUI shall display the expected input format on all form fields to the user if the label is not clear enough (e.g. date input format - ddmmyyyy or dd-mm-yyyy). This may be done via tooltips, greyed-out example content, additional labels, or some other means.*

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

[T1-R1468] *TRITON GUI shall be tolerant to the delimiters of input format, including Date format (e.g. dd-mm-yyyy could also be entered as ddmmyyyy or d-m-yy without error or picked from a calendar) and Location format (e.g. latitude/longitude could be entered as degrees-minutes-seconds or degrees.decimal degrees).*

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

[T1-R1469] *TRITON shall apply automatic layout (format) of data where possible (e.g. correct format of dates).*

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

[T1-R1470] *TRITON shall prevent ambiguity and make it clear what information in what format is required for each data entry field. All information shall have its units of measure when applicable (e.g. degrees, metres, yards, knots, seconds).*

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

[T1-R1471] *For all attributes related to geographic coordinates, TRITON GUI shall allow the user to enter geographic coordinates in a single text field (not requiring the user to copy/paste more than once to input a geographic value). TRITON shall automatically identify and parse the Location Information Entry as given in the Description.*

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

[T1-R1472] *TRITON GUI shall use predefined drop-down or pull-down lists in appropriate situations to speed up the entry of information and prevent input mistakes. Open text input fields shall be avoided to prevent errors during input.*

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

Baseline : BL 1  
 Qualific. Method : Demonstration

- [T1-R1473] *TRITON GUI shall allow usage of the keyboard to directly input the code of a value of a list. TRITON shall verify the code and match it against the Domain Values for that list.*

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

- [T1-R1474] *TRITON GUI shall retain entered data even after use of the back or reload button or any other user action except conscious choice to delete the data or empty (or reset) the web form fields.*

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

- [T1-R1475] *TRITON GUI shall not lose, discard, or corrupt user input without user consent.*

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

### 5.1.3.5.7. Real-Estate Management

Real-estate in GUI indicates the valuable information presented in a page. The layout of TRITON GUI design should provide sufficient information to users in even different screen sizes.

- [T1-R1476] *TRITON GUI shall keep page size limited on one screen and in order to reduce the need for scrolling to see the submit button to the extent possible. For additional information tabbed forms shall be used, where appropriate.*

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

- [T1-R1477] *TRITON GUI shall be designed to support various screen sizes. TRITON pages shall expand to the right size of the user screen to the extent where the GUI is not distorted.*

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

- [T1-R1478] *TRITON shall allow grouping of items with expand/minimise buttons (Microsoft Explorer style) in tree views, or using a "group by column" feature in tabular views.*

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

[T1-R1479] *TRITON shall provide wizards if input of certain information requires filling out more than one form, or require a form larger than one screen. This means long forms or lists shall be split up over different subpages (or tabs) within the wizard.*

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

### 5.1.3.5.8. Time Display

Time will be displayed in military domain. Date-Time-Group (DTG) is a special convention for military. Its format is:

DDHHMMZ MMM YY  
 Ø9163ØZ JUL 15

Additional use of date and time will comply with ISO 8601.

[T1-R1480] *TRITON shall use Coordinated Universal Time (UTC) (temps universel coordonné) for all time stamps and DTGs to be stored internally.*

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

[T1-R1481] *TRITON shall display time in UTC by default. It shall be displayed on the GUI with Zulu Time Zone.*

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

[T1-R1482] *TRITON shall present the local time of any other possible time zone if selected by the user.*

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

[T1-R1483] *TRITON shall clearly identify time values as Zulu (e.g. 0815Z) or Local in user displays and logs.*

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

[T1-R1484] *TRITON shall represent date/time data according to ISO 8601 [ISO 8601] by default. Application-specific displays of date/time data shall use the military convention for DTG.*

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

**5.1.3.5.9. Standard Functionality**

TRITON GUI will support standard functionality such as copying and pasting, undo/redo, screen tips etc.

[T1-R1485] *TRITON GUI shall support copying and pasting from other applications via the Clipboard (including text and graphics). The copy and paste action shall take into account the view and the status of the view (e.g. sorting, labelling) from which the information was copied and into which type of application it was pasted. As an example, information copied from a Matrix View and pasted into Microsoft Excel shall cause the information to be placed into corresponding cells (i.e. not a single cell containing all copied/pasted information) in the same sort order.*

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

[T1-R1486] *TRITON GUI shall allow an operation to apply to multiple-selected objects where possible.*

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

[T1-R1487] *TRITON GUI shall render row and column headers for data matrices.*

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

[T1-R1488] *TRITON GUI shall allow the user to sort (with an initial default of 'ascending') the contents of a matrix or list by clicking on the column header for the attribute on which the sort is to be based.*

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

[T1-R1489] *TRITON GUI shall allow the user to reverse the sort order (i.e. ascending to descending, descending to ascending) by clicking again on the column header for the attribute on which the current sort is based.*

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

[T1-R1490] *TRITON GUI shall allow the user to select which columns are displayed in matrix-views (i.e. hide/unhide columns). The user shall be able to store the column selection as a preference.*

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

[T1-R1491] *TRITON GUI shall allow the user to select the order in which columns in a matrix-view are displayed. The user shall be able to store the column order as a preference.*

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

[T1-R1492] *TRITON GUI shall allow the user to enable or disable screen tips and visual aids.*

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

[T1-R1493] *TRITON GUI shall support screen tips (as titles or alt-text) on all icons and attributes that offer added explanation and assistance.*

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

[T1-R1494] *TRITON GUI shall provide undo/redo functionality for changes to objects to the largest extent possible (not limited to formatting), at least until the last save action.*

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

[T1-R1495] *For changes that cannot be undone, TRITON shall ask the user to confirm with an additional warning about the irreversible effect of the action.*

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

[T1-R1496] *TRITON GUI shall save the positions and states of the GUI elements for each user between application sessions, and shall restore the GUI on starting another session.*

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

[T1-R1497] *TRITON GUI shall allow the user to navigate on tabular lists row-by-row or by paging.*

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

[T1-R1498] *TRITON GUI, when suitable, shall use asynchronous technologies, to provide native application's responsiveness experience on the Web interface.*

Requirement Property :

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

**5.1.3.5.10. Defaults**

TRITON will be able to manage default data for entries.

[T1-R1499] *TRITON GUI shall provide auto-completion feature with session-available information to be filled automatically by TRITON (i.e. date/time, name and other profile information of the user, classification). This shall apply to "entry fields" (including text-fields, drop down lists, radio-buttons).*

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

[T1-R1500] *TRITON GUI shall apply automatic layout (format) of data where possible (e.g. capitalisation of names, correct format of dates, geographic positions).*

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

[T1-R1501] *TRITON shall provide data defaults where applicable.*

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

**5.1.3.5.11. User Feedback**

Feedback in Human Factors Engineering can be defined as the perceivable reaction of a system to an operator control action. Feedback makes the user aware about the effects of his/her actions. The reaction to a user control action can either be directly perceived (e.g. by observation of the input element itself) or the effects of the control action can be observed from the system’s reaction.

Feedback can be before, during and after a user action.

Feedback before a user action may be, for example, realised by change of colour an input element in an appropriate way when the user moves the cursor over it in order to make the user aware of the function which would be activated by a click. Feedback during the action is given when, for example, a button is being pressed and the GUI models the movement of the button which is immediately perceivable (e.g. button pressed). Feedback after the action applies after the click, that is, when a system function has been selected. Although every function has to be associated with an immediate visible reaction like changing of the displayed information, it can also have multiple characteristics.

Even if the execution takes some time the user must always be correctly informed about the status of the execution. The exact way to inform the user depends on the delay time. For shorter waiting periods (< 5 seconds) messages such as “please wait”, the busy cursor might be acceptable, but for longer periods this kind of feedback is frustrating for the user. The least stressing method is an indication of a time countdown, that is, the time remaining for the system to complete the operation. This indication must, however, be fairly correct. If such a time display is not possible, other sorts of indications may

be adequate to show progress, such as a percent value or a progress scale. If appropriate, a means should be provided by which the operation can be cancelled or aborted. Any such indication will be removed when the operation has been completed.

In addition, when a control attempt wasn't successful (e.g. entering a wrong value) the user requires the right kind of feedback. This could be one form of Context-sensitive On-line Help or some special error feedback (error message), dependent on the function.

All TRITON GUI components will provide user feedback for each user action.

[T1-R1502] *TRITON GUI shall provide user feedback for each user action.*

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

[T1-R1503] *After the user has initiated a prolonged action, TRITON GUI shall inform that processing of an action has started and convey the sense of processing progress (by means of an animated progress indicator such as sand glass and progress bar). Where the action is quantifiably measurable (e.g. performing N actions) the animation shall provide a quantifiable display (e.g. a progress bar, time remaining). Where the action is not quantifiably measurable (e.g. awaiting a response) the animation shall provide a generic display (e.g. sand glass).*

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

[T1-R1504] *TRITON GUI shall provide prompts (i.e. allow cancellation or confirmation) when input or changes may be lost due to navigation or logging out.*

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

[T1-R1505] *TRITON GUI shall provide user feedback on required fields which have not been correctly entered (i.e. by highlighting the field or the field label in red).*

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

### 5.1.3.5.12. Tooltips

TRITON GUI will provide Tooltips to support inexperienced users for especially icon-based controls. When the user hovers the cursor over a symbol, a Tooltip describing the function of that symbol will be displayed.

[T1-R1506] *TRITON GUI shall provide Tooltips to describe the function when a user hovers the cursor over a GUI symbol.*

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

Baseline : BL 2  
Qualific. Method : Demonstration

### 5.1.3.6. Accessibility

Accessibility is a set of features that will make an application usable for people with certain disabilities.

[T1-R1507] *Sufficient contrast shall be used throughout the application. Highlighting information shall not rely on colours only.*

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

[T1-R1508] *TRITON GUI shall comply with "Level A" of the Web Content Accessibility Guidelines as defined by the W3C (see [WCAG]).*

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

[T1-R1509] *The TRITON accessibility features shall apply to the application GUI, including the help pages, CBT pages, the error/warning/notification messages, etc.*

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

[T1-R1510] *TRITON information on screens shall also contain text. Reliance on pictures or icons alone is not desired.*

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

[T1-R1511] *TRITON shall scale the user interface to fit the screen when low resolutions are used for poor vision accessibility.*

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

### 5.1.3.7. Language

TRITON will use English language through all its displays and internal documentation and source code.

[T1-R1512] *TRITON shall use "UK English" as the default language. This shall apply to all system and supporting components, including views, dialogs, help screens, tooltips, CBT, error/notification/warning messages and documentation.*

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

Baseline : BL 1  
 Qualific. Method : Inspection

[T1-R1513] *TRITON shall allow the user to set localisation (alternative languages/regional settings).*

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

[T1-R1514] *All TRITON On-line Help screens, CBT pages and User Guides shall have a score of at least forty (40) in the Flesch Reading Ease test.*

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

[T1-R1515] *TRITON shall use the common Maritime Domain terminology consistent with this SRS and other NATO documents.*

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

[T1-R1516] *Labels used in TRITON shall be context-dependent, meaningful and descriptive to the function or action at hand.*

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

[T1-R1517] *TRITON internal development documentation shall be in English.*

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

[T1-R1518] *TRITON source code shall be readable in English (i.e. variables, functions and procedures shall be in English).*

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

#### 5.1.4. Reliability

Reliability is defined as the capability of TRITON to maintain a specified level of performance when used under specified conditions.

A "failure" is defined as an error or cessation in the operation of the software requiring, as a minimum, a restart of the application. For Services, a failure is characterized by the inability of the Service to perform its operation For Web-based applications, an error requiring the user to reload the browser will be considered a failure.

**Graceful Degradation:**

TRITON will not completely lose its functionality in case some errors occur in its dependent services. It will gracefully degrade and change its Operational State to Degraded when the conditions in the System Configuration Settings occur. A "graceful degradation" means all TRITON functions unrelated to the unavailable services should continue to work and the situation is recoverable when the dependencies are working again. The capability will not raise exceptions, or even crash, but will elegantly notify the users and if possible will continue to provide some functions using the available resources.

Note that in some cases a graceful degradation can mean no access to TRITON (e.g. unavailability of Security Services won't allow the authentication of new users).

TRITON will gracefully degrade in the condition where one or more of the following Dependent Services are not available:

- Geospatial Services (GIS Server)
- Directory Services
- Enterprise Management Services
- Security Services
- E-mail Services
- General Web-service unavailability/time-out
- Network connectivity

The status of internal components will be reported to Enterprise SMC via System Management.

[T1-R1519] *TRITON shall gracefully degrade in case the conditions given in the System Configuration Settings and the Dependent Services given in the Description are not available (see Operational States and State Transitions). The status of internal components shall be reported to Enterprise SMC via System Management.*

Requirement Property :

Domain for Static : Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1520] *TRITON shall provide data integrity during mode and state changes. The last state of data before the state change shall be preserved.*

Requirement Property :

Domain for Static : Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Inspection

### 5.1.4.1. Maturity

Maturity is the degree to which a system meets needs for reliability under normal operation. System should be able to avoid failure as a result of faults.

[T1-R1521] *TRITON Operational Software at each installed operational node shall exhibit a Mean-Time-Between-Failure (MTBF) characteristic of less than one (1) failure in twenty-four (24) hours, and that shall not be affected by the total number of nodes which are active during that period. The MTBF measurement shall not include failures resulting from factors determined to be external to TRITON (e.g. loss of domain controller).*

Requirement Property :

Domain for Static : Both

Domain for Afloat: Both

Baseline : BL 4  
 Qualific. Method : Analysis

**5.1.4.2. Availability**

Availability is the degree to which a system, product or component is operational and accessible when required for use. Availability of TRITON is defined as the capability of the TRITON Operational Software to be in a state to perform a required function at a given point in time, under stated conditions of use. TRITON non-availability time is measured by adding the Downtime period (time elapsed from Time of Occurrence to Time of Recovery) for each system, service or application failure. Measurements of availability will not include failures resulting from factors determined to be external to TRITON (e.g. loss of domain controller, loss of network connectivity).

The overall TRITON capability reliability and availability will be based on the TRITON application set, the underlying site infrastructure capability, and external communications. For deployed capability, TRITON will follow the on-board or on-site survivability procedures.

Following table indicates the Levels of Operational Continuity for the desired availability:

Level	Operational Continuity						Disaster Recovery	
	% Availability	Monthly Unplanned Downtime	Monthly Planned Downtime	Degraded Service	Max Restoration time	Max Allowable Data Loss	Recovery Time	Recovery Point
L1	99.99	<1 hr	<1 hr	None	1 hr	1 hr	N/A	N/A
L2	99.9	1 hrs	6 hrs	Minimal	2 hrs	4 hrs	4 hrs	8 hrs
L3	99	7 hrs	12 hrs	Some	4 hrs	8 hrs	12 hrs	24 hrs
L4	98	14 hrs	36 hrs	Allowed	12 hrs	24 hrs	48 hrs	48 hrs

[T1-R1522] *TRITON, including hardware, infrastructure and Operational Software, shall be available for use at static sites (via Data Centres) twenty-four (24) hours per day, three-hundred and sixty-five (365) days per year with an availability of ninety-nine point zero percent (99.0%) (Level 3 of Operational Continuity).*

Requirement Property :  
 Domain for Static: Both  
 Domain for Afloat: N/A  
 Baseline : BL 3  
 Qualific. Method : Analysis

[T1-R1523] *TRITON Operational Software shall be available for at least ninety-nine point nine percent (99.9%) of time (Level 2 of Operational Continuity) at Data Centres using multi-site operation capability.*

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

[T1-R1524] *TRITON Deployable Kit, including the hardware, the infrastructure and the Operational Software, shall be available at least ninety-nine point zero percent (99.0%) of time (Level 3 of Operational Continuity).*

Requirement Property :  
 Domain for Static: N/A  
 Domain for Afloat: Both

Baseline : BL 4  
 Qualific. Method : Analysis

[T1-R1525] *One TRITON instance shall provide a Mean-Time-To-Repair (MTTR) of one (1) hour or less.*

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

[T1-R1526] *TRITON shall always be available for any incoming service request even though it is executing time-consuming function.*

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

[T1-R1527] *TRITON shall ensure system availability to users so that they do not experience interruption of services as a result of intermittent connection, except as it impacts their direct access to Web Application Server for an in-progress action. Intermittent connection is defined as loss of connectivity that is less than thirty (30) seconds.*

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

[T1-R1528] *TRITON shall ensure system availability to users so that they do not experience interruption of services as a result of Limited Bandwidth. Limited Bandwidth is defined as a bandwidth of less than sixty-four (64) kbps for afloat sites and five-hundred-and-twelve (512) kbps for static sites.*

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

[T1-R1529] *TRITON shall ensure system availability to users so that they do not experience interruption of services as a result of high latency. High latency is defined as latency exceeding one-thousand-and-one-hundred (1100) milliseconds.*

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

[T1-R1530] *In case of TRITON failure the availability interruption shall not exceed two (2) hours in eighty percent (80%) of cases for an individual TRITON user at static site. In no case shall the availability interruption exceed twenty-four (24) hours for an individual TRITON User at static site. Measurements of availability shall not include failures resulting from factors determined to be external to TRITON (e.g. loss of domain controller, loss of network connectivity).*

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

Baseline : BL 3  
 Qualific. Method : Demonstration

[T1-R1531] *TRITON non-availability time shall be measured by adding the Downtime period (time elapsed from Time of Occurrence to Time of Recovery) for each system, service or application failure.*

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

### 5.1.4.3. Accuracy

Accuracy is defined as the degree of conformity of a measured or calculated value to its actual or specified value.

[T1-R1532] *TRITON shall provide accuracy of timing for information object time stamps (e.g. time of update) to one second. Other system-level functions (e.g. process synchronisation) may require additional accuracy as required for correct operation.*

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

[T1-R1533] *TRITON geographic location accuracy shall be less than 0.0001 minutes, distance accuracy less than one metre (i.e. sub-metre accuracy) for translation of values (UTM, Latitude/Longitude, others). Confidence interval shall be shown within values.*

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

[T1-R1534] *TRITON shall ensure consistency and accuracy of all the data displayed on all open views and applications.*

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

### 5.1.4.4. Fault Tolerance

Fault tolerance is defined as the ability of the software product to maintain a specified level of performance in cases of software faults or of infringement of its specified interface.

TRITON is expected to handle errors in a way that helps users rather than disturb or otherwise hinder their work.

The TRITON capability will mainly be available on static NATO Command sites. At each of these locations TRITON will take advantage of the site's disaster recovery infrastructure and processes, or those procedures relevant to remote access and hosting in accordance with the NATO IT Modernisation Plan.

TRITON will gracefully degrade when the Dependent Services (see Reliability) are not available.

[T1-R1535] *TRITON shall not have any unhandled exceptions. All errors shall be handled and minimise the impact upon the users workflow.*

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

[T1-R1536] *TRITON shall notify the user for potential loss/deletion of information objects during modification of any information object (e.g. by cascading deletion). When prompted by a notification about the data that might be lost/deleted, the user shall be able to choose the action that shall be taken by the system (e.g. cancel, continue).*

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

[T1-R1537] *TRITON shall automatically report errors and suggested corrective actions with respect to the creation, change, exchange and storage of data elements, objects and products.*

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

[T1-R1538] *TRITON messages (e.g. error, warning, notification, and informative messages) shall contain initiating module information, and contain context sensitive help and directives on where to find answers and solutions. Technical or debugging error scripts are not acceptable (e.g. "Java object 01 not accessible").*

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

[T1-R1539] *TRITON shall report errors in context (e.g. given within the same page where they are encountered). An error message shall be displayed or provided in a popup. Invalid entries shall be highlighted or marked so they can be quickly identified and corrected.*

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

[T1-R1540] *TRITON shall popup screens or windows are used to report about errors. They shall be closable with a single click.*

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

[T1-R1541] *TRITON shall display only one error report popup screen for the same error.*

Requirement Property :  
 Domain for Static: Both

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

[T1-R1542] *TRITON shall not in any case permit loss of user-entered data due to receipt of an error or other message. User input shall never be lost, discarded or corrupted unless a user actually chooses to delete or reset the input.*

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

[T1-R1543] *TRITON shall allow a user to report problems, bugs and change requests when they encounter a problem or an unexpected result. The feature shall send a message to the Organizational Node Administrators for their review. The user shall not need to do any configuration of the actual sending of the message; the system shall handle that automatically.*

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

[T1-R1544] *TRITON error messages shall provide the users the capability of attaching the user comments on the nature of the problem in addition of automatic reporting the error messages, screen dumps and other related system data for problem reports.*

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

[T1-R1545] *TRITON error message content shall allow the TRITON System Administrator to re-create the conditions when the problem occurred (e.g. the appropriate screen and information content that caused the problem).*

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

[T1-R1546] *TRITON Server shall gracefully degrade in the condition where any dependent services and components are not available and notify the user for the limited functionality. Upon restoration of services, TRITON Server shall become fully operational. TRITON shall change its Operational State accordingly.*

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

[T1-R1547] *TRITON shall be able to queue requests to an unavailable Core Service and deliver them when the Service becomes available again. TRITON shall change its Operational State accordingly.*

Requirement Property :

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

### 5.1.4.5. Recoverability

In the event of an interruption of communications TRITON will be capable of operating in a stand-alone mode, which will require the capability to export and import planning products for transmission via e-mail or other means between planning locations at one command or amongst several commands.

[T1-R1548] *In case of a TRITON Server failure, TRITON shall be capable of switching to a TRITON Backup Server within three (3) minutes.*

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

[T1-R1549] *TRITON operation shall not be interrupted during incorporation of in-service equipment updates or maintenance software updates.*

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

### 5.1.4.6. Survivability

Survivability is the quantified ability of a system, subsystem, equipment, process, or procedure to continue to function during and after a natural or man-made disturbance. TRITON is expected to ensure the survival of data and associated functional services in defined conditions.

Data survivability can be supported in two ways:

- Backups: taking periodic full or incremental 'snapshots' of the data store to mitigate the risk of system/storage failure.
- Archiving: removing and storing data that is no longer required for use from the system, thus reducing the size of the data store (and improving performance).

[T1-R1550] *TRITON shall support fail-over in its architecture. Clients shall be able to survive failure of the Application Server without crashing or affecting the stability of the overall system.*

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

[T1-R1551] *TRITON shall be able to roll-back if transactions are not completed due to an error.*

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

[T1-R1552] *TRITON shall provide data survivability by using backups and archiving.*

Requirement Property :  
 Domain for Static: Both

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

[T1-R1553] *TRITON shall automatically detect the availability and re-establishment of network connectivity and shall automatically continue or restart tasks that were on-going at the time a failure occurred, initiate subsequent tasks as though network connectivity had not been lost, provide a visual notification of the connectivity status (connected, limited, unconnected) and highlight a change in status.*

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

[T1-R1554] *TRITON shall not cause data corruption or loss of data integrity due to connection failure or other hardware/software failures.*

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

### 5.1.5. Maintainability and Supportability

Maintainability and supportability refer to the ability of TRITON to be effectively maintained and supported in the field. Attributes include the ability to implement improvements or adaptation of the system to reflect changes in environment and in requirements and functional specifications. Software maintainability is defined as the capability of the software product to be modified. Modifications may include corrections, improvements or adaptation of the software to changes in environment, and in requirements and functional specifications.

TRITON will be easy to maintain with COTS hardware and software in order to minimise the operating and maintenance costs.

Supportability also includes installability of the operational software. Installability is the degree of effectiveness and efficiency with which a product or system can be successfully installed and/or uninstalled in a specified environment.

At each deployed location, the TRITON Operational Software will be integrated with the central management system supporting the site CIS. This will allow adequate fault isolation and troubleshooting interfaces to enable the system maintainers to restore the TRITON functionality in a timely manner.

#### 5.1.5.1. Installation

TRITON will be installed on Data Centres having Bi-SC AIS Virtualised Environment.

[T1-R1555] *TRITON components shall be capable of being installed by a MS Windows Installer or similar service/product installation package in any Bi-SC AIS approved platform.*

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

[T1-R1556] *TRITON shall be capable of being installed and correctly run on multi-processor and multi-core systems.*

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

[T1-R1557] *TRITON shall support successful installation on both 32-bit and 64-bit operating systems (e.g. where the default program files folder is "Program Files (x86)").*

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

[T1-R1558] *TRITON shall allow the authorised user to install all or selected components of TRITON Infrastructure and Operational Software.*

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

[T1-R1559] *TRITON shall detect, during installation, if the user has insufficient privileges required for installation (e.g. folder or registry access). TRITON shall report the details of the access failure to the user before aborting the installation.*

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

[T1-R1560] *The TRITON installer shall detect and appropriately address issues of disk space and drives with "not enough" space prior to beginning installation.*

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

[T1-R1561] *The TRITON installer shall detect and appropriately address a previous installation of the same application. In this case, the installer shall notify the authorised user and prompt if the user wants to reinstall, repair or cancel, and proceed accordingly.*

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

[T1-R1562] *The TRITON installer shall detect and appropriately address an earlier version of the application. In this case, the installer shall notify the authorised user and prompt if the user wants to upgrade or cancel the installation, and proceed accordingly.*

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

[T1-R1563] *The TRITON installer shall detect and appropriately address files protected by MS Windows File Protection (if MS Windows is chosen as the operating system) or other operating system file protection function, and not attempt to replace these files.*

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

[T1-R1564] *TRITON shall ensure that all shared application files are referenced during installation.*

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

[T1-R1565] *TRITON shall install into "Program Files" application directory by default or allow alternate directory/drive to be selected for installation.*

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

[T1-R1566] *TRITON shall support successful installation and running on non-English language versions of MS Windows (e.g. the Italian version of MS Windows uses "Programmi" instead of "Program Files") if MS Windows is chosen as the operating system.*

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

[T1-R1567] *TRITON shall allow, as appropriate, "Complete", "Typical" and "Custom" installation options to perform complete (i.e. all components), typical (i.e. typical components for a standard installation) and custom (i.e. User-selected components), respectively.*

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

[T1-R1568] *TRITON shall provide an installation supported by a complete, clearly-worded Installation Manual.*

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

[T1-R1569] *TRITON shall ensure the ability to re-run, allow addition or removal of components that have been or are still to be installed.*

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

[T1-R1570] *The TRITON installer shall detect and appropriately address components shared with other applications. The installer shall not adversely affect other installed applications.*

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

[T1-R1571] *The TRITON installer shall detect and appropriately address issues of disk space and drives with "not enough" space prior to beginning installation.*

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

[T1-R1572] *The TRITON installer shall detect and appropriately address files protected by MS Windows File Protection (if MS Windows is chosen as the Operating System), and not attempt to replace these files.*

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

[T1-R1573] *The TRITON installer shall detect and appropriately address the presence or absence of special hardware (e.g. Deployable Kit Central Control Unit).*

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

[T1-R1574] *The TRITON installer shall set-up Program group/folders as appropriate. All expected program group folders, shortcuts and links (icons) shall appear correctly and be installed where expected.*

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

[T1-R1575] *TRITON shall allow termination of the installation before it is complete. Cancellation of an installation shall terminate the process and remove all program files and directories, registry entries, program and group directories, as appropriate, retaining all shared and system files. Restart of the installation shall allow the installation to complete without error.*

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

[T1-R1576] *Once installed by an administrator, TRITON shall be usable by all authorised users of the system (i.e. it shall not require all users to have administrator privileges).*

Requirement Property :

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

### 5.1.5.2. Uninstallation

TRITON Operational Software will be able to uninstall itself if the authorised user initiates the process.

[T1-R1577] *TRITON shall provide a capability to uninstall the TRITON Operational Software and individual applications.*

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

[T1-R1578] *The TRITON Uninstallation Capability shall be available from the Control Panel's add/remove programs applet (Application Manager) for only the authorised user.*

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

[T1-R1579] *TRITON shall prompt the authorised user to confirm the uninstallation.*

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

[T1-R1580] *The TRITON Uninstallation Capability shall remove all program files and folders, registry entries, program and group folders, as appropriate, retaining all shared and system files.*

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

[T1-R1581] *The TRITON Uninstallation Capability shall retain all shared and system files, and shall not adversely impact other installed applications.*

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

### 5.1.5.3. Co-existence

Co-existence is defined as the ability of the software to co-exist with other independent software in a common environment sharing common resources.

[T1-R1582] *Installing, running and uninstalling the capability shall not adversely impact other applications or the system it is installed on, running on or uninstalled from.*

Requirement Property :  
 Domain for Static: Both

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

#### 5.1.5.4. Configuration Data

TRITON configuration data will be temporarily stored during installation, and the Registry file size will not grow too much.

[T1-R1583] *TRITON shall store temporary files only in the user's temporary folder.*

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

[T1-R1584] *TRITON shall not store any user data in Registry unless approved by the Purchaser.*

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

[T1-R1585] *TRITON shall ensure that the application stores user configuration data in User Profile to prevent log-in delays, etc.*

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

#### 5.1.5.5. Remote Automated Deployment and Reporting

TRITON will allow the use to remotely deployment, restoring, configuration, and reporting of the Operational Software. Both static and afloat sites can be remotely controlled. If MS Windows is chosen as the Operating System, then MS System Center Configuration Manager can be used.

[T1-R1586] *TRITON shall support remote deployment, restore, configuration and uninstallation of all TRITON components and updates.*

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

[T1-R1587] *TRITON shall support collection and reporting of asset inventory metrics for all TRITON components using Microsoft System Centre Configuration Manager, if MS Windows is chosen as the operating system, including memory, operating system, peripherals, services, login tracking, licensing, software existence and usage.*

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

### 5.1.5.6. Usage Scope and Limitations

NATO intends to be able to manage, install and use TRITON using their own resources on sites and locations decided by NATO without restriction on the product.

[T1-R1588] *TRITON shall be installable and executable by NATO resources only.*

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

[T1-R1589] *TRITON shall bear no limitation on the usage scope in term of time, duration and location of usage.*

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

[T1-R1590] *TRITON usage shall be permitted for any type of event or activities, including but not limited to training, demonstration, exercise, static, deployed, mobile, civil or military locations, aircrafts or ships.*

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

[T1-R1591] *TRITON shall not bear additional licences and charges for deployment of TRITON if used in a NATO context (exercise, mission, static and deployable commands, NRF).*

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

### 5.1.5.7. Supportability

Supportability for TRITON is the degree of providing First and Second Level Support to the Operational Software.

[T1-R1592] *TRITON Operational Software shall permit the authorised users to perform First Level of Support, such as routine daily administration, data management, disaster recovery and back up at the local level.*

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

[T1-R1593] *TRITON Operational Software shall permit the authorised users to perform Second Level of Support such as client/server installation, configuration management, help desk, identification of required corrective actions, etc., remotely from a centralised support site.*

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

Baseline : BL 1  
Qualific. Method : Inspection

## 5.1.6. Portability

Portability is the capability of the software product to be transferred from one environment to another.

### 5.1.6.1. Environment

Environment for TRITON indicates the computing platform.

[T1-R1594] *TRITON Operational Software shall run on both 32-bit and 64-bit Intel architecture.*

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

[T1-R1595] *TRITON Client shall be able to be run in any Web Browser present and Web Browser plugins present on the Approved Fielded Product List at the time of deployment.*

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

[T1-R1596] *TRITON Client software shall run natively (no emulation) on the Standard NATO Bi-SC AIS Workstation (Desktop Environment).*

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

[T1-R1597] *TRITON shall support the use of IPv6 without impaired functionality and performance within a network environment.*

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

[T1-R1598] *TRITON shall not rely on the NetBIOS interface to communicate with other applications, clients or management services. Disabling NetBIOS shall not affect the applications operation or interoperability in any way.*

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

[T1-R1599] *TRITON shall run successfully independent of environment regional settings (e.g. decimal symbol, date/time format).*

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

Baseline : BL 1  
 Qualific. Method : Inspection

### 5.1.6.2. Customisability

Customizability is the ability of a product or system to offer extensions to existing functionality to better suite the needs of a user. TRITON will allow a user, where appropriate, to set personal preferences for the display of units (e.g. distance in yards or metres), display of date/time information, display of geographic information.

[T1-R1600] *TRITON shall support customisation of user environment with Workspaces.*

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

[T1-R1601] *TRITON shall allow a change to the GUI only when committed separately by the authorised user. If no commit is entered, the GUI will revert to the previous state.*

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

### 5.1.6.3. Adaptability

Adaptability is the degree to which a product or system can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments. Adaptability also includes the scalability of internal capacity (e.g. screen fields, tables, transaction volumes, report formats, etc.).

[T1-R1602] *TRITON Operational Software shall be adaptable to newer versions of the virtualised environment.*

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

[T1-R1603] *TRITON Operational Software output design shall be adaptable to changing environment. It shall be possible to apply changes on the system display and output such as screen layouts, data fields, table formats, report formats.*

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

### 5.1.6.4. Replaceability

Replaceability is the degree to which a product can be replaced by another specified software product for the same purpose in the same environment.

[T1-R1604] *TRITON shall support replaceability through reusable software components. The defined software component for this Increment shall be the "C4ISR Visualisation Component".*

Requirement Property :

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

[T1-R1605] *TRITON Deployable Kit shall support replaceability through hardware components.*

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

### 5.1.7. Modularity

Modularity is the degree to which a system or computer program is composed of discrete components such that a change to one component has minimal impact on other components.

[T1-R1606] *TRITON design shall support modular approach by defining Components, User Applications and Technical Services as defined in NAF [AC/322-D(2007)0048] and [C3TAXO].*

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

### 5.1.8. Reusability

Reusability is the degree to which an asset can be used in more than one system, or in building other assets. TRITON will support reusability through reusable components.

[T1-R1607] *TRITON design shall include identifying and implementing reusable software components. The defined reusable software components for this Increment shall be the C4ISR Visualisation Component.*

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

[T1-R1608] *TRITON design shall include reusing software modules and libraries that are developed for a particular function.*

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

### 5.1.9. Analysability

Analysability is the degree of effectiveness and efficiency with which it is possible to assess the impact on a product or system of an intended change to one or more of its parts, or to diagnose a product for deficiencies or causes of failures, or to identify parts to be modified.

[T1-R1609] *TRITON shall provide the authorised user with capabilities to measure the performance level of the Operational Software.*

Requirement Property :

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

[T1-R1610] *TRITON shall provide the authorised user with capabilities to diagnose for causes of failures.*

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

[T1-R1611] *TRITON shall provide the authorised user with capabilities to analyse the system output against the actual data inputs (e.g. by comparing the result of a process when data is input).*

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

[T1-R1612] *TRITON shall have input data logging capability for analysing external system interfaces.*

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

[T1-R1613] *TRITON shall allow the user to turn on and off the input data logging capability.*

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

### 5.1.10. Modifiability

Modifiability is the degree to which a product or system can be effectively and efficiently modified without introducing defects or degrading existing product quality.

[T1-R1614] *TRITON design shall support maintenance of software modules without effecting the rest of the system.*

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

### 5.1.11. Testability

Testability is the degree of effectiveness and efficiency with which test criteria can be established for a system, product or component and tests can be performed to determine whether those criteria have been met

[T1-R1615] *TRITON shall be designed and implemented to allow testing and validating the whole or part of the Operational Software.*

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

### 5.1.12. Scalability

Scalability is defined as a desirable property of a system, a network or process, which indicates its ability to either handle growing amounts of work in a graceful manner, or be readily enlarged.

TRITON will be scalable for its computation and storage capacity vertically and horizontally. As an example for vertical scalability, TRITON will allow the database server, Web services, interface services and various data management tools to run on separate machines. Horizontal scalability example is to run more than one application server within one instance to increase the overall performance.

[T1-R1616] *TRITON shall be scalable and technically upgradeable to maintain performance against threat growth.*

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

[T1-R1617] *TRITON shall use an architecture that allows vertical scalability and allows the various components to be deployed on separate machines.*

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

[T1-R1618] *TRITON shall use an architecture that allows horizontal scalability and allows the same component to be deployed on multiple machines without interference.*

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

[T1-R1619] *TRITON shall be dimensioned and configured to scale in performance to support at least twenty percent (20%) increase in users at each site and at least twenty percent (20%) growth in data per year for five (5) years without degradation of performance.*

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

[T1-R1620] *The TRITON databases shall be dimensioned to support all the relevant data based on current estimates of numbers and sizes of Maritime Information Entities and provide an additional twenty percent (20%) of space a year for five (5) years.*

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

## 5.2. Security Requirements

Security is the degree to which a product or system protects information and data so that persons or other products or systems have the degree of data access appropriate to their types and levels of authorisation.

TRITON security will protect information and data so that unauthorised persons or systems cannot read or modify them. Only the authorised persons or systems can access to them.

For purposes of this SRS, the following definitions are used:

**Authentication** : Verifying the identity of the user or consumer of a service or application.

**Authorisation** : Ensuring that the consumer is able to perform a particular action on a resource.

**Confidentiality** : Ensuring that data is not disclosed to unauthorised parties, usually through the use of encryption.

**Data Integrity** : Ensuring that the data has not been altered in transit.

**Non-repudiation**: Ensuring that neither the sender nor the receiver of a message can deny having sent or received it.

**Accountability** : Ensuring that there is a permanent record of any transaction, which can be retrieved and analysed outside the scope of a transaction.

TRITON will comply with the Bi-SC AIS Community Security Requirement Statement (CSRS) for Secure Automated Information System. TRITON is required to operate primarily on the NS and NU Network. However, it may also be used on NR (aka Private Business Network - PBN) and Mission Network (possibly MS) when deployed.

The Security Accreditation Authority (SAA) will be the NATO Security Accreditation Board (NSAB), who will be responsible for assigning security accreditation for TRITON software. Nations desiring to utilise TRITON for their national purposes will be responsible for their own security accreditation to be installed on their networks.

### 5.2.1. General

In general, NATO Security Requirements are specified in [ACO-70-1]. This document covers all aspects of security (physical, document, personnel, etc.). However, for the purposes of TRITON, more specific requirements for security are defined.

[T1-R1621] *TRITON-NS shall run on the NS Network provided by both static and afloat sites.*

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

[T1-R1622] *TRITON-NU shall run on the NU Network provided by both static and afloat sites.*

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

[T1-R1623] *TRITON-NU shall be able to run on the NR Network (aka Private Business Network - PBN) if it is available on the static sites.*

Requirement Property :  
 Domain for Static: N/A  
 Domain for Afloat: N/A

Baseline : BL 2  
 Qualific. Method : Inspection

[T1-R1624] *TRITON shall be able to run on a Mission Network if it is deployed and configured.*

Requirement Property :  
 Domain for Static: N/A  
 Domain for Afloat: N/A  
 Baseline : BL 3  
 Qualific. Method : Inspection

[T1-R1625] *TRITON shall be compliant with NATO document [C-M(2002)49] for the protection of NATO classified information, supporting systems services and resources in CIS, or other storing devices, processing and transmitting systems.*

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

[T1-R1626] *TRITON shall operate in the "System High" mode of operation with security levels. That is, all individuals with access to the system are cleared to the highest classification of the information stored, processed or transmitted within the system, but not all individuals with access to the system have a common need to know for the information stored, processed or transmitted within the system.*

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

## 5.2.2. Compliance with Bi-SC AIS Security Requirements

The following INFOSEC functionalities will be provided by the Bi-SC AIS:

### **Confidentiality:**

Military-grade NATO IP Cryptographic Equipment (NICE) will provide confidentiality to user data as well as cryptographic separation between security domains (e.g. NS, NU, MS). Information exchange between these security domains will be achieved through appropriate Boundary Protection Services (BPS). As a minimum, NICE will be located at each boundary between the Local Area Networks (LANs) and the NATO Wide Area Network (WAN). This will ensure that all user data will be encrypted prior to transmission across the NATO WAN. Software application layer mechanisms will be used for Community-of-Interest (COI) separation.

### **Integrity:**

Digital signatures and authentication services will be used by various protocols (e.g. SNMP, IPSEC) to provide integrity and strong authentication to user data and network configurations. The NATO Public Key Infrastructure (NPKI) will enable these specific security services. XML Digital Signature standards should be used as applicable [XML-Digital Signature].

Infrastructure security as provided by the Bi-SC AIS Infrastructure will be transparent to TRITON.

[T1-R1627] *The security settings of TRITON shall be compliant with the Secure AIS CSRS for Bi-SC AIS Security Settings and File Systems.*

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

Qualific. Method : Inspection

[T1-R1628] *TRITON shall be capable of operating across multiple security domains including National, NATO, Coalition and Mission. These domains shall include SIGINT COINS, NS, MS, NR and NU networks) in accordance with the security policy set by the Purchaser.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1629] *Performance of a TRITON instance on a security domain shall not be degraded more than 10% because of the presence of other security domains.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1630] *TRITON shall be compliant with the security infrastructure as provided by the Bi-SC AIS Core Services. The Service Interface Profiles [NCIA-06.02.01], [NCIA-06.02.02], [NCIA-06.02.03], [NCIA-06.02.04] shall be applicable.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1631] *TRITON shall adhere to NATO INFOSEC security requirements as specified in [ACO-70-1].*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

### 5.2.2.1. Bi-SC AIS Security Settings

The Security settings in effect on the NS WAN environment are categorised using the categories below:

- Account Policies: Password policies, account lockout policies and Kerberos policies.
- Local Policies: Audit policy, User rights assignment, security options.
- Event Log Settings: Settings for event log parameters itself (e.g. max size of audit file).
- Restricted Groups: Membership of security-sensitive user groups.
- System Services: Start-up and permission for system services.
- Registry: Permissions for registry keys (for MS Windows).
- File System Permission: Permissions for folders and files.
- Removal of Certain Folders and Files: Removal of some default files and registry keys.
- Installation of Devices: Settings for installation of specific hardware devices (e.g. floppy/USB drives, microphones).
- Configuration of Specific Software Modules: Settings for use of security-related software modules (e.g. MS Windows DHCP, RAS, etc.)
- BIOS Settings: Security related configuration data for BIOS.

Details of standards applicable to the security settings are given in NATO Information Assurance Technical Centre (NIATC) Security Settings. NATO Computer Incident Response Capability (NCIRC)

provides configuration guides for a variety of COTS products which can be selected and applied according to the selected solution.

[T1-R1632] *TRITON shall be capable of operating within the NS, MS, NR and NU WAN environment (including servers, network, services and workstations) in the presence of the approved NATO Security Settings (target version to be provided by the Purchaser during the Design Stage).*

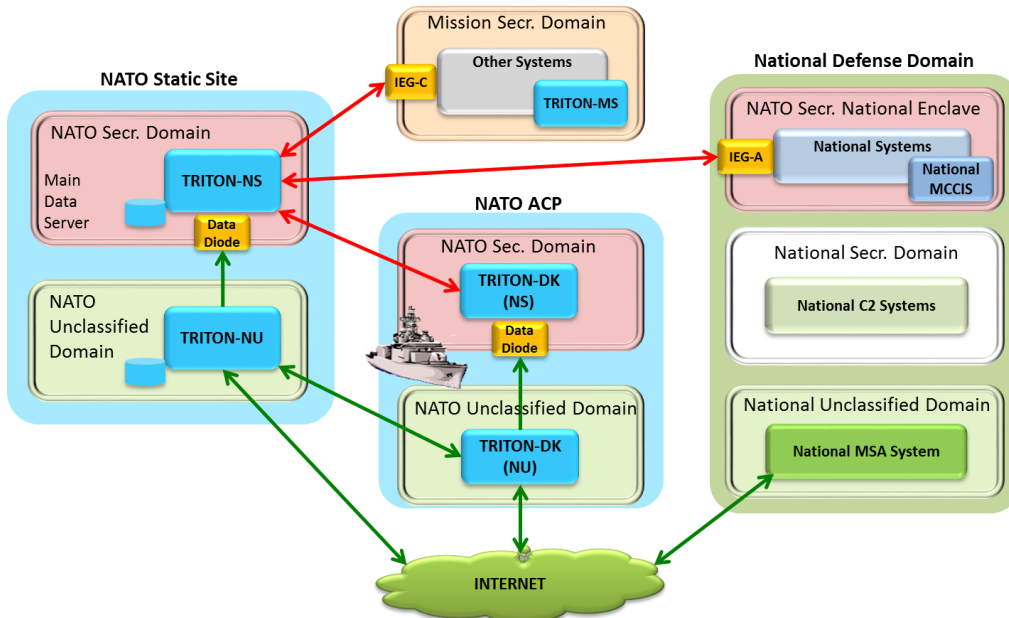
Requirement Property :  
 Domain for Static : Both  
 Domain for Afloat : Both  
 Baseline : BL 1  
 Qualific. Method : Inspection

[T1-R1633] *TRITON shall be compliant to the NCIRC Configuration Guides which will be provided by the Purchaser according to the selected COTS products. Any deviations from the approved security settings shall be identified by the Contractor prior to testing and shall be subject to approval of the Purchaser.*

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

### 5.2.2.2. Cross-Domain Support

TRITON Functional Services will operate in multiple security domains (NS, MS, NR, NU) where rules, regulations and category of personnel are different. In order to make information available across these domains, multiple procedures and devices are needed. Cross-domain Support is necessary when TRITON is used in a distributed environment for creating and feeding the Information Products from various sources spreaded across differing security domains. Possible scenarios for cross-domain operation of TRITON are illustrated below:



TRITON will provide cross-domain operation by enabling data transfer from differing security domains using Information Exchange Gateways (IEG). Currently, a gateway solution called "Data Diode" is used to transfer information from the NU Domain to the NS Domain (one way). TRITON will use this Data Diode to pass White Picture information from NU to NS Domain on both static and afloat sites.

NATO Nations already have direct connection to NS Domain using IEG Scenario A. Nations having access to NS Domain will also be able access TRITON services.

When TRITON is installed on a Mission Network, IEG Scenario C will be used to exchange information. TRITON will provide labels on the data that needs to be exchanged over IEGs.

**5.2.2.2.1. Data Labelling**

Since IEGs pass only the labelled data, TRITON will assign a Confidentiality Label to the relevant data objects according to [ADatP-4774] and [ADatP-4778].

**Confidentiality Label:**

Confidentiality Label will include the following:

- Authority (e.g. NATO, NATO/EAPC (Euro-Atlantic Partnership Council))
- Classification marking (e.g. NS, NU)
- Releasability (e.g. Releasable to AUS/FIN, Releasable to ISAF, Releasable to Coalition)

Confidentiality Labels will be bound to the information object using an appropriate binding mechanism. The methods of binding are defined in the NATO Directives.

[T1-R1634] *TRITON shall assign Confidentiality Labels as defined in [ADatP-4774] and [ADatP-4778] to all Maritime Information Entities including information products, information objects, messages, files, bounded data streams that are subject to be transferred over IEG.*

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

[T1-R1635] *TRITON shall use a binding mechanism to indicate the relationship between a Maritime Information Entity and its label(s) or marking. The methods of binding are defined in the NATO Directives.*

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

[T1-R1636] *TRITON shall maintain Confidentiality Label information for Maritime Information Entity across TRITON Services.*

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

[T1-R1637] *TRITON shall maintain Confidentiality Label information for Maritime Information Entity in the data sent by every Web services that TRITON expose.*

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

[T1-R1638] *TRITON shall support Confidentiality Labels upon Maritime Information Entity entry and create the corresponding Security Classification using approved NATO labelling standards*

*for each Maritime Information Entity. "Entry" refers to direct creation in TRITON. Entities imported from an external system/file shall be required to have security labels.*

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

[T1-R1639] *TRITON shall maintain Security Classification on received information using Confidentiality Labels across all TRITON Services and using NATO approved labelling standards.*

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

[T1-R1640] *TRITON shall create Confidentiality Label upon information production based on Security Classification.*

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

[T1-R1641] *TRITON shall sign the Confidentiality Label using the source entity credentials upon production of information.*

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

[T1-R1642] *TRITON shall allow the authorised user to set the Confidentiality Label of any Maritime Information Entity.*

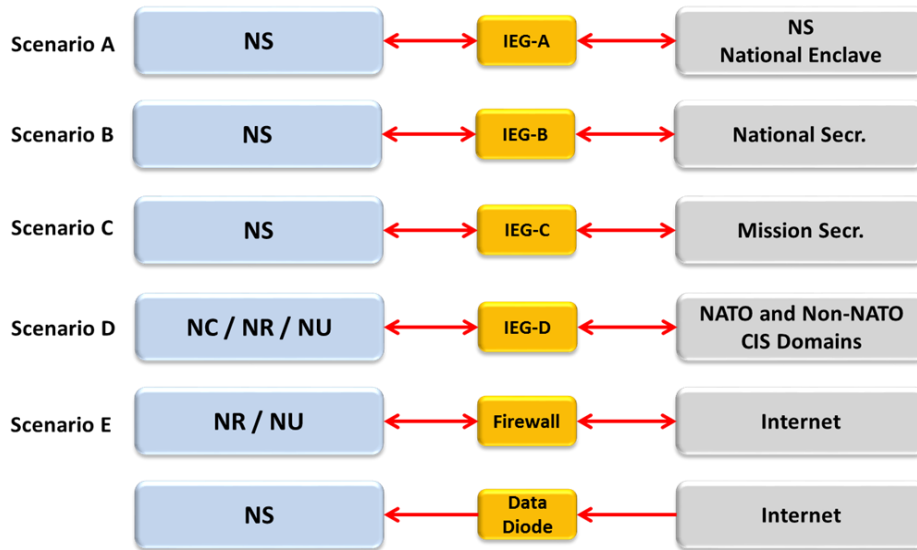
Requirement Property :  
 Domain for Static : Both  
 Domain for Afloat : Both  
 Baseline : BL 1  
 Qualific. Method : Test

**5.2.2.2.2. IEG**

TRITON will make use of IEGs provided by the Purchaser. The Data Diode and IEG-A will be used according to current regulations. Other types of IEGs may be used in future depending on the operational needs and approval status.

**IEG Scenarios:**

The currently identified IEG Scenarios are shown below:



[T1-R1643] *TRITON shall be able to use the IEG-A to securely exchange information with Nations on National Enclaves.*

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

[T1-R1644] *TRITON shall be able to use IEG-C to securely exchange information with Mission Network when necessary.*

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

[T1-R1645] *TRITON shall be able to use the existing Data Diode to securely transfer information from the NU Domain to the NS Domain on static sites (e.g. transferring WP from TRITON-NU to TRITON-NS).*

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

[T1-R1646] *TRITON shall make use of the Data Diode to securely transfer information from the NU Domain to the NS Domain on TRITON Deployable Kits.*

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

### 5.2.2.3. Web Security Features

#### 5.2.2.3.1. Validation of Input

Improper validation of input from Web requests may expose vulnerabilities that an attacker can use to attack backend components (e.g. databases) through the Web application.

All input values will be validated if they are of correct type and within the allowed limits. For example, when a user enters a course value, the system will check that the entered value is between 0.0 and 359.9. If not, the user will be notified. Following values are subject to validation:

- Data types (e.g. string, integer, real)
- Allowed character sets
- Minimum and maximum length
- Whether null is allowed
- Whether the actual parameter is required or not
- Whether duplicates are allowed
- Numeric range
- Specific patterns (e.g. regular expression)
- Maritime specific values (e.g. ship speed must be less than 100 kts, geographic positions must be in degrees).

[T1-R1647] *TRITON shall validate all user input at the front end of the User Interface before accepting and using it.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

[T1-R1648] *TRITON shall automatically validate the entries, given in the Descripton, into TRITON to ensure that they conform to the required formats and limits.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

#### 5.2.2.3.2. Enforcement of Access Control

Improper access control features can be exploited to access other users' accounts, view sensitive files or use unauthorised functions.

##### **Forced Browsing:**

Forced browsing is an attack the aim of which is to enumerate and access resources that are not referenced by the application, but still can be accessible.

##### **Path Traversal:**

A path traversal attack is one that aims to unauthorised navigate through the file system and access files and directories that are stored outside Web root folder, particularly by manipulating variables that reference files with "dot-dot-slash (../)" sequences. Path traversal attacks include providing relative path information as part of a request (e.g. ../../etc/passwd). TRITON will prevent "path traversal" past access control checks.

[T1-R1649] *TRITON shall ensure that privilege restrictions of authenticated users are properly enforced.*

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

[T1-R1650] *TRITON shall not rely on the secrecy of identification information (i.e. IDs) for protection.*

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

[T1-R1651] *TRITON shall prevent Forced Browsing, as defined in the Description, past access control checks.*

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

[T1-R1652] *TRITON shall prevent Path Traversal, as defined in the Description, past access control checks.*

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

[T1-R1653] *TRITON shall securely configure and enforce file permissions. Unless specifically authorised by the Purchaser, only files that are specifically intended to be presented shall be marked as readable. Best practices suggest that most directories should not be readable, and very few files, if any, should be marked as executable.*

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

[T1-R1654] *TRITON shall prevent compromise of information via client-side caching, including best practice use of mechanisms such as HTTP headers and meta tags.*

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

### 5.2.2.3.3. Authentication and Session Management

Improper protection of account credential or session may compromise passwords, keys, session cookies or other tokens, allowing an attacker to bypass authentication restrictions or assume other Users' identities.

[T1-R1655] *TRITON shall use the Directory Services or operating system to authenticate a user. TRITON shall not maintain its own set of usernames and passwords.*

Requirement Property :  
Domain for Static: Both

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

[T1-R1656] *TRITON shall ensure that account credential and session tokens are properly protected.*

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

[T1-R1657] *TRITON shall lock user accounts for which a configurable number of failed authentication attempts have been made to await administrator action. By default, TRITON shall lock user accounts after three (3) failed login attempts.*

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

[T1-R1658] *TRITON shall protect authentication details in the storage. All authentication details shall be stored in either hashed or encrypted form to protect them from exposure, regardless of where they are stored.*

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

[T1-R1659] *Authentication details shall not be hard-coded in any part of the source code. Decryption keys shall be strongly protected to prevent unauthorised access.*

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

[T1-R1660] *TRITON shall protect user credentials in transit. TRITON shall employ encryption of the entire authentication transaction using SSL or similar technologies.*

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

[T1-R1661] *TRITON shall protect session IDs. TRITON shall protect the user's entire session via SSL to ensure that the session ID (e.g. session cookie) cannot be read off the network. Session IDs shall never be included in any URL or sent in the referrer header to prevent caching by the browser. Session IDs shall be long, complicated random numbers which cannot be easily guessed. Session IDs chosen by a user shall not be accepted.*

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

[T1-R1662] *TRITON shall not submit authentication and session data as part of a GET. Authentication pages shall be marked with all varieties of the no cache tag to prevent use of the back button in the web browser and re-submission of the credentials. Best practices suggest the use of "autocomplete=false" flag to prevent storing of credentials in autocomplete caches.*

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

[T1-R1663] *TRITON shall allow the System Administrator to set a "timeout" period which shall automatically log-out any sessions which have been inactive for that period of time. The system administrator shall be able to disable this feature.*

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

[T1-R1664] *TRITON shall allow the System Administrator to prevent multiple concurrent authentications from the same user from different locations (IP addresses). The system administrator shall be able to disable this feature.*

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

**5.2.2.3.4. Cross-Site Scripting**

Without proper protection, a Web application can be used as a mechanism to transport an attack to an end user's browser, causing a user's Web browser to execute a malicious script. A successful attack can disclose an end user's session token, attack the local machine or spoof content to fool the user. TRITON will take precautions to prevent Cross-Site Scripting (XSS). Best practice suggests Conversion of Characters given below to the appropriate HTML entity encoding:

Character	Encoding
>	&#60
<	&#62
&	&#38
"	&#34
'	&#39
(	&#40
)	&#41
#	&#35
%	&#37
+	&#43
-	&#45

[T1-R1665] *TRITON shall perform validation of all headers, cookies, query strings, form fields and hidden fields.*

Requirement Property :  
 Domain for Static: Both

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

[T1-R1666] *TRITON shall ensure that the HTTP TRACE method is turned off on all Web servers to prevent compromise of cookie data.*

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

[T1-R1667] *TRITON shall encode user-supplied output using the best practices for Conversion of Characters to prevent XSS.*

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

### 5.2.2.3.5. Injection Flows

Web applications pass certain parameters when they access external systems or the local operating system. If an attacker can embed malicious commands in these parameters, the external system may execute those commands on behalf of the web application. Injecting valid SQL queries through the username and password fields could allow the application to send the query through to the database, allowing the attacker to query the database or authenticate using someone else's credentials.

[T1-R1668] *TRITON shall constrain the input by validating it for type, length, format and range.*

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

[T1-R1669] *TRITON shall use type-safe SQL parameters. Input shall be treated as a literal value, and TRITON shall not treat it as executable code.*

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

[T1-R1670] *TRITON shall use filter routines that sanitise the code, adding escape characters that have special meaning to SQL.*

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

[T1-R1671] *TRITON shall create custom error pages to prevent server error messages from being disclosed.*

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

Qualific. Method : Inspection

### 5.2.2.3.6. Buffer Overflow

Web application components that do not properly validate input can be 'crashed', and in some cases used to take control of a process. These components can include CGI, libraries, drivers and web application server services or components. An attacker may take full control of the system being targeted or kill a process.

[T1-R1672] *TRITON shall be configured with the latest patches to the web and application server products.*

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

[T1-R1673] *TRITON shall ensure that application code which accepts input from Users via the HTTP request provides appropriate size checking on all inputs.*

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

### 5.2.2.3.7. Improper Error Handling

Improper handling of error conditions which occur during normal operation can expose vulnerabilities. If an attacker can cause errors to occur that the web application cannot handle, they may gain detailed system information, deny service, cause security mechanisms to fail or, in some cases, crash the server.

[T1-R1674] *TRITON shall use custom error pages to prevent server error messages from being disclosed.*

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

### 5.2.2.3.8. Unsecured Storage

Web applications can use cryptographic functions to protect information and credentials. These functions and the code to integrate them have proved difficult to code properly, resulting in weak protection.

[T1-R1675] *TRITON shall properly apply selected asymmetric encryption mechanisms (SSL and SQL server security mechanisms) according to the standards approved by NATO Infosec Technical Centre (NITC) to protect information and credentials.*

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

### 5.2.2.3.9. Application Denial of Service

Due to application coding errors, it may be possible for an attacker to consume web application resources to a point where other legitimate Users can no longer access or use the application. Attackers may also be able to lock Users out of their accounts or cause the entire application to fail. TRITON will protect itself against application denial of service using best practices.

[T1-R1676] *TRITON shall protect itself against application denial of service using best practices.*

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

[T1-R1677] *TRITON shall limit the number of resources allocated to any user to a bare minimum. For authenticated users, TRITON shall consider implementing quotas to limit the amount of load a particular user can put on the system.*

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

[T1-R1678] *TRITON shall limit the number of requests a user can have active at any one time.*

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

[T1-R1679] *TRITON shall avoid unnecessary access to databases or other expensive resources. Consideration should also be given to caching the content received by unauthenticated Users instead of generating it or accessing databases to retrieve it.*

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

### 5.2.2.3.10. Unsecured Configuration Management

A strong server configuration standard is critical to secure a Web application. These servers have many configuration options that affect security and are not generally secure by default. For example, if a Web application is not secured, an attacker may be able via directory traversals to get to directories where authentication details are stored.

TRITON will secure its configuration using the following best practices:

- Disabling unused services on the TRITON Servers
- Disabling default accounts, and accounts no longer used
- Correctly configuring permissions and accounts
- Correctly configuring logging and alerts

[T1-R1680] *TRITON security mechanisms shall be properly configured according to the best practices.*

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

Qualific. Method : Inspection

[T1-R1681] *TRITON components and software elements shall be configured with the latest security patches and updated with the latest security guidelines from the NATO Information Assurance Technical Centre (NIATC).*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

### 5.2.2.4. File System

TRITON will support accessing to the file system using MS Windows standards. The (Secure) Bi-SC AIS-supported devices are given below:

- Local drives:
  - NTFS drives
  - FAT16 drives (floppy disk)
  - FAT32 drives
- Remote (network) machines mapped by drive letters and UNC paths
- Compressed/uncompressed drives.

[T1-R1682] *TRITON shall support access to the file system using MS Windows standards, including long file names and legal naming characters.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

[T1-R1683] *TRITON shall allow saving to and opening from the (Secure) Bi-SC AIS-supported devices given in the Description.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

### 5.2.3. Accountability, Auditability and Non-Repudiation

Accountability is the degree to which the actions of an entity can be traced uniquely to the entity. TRITON is to provide and record traceability of changes (data, objects, products, key data elements) for use by authorised users to:

- Gather further information about the data element in question
- Resolve conflicts
- Classify data elements according to their sources
- Discover and remove errors.

Non-repudiation is the degree to which actions or events can be proven to have taken place, so that the events or actions cannot be repudiated later. TRITON will ensure non-repudiation through Logbook Function (Maritime) and Audit Logging mechanism.

### 5.2.3.1. Audit Logging

TRITON will be able to record all errors and faults and trace them for auditing and non-repudiation purposes.

[T1-R1684] *TRITON shall provide audit capability for all types of Maritime Information Entities by recording important events into Audit Log.*

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

[T1-R1685] *TRITON shall use the details of the External Service user and of the Logged-in User to maintain the audit traceability.*

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

[T1-R1686] *TRITON traceability mechanisms shall be embedded in the data itself and independent of the way data are exchanged.*

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

[T1-R1687] *TRITON audit tracing system shall be permanently effective.*

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

[T1-R1688] *All errors and faults in TRITON shall be recorded in an Error Log which shall be centrally and locally maintained.*

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

[T1-R1689] *TRITON Error Log and Audit Log shall contain all required information in order to provide the support staff with interpretable and comprehensive information about the cause and nature of the error/change.*

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

[T1-R1690] *TRITON shall allow the authorised user to view the audit traceability for the objects authorised for a user.*

Requirement Property :  
 Domain for Static: Both

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

[T1-R1691] *TRITON shall allow the authorised user to view faults and errors in the Error Log.*

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

[T1-R1692] *TRITON shall allow the authorised user to select the events to be logged in the Audit Log.*

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

### 5.2.3.2. User Auditing

TRITON will be able to record all user activities in traceable User Audit Logs.

[T1-R1693] *TRITON shall record in traceable Audit Logs all selected transactions, database activities, technical events (e.g. dataset synchronisation, directory replication) and accessing of data.*

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

[T1-R1694] *TRITON shall ensure that any Information Object can always be traced to its original source (i.e. Organizational Node, User and/or system).*

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

[T1-R1695] *TRITON shall maintain a record of the date, time and user that created an Information Object in the Audit Log.*

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

[T1-R1696] *TRITON shall maintain a record of the date, time, details of the change and user that last modified an Information Object.*

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

[T1-R1697] *TRITON shall support audit trailing to all user and TRITON system actions and user activities if so configured.*

Requirement Property :  
 Domain for Static: Both

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

[T1-R1698] *TRITON shall log all configurations changes with the trace to persons or systems if so configured.*

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

[T1-R1699] *TRITON shall log the use of all system functions and their corresponding messages including data exchanges with the trace to persons or systems if so configured.*

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

[T1-R1700] *TRITON shall log a user action by user, timestamp and function name(s) if so configured.*

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

[T1-R1701] *TRITON shall log changes by user, timestamp, field name, new value and old value if so configured.*

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

### 5.2.3.3. System Monitoring

#### Auditable Events:

TRITON will log each of the following Auditable Events in the Audit Log:

- System start-up and shutdown
- Log-on and log-off of individual users
- Changes to permissions and privileges of users and groups
- Changes to security relevant system management function
- Any access to audit log
- Deletion, creation or alteration of the security audit records
- All privileged operations
- All updates of system access rights
- All attempts to delete, write or append the audit files.

#### System Events for Warning:

- Low network bandwidth : Organizational Node-specific
- Almost out of disk space : TRITON Server specific
- Almost out of table space : TRITON Server specific.

#### System Events for Error:

- Crashing of software components
- Unplanned and recovering of a connection with a terminator
- Incorrect received data
- Replication failure.

[T1-R1702] *TRITON shall record each of the Auditable Events given in the Description in the Audit Log.*

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

[T1-R1703] *TRITON shall associate individual user identities to Auditable Events, and shall include date and time of the event, type of event, user identity, and the outcome (success or failure) of the event.*

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

[T1-R1704] *TRITON shall notify the authorised user and the Enterprise Management System when the Audit Log reaches ninety-percent (90%) of its maximum permitted size.*

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

[T1-R1705] *TRITON shall archive the Audit Log after a period of time as configured by the authorised user. By default the log shall be archived after forty-eight (48) hours of Logging Period. If the log activity reaches the limit of the log file size before the Logging Period completed, TRITON shall create another log file and continue logging with notification to the authorised user.*

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

[T1-R1706] *TRITON shall use integrity checking countermeasures to ensure that the Audit Log has been archived successfully after each archiving process.*

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

[T1-R1707] *TRITON shall generate warning for the System Events for Warning given in Description.*

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

[T1-R1708] *TRITON shall generate error condition for the System Events for Error given in the Description.*

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

- [T1-R1709] *TRITON shall allow the authorised user to display system events using standard system management tools like the MS Windows Management Console and TRITON System Technical Management functions.*

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

- [T1-R1710] *TRITON shall allow the authorised user to filter and sort system events by date/time range, event Identifier, event type, category, description text, Operating System (OS) User/OS User Group, or source.*

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

- [T1-R1711] *TRITON shall allow the authorised user to perform system event log clearing and backup.*

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

- [T1-R1712] *TRITON shall be able to generate debug messages with multiple levels of verbosity.*

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

- [T1-R1713] *TRITON shall allow the authorised user to dynamically set (i.e. a node configuration setting) the level of verbosity for debug messages.*

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

- [T1-R1714] *TRITON shall notify the user when a system event of type "Error" arises.*

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

- [T1-R1715] *TRITON shall log a memory dump of the whole system when TRITON Server crashes.*

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

Baseline : BL 1  
 Qualific. Method : Inspection

[T1-R1716] *TRITON shall be able to maintain a Performance Log, selectively (i.e. as a configuration setting) logging queries and accesses to Maritime Information Entities.*

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

[T1-R1717] *TRITON shall allow the authorised user to review the Performance Log.*

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

### 5.2.4. Authenticity

Authenticity is the degree to which the identity of a subject or resource can be proved to be the one claimed. Following Authentication Standards will be applicable:

- Microsoft Active Directory, ver 2008 R2
- Kerberos, Open Group - Kerberos, version 5
- LDAP related protocols.

[T1-R1718] *TRITON shall implement Identification and Authentication (I&A) for uniquely identifying and authenticating users.*

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

[T1-R1719] *TRITON shall comply with the Authentication Standards given in the Description.*

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

### 5.2.5. Authorisation

Authorisation consists of ensuring that the consumer is able to perform a particular action on a resource. TRITON User Management function will be used to handle authorisation.

[T1-R1720] *TRITON shall provide authorisation for an authenticated user after login. The associated privileges shall be given to the user during the authorisation.*

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

## 5.2.6. Confidentiality

Confidentiality is the degree to which a product or system ensures that data are accessible only to those authorized to have access.

Confidentiality of TRITON will ensure that data is not disclosed to unauthorised parties, usually through the use of encryption. It will display the Security Classification of the current environment.

In line with C-M(2002)49-COR5, the Security Classification in TRITON will include:

- Authority: Policy Identifier/ Information Ownership, e.g. NATO, NATO/EAPC (Euro-Atlantic Partnership Council), ISAF (International Security Assistance Force);
- Classification: Classification marking, e.g. NS, MS, NR, NU;
- Releasability: Category/Caveats, e.g. Releasable to AUS/FIN, Releasable to ISAF, Releasable to Coalition.

[T1-R1721] *TRITON shall protect its data for confidentiality purposes.*

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

[T1-R1722] *TRITON shall ensure that Security Classifications are automatically included into all TRITON products (showing the highest classification of information they contain).*

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

[T1-R1723] *TRITON shall provide visual confirmation to users of the Security Classification of the displayed data. The visual confirmation shall include a configurable colour-based visual cue in addition to text to indicate classification. The highest Security Classification shall be displayed as the Header on both AppView and GeoView.*

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

[T1-R1724] *TRITON shall use the Security Classification as a domain value for each Maritime Operation.*

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

[T1-R1725] *TRITON shall insert a Security Classification construct into headers/footers and metadata of generated, created or exported reports, MS Office files and PDF files. The user shall be prompted during the process. By default TRITON shall propose the highest classification level of the selected objects. If no classification is specified for the selected objects, then the repository classification level shall be proposed. The user shall be able to override the proposed classification level by choosing another level.*

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

Baseline : BL 1  
 Qualific. Method : Inspection

[T1-R1726] *For generated or export file formats that do not use headers/footers (e.g. screen, print-out, MS Excel files) TRITON shall include the Security Classification of a file into an appropriate part of the file so that it is clearly visible to users.*

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

## 5.2.7. Data Protection Policy

Data integrity is the degree to which a system, product or component prevents unauthorized access to, or modification of, computer programs or data.

TRITON must be used in compliance with the "TRITON Data Protection Policy" to provide data integrity. The policy affords protection according to the following outline conditions which must be supported by appropriate technical and/or procedural measures as required.

### 5.2.7.1. Protection of System and Maritime Information

TRITON will be able to protect its own software and all the Maritime Information it uses.

[T1-R1727] *TRITON shall ensure that the system, the information and functionalities are only available to authorised users using authorised functionality.*

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

[T1-R1728] *TRITON shall ensure that access to system and information available users only via authorised TRITON applications, unless specifically authorised.*

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

[T1-R1729] *TRITON shall ensure that mechanisms to provide access to system and information via authorised TRITON applications shall not, as a side effect, also provide access via non-authorised applications.*

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

[T1-R1730] *Maritime Information Entities within TRITON shall be updated/removed by only authorised users.*

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

[T1-R1731] *TRITON shall prevent access by non-TRITON Users (e.g. external systems) to Maritime Information Entities marked as unfinished products.*

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

[T1-R1732] *TRITON shall ensure that unfinished products are not shared with, or included in data exchanges with other systems.*

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

[T1-R1733] *TRITON shall contain residual information protection mechanisms to ensure that deleted information is no longer accessible (i.e. information that has been logically deleted).*

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

[T1-R1734] *TRITON shall ensure that newly created objects do not contain information that shall not be accessible.*

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

[T1-R1735] *TRITON shall prevent a user to open simultaneously more than one 'database' (e.g. operational, training, exercise) being opened by a single TRITON application execution.*

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

### 5.2.7.2. Protection of Licensed Information

Some information (e.g. Maritime Datasets, LRIT feeds) within TRITON may be subject to licensing agreements. Access control will be applied to this type of data.

[T1-R1736] *TRITON shall be able to restrict the access to collections of information based on user attributes (e.g. Country, Organization).*

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

[T1-R1737] *TRITON shall allow the access to collections of information to be limited based on the number of simultaneous users.*

Requirement Property :  
 Domain for Static: Both

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

[T1-R1738] *TRITON shall allow the auditing of access to collections of information (e.g. number of simultaneous users).*

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

### 5.2.7.3. Protection of Personal Information

TRITON will protect personal information such as user profile, workspace, data related to persons.

[T1-R1739] *TRITON shall provide protection and management of Personal Information (e.g. User Profile and expertise information) held within TRITON.*

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

[T1-R1740] *TRITON shall provide protection and management of information related to people such as Person of Maritime Interest.*

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

## 5.3. Safety Requirements

TRITON will not require any safety precautions as it does not have any interface with weapons or emitting systems. Only operator safety due to using workstations will prevail.

### 5.3.1. Safety at Static Deployment

Safety rules at static sites will be applicable.

### 5.3.2. Safety at Afloat Deployment

Deployable Kits will be used on board ships, safety regulations will apply. The portable equipment will be fixed accordingly.

[T1-R1741] *The TRITON Deployable Kits shall be able to withstand ship movements at Sea States at least seven (7) without harming surrounding equipment and personnel.*

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

[T1-R1742] *The TRITON Deployable Kits shall be able to withstand instantaneous shocks up to one G from any direction without causing any harm to surroundings (i.e. no parts or pieces will be scattered around).*

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

[T1-R1743] *Each carrying case of the TRITON Deployable Kit shall be carried safely by two persons.*

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

[T1-R1744] *Each carrying case of the TRITON Deployable Kit shall be safely lifted by a crane using its designated handles.*

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

## 5.4. Computer Resource Requirements

All instances of TRITON at static sites will run on the Virtualised Environment provided by the Enterprise Data Centres. The infrastructure components, hardware and software, are described below.

### Hardware:

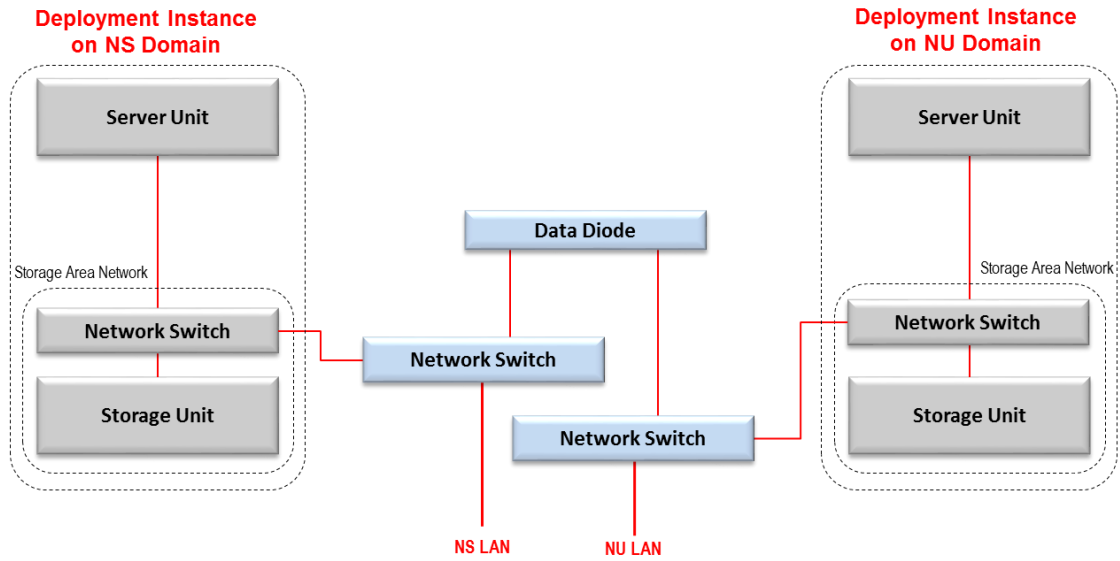
The typical specification of the main hardware components used static sites are given below as example (upgraded hardware may be available at the time of TRITON installation):

- Server Unit
  - Minimum 2 CPUs with 10 core per CPU
  - Intel Xeon 3GHz Level 2 cache or higher model CPU
  - 19 inch rack mountable, not exceeding 8RU (1 Rack Unit = 4.44 cm)
  - 256GB or more memory
  - Dual embedded Gigabit network interface with load balancing and fail-over support
  - Integrated full HD graphics support with HDMI
  - Minimum 2 USB ports
  - At least 1TB or more SCSI or SATA Hard Disk Drive
  - On-board, integrated SCSI or SATA Controller supporting RAID 0/1/1+0/5
  - Fibre Channel Host Bus Adapter (HBA), 64-bit PCI to 2GB FC multi-mode (duplex) optical interface with auto speed negotiation, 2GB/1GB auto sensing, dual homed
  - USB mouse/keyboard ports,
  - Management functions (Integrated SNMP, Performance, Storage, Remote Management)
- Storage Unit
  - 10TB or more storage capacity
  - Minimum 8 server attachments to a single array
  - Hot pluggable drives
  - SATA Disk Drive support
  - 19 inch rack mountable, not exceeding 4RU
  - Redundant controllers

- High availability (hot spare disk drive support, multi-path failover, snapshots, cloning, cloning, local/remote mirroring, non-disruptive upgrades)
- On-board 512MB battery-backed cache,
- RAID 0, 1, 4 support
- 2GB disk cache
- 2GB / 1GB Fibre Channel Frequency Capable Support, 200 Mbytes/sec data transfer throughput to all SAN clients
- Primary & Secondary Interlink (ICL) interfaces
- Management functions (global online spare rebuild, online storage capacity expansion, multiple host storage access, remote configuration & monitoring, cluster aware, point in-time snapshots, interoperability with one or more systems management frameworks, MS SMS and MOM, compatible with common enterprise backup software products)
- Network Switch
  - 8 x External (user accessible) 2GB ports
  - 19 inch rack mountable, Small Form-factor Pluggable (SFP)
  - Universal ports (E, F, FL) Self-configuring (auto-sensing) based on switch type (U port)
  - At least 16 Fibre Channel Switches, supporting minimum 3 ISL hops between any two N Ports
  - Full line-speed switching for each port at 400MB/sec per port, 40,000 cached I/Os per second, Full-Duplex data transfer for each port
  - Full cascade ability for expansion
  - Able to interoperate in a redundant configuration which supports load distribution and static mapping between LUNs and HBAs
  - Hot-pluggable SFP interfaces, 10/100 RJ45 Ethernet (management port), SNMP, Telnet and other management tools/protocols
  - Data transfer over auto-sensing 2GB / 1GB Fibre Channel Frequency Capable (full duplex)
  - Management functions (Fabric Manager to fully support delivered switches, event monitoring, preferably through MS MOM)
- Protective Cases
  - 19 inch standard racks supporting both front and rear component installation in accordance with IEC 297-3
  - 2000mm tall, 800mm wide and 1000mm deep, floor mountable
  - Rack frame, mounting supports, shock and vibration mounts and brackets
  - Lockable, shatterproof glazed glass front door
  - Perforated steel back door
  - At least two 250V-15A power distribution units, each supporting at least 10 outlets
  - Equipment trays shall be installable at a raster of ½ RU
  - Adjustable feet, side panels, perforated top panel, grounding braids for side panels, power distribution to installed equipment with two independent power rails, adequate ventilation/cooling for installed equipment for a normal office environment
- Data Diode
  - An approved commercial product which can be found in NATO Information Assurance Product Catalogue (NIAPC) at <http://www.ia.nato.int>

All indoor equipment will be able to operate under temperatures ranging between +10 degrees C and +35 degrees C, withstanding the accumulation of residual dust and sand as can be expected in moderately sheltered office environment.

The hardware structure (provided at static sites) for TRITON NS and NU is depicted below:



Existing Network Elements on Organizational Nodes and NATO Standard Workstations as Clients will be used to access the TRITON Applications on Servers.

**Infrastructure:**

TRITON will run on an infrastructure with the following components:

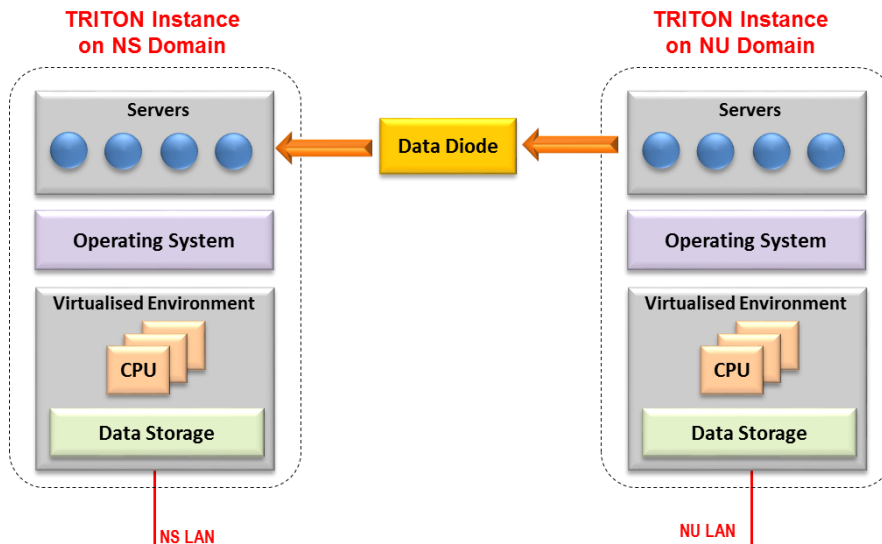
- Virtualised Environment
- Operating System
- Virtualised Server
- Virtualised Data Storage
- Network Configuration
- Client Environment

**5.4.1. Virtualised Environment**

TRITON Operational Software will run on a virtualised environment provided at the Enterprise Data Centres. Virtualised environment will be provided for both NS and NU Domains.

**Virtualised Environment Configuration:**

A sample Virtualised Environment Configuration to run TRITON instances on the NS and NU Domain is depicted below:



The requirements for the infrastructure services needs to be identified in terms of Service Parameters.

**Service Parameters:**

The Service Parameters will include the following:

- Virtual Machine units of specified CPU
- Number of Virtual Machine units
- Memory
- Disk capacity, disk I/O
- Network bandwidth and network I/O parameters
- Security classification of the targeted network.

[T1-R1745] *The TRITON infrastructure requirements for each instance shall be identified in terms of Service Parameters as defined in the Description.*

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

[T1-R1746] *The Virtual Machine Performance Parameters shall be scaled not to exceed fifty percent (50%) load on average in twenty-four (24) hours.*

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

[T1-R1747] *TRITON shall use Open Virtualisation Format, Option B. Mission Participant can create single, pre-packaged appliances and service providers can export and import virtual machines that can run across different virtualisation platforms.*

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

[T1-R1748] *TRITON shall be able to execute in the virtualisation hypervisor environments supported by NATO, namely "MS Hyper-V Server 12 or later" and "VMWare 5.5 or later"MS Hyper-V Server 12 virtualisation surrounding.*

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

[T1-R1749] *The Server deployment package (virtual appliance or installation package) shall be tested against the following-used hypervisors, configured in accordance with NATO Security Settings "VMWare ESXi 5.5 and-or later" and "Microsoft Hyper-V 2012 and-or later".*

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

## 5.4.2. Operating System

Bi-SC AIS Functional Services are currently using Microsoft Windows Operating System (Microsoft Windows Server 2012 R2) on a Virtualised Environment. After IT Modernisation, it will be Microsoft Windows Server 2016. Only the version in AFPL can be used.

Although other operating systems can technically run on the provided Virtualised Environment, due to supportability and maintainability reasons, new Bi-SC AIS Functional Services are expected to be compatible with the existing operating systems. Other solutions which include different operating systems need to be documented in detail with the necessary justification and be subject to Purchaser's evaluation and approval. Such deviation will address complete lifecycle of the proposed stack including but not limited to the integration into NATO Enterprise Management System for Testing, Deployment, Operation, Updating and Troubleshooting.

[T1-R1750] *TRITON shall use a COTS Operating System on a Virtualised Environment. If the proposed solution does not use MS Windows, it shall be specified, documented, justified and the necessary licenses shall be provided.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1751] *TRITON shall comply with the latest versions of the operating system available and supported by the Bi-SC AIS Servers and Workstations. This should include all versions of the operating systems planned to become available for the Bi-SC AIS prior to the TRITON System Integration Tests.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1752] *The Operating System selected for TRITON shall have an operating lifetime of at least five (5) years. Any deviations shall be described and justified in the Obsolescence Management Plan (OMP). Standard documentation shall be provided.*

Requirement Property :

Domain for Static: Both

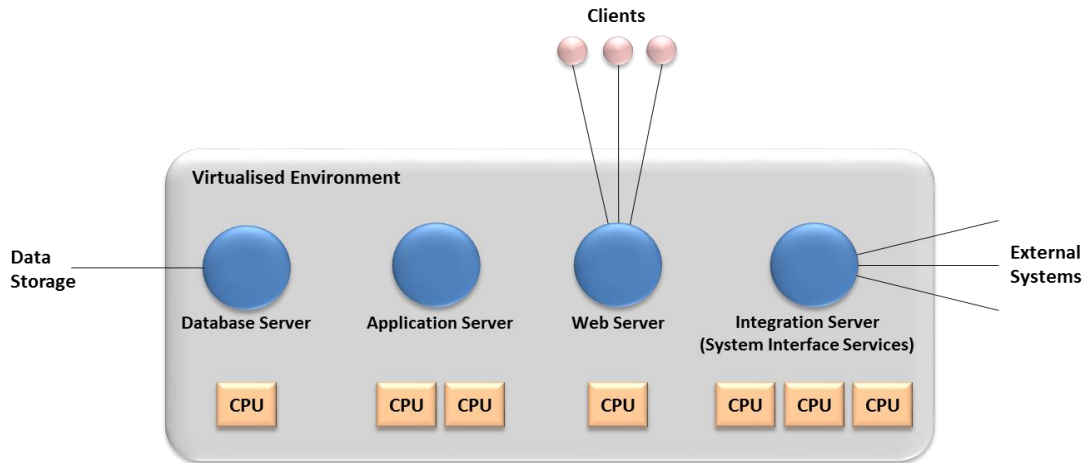
Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

## 5.4.3. Virtualised Servers

TRITON will utilise Virtualised Servers running on the Virtualised Environment. A sample Virtualised Environment is depicted below:



The servers, their functionality and CPU allocation will be determined during the System Design considering the performance, scalability and load balancing.

**Server Components:**

The Virtualised Server will use the following Server Components:

- Operating System (The proposed Operating System or Microsoft Windows Server 2016 (or later))
- Database Server
- Web Server Software
- Virus Scan Software
- Backup Software
- Compression Software

[T1-R1753] *TRITON shall be able to utilise Virtualised Server provided by the Virtualised Environment.*

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

[T1-R1754] *TRITON Virtualised Server shall be designed considering performance, scalability and load balancing factors.*

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

[T1-R1755] *TRITON Virtualised Server shall use the Server Components given in the Description. Any necessary third-party software and licenses shall be provided for each instance of TRITON.*

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

[T1-R1756] *TRITON Virtualised Server shall be compatible with the native file system used on NATO Servers. Any deviation shall be documented in detail with justification and be subject to the Purchaser's evaluation and approval.*

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

Baseline : BL 1  
 Qualific. Method : Inspection

#### 5.4.4. Virtualised Data Storage

TRITON will utilise the Data Storage Service provided on the Virtualised Environment according to the Service Parameters.

The TRITON Operational Software must be isolated from the physical parameters of the Data Storage environment.

[T1-R1757] *TRITON shall be able to utilise Virtualised Data Storage provided by the Virtualised Environment.*

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

[T1-R1758] *The TRITON Operational Software shall not have any direct dependency to the physical parameters of the storage environment (such as disk type, connection type, Storage Area Network and protocol) provided by the Virtualised Environment.*

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

[T1-R1759] *All UNC, File Path, Drive Letter or similar storage location settings used in TRITON Virtualised Data Storage shall be parametric, configurable, and possible to automate for unattended installation, backup, recovery. No hard-coded location setting shall be used.*

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

#### 5.4.5. Third-Party COTS Software

TRITON may use third-party COTS Software or Open Source Software to support its functions.

##### **Infrastructure Software:**

The minimum specifications for such software, if used for infrastructure, are given below:

- Operating System: Microsoft Windows Server 2016 (or later)
- Database Management System/Server: Microsoft SQL Server 2014 (or higher), or Oracle 11g (or higher) or PostgreSQL Version 9 (or higher)
- Web Server Software: Microsoft Internet Information Services (IIS) (Version 6 (or higher) or Apache HTTP Server Version 2.0 (or higher) or Eclipse Jetty Version 9 (or higher))~~(use of TOMCAT or JETTY can be evaluated upon request)~~
- Virus Scan Software (Server): ~~if not~~ McAfee Total Virus Defence Suite (for TDKs only), ~~to be provided by the Contractor~~
- Backup Software: Veritas Backup Exec Advanced Server (for TDKs only)
- Compression Software: Operating system feature or Winzip or equivalent

[T1-R1760] *TRITON may use third-party COTS Software or Open Source Software to support its Infrastructure Software. Samples are given in the Description.*

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

[T1-R1761] *The third-party COTS Software shall be the latest commercial version with the latest updates, unless agreed by the Purchaser.*

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

[T1-R1762] *The licensing for all third-party COTS Software components (including versions/editions, client access licenses, etc.) shall allow the component to take full advantage of the number of allocated processors and memory of the Virtualised Server to support the maximum number of users.*

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

[T1-R1763] *All third-party COTS Software shall have standard product documentation, a product support and validity time of at least five (5) years. Any deviations shall be described in the Obsolescence Management Plan.*

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

[T1-R1764] *TRITON may use COTS Software in its architecture in place of dedicated solutions when the functionalities of a COTS product matches the requirements for a service with no or minimal adaptation.*

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

[T1-R1765] *When COTS solutions are used, adaptations shall be delivered as additional services that complement the COTS Software native functionalities.*

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

#### 5.4.6. Network Configuration

TRITON will utilise the site LAN for connecting to NSWAN and other systems/services on the network. The Operational Software must be isolated from the physical parameters of the network.

[T1-R1766] *All URL, DNS, IP Addressing and similar network settings used in TRITON shall be parametric, configurable, and possible to automate for unattended installation, backup, recovery. No hard-coded address settings shall be used.*

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

## 5.4.7. Client Environment

TRITON Client will be able to run on Standard NATO Bi-SC AIS Workstations connected to the appropriate LAN (NS or NU Domain) to access TRITON Servers. Bi-SC AIS Functional Services are currently using Microsoft Windows 7 as the workstation operating system. After the IT Modernisation, it will be Microsoft Windows 10.

### Client Configuration:

Considering the future IT Modernisation, following is a standard Client Environment with minimum specifications:

- Workstation : Desktop, Laptop or Thin Client computer (only those laptops approved by the Purchaser)
- CPU : Intel-based, multiple cores
- RAM : 4 GB
- Disk Space : 120 GB (for desktops and laptops)
- Graphics : Minimum integrated graphics
- Desktop Monitors : 1 x 25", 2 x 20", 2 x 24", Possibly touch screen
- Resolution : Minimum 1920 x 1080 (Full HD), 1920 x 1600 or higher are preferred
- Laptop Monitor : min. 15" Possibly touch screen
- Operating System : Microsoft Windows 10 or higher (including 32-bit and 64-bit editions)
- Browser : Microsoft Internet Explorer 11 (or higher) or a secondary browser approved by the Purchaser (current alternative is Firefox ESR 45)

[T1-R1767] *TRITON Client shall be able to run on a NATO Standard Workstation with the Client Configuration given in the Description.*

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

[T1-R1768] *TRITON Client installation requirements (workstation software, add-ons, plug-ins) shall be clearly defined in advance and their use shall be subject to approval of the Purchaser.*

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

[T1-R1769] *TRITON GUI shall be able to handle normalised input events which are not bounded to an input device. The GUI should have growth potential to be used on mobile devices with touch screens conforming to [W3C WBMP].*

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

Baseline : BL 3  
 Qualific. Method : Inspection

## 5.5. Design and Construction Constraints

### 5.5.1. Reference Architecture

The NATO Reference Architecture includes the following basic elements:

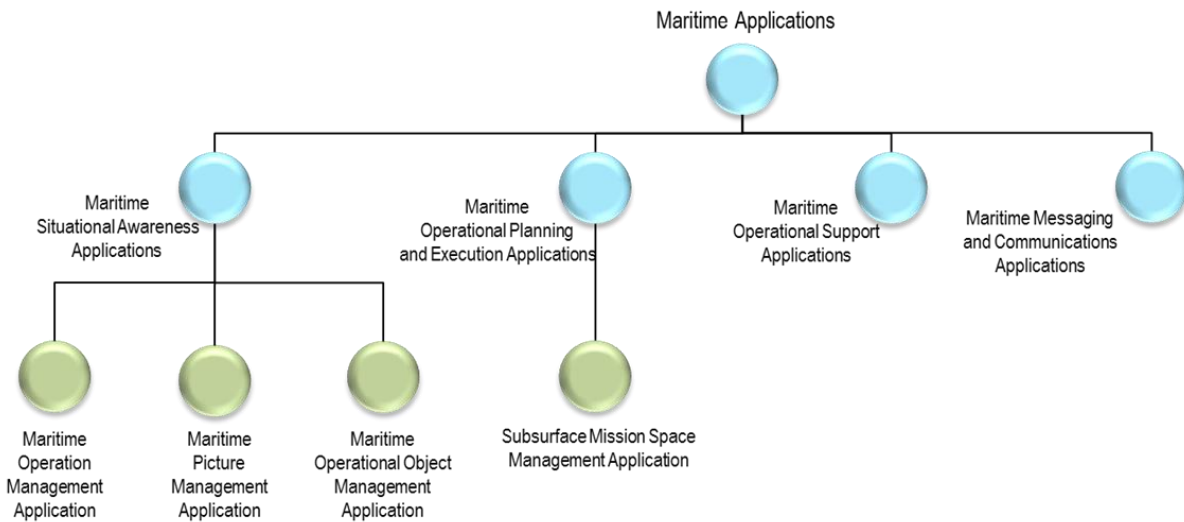
- User Applications
- Technical Services
- Information Products

#### 5.5.1.1. User Applications

User Applications, also known as application software, software applications, applications or apps, are computer software components designed to help a user perform singular or multiple related tasks. User Applications run on User Appliances and provide the logical interface between human and automated activities. Within the C3 Taxonomy and based on TOGAF 9, the objective of the "User Applications" layer is to "define the major kinds of application system necessary to process the data and support the business".

User Application descriptions identify information and functional requirements for the user to perform specific tasks. The Application's context within a Community of Interest (COI) determines whether information and/or function is the primary discriminator used to build the User Application hierarchy.

TRITON User Applications will be determined according to the functions defined in this SRS. Following diagram gives an example of such a decomposition. The User Applications in leaf positions (green) will be the actual running components that the user will activate.

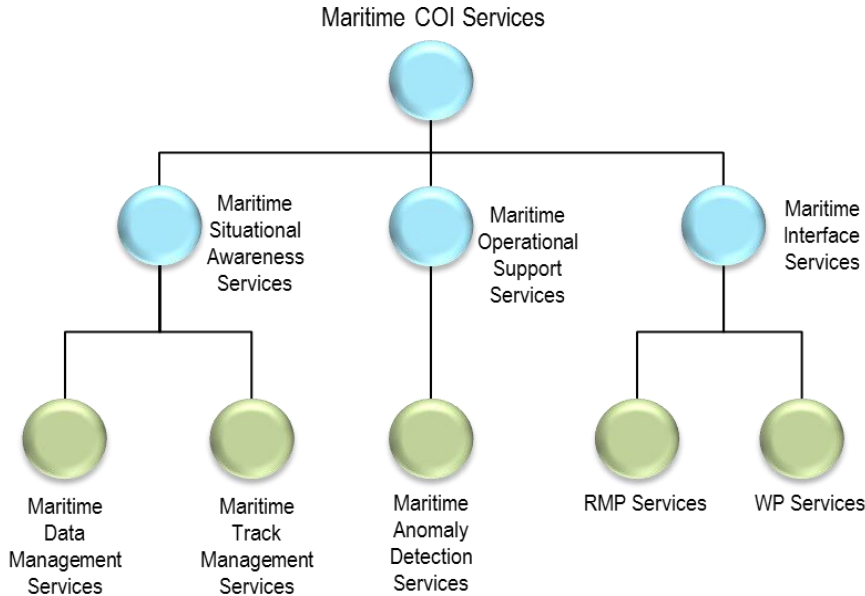


#### 5.5.1.2. Technical Services

Technical Services provide the foundation for NATO's Network Enabled Capabilities. Technical Services are implemented using a federated model that allows NATO and the Nations to jointly provide a robust and secure platform on top of which applications can be run. Technical Services must support all NATO mission types and should be transparent to operational users. Technical Services must implement agreed and open standards and must exhibit plug-and-play properties.

Core Enterprise Services (CES) are a Set of Common Information Services that support all COIs and must be available to all members.

COI-Specific Services are network-enabled services that support one or many collaborative groups of users with shared goals, interests, missions or business processes. The services are primarily meant for COI consumption. They provide functionality required by particular C3 and C4ISR user communities in support of NATO operations and exercises during peacetime, crisis and conflict. TRITON Technical Services are considered as COI-Specific services and located under the "Maritime COI Services" group as notionally illustrated below:



### 5.5.1.3. Information Products

An Information Product is considered to be a final product in the form of information that a person needs to have. Information Products may contain a number of information elements in various forms such as facts, data, or opinions. An Information Product may be a document, a Formatted Message or a collection of information from a database. When made available through services information products can be produced or consumed by User Applications either in the same Functional Service or from other Functional Services.

Some of the Information Products that will be supported by TRITON Applications have already been defined in the Reference Architecture. The definition of the Information Products will be finalised at System Design. Some of the Maritime Information Objects can be defined as Information Products.

### 5.5.2. Architectural Views

TRITON will use the NATO Architecture Framework (NAF), Version 3.0 [\[AC/322-D\(2007\)0048\]NAF-3](#) as the reference for generating architectural views together with the NATO Maritime Reference Architecture which defines the exchange of Information Products between Functional Services. The services to be delivered under Project TRITON will develop the Information Products and facilitate the information exchange as defined in that model [and \[C3TAXO\]](#). The architecture will be developed based on the Architecture Development Method described by The Open Group Architecture Framework (TOGAF) [TOGAF] version 9 or higher.

[T1-R1770] *TRITON shall be designed considering ~~with~~ the standards given in the section "Applicable Standards". Any proposed deviation shall be subjected to the Purchaser's approval.*

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

Qualific. Method : Inspection

[T1-R1771] *The proposed software architecture, development environment, middleware and the separation of components (Human-Machine Interface, Business and Data) for TRITON shall be documented and explained in detail.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1772] *TRITON shall expose selected functionality as Technical Services, as components of SOA to encourage reuse and interoperability with other applications in a distributed way. The criteria used for selection of functionality shall be documented.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1773] *The TRITON Technical Services shall comply with the C3 Taxonomy [C3TAXO].*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1774] *TRITON shall, where applicable, make use of Representational State Transfer (REST) architecture according to the Service Interface Profile given in [NCIA-06.02.07] to make resources available over a URL in promotion of interoperability.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1775] *The TRITON design process shall balance design implementation with cost for implementation and support to minimise life cycle cost. TRITON design shall take into account the technical, support and cost impacts for NATO.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

### 5.5.3. Browser-based Functionality

TRITON user functionality will be implemented as Web applications accessible by a Web Browser.

[T1-R1776] *TRITON user functionality shall be provided via browser-based Web applications, except as specifically waived by the Purchaser.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1777] *TRITON user functionality shall require only a browser and should not require the installation of additional software, components or plug-ins on the user workstation, except as specifically waived by the Purchaser.*

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

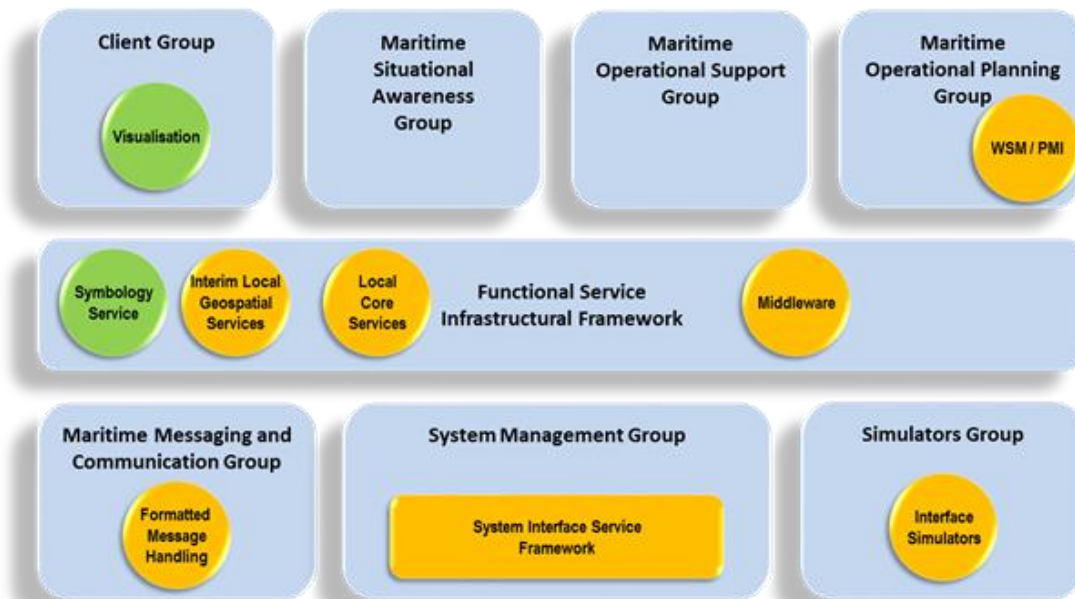
[T1-R1778] *TRITON shall use browser-based applications with standard internet addressing, Universal Resource Locator (URL) and Universal Resource Identifier (URI).*

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

### 5.5.4. Component-Based Development

TRITON will be implemented using component-based development approach. A "Component" is a collection of software modules with well-defined external interfaces enabling loosely-coupled operation. Components can be replaced by other implementation or can be reused for implementing other developmental items, even in other projects.

The figure below shows the logical collection of components and modules that implement the functions specified in this SRS.



The Frameworks are expected to be designed and implemented to provide a robust, coherent infrastructure for the current and future Increments. The circles are the currently identified and potential reusable software Components. Of these, C4ISR Visualisation Component, indicated as green circles, will be delivered as a separate package. The other components (yellow circles) should be implemented as replaceable components. In future, it should be possible to replace these components with new ones when the Purchaser decides to do so.

[T1-R1779] *TRITON software architecture shall be able to support loosely-coupled software components through an infrastructural framework.*

Requirement Property :

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

[T1-R1780] *TRITON shall integrate with the C4ISR Visualisation Component at both server and client side.*

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

[T1-R1781] *TRITON "should" have a Middleware as a replaceable component to provide communication between all internal components.*

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

[T1-R1782] *TRITON "should" have a WSM/PMI Component to provide basic computation for subsurface mission space management.*

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

[T1-R1783] *TRITON "should" have Formatted Message Handling Component as a replaceable component to handle (parse or prepare) Formatted Messages.*

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

[T1-R1784] *TRITON "should" have Interface Simulators as replaceable components to simulate interfaces of external systems as defined in the Interfaces Section.*

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

[T1-R1785] *TRITON "should" have an Interim Local Geospatial Service as a replaceable component in case NATO Core GIS is not available for static or afloat sites.*

Requirement Property :  
 Domain for Static: NU  
 Domain for Afloat: Both  
 Baseline : BL 4  
 Qualific. Method : Inspection

[T1-R1786] *TRITON "should" have Local Core Services as replaceable components to support standalone operation of TRITON Deployable Kits.*

Requirement Property :  
 Domain for Static: NU

Domain for Afloat: Both  
 Baseline : BL 4  
 Qualific. Method : Inspection

### 5.5.5. Implementation Constraints

TRITON design will aim to minimise the total system life cycle costs, including its Operations and Maintenance (O&M). TRITON will use Bi-SC AIS Core Services available at the static sites. TRITON will provide wide area access over the NATO General Purpose Communications Systems (NGCS) which provides the backbone for connectivity among NATO Commands and Nations. The bandwidth limitations for ACPs will also be considered during the system design. All components of TRITON will use the same software architecture.

[T1-R1787] *TRITON shall be designed to work within the Bi-SC AIS environment as a Functional Service without causing any interference to other Functional Services. All components of TRITON shall use the same software architecture.*

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

[T1-R1788] *TRITON Deployable Kits shall be designed to work in low bandwidth for synchronising their databases with a static TRITON instance over the available communication environment.*

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

### 5.5.6. Programming Languages

TRITON software will be developed with any variations from the languages or specifications given below as "Preferred Languages":

**Preferred Languages:**

- C# [ISO/IEC 23270:2003]
- Common Language Infrastructure (CLI) [ISO/IEC 23271:2003] [ISO/IEC 23272:2003]
- Java SE Version ~~6 [JSR-270]~~ 8 or newer
- C++ [ISO/IEC 14882]
- JavaScript [ECMA 262]
- HTML.

**XML Standards:**

- XML : W3C - eXtensible Markup Language (XML), version 1.0 (5th Edition)
- XSD : W3C - XML Schema Definition, version 1.1 (April 2012)
- XSL : W3C - eXtensible Stylesheet Language, version 1.0
- XML NS : W3C - Namespaces in XML
- XSLT : W3C - XSL Transformations
- XPATH : W3C - XPATH 2.0
- XQUERY : W3C - XQUERY 1.0
- Schematron : Document Schema Definition Languages (DSDL) [ISO/IEC 19757]

XMLENC : W3C - XML Encryption Syntax and Processing

XMLDSIG : W3C - XML Signature Syntax and Processing

TRITON information that is customarily exchanged using a well-known open standard does not have to be made available in XML. For example, programs may transfer image data in JPEG format. There is no requirement to develop an equivalent XML representation for these.

[T1-R1789] *TRITON "will" be developed using the latest version of Microsoft Visual Studio .NET if C# is used as the programming language.*

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

[T1-R1790] *TRITON shall be compatible with the .NET Framework version 4.5 or newer if .NET Framework is utilised for development.*

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

[T1-R1791] *TRITON shall comply with the standards and language specifications given in the Description as the Preferred Languages. Any variations from the languages or specifications shall be agreed with the Purchaser.*

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

[T1-R1792] *TRITON scripting language and standard shall be JavaScript and compliant to [ECMA-262].*

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

[T1-R1793] *TRITON shall not use DCOM, COM, ActiveX and/or COM+ unless specifically authorised in advance by the Purchaser.*

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

[T1-R1794] *TRITON shall use XML as the main data and document format. The XML Standards given in the Description shall be used.*

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

[T1-R1795] *All information exchanged across TRITON boundaries shall be available in XML format.*

Requirement Property :

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

### 5.5.7. Code Documentation

TRITON software source code will be documented as in-line comments providing sufficient readability and understandability. Comments can be extracted and formatted to augment technical documentation. In order to reduce the code size and improve the transfer time, the source code comments of the client applications must be removed by an automated process before entering into production.

**Basic Usage of Comments:**

- Each class definition explaining the purpose of the class
- Each member function explaining what the function does, including descriptions of input parameters and return values
- Each member variable explaining what the variable means (including unit of measure where appropriate)
- Each type definition (enums) explaining what the type represents
- Explanation of a specific computation algorithm
- Algorithm references to external sources.

[T1-R1796] *All TRITON software source code shall be documented with in-line comments using the best practices in the level of commenting.*

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

[T1-R1797] *Comments in TRITON source code shall clarify the intent of the code by considering the Basic Usage of Comments given in the Description.*

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

[T1-R1798] ~~*Comments in TRITON source code shall be formatted according to the "XML Comments" format (i.e. beginning with three forward slashes "///" and using XML comment tags) allowing extraction and formatting for augmenting technical documentation. Comments in TRITON source code shall be formatted according with best practices applicable to the specific programming language and allow for the automated extraction and formatting for augmenting technical documentation. The source code comments of the client applications shall be removed by an automated process before entering into production.*~~

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

### 5.5.8. Coding Standards

TRITON software implementation will use best practices for coding. .NET components will be developed in conformance to Microsoft's ".NET Framework Design Guidelines" and in compliance of the following Microsoft FXCop Static Code Analysis Tool rule sets:

- Microsoft Basic Correctness Rules
- Microsoft Basic Design Guideline Rules
- Microsoft Extended Correctness Rules
- Microsoft Extended Design Guideline Rules
- Microsoft Minimum Recommended Rules
- Microsoft Security Rules

If another development framework is used, the appropriate coding standards for the platform will be followed, as approved by the Purchaser.

[T1-R1799] *Whilst the specifics of coding syntax are not specified, a convention shall be adopted and applied consistently across all code artefacts for each programming language employed. Sample sets of rules are given in the Description.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

Comment : The coding syntax(es) will be agreed with the Purchaser during Software Requirements Analysis.

[T1-R1800] *TRITON ".NET" components shall be developed in conformance to Microsoft's ".NET Framework Design Guidelines" and in compliance of the Microsoft FXCop Static Code Analysis Tool rule sets.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

[T1-R1801] *All code delivered as part of the TRITON Contract shall comply with the standards defined in the SRS. Code derived from other sources (e.g. prototype systems, COTS products, open source components) shall be refactored as necessary to meet standards.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection

### 5.5.9. Free and Open Source Software

TRITON may use Free and Open Source Software (FOSS) components. If such software is used, they will comply with the NATO strategy on the use of Open Source Software in NATO systems [AC/322-D(2009)0015].

[T1-R1802] *TRITON may use Free and Open Source Software (FOSS) components which shall comply with the NATO strategy on the use of FOSS in NATO systems.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Inspection

- [T1-R1803] *Any TRITON component based on FOSS shall be provided with the source code of the FOSS. The source code shall correspond to the delivered component (i.e. same version), and that component shall be capable of being built from the delivered source code with the provided documentation.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Inspection

- [T1-R1804] *Use of a FOSS component shall not limit the deployment or use of the TRITON in any way and shall not require the release of code developed for TRITON.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Inspection

- [T1-R1805] *Any component-based on FOSS shall be verified for compliance to other non-functional requirements, including security requirements.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 3

Qualific. Method : Demonstration

## 5.5.10. Code Refactoring

Code refactoring is a disciplined technique for restructuring an existing body of code, altering its internal structure without changing its external behaviour, undertaken in order to improve some of the non-functional attributes of the software.

Advantages of code refactoring include improved code readability and reduced complexity to improve the maintainability of the source code, as well as a more expressive internal architecture or object model to improve extensibility.

- [T1-R1806] *All code delivered as part of TRITON shall comply with the Contractor's QA Standard. The Contractor's QA Standard shall be approved by the Purchaser. Code derived from other sources (e.g. prototype systems, COTS products, open source components) may be refactored as necessary to meet standards when proposed by the Contractor and approved by the Purchaser.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Demonstration

## 5.5.11. Data Modelling

TRITON Data Modelling will include the following models:

### Conceptual Model:

TRITON Conceptual Data Model will contain semantics, identifiers (i.e. attributes with semantics that identify and record so-called "natural keys"), and syntax.

**Logical Model:**

TRITON Logical Data Model will contain identifiers (a.k.a., “natural keys”), normalization and semantic, surrogate key (a.k.a., “artificial key”) and syntax.

**Physical Data Models:**

TRITON Physical Data Model will propose an External Data Model compliant with SQL2 [ISO/IEC 9075]. All the models included in the Physical Data Model will be normalized up to 3rd normal form (Relational Model).

**Behaviour Model:**

TRITON Behaviour Model will contain sequence of operations, object states and interactions, state machines and rules related to the data model.

**Metadata:**

The metadata used in the Data Modelling will be compliant to [AC/322-D(2014)0010].

[T1-R1807] *TRITON shall have documented Conceptual, Logical and Physical Data Models.*

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

[T1-R1808] *TRITON Data Model documentation shall be compliant with RAS (OMG Reusable Asset Specification).*

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

[T1-R1809] *TRITON Data Model file format for the system of record shall be XMI (OMG XML Metadata Interchange).*

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

[T1-R1810] *TRITON Data Model shall support multiple Security Classifications.*

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

[T1-R1811] *TRITON Data Model shall internally use storage values in International System (S.I.) units (unless otherwise specified).*

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

[T1-R1812] *TRITON Data Model shall be compliant with the NATO Core Metadata Specification [AC/322-D(2014)0010].*

Requirement Property :

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

### 5.5.12. Registry Settings

TRITON Functional Services will use the MS Windows Registry. All settings will be documented.

[T1-R1813] *All usage of the MS Windows Registry by TRITON Applications shall be fully documented in the User Guides.*

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

[T1-R1814] *TRITON shall not use Registry hives other than HKEY\_LOCAL\_MACHINE (during installation) and HKEY\_CURRENT\_USER (during application operation) except as approved by the Purchaser not later than the System Detailed Design.*

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

### 5.5.13. Time Management

TRITON will use secured time source as a reference time for all internal computation, time stamping and display. Static sites will provide Secure Time source. Deployable Kits will use internal System Time. Separate instances of TRITON will use UTC while exchanging time-stamped data. For example, database synchronisation of Deployable Kits and Data Centre will use the same time zone, Zulu, in order not to cause any conflict with local time.

[T1-R1815] *In order to set the time of TRITON Services, TRITON shall verify and complement Operating System time with an external Secured Time source.*

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

[T1-R1816] *TRITON shall use the same time source for all time stamping services and application within the same Server.*

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

[T1-R1817] *TRITON Instance shall be able to synchronise itself with a Time Server in compliance with NTPv4 [IETF RFC 5905].*

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

[T1-R1818] *TRITON Deployable Kit shall use the internal Time Server when it is switched to Standalone Mode.*

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

[T1-R1819] *TRITON shall set a centralised time across all services based on the Secured Time.*

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

[T1-R1820] *TRITON shall allow the authorised user to select the Time Server available on the network.*

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

[T1-R1821] *TRITON shall use a separate Training Time and maintain the correspondence between Training Time and Secured Time.*

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

[T1-R1822] *TRITON shall notify the authorised user if the available time source has more than one (1) second different than the current internal time.*

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

[T1-R1823] *TRITON shall notify the authorised user if time-based computations result in unexpected behaviour. For example, last time of update of a track is greater than the current time.*

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

[T1-R1824] *TRITON Clients shall use the time source available on their own network.*

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

[T1-R1825] *TRITON shall use UTC while exchanging time-stamped data among servers.*

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

Baseline : BL 1  
Qualific. Method : Demonstration

## 5.6. System Environment Requirements

Static sites will provide the necessary computing environment for hosting the TRITON Functional Services. There is no specific requirement for provision of enhanced environment protection for static sites on which TRITON will be installed.

Afloat sites require certain protection for hardware to operate in naval sheltered environment. TRITON Deployable Kits will have semi-ruggedized cases to protect computing hardware for afloat deployments. Environmental requirements given in this Subsection are applicable for only TDKs.

[T1-R1826] *Certificate of Conformance for not using hazardous material shall be delivered for any hardware component developed under this Contract.*

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

[T1-R1827] *The equipment used indoors shall be subject to temperature ranging between +10 degrees C and +35 degrees C.*

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

[T1-R1828] *The equipment used indoors shall be subject to humidity ranging from 10 to 90% non-condensing.*

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

[T1-R1829] *The equipment used indoors shall be able to withstand the accumulation of residual dust and sand as can be expected in moderately sheltered environment.*

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

[T1-R1830] *The equipment used indoors shall be fully operational on altitudes at least 3.000 m above mean sea level.*

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

[T1-R1831] *Best commercial practices shall be used to ensure that prolonged periods of exposure to a fungus environment will not result in evidence of fungal growth on component or equipment surfaces.*

Requirement Property :

Domain for Static : N/A  
 Domain for Afloat: Both  
 Baseline : BL 4  
 Qualific. Method : Inspection

- [T1-R1832] *Any equipment openings (e.g. fans or heating devices) associated with the risk of letting sand, dust, water, snow, and/or moisture into the equipment and shall be described and solutions to overcome the risk of these affecting system availability shall be defined.*

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

- [T1-R1833] *All connectors and cables shall have bungs and caps firmly attached to them so that they cannot be lost, in order to prevent the ingress of sand, water and dust. Exceptions to this requirement shall be addressed on a case-by-case basis, and are subject to review and approval by the Purchaser.*

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

- [T1-R1834] *The equipment shall be made with non-corroding or suitably protected materials corresponding to the area of operation for a minimum of three (3) years.*

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

- [T1-R1835] *All equipment shall be capable of operating in close proximity to other COTS equipment without causing mutual interference problems. Tested and documented compliance with officially recognised Electromagnetic Interference or Electromagnetic Compatibility standards is sufficient to meet this requirement (e.g. Emission Standard EN55022, Immunity Standard EN50022 or FCC Part 15 Class A).*

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

## 5.7. Training-Related Requirements

In addition to the training courses for system administrators and operational users, TRITON will provide the potential users with Computer-Based Training (CBT) capability.

## 5.8. Logistic-Related Requirements

### 5.8.1. Spares

A Spare Part List will be defined for the TRITON Deployable Kits. In principle, each identified Hardware Component/Unit used in TDK will be defined as a spare item. The Spare Part List will include at least the following:

- One TDK Case with 19-inch rack (empty)
- One Carrying Case (empty)
- One Monitor Keyboard Unit (drawable)
- One Server Unit
- One Data Storage Unit
- One Network Switch
- One Central Control Unit
- One Data Diode
- One UPS
- One Installation Kit (including cables and sockets)
- Any special harness to fix the units.

[T1-R1836] *TRITON Deployable Kit Spare Part List shall include at least the items given in the Description.*

Requirement Property :

Domain for Static: N/A

Domain for Afloat: N/A

Baseline : BL 4

Qualific. Method : Inspection

Comment : The List of Spare Parts with part numbers and prices will be proposed by the Bidder.

## 5.8.2. Operating Documentation

The operating documentation of TRITON covers how to use the TRITON functionality in support of the C2 of Maritime Operations, and how to perform the administration at static and afloat sites. It includes Manuals for Users and System Administrators.

- TRITON will have separate operating documentation for the following systems:
- TRITON Functional Services (for both NS and NU)
- TRITON Deployable Kit (for both NS and NU)
- TRITON Training System (for both NS and NU)

### 5.8.2.1. System User Manuals

System User Manuals (SUM) will include, but not limited to, the following subjects:

- Preface, purpose and target audience
- Detailed system block diagrams showing all interfaces with descriptions
- General capability descriptions
- Drawings, illustrations, photographs, and diagrams
- Description of each function with screenshots
- Error conditions
- Basic fault isolation methods
- Terms and definitions.

[T1-R1837] *TRITON shall have System User Manuals (SUM) for each applicable system which includes the subjects given in the Description.*

Requirement Property :

Domain for Static: Both

Domain for Afloat: Both

Baseline : BL 1

Qualific. Method : Inspection