Implementing S1000D for Swedish military assault and support crafts

How do you continuously manage technical publications for a large fleet of military assault and support crafts, differing not only by several series and versions within its two classes – *Combat Boat 90* and *Light Support Vessel* – but also with regard to lifetime extensions, rapid reconfigurations for missions abroad, and changes driven by technical orders? You do this by implementing *S1000D*, the *International Specification for Technical Publications*. SSPA supports the Swedish Defence Materiel Administration (FMV) in several projects with information analysis, data conversion, restructuring, content revisions, and quality assurance.

The case for high-quality technical information

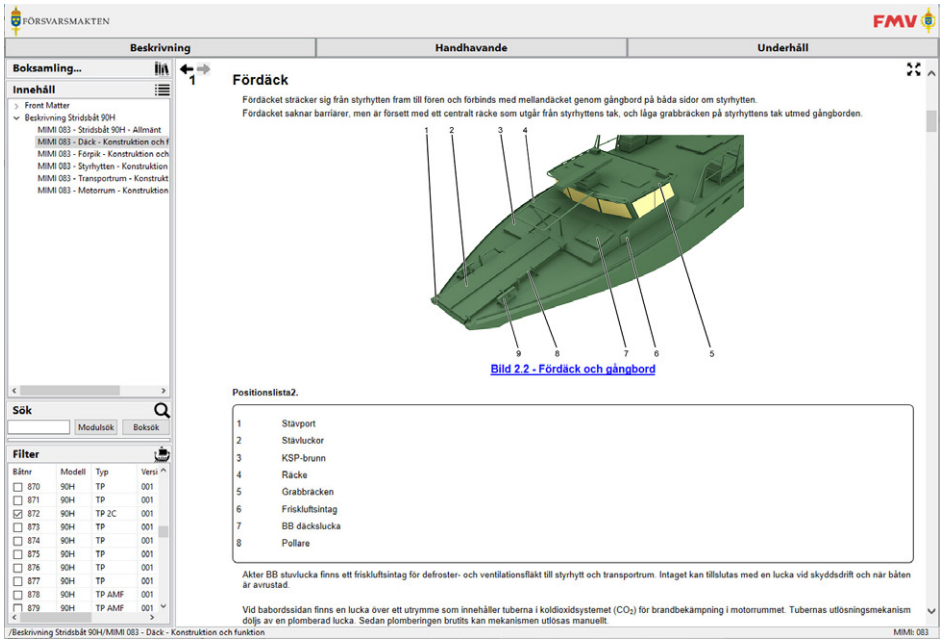
While the case for accurate, reusable, and accessible technical information may seem indisputable, surveys in many industries over the last few decades have clearly shown that vast amounts of technical support are spent unnecessarily, due to the lack of correct information about the product or system at hand. Some companies in the information logistics field quote from customers that up to 30% of a service technician's time is spent on searching for information across sources that are known to be unreliable.

For military systems that typically have a very long lifecycle, these problems may soon lead to unmanageable risks and costs. It is therefore not surprising that defence industries and defence procurement administrations very early saw the need for a technical strategy and became strong stakeholders in S1000D.

Technical information in the analogue era

As military systems became more complex during the latter half of the 20th century, the amount of technical information rose dramatically. In 1979, the U.S. Navy listed 25 million pages of technical manuals, and added somewhere between 300,000 and 500,000 pages annually. In 1991, the Swedish Defence Materiel Administration distributed 4,500,000 pages of technical orders to 400 national subscribers.

In contrast to this, the entire technical information for a British Type 45 destroyer – information that is managed in S1000D – amounts to the equivalence of 120,000 pages and is accessible using a tablet viewer. S1000D is now the principal specification in global use for larger aerospace and military technical publication projects.



Example of what an Interactive Electronic Technical Publication (IETP) may look like.

A brief history of S1000D

S1000D can be traced back to 1984, when seven European countries started working on harmonising various national and international aerospace specifications. At the time, there were no common technical information standards for collaborative projects and reuse and leverage of information was difficult or even impossible.

The first issue of the specification was released in 1989 and while the early issues had a strong focus on aerospace systems, the specification has since developed and is now designed to support any air-, land-, or sea-based vehicle or equipment, be it military or civilian.

Key concepts of S1000D

The S1000D specification lays out processes and methods for the production, maintenance, quality assurance, data transfer, and presentation of technical publications.

Enforcing XML (eXtensible Markup Language), the specification separates *form* (i.e., layout) from *content* and the technical information can easily be published in a variety of output formats, such as print, PDF, and HTML for desktop, tablets, and mobile devices.

One of the key concept in the specification is the *data module*, which is a small, reusable container of information, such as a task or a description. The specification describes how to break down technical information for a complex system into data modules from a functional and/or physical point of view.

Each data module is assigned a *data module code*, which, among other things, tells the user how the data module relates to the system in whole and what type of information it contains. In order to avoid naming collisions in interna-

Combat Boat 90
Length: 15.9 metres
Width: 3.8 metres
Draught: 0.8 metres
Propulsion (one of the following):
- 2 × Scania DSI 14, 625–675 hp, V8 diesel engines
- 2 × Scania DI 13, 700 hp, straight 6 diesel engines

Photo: Anders Sjödén, Swedish Armed Forces.

Light Support Vessel
Length: 24.6 metres
Width: 5.4 metres
Draught: 1.1 metres
Propulsion:
- 3 × Scania DSI 14, 675 hp, V8 diesel engines

Photo: Swedish Armed Forces.

Mats Broberg
S1000D Information Manager.

Mats has an MA degree from Uppsala university and joined SSPA in May 2018. His previous job experience includes *Technical Documentation Manager* at FLIR Systems, and *Service Information Manager* at Getinge. At FLIR he worked with process development relating to technical information, such as automation of typesetting toolchains, industrialisation of publishing strategies, and XML and standards-based workflows and technologies.

Contact information
E-mail: mats.broberg@sspa.se

S1000D is now the principal specification in global use for larger aerospace and military technical publication projects.

tional projects, each data module code starts with a globally unique *model identification code*.

Prior to publishing, data modules are arranged in a *publication module,* which becomes the principal technical publication. Since the technical information is modular by design, it is reusable and the publication manager can easily remove or add data modules and/or create entirely new publication modules.

Central to the specification is also the far-driven semantic tagging, which both enables import of data from external sources – e.g., spare parts data from materiel management databases – and extraction or processing of specific data for down-stream of off-stream purposes.

The MIMI breakdown structure

As mentioned previously, S1000D provides the means to break down technical information for a product or system. This break-down structure is called the *Standard Numbering System* (SNS) and the specification offers a number of maintained SNSs, e.g., one for general sea vehicles.

However, in the Swedish Navy there is an existing break-down structure that is extensively used, not only for technical information but also for service & spare parts management, lifecycle management, repair analysis, and so on. This structure, which dates back to 1973 and replaced several older break-down structures at the time, is called MIMI – *Marin Installations- och materielindelning* ("Marine Installation & Materiel Classification"). In our projects, it was critical that this break-down structure was retained, as so many existing workflows and activities in the navy relied on it.

The applicability concept

The Combat Boat 90 fleet comprises around 140 individual vessels in five different series and 20 different versions and variants. For the *Light Support Vessel*, there are 16 individual vessels in three different versions. Fixed and non-fixed equipment in these boats differ not only by class, series, version, and variant, but may also be subject to a temporal aspect, such as the implementation of a technical order, whether or not a specific vessel has yet been subjected to dry-dock upgrades, and so on.

From a technical information standpoint, this is called *applicability of information.* For example, a data module describing the engine cooling system may include information on two different engines that are both in use across an entire vessel class. By setting different *applicability* on the two sections, either section can be generated in a publication, depending on which engine is installed.

Similarly, for a dry-dock upgrade, a data module may contain information on both an existing and a planned installation. By setting a switch in the publication system, the new and correct information can be turned on immediately, once the dry-dock upgrade is finished.

Key benefits for the customer

Once finished, we hope that our projects with the Swedish Defence Materiel Administration will add considerable value in several different areas. Some of these include the following:

- Adoption of an established specification (S1000D) and data format (XML) for collaboration and long-term preservation of digital information.
- A modular information approach with a strong focus on re-use and leveraging of the existing MIMI break-down structure.
- Reduced life cycle cost by providing complete, accurate and easily accessible technical information.
- Powerful means to address future hardware changes on the vessels by rapidly reconfiguring the technical information.
- Paving the way for various dynamic outputs, such as Interactive Electronic Technical Publications (IETPs) for tablet and mobile viewers, augmented reality (AR) deliverables, and more.