The iSMART Document Suite Explained

Defining the Tactical Data Link Requirement

When you purchase an expensive item such as a new car, how do you go about deciding what you do and don't need? Do you really need lane departure warning, adaptive headlights, or a baby bottle warmer?

Maybe you do, and maybe you don't, but you can be sure of one thing – the car salesman will try and convince you that every gadget is an absolute necessity. So how do you decide what's needed and what's not, and how do you convey that to the salesman?

The same thought process is needed when defining the functionality needed for our Tactical Data Link (TDL) systems. The standards give us a huge amount of capability but, as with the car, which elements do we need, and what can we leave out, and how do we document the decisions that were made?

To help us with this complex issue the interoperable Systems Management And Requirements Transformation (iSMART) process has been developed. A progression of the United Kingdom (UK) Ministry of Defence's (MOD's) Through Life Interoperability Process (TULIP), iSMART supports a suite of documents which define the TDL requirement in a hierarchy as discussed below. iSMART is an open process that can be employed by any organisation to assist in the management of Interoperability (IO).

While the iSMART process can be performed manually for any information exchange it may be supported by software tools such as the System Process for Interoperability Requirements and Implementation Testing (SPIRIT) or the enhanced Systems Management And Requirements Transformation (eSMART).

So, what documents does iSMART provide for us?

The choice of using the North Atlantic Treaty Organisation (NATO) Allied Tactical Data Link Publication (ATDLP) or the United States (US) Military Standard (MIL-STD) will generally be governed by who we wish to operate with and other requirements such as doctrine determined by Concept of Operations (CONOPS) and other high-level policy. These requirements help in determining the Information Exchange Requirements (IERs) which in turn determine the TDL we will utilise. (We will use Link 16 for our example, but the process could apply to any other TDL.)

Once we have determined which TDL to use, we also need to decide which edition of the standardisation document we will use. In our case we have chosen the NATO ATDLP-5.16 Edition B Version 1.

This now becomes our baseline document from which all the iSMART documentation is derived.

As mentioned earlier, the iSMART process uses a hierarchal system which, after the chosen standardisation document, moves to the national level. At each level a positive and negative document is produced. At the national level the positive document states which elements of the standardisation document (ATDLP-5.16 Edition B Version 1) will be implemented by that nation. The negative document details the functionality which will not be implemented by that nation, and a rationale behind each decision.

Therefore, within the positive document, after defining the functional areas of interest for our platforms, we can then describe which messages, words within those messages, data elements and items we shall implement. For the negative document we determine which areas etc. we shall not implement. At the national level these documents are known as the National Requirements Specification (NRS) – the positive document, and the National Difference Document (NDD) – the negative document.

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The diagram below gives an overview of the iSMART document suite.
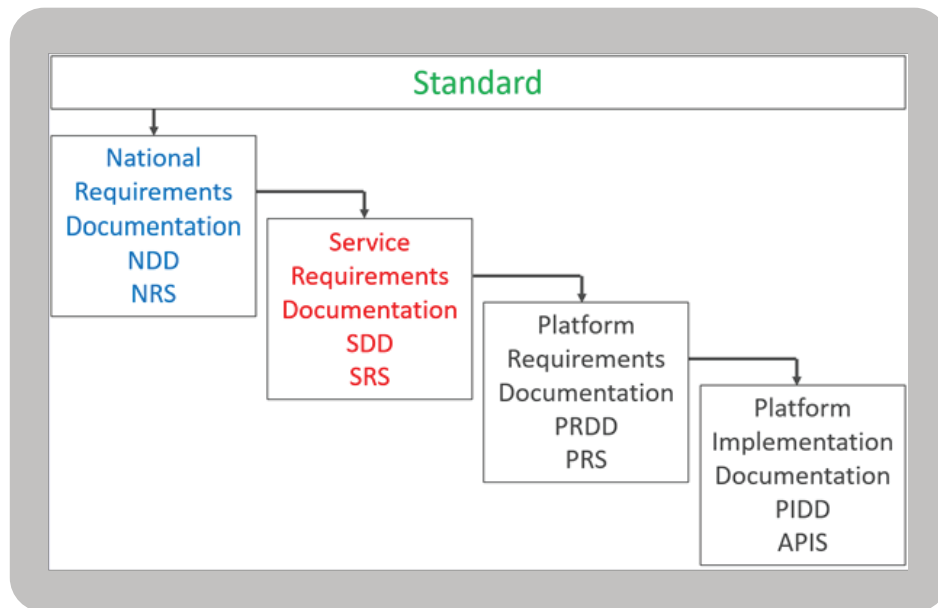
The next level down provides the Service level documentation. These documents provide information regarding the requirements of each service i.e. Army, Air Force, Navy. The format of the documents is similar to that at the National level and the documents in this case are named the Service Requirements Specification (SRS) – positive, and the Service Difference Document (SDD) – negative. As most nations do not have individual forces large enough to justify the use of these documents, this level is not utilised by most nations. It is believed that only the US forces use the Service level documentation.

After the Service level documentation, the next level refers to individual platforms. Each TDL equipped platform type e.g. Typhoon, Type 45 Destroyer etc. will have a Platform Requirements Specification (PRS) – the positive document, which describes that platform's TDL implementation down to the data item/bit level for both transmission and reception. The Platform Requirements Difference Document (PRDD) – the negative document, describes the areas not implemented by that platform, and once again the rationale behind the non-implementation. The PRS document is the specification used to define the requirements to a manufacturer.

To provide a starting point, the ATDLP provides a set of minimum requirements for a number of functions that a platform may choose to implement. For each chosen function, there are defined messages, message transmit and receive tables and message data element content.

For a Command and Control (C2) platform, these functions are:

- **Basic** – This function defines the requirements for a Joint Tactical Information Distribution System/Multifunctional Information Distribution System (JTIDS/MIDS) Unit (JU) to participate on a Link 16 interface and is broken down into 2 further sub-functions:

  Terminal – This sub-function defines the message requirements for the terminal to support JU participation on a Link 16 interface;

  Host – This sub-function defines the JU host message requirements to support friendly position and status, as well as message exchange capabilities.

- **Platform Situational Awareness;**

- **Network Management;**

- **Air Surveillance;**

- **Surface Surveillance;**

- **Subsurface Surveillance;**

- **Land Surveillance;**

- **Space Surveillance;**

- **Ballistic Missile Defence Operations;**

- **Electronic Warfare;**

- **Weapons Unit;**

- **Air Controlling Unit;**

- **Command;**

- **Surface-to-Air-Missile (SAM) Controlling Unit;**

- **Unmanned Aerial Vehicles (UAV) Controlling Unit;**

- **Network Enabled Weapon Controller;**

- **Network Enabled Weapon In-Flight Target Update Third Party Source.**

The final level of the iSMART documentation describes the delivered TDL capability. It is recognised that during the platform build process implementation issues or problems discovered during testing may result in changes to the functionality originally requested in the PRS. Therefore, this set of documents will identify any changes which occur during this final phase. The positive document is known as the Actual Platform Implementation Specification (APIS) while the negative document is referred to as the Platform Implementation Difference Document (PIDD). The APIS document may be utilised as the baseline at which platform testing is carried out.

Summary

Due to the complexity of TDL implementation and to improve IO it is imperative that the iSMART documentation suite or other similar documents are utilised. The use of iSMART is mandated for TDLs in both the UK and US, and it is also adopted by many other nations. Not only does the document suite provide a record of the platform implementations, it can also be used to carry out interoperability evaluations between platforms by comparing one implementation against another which in turn will improve operational effectiveness.

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