S1000D: Essential for Aerospace and Defence sector companies

Introduction
S1000D is the efficient, modern way to create, manage, and publish technical documentation for aerospace and defence projects. As an international specification, S1000D is being widely adopted for military projects in place of existing national standards. It is also gaining ground for civil aerospace projects. Whether you have a contractual requirement to deliver S1000D or chose the specification voluntarily, there is a lot to get used to before initial publication. While the complexity of S1000D cannot be ignored, it can be tamed when you have the right tools.

Adobe® FrameMaker® 10 delivers S1000D support as standard. Create your first S1000D issue 4.0 project using Adobe FrameMaker’s innovative Common Source Data (CSD) features. With FrameMaker, your S1000D project can start small and then grow as your needs dictate.

So is S1000D difficult and how different is it from the previous generation of technical publications standards? This white paper should answer many of your S1000D questions while providing a brief introduction to S1000D concepts.

Does it have to be S1000D?
Technical publications deliverables for new aerospace or defence projects will normally be specified as contractual requirements. If the contract states S1000D, it should also give a specific version.

If a project is new to you, it does not mean that the latest S1000D version will be used as there may be external influences and existing business rules that mandate an earlier version. S1000D versions do not become obsolete once a new version has been released. It is normal for one version of the specification to be retained throughout the lifecycle of the equipment. There are still many projects using version 1.6 with no plans to ‘upgrade’.

For new projects, you can expect the requirement to be for S1000D documentation, while upgrades to existing projects often retain the use of national specifications. This is not always the case. Sometimes, a major project upgrade will include the switch to S1000D documentation. In some countries, the requirement to use S1000D is not negotiable. Other countries are more flexible, but choosing S1000D can be a wise decision even if there is no legal requirement.

If you are in a position to choose your documentation standards and your products are used by defence and aerospace clients, then S1000D is the logical choice. You may have years of experience using national specifications, but it makes sense to investigate the significant long-term benefits that S1000D will bring.

Alternative options
When the time comes to start your first S1000D project, you may wonder what the alternatives are; does it really have to be done this way? Simply put, yes it does. It is possible to use a wide range of software tools for S1000D production; there’s no hiding from the specification itself.

Some may say "why not use DITA? It’s so much easier." On the surface there are similarities, but S1000D covers many areas that DITA may never address.
National specifications

National technical documentation specifications are gradually being replaced by S1000D. The development of S1000D is a truly international process where the needs of each represented country combine to make the specification what it is today. From its roots in European Aerospace, S1000D is now jointly maintained by three organisations: ASD, AIA, and ATA.

- ASD: AeroSpace and Defence Industries Association of Europe
- AIA: Aerospace Industries Association represents the interests of the United States of America’s leading manufacturers and suppliers of civil, military, and business aerospace equipment.
- ATA: Air Transport Association of America is the civil airline trade association.

The modular design and built-in support for project configuration through business rules has allowed S1000D to comfortably meet the requirement of these different industry sectors.

While S1000D is not mandatory everywhere yet, many countries will not accept anything else. A useful indicator is that the development of many national specifications has been suspended as S1000D gains acceptance worldwide.

S1000D versions

There have been many versions of S1000D since the first really usable version which was 1.6 released in 1995. At the time of writing this paper, the current version issued is 4.0. Version 4.1 is due for release in 2012. Guidance on the correct version of S1000D is normally a project-level decision and if your organisation is a subcontractor, you should be given guidance by the prime contractor.

From version 1.6 through to version 3.0, the specification evolved gradually as new data module types and features were added. Issue 4.0 however was a radical change when the XML schemas were overhauled bringing new element and attribute names.

FrameMaker 10 top quality intrinsic S1000D support

FrameMaker 10 provides intrinsic high-quality support for a subset of S1000D issue 4.0.1. Using a set of carefully chosen and unique tools, you can control S1000D projects, create data modules, and publish your own publication modules. For the first time, it is possible to properly handle many of S1000D’s more complex concepts using a stand-alone XML editor.

The CSDB

S1000D’s full title is “International specification for technical publications utilizing a common source database”. So what is a Common Source Database (CSDB)? The answer is surprising; S1000D does not demand that a CSDB has to be any specific type of computer database or content management system. S1000D simply states the major objectives for a CSDB. Here’s how FrameMaker 10 meets those objectives:

<table>
<thead>
<tr>
<th>Objective</th>
<th>FrameMaker 10</th>
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<tbody>
<tr>
<td>Support the technical publication process</td>
<td>Configurable S1000D projects</td>
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<tr>
<td></td>
<td>DMRL -based project control</td>
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<td>Business rules exchange</td>
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<td></td>
<td>Applicability handling</td>
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<tr>
<td>Support the controlled authoring</td>
<td>Standard guided editing for all supported data module types. Structure validation feedback in structure view</td>
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<tr>
<td>Support the QA process</td>
<td>QA status stored in the Data Module List</td>
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<tr>
<td>Support the data exchange with partners,</td>
<td>XML output validated against XML schemas</td>
</tr>
<tr>
<td>suppliers, and customers</td>
<td>File naming rules enforced for CSDB objects</td>
</tr>
<tr>
<td>Support delivery of technical publications on</td>
<td>Normal behavior for file-based storage and transfer</td>
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<td>various media independent from the source</td>
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<td>storage format</td>
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FrameMaker 10 supports all of the Related Standards for CSDB objects as listed in S1000D chapter 4.2.2.

The hub of an S1000D project is FrameMaker’s Common Source Data panel which is described in the project walk-through that follows.
An S1000D project

The S1000D support in FrameMaker 10 allows you to start an S1000D project using its built-in tools. Ultimately, a CMS-style common source database should be considered essential but, as a starting point, FrameMaker offers much of what you need.

In the following sections, we will look at how FrameMaker 10 can be used to control a new S1000D project.

Data modules and the Data Module Requirements List

S1000D is a modular publication standard where each reusable chunk of data is a managed object in the CSDB. An author writes data modules which are small, self-contained, reusable topics of information. A publication will comprise hundreds or thousands of individual data modules. There are several different data module types available. Issue 4.0 of FrameMaker supports the following types:

- Crew
- Description
- Illustrated Parts Data
- Procedural
- BREX
- Applicability Cross-reference
- Condition Cross-reference
- Product Cross-reference

One of the first stages of an S1000D project is the creation of the Data Module Requirements List (DMRL). The DMRL lists all of the proposed data modules ideally before any are written. For each data module, the DMRL lists the unique information required to uniquely identify that data module. S1000D requires each CSDB object to have a unique identification code. For a data module, that is the Data Module Code (DMC). S1000D demands that the DMC is also the file name for the XML data module. FrameMaker 10 enforces that important requirement.

To get your S1000D project started, FrameMaker 10 gives you the data module list application. In FrameMaker, select S1000D > New > DML. With the help of subject matter experts, build a list of all data modules that will be required for complete coverage for all systems in the publication. This is not a trivial task, but is vitally important for the success of any S1000D project.

Later, when you have set up the other parts of the project, you will have access to the data module list from FrameMaker’s Common Source Data panel. When you start to create data modules, simply select the data module from the list, then click open "data module". FrameMaker creates a new data module of the correct type ready for you to start editing. At any time, you can use the "save as S1000D" command, and FrameMaker will save the data module using the S1000D format file name.

Figure 1: The data module list shows the available data modules in the current project.
Business Rules Exchange

S1000D compliance forces projects to follow a very well-defined set of rules. This is essential for reliable data interchange. However, not all projects have the same rules, so there has to be some controlled flexibility. S1000D uses the Business Rules Exchange (BREX) concept to handle project-specific customization. All data modules must reference a BREX file, even if only the basic ‘Default BREX’ is provided.

A BREX file is a special type of data module which lists various classes of business rules such as:

- SNS rules, which are used to define a project-specific Standard Numbering System. It is a part of the data module code.
- Context rules, which can limit or refine the way a specification’s rules are applied.

FrameMaker 10 provides the handy BREX viewer where you can examine the business rules from the referenced BREX for the current data module or any of the project’s available BREX files.

Figure 2: View the BREX context, SNS or Notation rules.

Project configurable attribute values

Attribute value tailoring is an S1000D feature that allows some XML attribute value choices to be configured to meet the needs of the project. This BREX feature is fully supported in FrameMaker 10 where it significantly simplifies the author’s use of these special attributes. This enables the author to work with meaningful, descriptive names rather than ambiguous codes.

Figure 3: Easy to use “emphasisType” value choices when attribute value tailoring is enabled. Without attribute, tailoring all 99 choices (em01 through em99) is selectable, but what do they mean?
A few of these configurable attributes have a direct impact on the formatting of data module content. For example, the "emphasis" element has the "emphasisType" attribute which is used to define the way that the text "emphasis" is to be displayed. You can use the S1000D Options panel to define a BREX mapping so that the text becomes bold when you select the value "bold". This feature is extensible, so if the project is updated to define a new style for emphasis, it can simply be added to the BREX mapping.

![S1000D Options Panel](image)

Figure 4: Choose the text formatting for the BREX mapping. Mapped attributes are Color definitions, Text emphasis style, List item prefix characters, and Verbatim style formatting.

**Applicability**

Applicability is S1000D’s conditional content feature and is probably the most complex single feature of the specification. The concept is similar in principle to FrameMaker’s conditional text and filter by attribute features. S1000D applicability is fully configurable at the project level where three special data module types are used to define the project’s applicability cross-referencing information for:

- **Product** attributes which define features of the product such as serial number, model or any other unique, permanent property of the product.

- **Conditions** list where operating conditions or modification states for the product are defined. Conditions will vary from time to time over the life cycle of the product.

- **Products**, which are groups of product attributes and conditions. Each product group defines a unique product configuration that is used to identify data modules or parts of a data module to be included or excluded from publication.

Each data module includes elements for applicability control in its IdentAndStatusSection. Data module applicability can be applied for the entire data module or as in-line applicability for individual elements.

FrameMaker 10 provides all you need to define and apply applicability within your S1000D projects.

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From the PCT list, you can select the product definition and directly apply the applicability filtering for the current data module, or all of the referenced data modules in a publication module book.
Editing data modules

FrameMaker is the perfect environment for writing and editing data modules. Its guided editing features ensure that building a valid data module structure is always as easy as possible. Special S1000D editing features include:

- Insertion of data module reference structures from the project’s Data Module List
- Single click generation of a module’s Table of Contents
- Auto-generate hypertext markers for each dmRef element
- Hide or show the IdentAndStatusSection in the document window without affecting FrameMaker’s structure view.

Typically, data modules for Illustrated Parts Data (IPD) are generated from a separate provisioning system. However, if you need to create IPD modules manually, FrameMaker takes away the pain of working with the unintuitive IPD XML structure. Instead, you get a familiar tabular layout where everything is exactly where you would expect it to be. Of course, your IPD data module is always saved using the correct XML structure as defined by the S1000D IPD schema.

Special care is taken to ensure that the formatting for all supported data module types matches requirements given in S1000D chapter 6.2.2.

Publications modules

The Publication Module (PM) is used to group data modules together for publishing purposes. It is equally suitable for page-based documents or interactive electronic technical publications. FrameMaker 10 provides two ways to work with a PM—either as a normal structured document or as a FrameMaker structured book. You can quickly switch between states at any time. The PM document view is best for creating or editing the PM structure when you can use the Data Module List to quickly add dmRef elements. The PM structure is simple but very flexible which makes it possible to build the Chapter – Section – Sub-section hierarchy that is typical of page-based technical documents. At any time, switch to the PM book view to make best use of FrameMaker’s book publishing features, perfect for high quality PDF documents.

Users of the Adobe Technical Communication Suite can publish the PM as a simple IETP based on the AIR Help output through Adobe RoboHelp 9.
Extending S1000D support

FrameMaker 10 delivers a significant level of support for S1000D issue 4.0. But what if you need to use one of the unsupported data module types? Fortunately, all of the S1000D frameworks can be accessed, and if the same design principles are followed for the structured template, EDD, and read/write rules, then it is possible to include the missing data module types.

At some point, you may decide that a separate CSDB has become necessary. Currently, there is no S1000D standard interface between the XML data module editor and the CSDB. Depending on the level of integration offered, it may be possible to continue using FrameMaker’s S1000D productivity tools. If there is a feature clash between the CSDB and FrameMaker 10, select Basic mode to enable the XML applications to continue to function, though many of the advanced features will be disabled.

Adobe FrameMaker 10—the natural choice when you move to S1000D

FrameMaker 10 has embraced S1000D, providing a unique, built-in editing environment. For some organisations, you may never need anything else. For others, FrameMaker 10 is a great way to start with S1000D, but with the flexibility to integrate with a fully featured CMS-style CSDB when the time comes.

FrameMaker S1000D is:

• the only XML editor that gives you so much S1000D as standard;
• all that you need to start your first S1000D project;
• robust, reliable, and fast;
• perhaps the easiest way to directly edit IPD modules; and
• offers perfect formatting for every data module.

About the author

Ian Proudfoot is an Adobe Community Champion, the owner-operator of FrameMaker and XML consultancy ITP-X (www.itp-x.co.uk) and a member of the S1000D Electronic Publications Working Group. Ian has been in the aerospace technical publications business for over 30 years. He developed the first commercial S1000D publishing package in 1995.