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As we rapidly approach our annual TDW-Live conference and my team stress levels increase, I pause to reflect on what a fantastic year it has been so far for Tech Data World!

Our membership network has increased dramatically, nearly all major vendors in the aerospace and defence sectors now support the work we do at TDW. TDW is engaged on multiple contracts supporting organisations meet their technical information needs now and into the future and TD-iQ, our learning portal, boasts many new users and students.

To be honest over the last quarter we have had so much happen it is impossible for me to do it full justice in my welcome piece, so I encourage you to follow us on all our social channels where we regularly update the market on what we are doing and most importantly how you can get involved.

I think what is vitally important is not talk about where we are coming from, but where we are going to, this is far more interesting to our members and the wider community.

2018 planning is already well underway - we have multiple workshops and events agreed. We have partnered with a technical publications vendor to deliver a workshop in successful contracting for technical publications, we have our Innovation Workshop planned for January as well as a seminar planned for Germany. Add to this mix that Claire and her team are already planning TDW-Live#8 and are negotiating a contract with a new venue and central location with the aim and vision to attract a wider audience from commercial aviation.

One thing I asked my team to investigate this quarter was how do we live stream our events to our wider member network, those that are unable to physically travel to any of our events, how do we make it accessible to all. The work my team has done in this area is outstanding. We have

invested in the technology to allow us to live stream our events - all our TD-iQ subscribers will now be able to join our events via their portal.

At TDW we are all about bringing to the market new ways of sharing, learning and ultimately succeeding with technical information - so I am delighted to announce that in 2018 - TDW will be bringing to the market the first ever independent ONLINE aerospace and defence conference.

This conference will be completely FREE of charge (more details inside). This is a first for our industry and we have many exciting ideas around this and how we can leverage the technology we have invested in and continue to deliver accessible resources to the wider community.

Not only this new and exciting development, at TDW we are launching our accreditation path for technical authors in the aerospace and defence sector - starting with a Level 1 - Foundation in aerospace and defence technical authoring. We have three levels of qualification up to and including Practitioner Level - TD-iQ subscribers will be the first to learn when this will be made available.

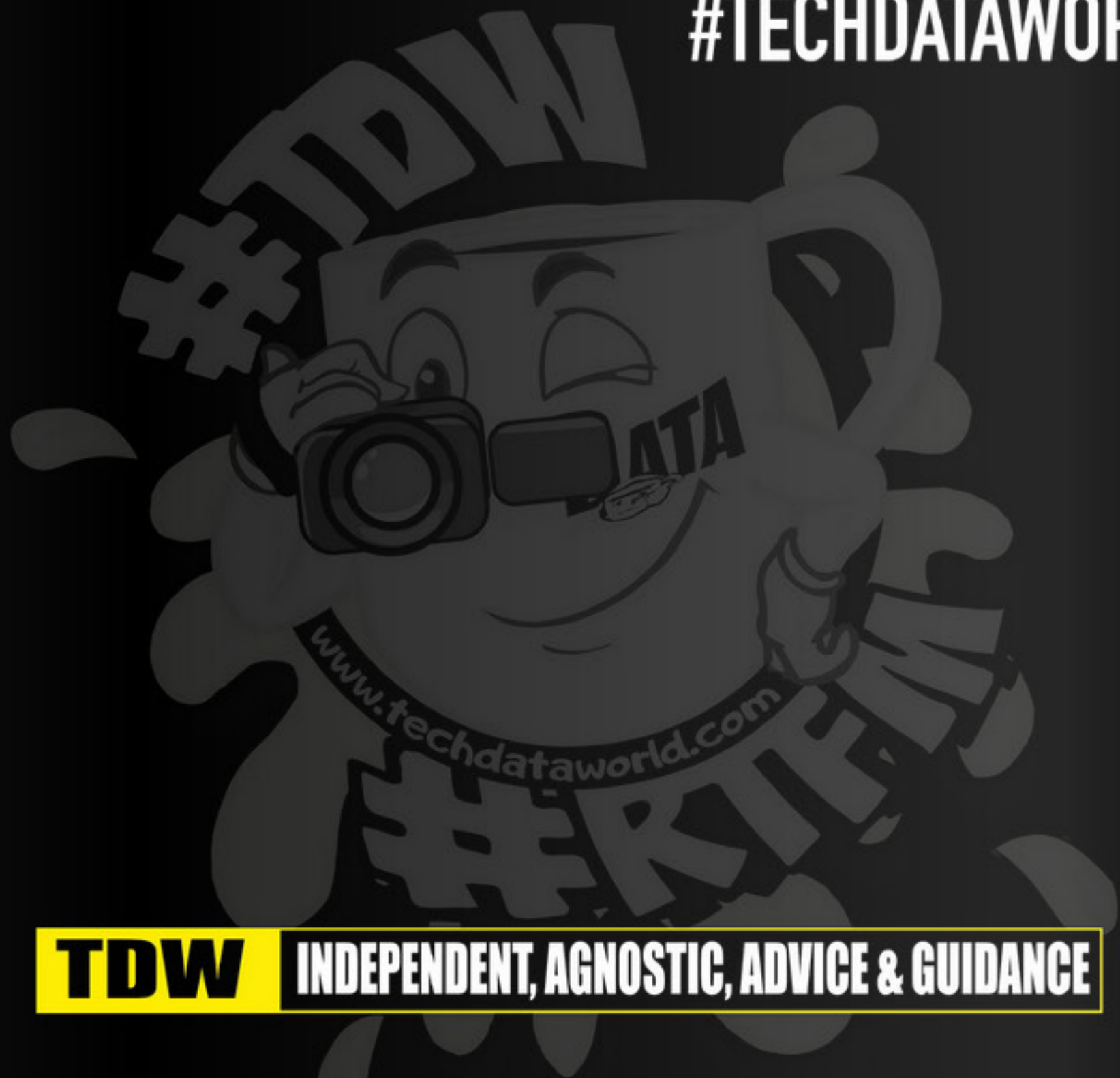
Anyone who has met me, knows I am passionate about our discipline, what we do is vital to product support - not everyone gets it, not everyone cares - but at TDW we care!

It just leaves me to say that if you are planning on attending TDW-Live do come over and say hello, I will be the one running around like a madman. I will also be attending a number of industry briefings and events over the next quarter, if you are there, say hi!

As ever a massive and huge thank you to those of you who continue to support the work we do at TDW, we have many new things planned so **stalk** us on all our social channels!

If you're reading this online - click on my face for a special message! Cheers, Mike

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FROM BEHIND THE DATA

HTML is the language of the internet, we already know this - 1997 was the last major release of HTML (HTML 4) and technology and capability has marched on rapidly since this update.

In the past HTML was only needed to support static web content, complex and dynamic web content was not a consideration, but of course now is the norm and expected.

As time has marched on, so has technology and the ability to do funky and clever things with our content has kept pace, but HTML was slow to keep up with and support these new ways of using content. So technology companies did their own thing!

A major challenge for HTML has been the ability to support new ways of deploying information, like video, audio, vector graphics and so on.

As HTML previously did not support these now common and expected content types 'natively', many software companies developed their own tools for viewing and listening to content. This led to many closed standards and resource heavy proprietary tools owned by individual software companies that required additional and often

[virus] risky add-ons to web browsers.

So in 2008 HTML5 was born (in draft anyway) and 2014 the first formal release of HTML5.

HTML5 was released with two fundamental goals!

One was to support natively common video and audio content and the other was to support users who now use mobile devices as their standard access point to the internet and web-based content. No longer is the internet only accessed from desktop computers with large screens.

A major advantage of HTML5 is for web/software developers to no longer have to rely on third party add-ons to support multiple screen resolutions. Vector graphic support is an obvious advantage for content delivery in our sector with no lack of quality, regardless of screen resolution and dynamic resizing.

HTML5 has opened the door for content creators to be able to use capability like drag and drop content creation, video and image editing, file sharing and much more!

The biggest plus for our market is that content creators can concentrate

more on content and worry less around third party (often blocked) plug-ins that prevents content from displaying or running.

HTML5

OUT - DECEMBER



NEXT ISSUE:

BUSINESS RULES PT4

TCS PT 4

BEHIND THE SCENES PT2

TOW-LIVE REVIEW

TEKOM REVIEW

TECHNOLOGY V TOOL CONTROL

AND MUCH MORE...

Layered Business Rules and Introducing the BREX

ALL ABOUT BUSINESS RULES

PART THREE

DR MIKE DAY

DID YOU MISS PART 1 & 2?

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In this article we will look at the layered model of business rules as they are defined in S1000D. We will discuss how these are implemented and how they affect data reuse. We finish with a high level discussion on the Business Rules Exchange data module (BREX) and how to implement it.

THE LAYERED MODEL OF BUSINESS RULES

S1000D has a concept of a layered set of business rules – but what does this mean? When you read S1000D Chapter 2.5.1 it explains that each layer “inherits”, “extends” or “profiles” the decisions from the layer above it as seen in Figure 1. Each layer has a set of business rules that are defined in a **Business Rules Exchange (BREX)** data module, and this inherits the rules from the BREX that represents the higher layer. From S1000D Issue 4.2 onwards perhaps there will be one (or more) **Business Rules Documents (BRDOCs)** which provide descriptions of the rules and information supporting the decisions made and why they were made. We start by discussing the business rules layers...

THE S1000D LAYER

Layer 1 is **always** the S1000D default rules that you find in the specification and defined in the S1000D default BREX (which is updated and provided with every issue

of S1000D). This layer contains the rules that every project **must** adhere to. Some of the rules are controlled by the Schemas (for example, the data types and the types of values allowed for each element and attribute), and others are controlled by the default BREX. The default BREX contains entries for all (if not, most) of the rules you can find expressed in S1000D; this includes rules that can be checked automatically using a business rules checker program (more later) and also those that cannot be checked automatically. At a minimum a project must comply with the default BREX.

THE PROJECT LAYERS

Layers 2..n are the “project layers”. The rules defined at each layer must conform and not contradict those of the layer above and ultimately to the highest layer – the S1000D layer.

LAYER 2

The trend that appears to be developing

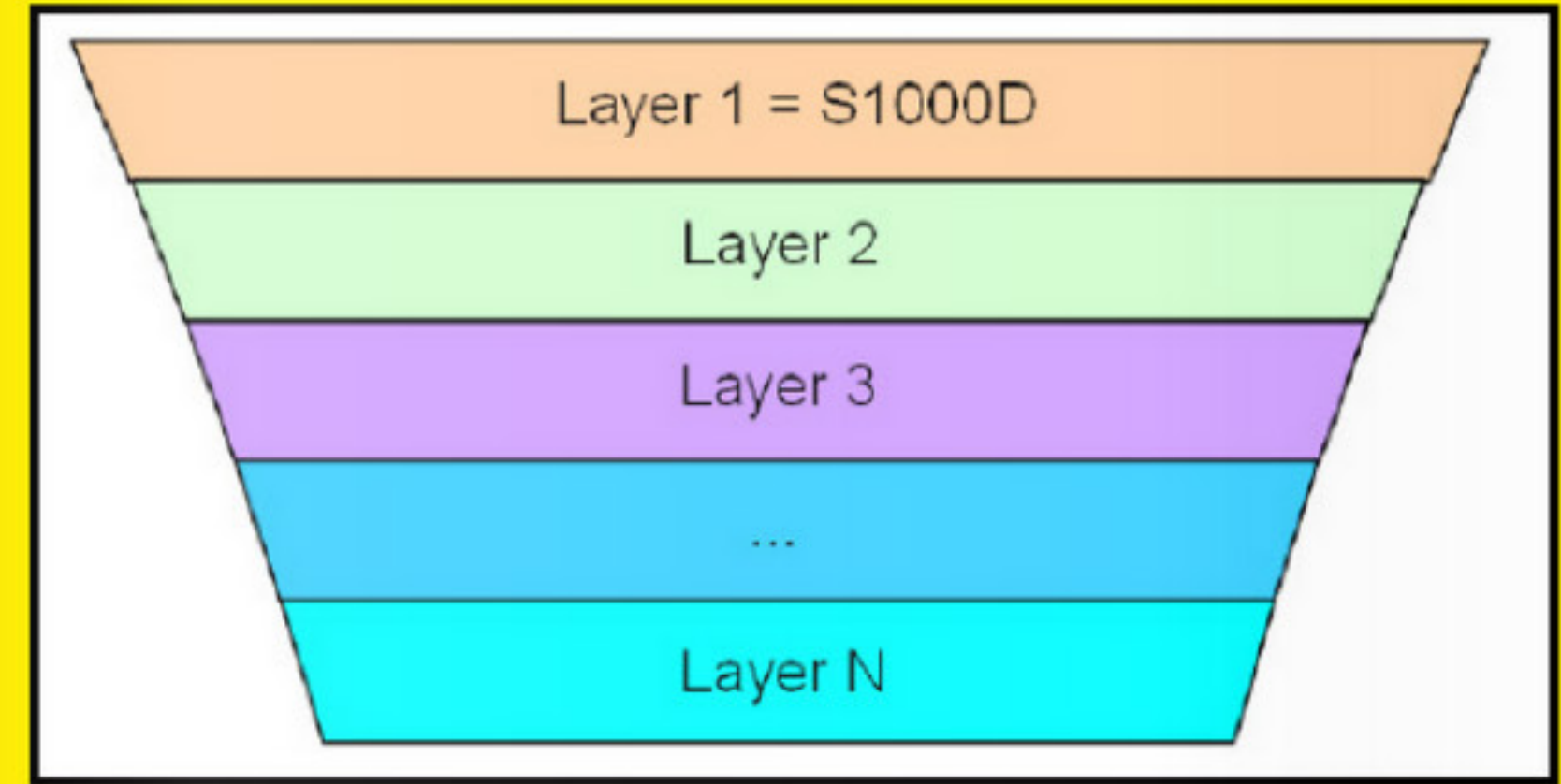


FIGURE 1 - S1000D's LAYERS



“The task you would like me to fulfil is so difficult that I do not dare to refuse.”

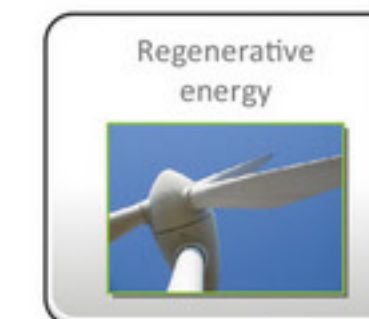
Ernest Starling

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in the S1000D community is that layer 2 is defined by what I will call an "Interest Group layer". For example, there is a **Civil Aviation Working Group** (CAWG), a **Defence Interest Group** (DIG) and the **ShipDex Group** (who are interested in nautical applications for S1000D). Each of these groups are developing high level business rules suitable for their domain. The DIG for example are developing Defence Business Rules – rules that are to apply to every conforming defence project, and the other groups are doing the same for their domains.

LAYER 3

This layer could be the UK MoD business rules, or in Germany, the Bundeswehr rules. These rules must conform and not contradict the DIG's rules and therefore by implication to the S1000D rules.

LAYER 4

The UK MoD may decide to develop a set of Layer 4 rules that sit beneath their UK MoD rules that could contain air specific rules, sea specific rules and land specific rules. Taking the Air rules as an example, the next layer down could be the major Air projects: Eurofighter Typhoon, Hawk, A400M,... rules etc.

LAYER 5

Layer 5 could contain the rules that apply to the engine and its airframe for a fast jet.

Let's explain by example: Figure 2 shows the route from an S1000D Business Rules Decision Point (BRDP) that we saw in the last article to a Project BRDP; it shows what could happen for "responsible partner company", you will see that S1000D has two decisions to make – to use the enterprise name XML element or not and / or to use enterpriseCode XML attribute or not.

At the MoD layer, they have made the decision in their business rules that the enterpriseName XML element must not be used and that the XML attribute enterpriseCode must contain the NCAGE code of the responsible partner company (and this will apply to ALL UK MoD projects).

At a lower level the project (eg Eurofighter Typhoon) will define the NCAGE values that are allowed and you will see from this example, that the Airframe sub-layer would define the NCAGES of the airframe partners and the Engine sub-layer, the NCAGES of the engine partners and so on.

When you look at this in detail you can see that the layered model presented by

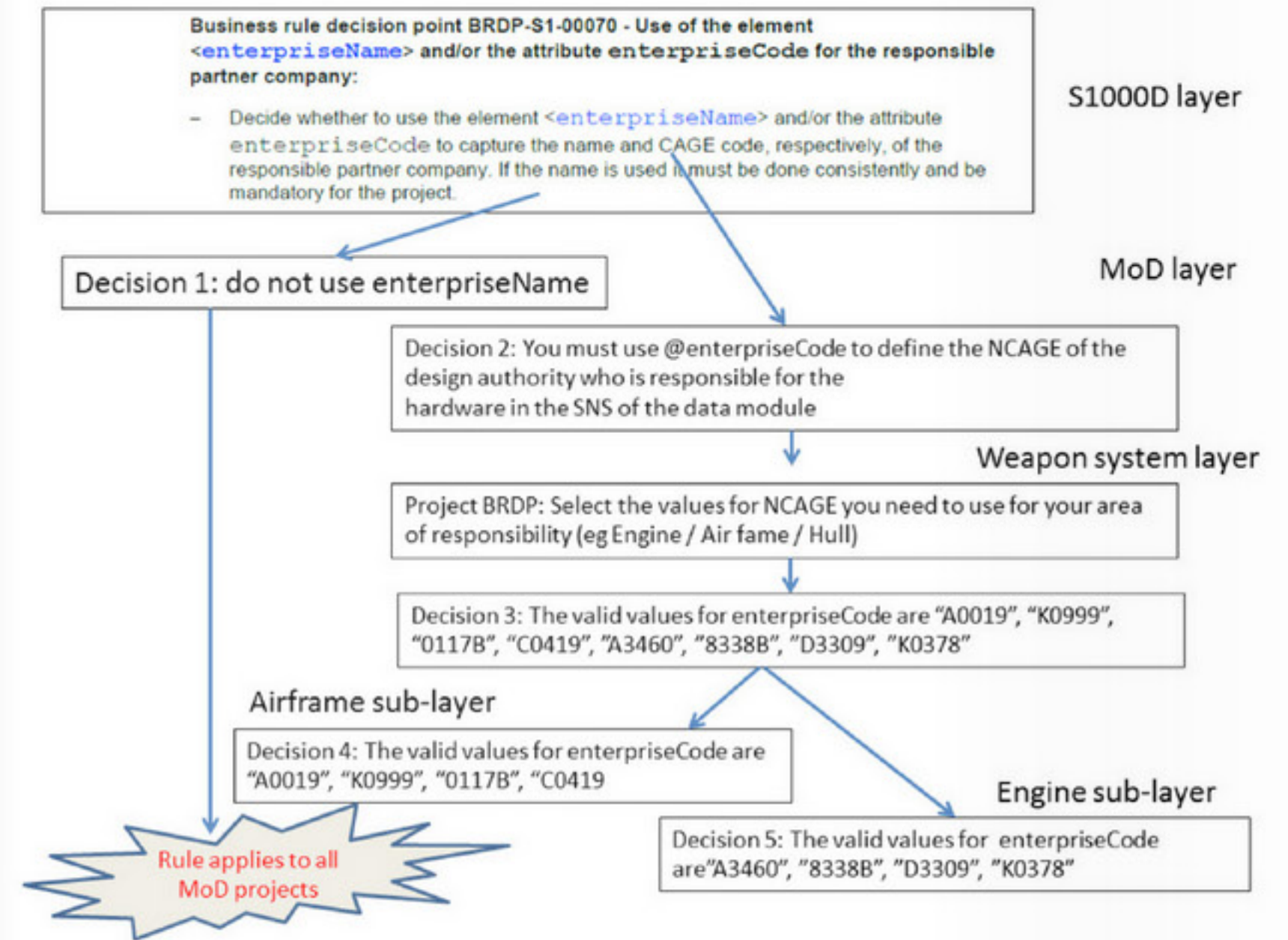


FIGURE 2 – THE RESULTS OF DECISIONS MADE AT EACH LAYER

S1000D and shown in Figure 1 isn't exactly right - as each layer can have "sibling sub-layer rules".

You cannot stop at this level though as there are rules that apply only to the **engines** and not to the **airframe** and vice versa and there are rules specific to the other sub-systems of the weapon system – for example engine accessories, the ejection seat and the radar.

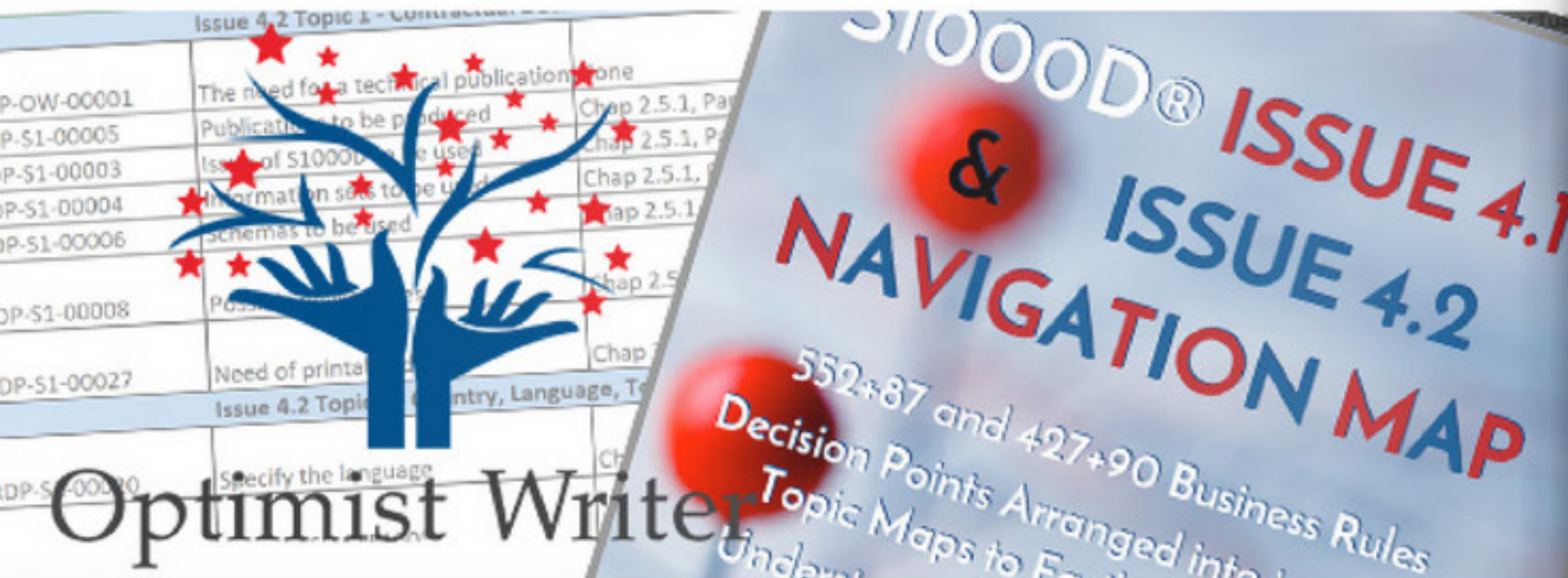
IMPLEMENTING THE LAYERED MODEL IN S1000D

In S1000D data modules will refer through a reference data module to the lowest level BREX data module that it complies to. The BREX data module in turn will have a reference to the next higher level BREX data module, which in turn has one to its parent layer. The layer 2 BREX

data module will then refer to the S1000D default BREX for the version of S1000D it uses. This again has problems if the project uses multiple versions of S1000D.

S1000D software suppliers have to provide the functionality for the layered model and they have to make sure that the rules are applied in the correct order. S1000D doesn't give much guidance in this area as it's up to the software vendor to implement the references between the layers. For the software-minded readers, one method that could be used is to convert all of the BREX data modules into one XSL file and have the order of precedence of matching templates to apply the rules in the correct order.

PROBLEMS WITH BUSINESS RULES AND DATA REUSE



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Information flow during the use of the project business rules

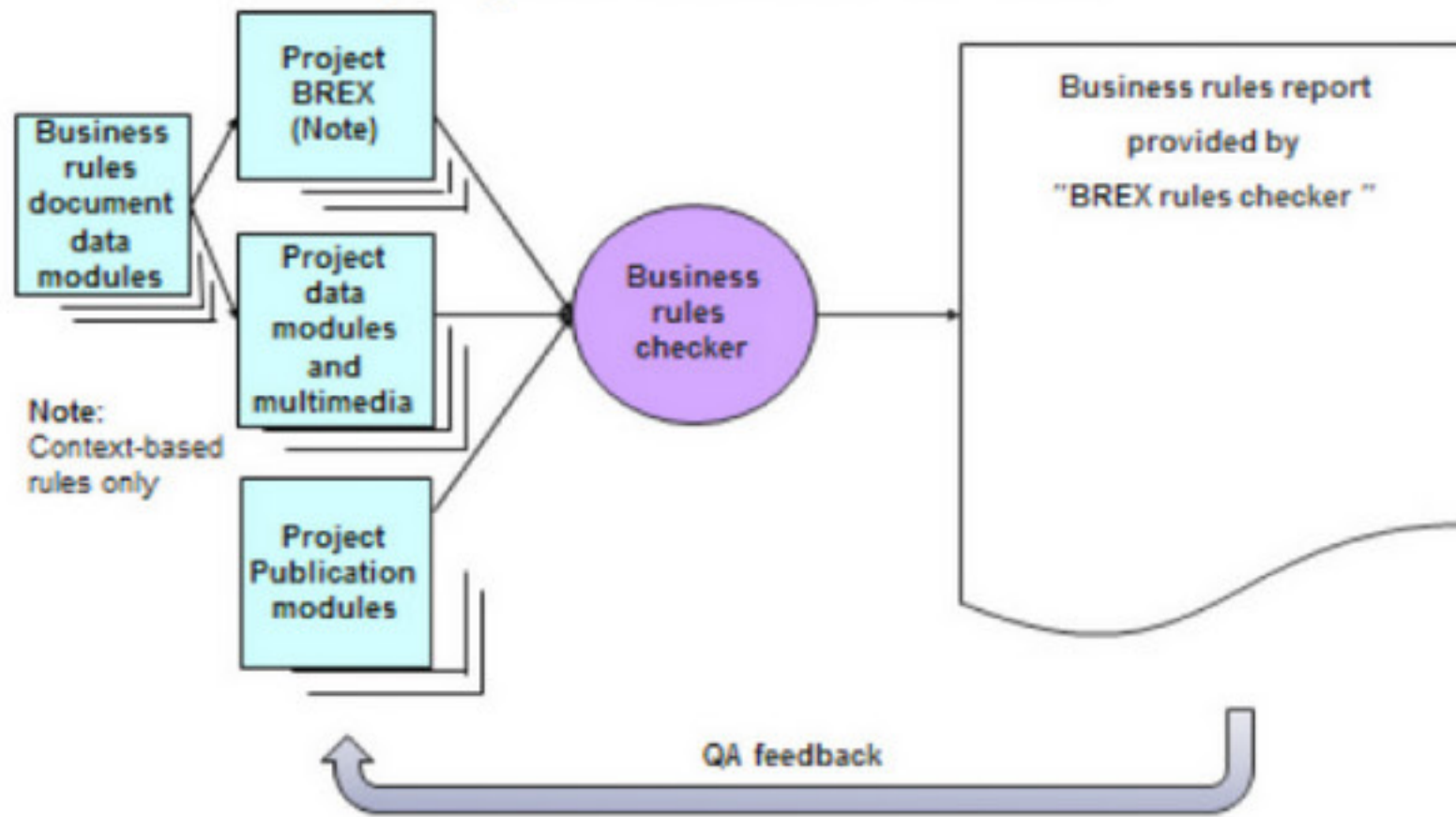


FIGURE 3 - BREX IN THE BR CHECKING PROCESS

Many supporters of S1000D claim that it promotes re-usability through the concept of "create once, use many times" and that data modules could be used across multiple projects. This is only true if both project's business rules are the same.

Let's say that a radio can be used in a ship and a land transport vehicle. In the layered model, in theory the data modules that support the radio must conform and comply to the Ship layer when the radio is used on a ship and to the land transport vehicle layer when it is used on the land vehicle. This can only work if the two sets of higher rules are the same. They won't be of course! The situation is worse if the radio is also used in a civilian ship or land vehicle. The implications of this are that the manufacturer of the radio has to create different versions of the same technical content because the rules on which XML elements and attributes may or must be used are different in the higher layers. If data already exists for the radio and it doesn't comply to a new customer's business rules, S1000D recommends in Chapter 2.5.1 that it is reused without

change to avoid extra costs.

INTRODUCING THE BUSINESS RULES EXCHANGE DATA MODULE

The Business Rule Exchange (BREX) has been with S1000D for some time now and is being widely used by projects. There is wide support for BREX in commercial off the shelf S1000D systems where it is used in a business rules checking process shown in Figure 3.

AUTOMATED RULES CHECKING

Before you allow data modules and multimedia to enter your CSDB as approved data, you should perform a quality check. Some of these checks will be against your business rules. The BREX uses XML to express the rules and therefore allows some of them to be checked automatically thus assisting the CSDB planner in the quality assurance task.

The first thing to note is that BREX can't

do everything. We saw in previous articles that it is a good at doing what it says in its name – exchanging business rules between organisations. For automated checking, we know that this is a good start, but this is not enough for those serious about checking data – especially those rules that affect the technical content and those rules that apply across systems.

Although there is wide support for automatically checking the elements and attributes and some content in S1000D XML data, the same cannot be said for checking the rules applied to multimedia (sizes, fonts, line weights, text to graphics rules); this is because the BREX can only specify the rules for checking XML using XPATH which is a standard XML method (it can only document the multimedia rules). Therefore business rules checkers that use BREX have to be supplemented by multimedia checkers, and as we saw in earlier articles, methods of checking your data across your enterprise systems. Just a note to say from my experience don't go overboard and specify trivial multimedia rules – if the graphic is usable and within the parameters of your display system should we care that the font is Arial and not Helvetica, or that a line weight is 0,35mm instead of 0,3mm? Common sense should apply and these issues will exist when the illustrations are reused between different projects.

The reader should also note that even in the XML data, not all rules can be checked automatically but the BREX has a mechanism that allows these to be expressed alongside those that can. The ones that can are held within a section of the BREX called the context rules block and those that can't are within the non-context rules block. Therefore the multimedia rules described above would be in the non-context rules and can be implemented within an organisation using proprietary software.

My advice is to take the BREX and extend it into your organisation so that you give it

**BEFORE YOU
ALLOW DATA
MODULES AND
MULTIMEDIA TO
ENTER YOUR
CSDB AS
APPROVED DATA,
YOU SHOULD
PERFORM A
QUALITY CHECK**

far more power.

THE BREX ISN'T JUST AN EXTENSION OF THE SCHEMA

Most implementations of the BREX in S1000D software systems are essentially extensions to the Schema and provide further checks refining the patterns and models in the schema. Indeed many do not allow data to enter the CSDB unless it conforms to the schema and the BREX. This wasn't the original intention – however the BREX has been successful in checking those important rules that **MUST NOT** be broken.

But some business rules aren't always precise enough for a checker to say "yes" or "no" to the question of conformance. For example, you could have the checker detect punctuation and the case of words and in this case you may want the checker issue a **warning** rather than an error. This doesn't quite fit with most software vendor's views of the BREX as they will prevent any data module entering the CSDB if it breaks ANY of the rules. In practice, I argue that this shouldn't be the case and that the decision to allow a data module to be loaded should not be an automatic one and it ought to be the decision of the CSDB planner if it gets loaded or not (using the power of the automated checker to find any issues). To support this view, I will use the example of a CSDB exchange that has failed one particular data module being loaded due to the fact that the unique identifiers (IDs) of paragraphs do not meet the string format specified for ID/IDREFs in the business rules, or that a sub-paragraph is missing a title. This data module could be one that is supporting the incorporation of a modification that could resolve an aircraft on ground situation and it has been rejected due to minor issues which do not mean that the data cannot be used. This is in contrast to a data module that has been rejected due to the torque value specified in a step doesn't match the one specified in the torque schedule – indeed many commercial BREX checkers don't have the ability to check these vital rules (and in this example, you couldn't expect them to

as to check it you need local knowledge of where the torque schedule is stored and its format).

BUSINESS RULES SEVERITY

So this leads me to the next topic – **business rules severity** which is a new feature in S1000D that we spoke about in the first article - and is now in the BREX. So what does it mean? The values are project configurable and have the value "1" to "99" – S1000D has "1" meaning most severe, "2" medium severity and "3" meaning least severe; the other 96 values can be used by a project for whatever they want (provided they give a definition). Indeed the values 1-3 need explaining for a project too and themselves are configurable. It's one thing

providing definitions of the values but far more important is defining what you should do if you find errors of a particular severity value and the highest severity of all the errors in the overall data module, multimedia etc should be used to determine if the data can be loaded or not.

A value of "1" would almost certainly mean that you have a technical content issue (say an invalid torque value, a part number or catalog sequence number that is not recognised etc.), and I would say that any data module that displays an error of 1 anywhere should definitely not be loaded to the CSDB until it is corrected.

The values "2" and "3" are less severe. A value of "2" could be our paragraph that is

WHAT'S COMING NEXT?

IN THE NEXT ARTICLE I WILL PROVIDE A TECHNICAL DISCUSSION ON THE BREX. THIS WILL HELP YOU UNDERSTAND THE BREX SCHEMA AND HOW YOU SHOULD USE IT TO CREATE YOUR OWN BREX. THE ARTICLE AFTER THAT WILL DESCRIBE HOW TO CREATE A BUSINESS RULES DOCUMENT USING THE BRDOC SCHEMA.

PART FOUR

missing a title, or the ID that isn't to the right string format, a value of "3" could be the minor things such as missing full-stops, or general things that the rules checker cannot be sure of. "2" and "3" could generate **warnings** in the rules checker that must be fixed at the next update but the data module could still be loaded.

The severity level then is recorded in the **business rules document (BRDOC)** and in the **BREX** and if no severity is applied to a rule it will inherit the **default severity** which is set using mark-up in the BRDOC and BREX. The examples above feed my argument that the BREX is not JUST an extension to the Schema, but do not confuse (business rule) severity with (business rule decision point) priority – we'll discuss that in a later article.

THE BREX ISN'T JUST AN EXTENSION OF THE SCHEMA



PART FOUR

JOUNI OJALA

You could argue that technical documentation is a necessary evil as it's a legal requirement and almost always regarded as a cost center. But many organizations don't recognize that when it's done right it can open new business opportunities and create considerable savings. Now as IoT is a hot topic, it is an especially good time to think about your content strategy in which your technical documentation should be in a central spot. Technical documentation can work as an integrator between different information systems and parts of the organization, internal and external, by bridging different gaps with connected content.

The state and quality of technical documentation varies a lot and it's often spread all over the place. Most engineers and technical writers still work with basic text editors, even though very simple tools are available which would offer better and more flexible results. What technical documentation direly needs is more semantic content that can be used more effectively and diversely. The content needs to be structured and self-descriptive like HTML. Content management systems can also help by connecting the information to other sources. The existing information needs to be marked up a lot better and more internal linking is needed like in hypertext. Adding meta-data and links will allow the creation of a central data-storage, which can then be referenced from other sources and locations. Most of these elements already exist for most parties, the problem is that they are missing the central component that allows the combination and integration of other data.

Meta-data allows the internal linking of information and the creation of interfaces and external links, so the information can be accessed from other sources and systems and the use of the information can be more varied. External links and structured content also allows the right information to be presented at the right time and place, which makes it easier to use and more valuable.

FROM "TAIL-LIGHT WARRANTY" TO LIFE-CYCLE THINKING - INFORMATION MODEL AND MATURITY REQUIREMENTS FOR FUTURE TECHNICAL DOCUMENTATION SYSTEMS

PART 1: TECHNICAL DOCUMENTATION DEFINED

INTRODUCTION

This article talks about technical documentation, which in this case means material delivered with equipment that is required by a contract partner, third party or by legislation. The concept of technical documentation is broad, but it should become clear in the article. Generally, related to equipment deliveries, it means, instruction and maintenance manuals and design drawings required to understand the use and function of the equipment.

This article takes a look at the state of technical documentation and the possibilities related to it in the near future, from the viewpoint of a company working

in the machine engineering and technical documentation industry. The article doesn't look at research in the field or refer to it that much. It also needs to be stated that this article is written from the very general perspective of a technical writer so it may be unable to take into account some aspects of the customer service and maintenance business. The article's view is rather an outside perspective into the field. The main purpose is to look at the state and possibilities of technical documentation to find concrete new business possibilities in the field of technical information management and to increase the quality and efficiency of technical documentation products and services. The central theme is to show how to make more advanced technical documentation and how it should be seen as a service rather than as a part of a product.

This article will also try to highlight the

complexity of technical documentation as a multi-disciplinary business. For a technical writer it's crucial to understand how machines are used, in what kind of environments and who exactly is the user. In addition to technical knowledge, a technical writer needs to understand information management, have layout and illustration skills and be a creative writer. Technical writing is actually a very good term to describe the business and skills needed to succeed in it, as it requires creative and technical skills.

TECHNICAL DOCUMENTATION

Technical documentation is a very broad concept that can be understood differently depending in on person's background and profession. This makes the term easily misunderstood. On the other hand, the term is broad enough to describe the technical documentation business.

Depending on who is using the term, the meaning can vary a lot. For a design engineer it means design drawing, for a technical writer it's manuals, for service and support it's spare part and error code lists or training materials, for sales it's a necessary cost and for the customer an important reference. The article looks at technical documentation from the technical writer's point of view, which means that the term technical documentation mainly means refined instruction material and spare part catalogues.

Documentation is most often delivered to the customer in print form, or in a digital version of the format intended for printing, e.g. PDFs, which limits the use of said documentation, but obviously we should not be content with the current state, but rather look at what could and should be. In the near future as digital and fleet management platforms become more common, new channels open up for technical documentation delivery. The increasing interest into life-cycle information also creates new possibilities for technical documentation services, as it allows the linking of design and life-cycle information into technical documentation.



TARGET GROUPS AND PURPOSE OF TECHNICAL DOCUMENTATION

One always needs to remember the audience of the document, since it affects the required level of refinement for the information as well as how it should be presented. The typical instruction package contains, partly due to directives and legislation, an instruction, a maintenance manual and a spare part catalogue, and can also contain a set of schematics and lists that are less refined and more standardized for domain specialists, like electrical diagrams and error codes.

Understanding the level of refinement and refining certain parts of the documentation to a sufficient degree is important due to the different types of end users. Machine operators, maintenance personnel, trainers, technical support and after-sales, all have different levels of education and backgrounds, a different viewpoint and a different need for documentation. Commissioning and maintenance personnel need installation instructions, illustrations and schematics, but the operator or parts sales have no need for them or even understand how to read them. Then again, maintenance and training personnel may need the operating instructions just as the operator does, so it is important to find the smallest common denominator to set the level of refinement for each document and instruction. Although sometimes there is a need to display the same information in different ways for different users, as more verbose text may be difficult to use in some cases or more detailed information, a tightening torque for example, is needed in step-by-step instructions. On the other hand, all information should not be refined as it is inefficient and costly, therefore understanding and recognizing, which parts of the information is used by which stakeholder is important.

TARGETING

Setting the correct target group for the instructions is important. Technical documentation handles information on different levels and technical information may be difficult to understand if it's from a

foreign domain or area of expertise. Technical documentation is therefore difficult to put in a single mould and it may be hard to see how the information can be delivered to the user at the right time and in the right format.

Typically documentation has been targeted to different user groups by providing different types of publications for a single product. It's common that a product comes with an operation and maintenance manual that have very different types of content and structure. Electronic or digital delivery channels and publications have considerable advantages compared to traditional media. Modern documentation tools allow for single source documentation, which means that the same content can be used in different publications and platforms and they also allow the production and viewing of context related documentation and content. Another benefit of interactive digital publications is the possibility to customize the displayed content in the final publication. For example, by adding credential management, which allows changing the content that is displayed for a user depending on his device, position or location.

The correct targeting and timely presentation of information are key components of the usability and effectiveness of documentation. Targeting often has a lot of room for improvement. It requires understanding of the context of use, extensive information design and an information model that allows for customization.

USABILITY, EFFECTIVENESS AND EXPEDIENCY OF DOCUMENTATION

Usability, which is defined as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use." (International Organization for Standardization, 2010), is similarly important in documentation as it is with other devices and user interfaces. The ISO-standard definition raises an important point that was already pointed out earlier: usability always depends on the user group



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and the context of use, which highlights the need for customizable documentation.

With paper publications the usability has largely depended on content design, but digital and electronic publications have new possibilities regarding their usability. Digital publications are more comparable to software products than to traditional media. Content is still king, but the digital platforms allow for new ways of use.

Rigid traditional paper-based documentation is a singular and unchanging view into the content. Instruction manuals are made from the content that the design engineers make and it's refined to a more understandable form, for less technical people, similar to what popularized science does. The same designs and definitions are used to create the instruction and maintenance manuals and spare part catalogues, which all have different end users. But with a digital format, a publication can easily contain all of them and just limit the visibility depending on the user role. It is possible to have other use cases as well. In addition to the traditional user roles, as the digital publications allow the content to be limited and filtered more.

Interactive digital publications also make it possible to display new kinds of media. Furthermore, digital devices have sensors and/or cameras capable of recording and monitoring the real world, which allows the devices and publications to interact with other objects, not only making it possible to integrate video or 3D models into the technical documentation package, but also allowing recognition of devices and reading error codes, which can be used to automatically filter content and instruct the user more effectively. For example, QR codes are already very common and can be read even in difficult conditions. They can be easily added to any device (or alternatively point clouds) to allow the detection of components based on their geometry. Mobile devices are also powerful enough to run real time 3D graphics, which allows for augmented or virtual reality environments to be used anywhere.



NEXT ISSUE: PART 2: STATE OF TECHNICAL DOCUMENTATION NOW

A great example of a very approachable and accessible technique to create modern semantic documentation is HTML5. It is light weight, well standardized, natively processed in almost all digital devices and it also natively supports interactive components like audio and video. Very simple and inexpensive solutions can be created to use the sensors and cameras of mobile devices, with simple scripting language allowing for data collection and targeted documentation on site. HTML5 is naturally semantic and the mark-up is both human and machine readable, which allows easy writing and reading of the content, but the biggest benefit is probably the fact that it works pretty much anywhere and can be published 'as is' online.

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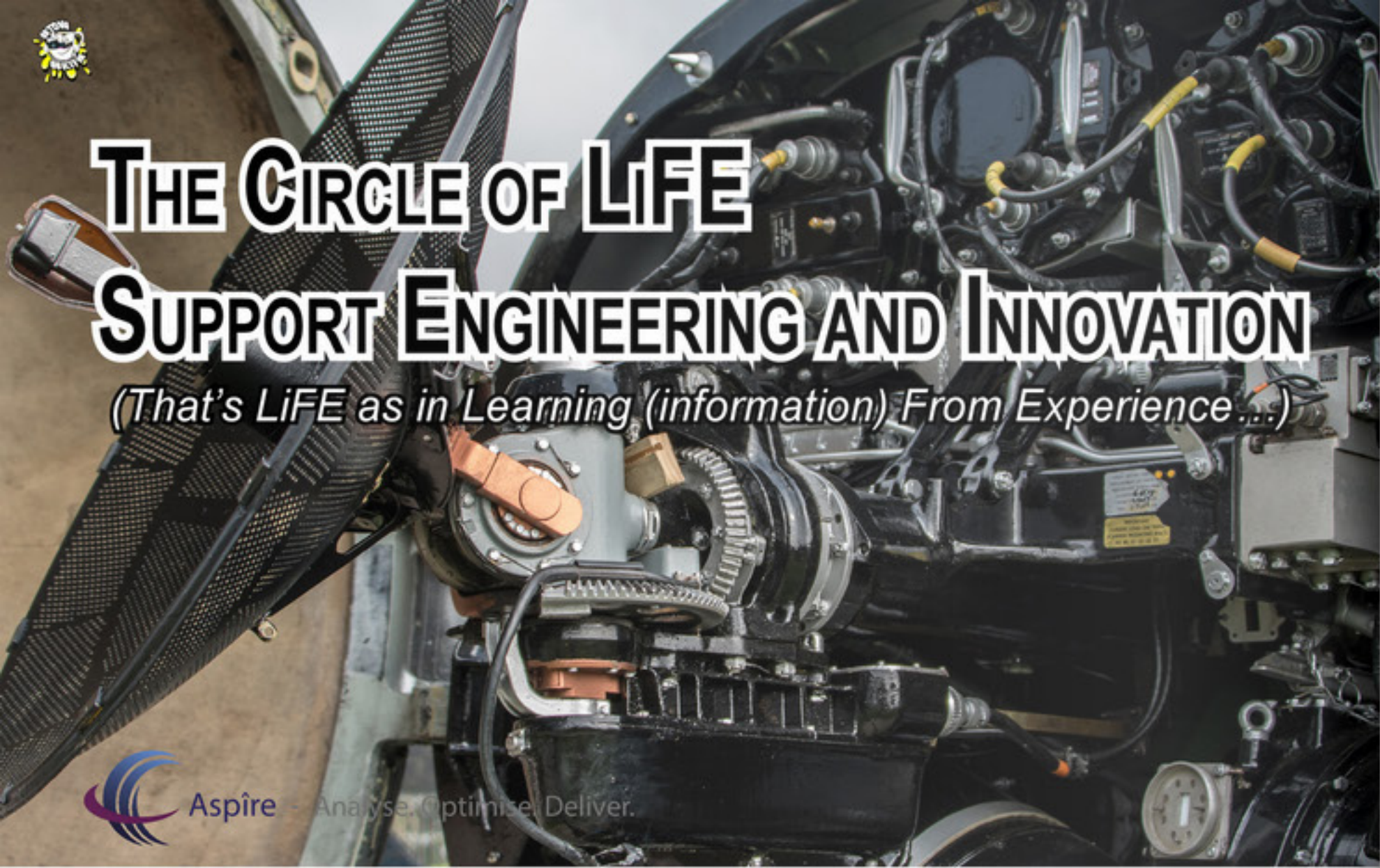


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THE CIRCLE OF LIFE

SUPPORT ENGINEERING AND INNOVATION

(That's LiFE as in Learning (information) From Experience...)



OK I had to work quite hard on that title to make it work, but the reality is that Learning From Experience [LFE] is a vital aspect of the Support Engineering process and there is a "circle" comprised of an analytical process, the use of the results of that analysis in-service, the gathering of data during the in-service phase, and the subsequent analysis of that data.

Support Engineering is complex, it has to take into account a great many factors, the process relies on having access to a lot of information; the concept of the "Total System", illustrates this ... and the reason why effective Support Engineering has to employ Systems thinking and Systems Engineering concepts.

The concept of the Total System has been addressed in other papers, suffice to say here that the Mission System is the hardware that we are interested in, it may be a fleet, a platform or an individual equipment. The Support System is the entire support infrastructure, including all organic and contractor elements, and the Employment Plan defines how the Mission System will be employed, where, what enemy action we



Figure 1 - The Elements of the Total System interact in a complex manner

expect, (we need to know what battle damage is likely so as to inform our Damage Modes and Effects Analysis [DMEA]), how often, how long for, etc., (think Mission Profiles). If we are to analyse (and optimise, within the given constraints) the Total System from a support perspective, then it is clear that we need a mechanism, or mechanisms, for capturing descriptions of each of these elements. This is too large a topic for this paper, so let me merely state that there needs to be a Mission System Definition Environment [MSDE], a Support System Definition Environment

[SSDE] and an Employment Plan Definition Environment EPDE]. These are notional means of managing the data and information associated with each element of the Total System.

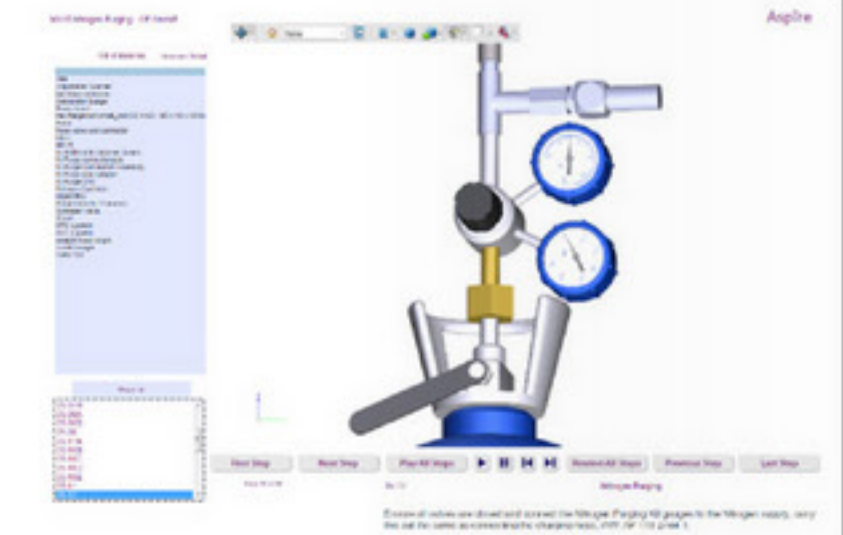
The Support Analysis process requires us to analyse the Mission System, defined in the MSDE, to determine the optimal maintenance requirements. As intimated above, when this is done, we must take cognisance of the operational context, noting that there may well be a range of operational scenarios that have to be taken into account (these being recorded in the EPDE). Then we can ask what will fail, why, when and how – i.e. what is the failure process, how long does it take, how often does it occur, what is the impact of a failure, how critical is it in operational, financial and safety terms?

We must then decide what we are going to do about the failure, we can determine the optimal response, should we intervene before the system fails or should we let the system fail and then repair it? Our response will depend to a large degree on whether we have access to technology which will enable us to track the failure process.

Once we have determined our approach we can define appropriate maintenance tasks and identify the resources required to carry them out. We can design an optimal Support System, the system required if we are to implement these tasks, and others, a system that puts the right stuff in the right place in the right condition, in the right quantities, at the right time. As we do this we can take cognisance of lessons learnt in the past, what works and what doesn't work, all of which should all captured in our SSDE.

If we utilise commercial technologies, we can manage this process using intelligent systems, databases that can handle equipment, fleets, fleets within fleets and families of platforms, and do so efficiently without duplication of effort or information. We can have analytical systems that will output "Camera Ready" documents, as well as Web, Kindle, Word, PDF, PowerPoint, Excel, or Mind-map "ready" outputs if you want them,

pretty much at the push of a button. Your documents can have any numbering system, with any trade structure, any zonal numbering convention, etc that the client requires; ... they can have any one, or they can have all of them. Consider the impact of this in world where the UK Government's concept of the Type 31e Frigate holds sway, a world in which complex systems are designed with the wider market, with exportability, in mind. Such a system also enables any updates to the support solution to be output and to be published immediately after an analysis has been updated and ratified.



Similarly, by using methods that are more or less ubiquitous in the commercial world, support data can be merged with CAD data to produce Technical Publications with embedded, manipulatable, 3D graphics. (This is now a standard feature in both Apple's iBooks Author and in Microsoft's Word and Outlook applications). Such Technical Publications can be used as training aids, to enable maintainers to "Train Forward". Information can be constructed so that it can be presented, not just as an electronic technical publication, but also as training notes, slide packs, conventional 'Page Turner' publications, or conventional hardcopy, all derived from the same data source, at virtually no additional cost.

Much of the Support information required to do this is "Qualitative" (consider how difficult it is to measure the quality of a Technical Publication for instance) and one of the most effective ways of deploying qualitative metrics is to ask simply, "is this new solution better than the solution we have today?" Support

Engineers also utilise "Quantitative" metrics, but, because we are managing high levels of uncertainty, these tend to be statistical measures (reliability metrics for example) which are wholly dependent on the existence of historical data. In the context of Support Engineering then not only are historical data and LFE are one and the same, and they are indispensable to the engineering process. We must not fall into the trap of only considering this need for information in the context of new development and procurement programmes however. The three elements of the Total System shown above share one characteristic, that is they are all constantly changing.

The Mission System ages, it behaves differently in different environments, it is used for purposes not foreseen when it was designed, parts become obsolete, it is modified, and we find, through experience, that it doesn't perform as per the specification. It has failure modes and damage modes that were unforeseen, some predicted failures don't occur, it may not be as robust or as reliable as we hoped, etc. The Support System changes as the support organisations evolve, different blends of organic and contractor support come into and out of vogue, new technology becomes available, other technologies become obsolete, and so forth.

The Employment Plan alters constantly due to changes in Foreign Policy, the threats change and new threats emerge, our enemies, and potential enemies, evolve their tactics and their technologies, the geographical areas in which our Armed Forces have to operate change.

This means that no Support Solution, no matter how well designed, will remain optimal, or anywhere near optimal, unless we are constantly testing and adjusting it, unless it is constantly evolving. In the world of defence if we are not moving resolutely forward, we are, inevitably, going backward, there is no such thing as stasis. If we are not moving forward fast enough, any advantage that we have over our enemies and potential enemies will narrow.

So what is the link between support innovation and information, between innovation and data, between innovation and LFE? The introduction above indicates that we need to collect a lot of information, (whilst avoiding the trap of collecting data for data's sake), and that data must pay its way, it has to be used effectively, to improve support, to lower through life cost. If this isn't seen to happen, the individual, the organisation, loses faith and loses interest, the quality of the data degrades, its utility is limited. Similarly, the process of managing data, and of gathering data, has to be made as unobtrusive and as "frictionless" as possible or it either will not be done, or it will be done badly. If we fail to utilise data effectively, if data collection becomes a burden on the maintainer, we will fail, we will establish a vicious, downward spiral.

Fortunately, this is not just an issue faced by the Defence sector, commercial organisations face similar issues and they have developed an array of smart technology to address the issues. Consider how easy it is to buy something on Amazon, to review their vast catalogue, to select, to order, to pay to arrange delivery, to track the progress of the order, to comment or to complain about the service. Consider how easy it is to design a photo album on your computer, to pay for it, to have it printed and delivered to your door, all within a period of a few days. Similarly, you can publish a book, promote it and sell it on line and copies will be printed and despatched to your customers "on demand". Note how 3D printing, "additive technologies", are developing on a similar path. Support Engineering can make more effective



use of technologies developed for the commercial world, many are mature, low cost and readily available. They can be utilised quickly and cost effectively, if a robust data management and manipulation philosophy



Figure 2 - Beacons, Sensor RFID, RFID, and NFC tags can all be deployed to enhance Support effectiveness

is deployed alongside them, (consider how well the Internet of Things [IoT] would operate without IoT software protocols). If this is approached pragmatically, with a dash of common sense and innovation, it will not require significant investment to realise very significant improvements in the effectiveness of Defence support.

Consider an operational unit, assume it has a Maintenance Management System [MMS] which details the required scheduled maintenance and which records details of any scheduled maintenance and corrective maintenance that has been carried out. Assume that the unit also has access to some form of electronic publications, a supply system and maybe a configuration management system, which collectively we can refer to as the Support Management System.

By utilising tried and tested technology, the Crew Chief could, when tasking each of his crew select all the relevant information required for each crew member that day. Relevant data can be extracted from the MMS, the Supply and Configuration Management Systems and the Electronic Technical Publications suite and downloaded onto a mobile device, in a coherent format; for example, with all the tools and test equipment, the spares and consumables, that are required being presented in consolidated lists.

The maintainer could then collect the required



oils, greases, adhesives etc from the ready use consumables store, if each consumable had an NFC label he could scan each item as it was selected using capabilities built into the standard mobile device. The maintainer could reorder items which were running low by pressing the relevant "Dash" button located on the back of the POL store door. In the tool store the tools could be identified with an RFID, the maintainer could attach a scanner to his tablet and scan them out.

In both instances, as the items are selected and scanned, the list on the tablet could be made to indicate that it has been selected, by changing colour for example. When the task is finished they can be scanned back into the relevant stores and the process reversed. Note that if additional tools or consumables are regularly checked out, this is information that can be used to update the maintenance task description.

If the task is complex, or the maintainer is unfamiliar with the procedure, they can "rehearse" the procedure on their device, watching each step of the process with its 3D graphics, like a video, before tackling the task 'live'.

If the required activity includes a complex condition monitoring task, or a fault finding logic to be followed, i.e. a procedure that required a series of measurements or observations to be made, the electronic documentation can be presented in the form of a contingent questionnaire. The procedure can instruct the maintainer to make an observation or to take a reading, the information being recorded on the device, the procedure will then present the appropriate next step, this step could vary depending on the result of the observation. The procedure in this instance also doubles up as a dynamic data collection 'form'.



Figure 3 – A wide range of technologies can be deployed, external or built in Thermal cameras, data bus adapters, external or built-in vibration sensors and endoscopes for example

At appropriate stages the maintainer can collect 'data', using a wide range of off the shelf technologies, by taking a picture with a thermal imaging camera attached to, or built into his mobile device, similarly they could use endoscopes attached to the mobile device, or take vibration readings using the device's internal capabilities or via an attached accelerometer, etc, etc. The maintainer can take notes using the key board, audio recording, voice transcription, or by attaching photos or videos as appropriate. An RFID bonded to the equipment can perform the function of an Engineering Record Card, using an RF scanner attached to the mobile device the relevant data, serial number, mark, mod state etc, can be recorded and associated with the data being collected, this can be collated with the time and date, and with the details of the maintainer who will be similarly identified via their ID card or log on. Location data may also be available, using GPS if available, or, for example if the task is being conducted on the workshop floor or in a servicing bay, by using an IoT beacon.

Some equipment may report their condition automatically, electronic BIT data can be accessed from a data-bus via a blue tooth adapter, or by interrogating sensor RFIDs



which can measure temperature, pressure, current, voltage, or which count operations.

There are hydraulic hoses that can detect their own degradation and report via wifi or cable to a central monitoring system.

With a mobile device and few attachments, the maintainer can now carry a sophisticated set of test and measurement equipment in their pocket. Taking measurements is now "frictionless", they can be made at any time, in response to a formal scheduled task, because the maintainer has concerns about a particular equipment, or simply because an opportunity presented itself.

But it is what we do with that data that is important now.

The first action would be for the maintainer to compare a performance measurement with a known "good" standard and, should the equipment be out of spec, the maintainer could then call up the relevant rectification routine and implement some corrective action.

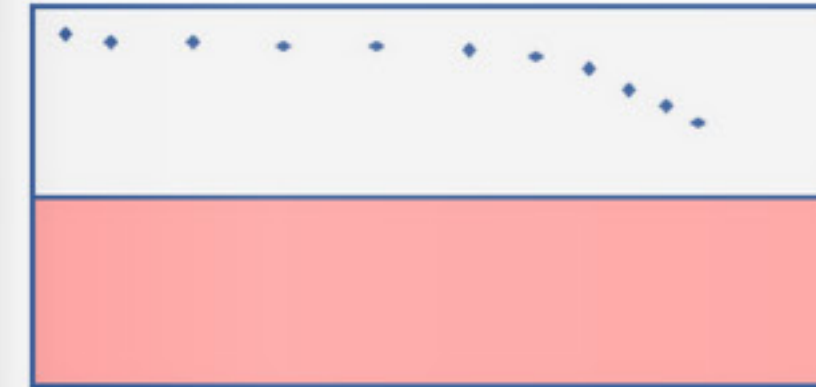


Innovative technical publications, utilising audio, video, 3D images, or Augmented Reality, would facilitate effective repairs even on complex systems and on tasks with which the maintainer is unfamiliar. Communication tools, derived from Social Media systems such as YouTube, FaceBook, Blogs, Vlogs, and Twitter, can be deployed which would enable the maintainer to communicate with others who may have performed the same or similar tasks recently, enabling them to

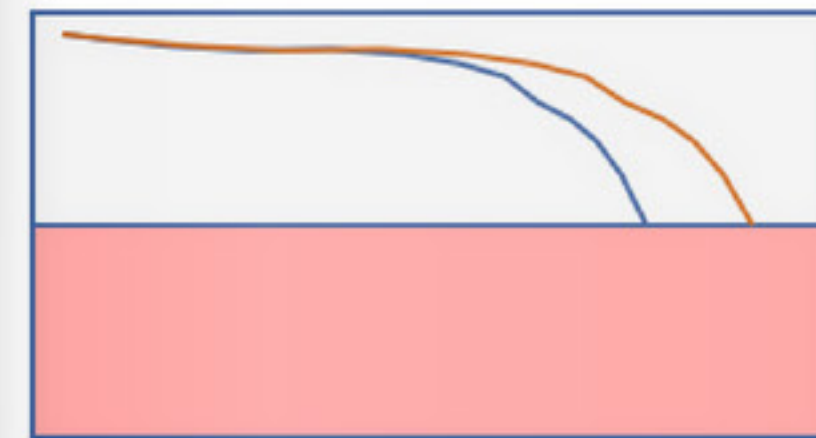
compare notes or to ask for advice, a sort of dynamic "Kit" magazine.

More importantly perhaps is the fact that all the data that has been gathered will be uploaded and collated with all other relevant data via the Support Management System. (Simple performance data may also be stored on the RFID attached to the equipment as well).

The consolidated data will indicate if an equipment is trending towards failure, this will allow a timely intervention to be planned.



Over time, the "Dynamics of Failure" of the system will become apparent, that is in Reliability Centred Maintenance [RCM] terms, we would be able to visualise the P-F Curve, and the scheduled maintenance regime could then be refined. If environmental data was also collected, then, over time, the impact of differing environments (e.g. dry and dusty, warm, wet salty) on the failure dynamics could be determined. This would enable future scheduled maintenance regimes to be adjusted dynamically, depending on the operational environment.



If the feedback is effective, if the analytical systems can produce outputs which are ready for use, for import into the in-service Support Management Systems, then the cycle times for updates can be reduced to days and

weeks, rather than, months and years. And hence we have come full circle, back to the analysis. We can establish a process that not only enables the maintainer, it also makes the gathering of feedback data more or less 'frictionless'. We can establish a virtuous cycle of continuous improvement, we can readily adapt to changing operational demands, to the availability of new technologies, to organisational change. We can improve the effectiveness of support, dramatically, whilst driving down through life cost.

Conclusion:

We use data and robust technologies to facilitate the analysis process, we use data and robust technologies to present appropriate information to the maintainer, to make the task easier, we use data and robust technologies to gather data and to feed it back into the analytical process.

There are some key themes in this article, namely:

1. Utilise robust, cheap, readily available off the shelf technology, most of the ideas described above can be realised using technologies at Technology Readiness Level 8 or 9. Most have been implemented, to some degree, by Aspire.
2. Enable / re-enable the engineer, facilitate optimal support.
3. Feedback and Data Exploitation – establish a virtuous cycle of improvement.
4. Utilise extant technologies to create data integration, management and manipulation systems (using xml, xslt, IoT protocols for example).
5. Improvements can be made incrementally, in low risk, low cost stages.
6. Support Engineering needs a place to experiment, the Support equivalent of a Skunkworks, somewhere that will enable that formidable blend of technical and domain knowledge, pragmatism, innovation and above all imagination to come together.

There are many other technologies that have not been addressed in this article, of particular interest to Aspire is the use of simulation models. Modern simulation tools are immensely powerful, and they can be deployed, not only on a 'project' basis to solve a specific problem, but also as day to management tools. Simulation tools can facilitate effective decision making wherever a manager has to take account of many variables which may interact with each other, when optimising scheduled maintenance regimes for example. But that is a subject for another article.

Historical Illustrations for Haynes

Roy Scorer Technical Illustrator

Well! These are a challenge to say the least. After completing some straight forward illustrations for the Haynes Fairey Swordfish book, I was asked if I would like to create the cover illustration for the Bismarck Owners' Handbook. I am not one to turn down a challenge. So my first task is to hunt down some reference material. This was quite a few evenings scouring the internet.

As you know, most images are low resolution, so some of the Bismarck plans were pretty poor and not much use. There was advertised, a book which had all the ships drawings deck by deck and bulkheads as well as details of guns and some cross sections of the hull. My budget would not afford the book as it was a little pricey.

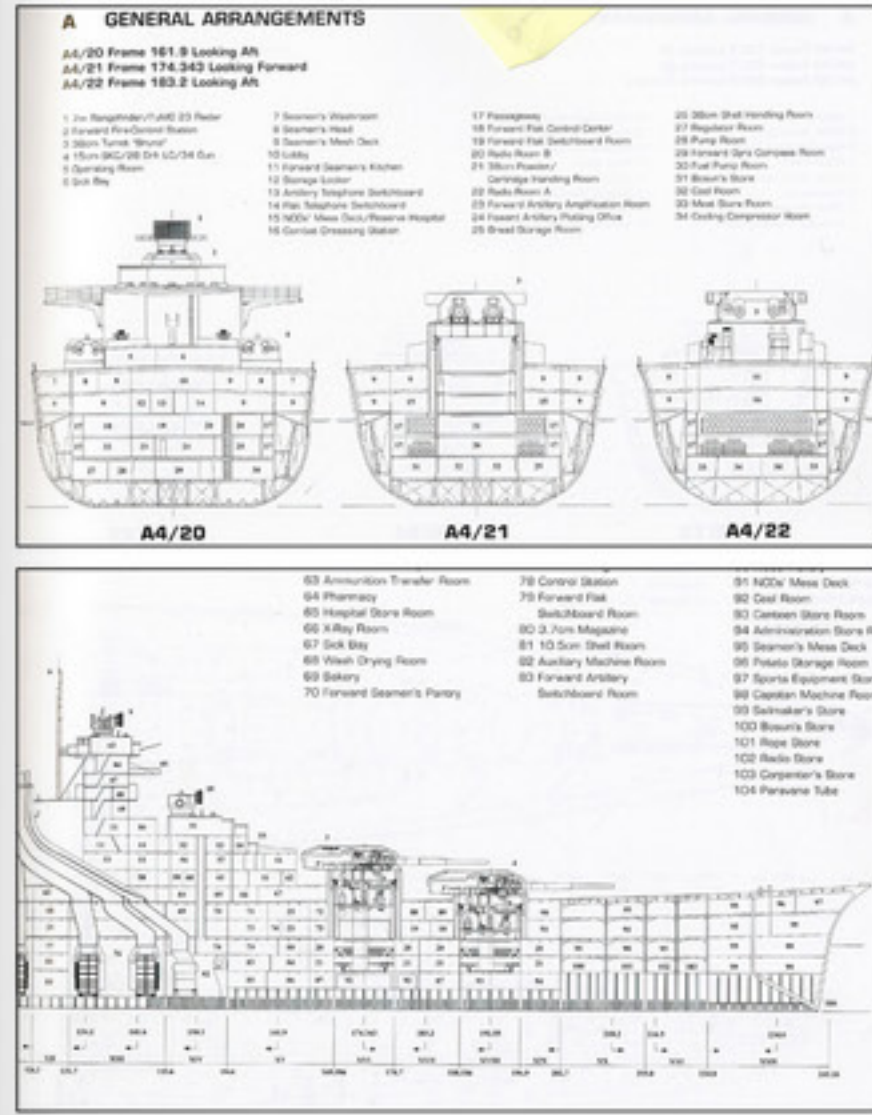
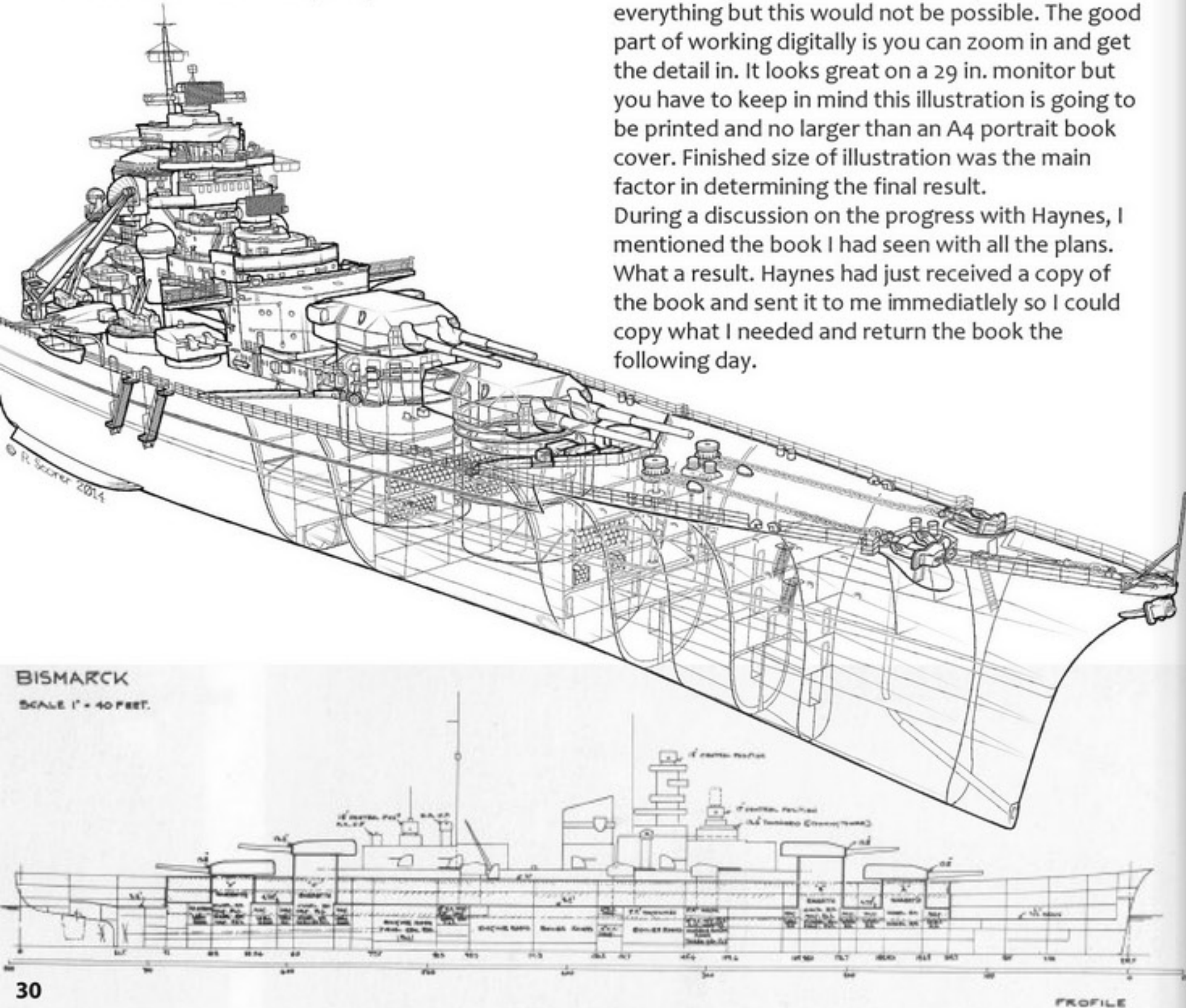
Models of ships

I found no end of photos of completed plastic models and eventually found one which was a nice high resolution and a nice view point. I investigated to see if there were any problems downloading and informed by the webmaster that was great and can I show them when finished.

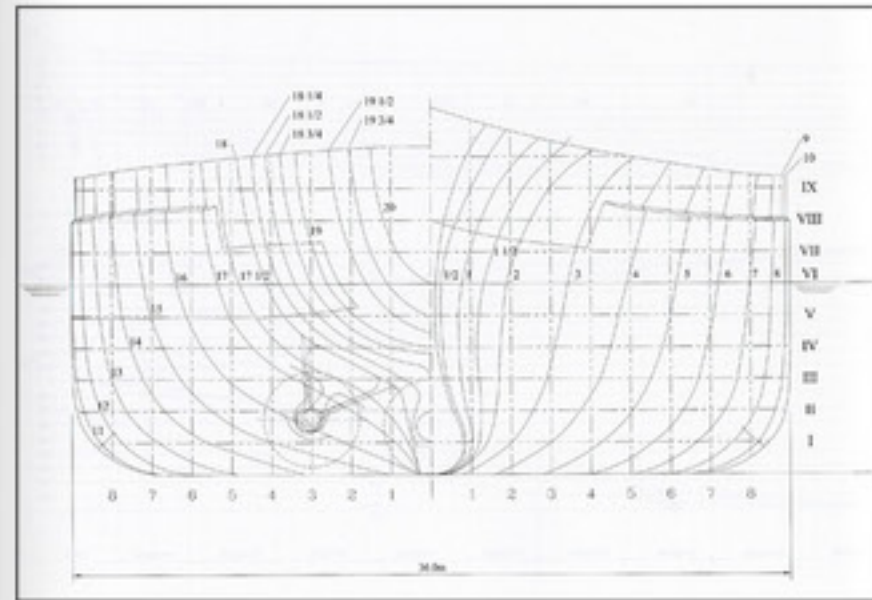
More hours on the internet and came across some very nice 3D computer generated models. A lot were locked down or no answer for permission to use.

How much detail?

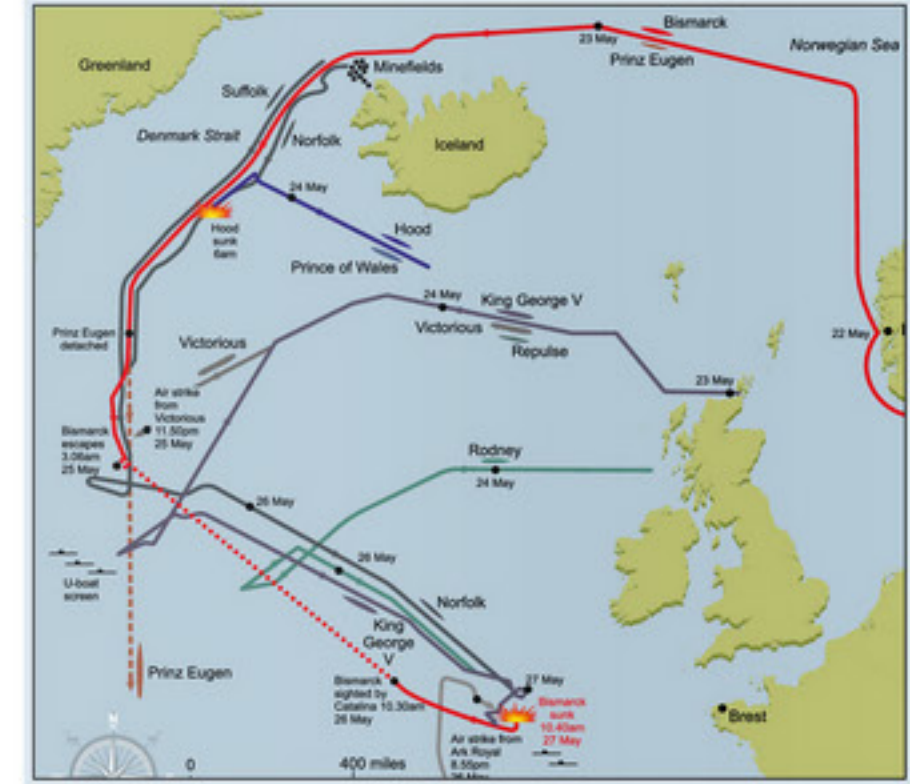
I sent Haynes a copy of the main reference to get approval of what I planned. Then it is on with the task. This became the tricky part. With my car cutaway illustrations I tend to try and show everything but this would not be possible. The good part of working digitally is you can zoom in and get the detail in. It looks great on a 29 in. monitor but you have to keep in mind this illustration is going to be printed and no larger than an A4 portrait book cover. Finished size of illustration was the main factor in determining the final result. During a discussion on the progress with Haynes, I mentioned the book I had seen with all the plans. What a result. Haynes had just received a copy of the book and sent it to me immediately so I could copy what I needed and return the book the following day.



Selection of drawings used for illustration



Now I can add the bulkheads accurately, show a little detail on some of the lower deck cargo holds. There was still a lot more detail I wanted to show, but when printing out it was just starting to get very dark and not pleasing to look at. I looked into what detail to add within the bulkheads and cross sections. A lot of the forward holds were ammunition, shells etc. so I added a few. At this point there was a lot of adding extra details on super structure and in holds, then removing it as the line weights had to be so thin so not to block in but were then too thin for printing. Finally ending with what is shown and Haynes happy with the final illustration. **U-Boat Owners Manual** This was again the same process all over again but a better final result.



Map produced for Bismarck Haynes Manual



Photos of Bismarck Models

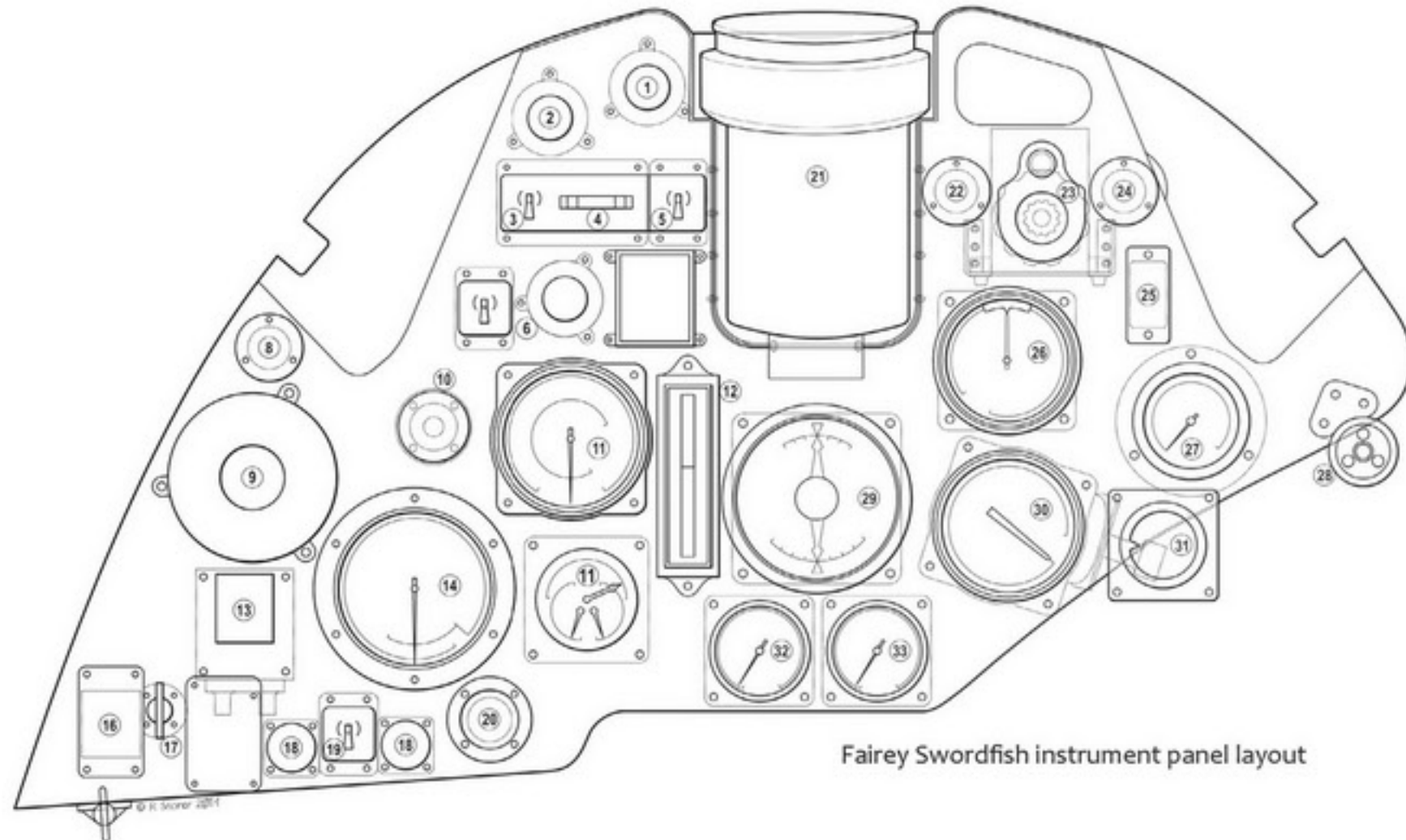


References.
The Battleship Bismarck, Series: Topdr Wings 15 by Waldemar Góralski.
www.battleshipbismarck.info
www.kbismarck.org
3D History by Thomas Schmid, Geschichte 3D.
And many more images of various scratch built models, too numerous to name.

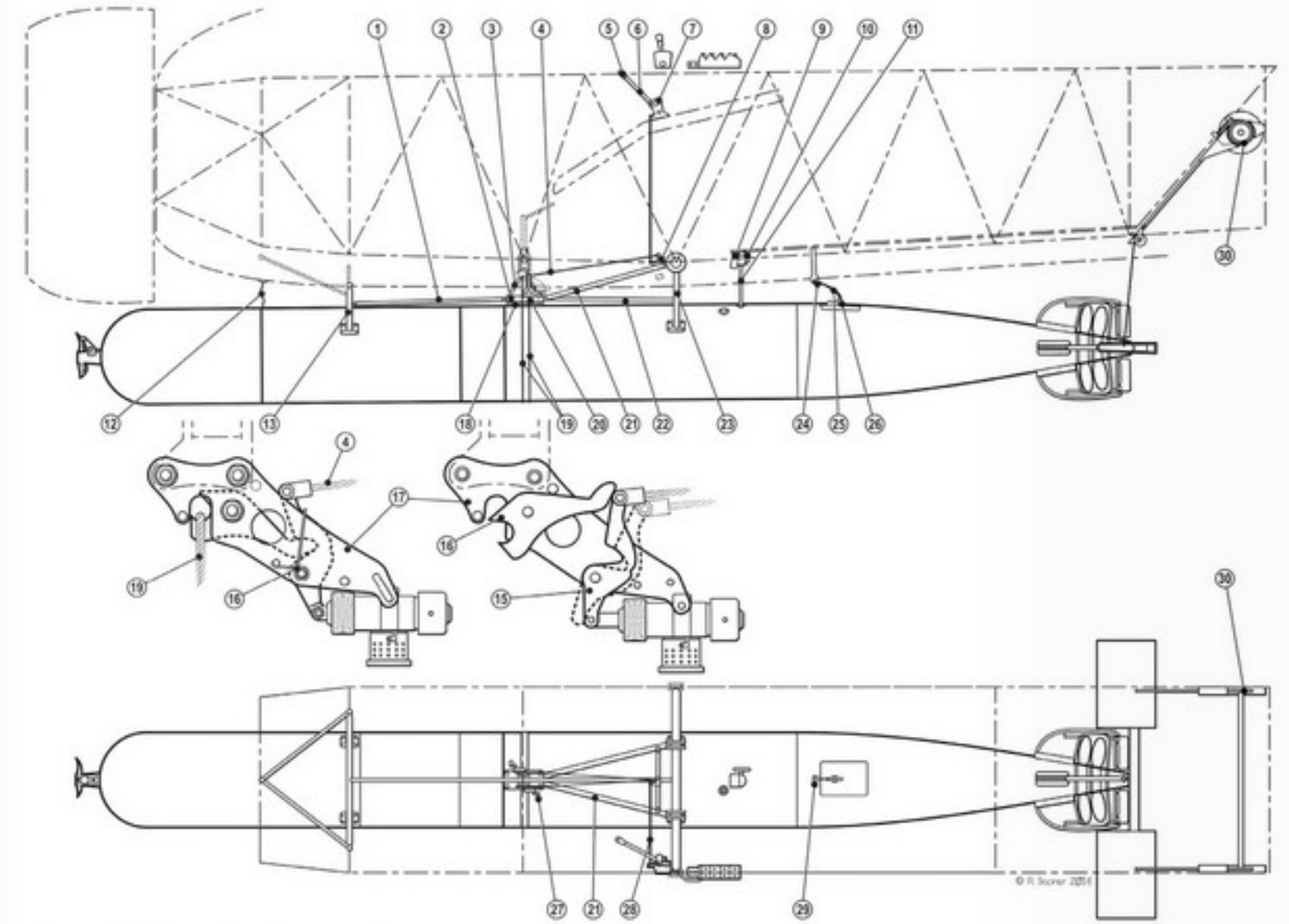
Fairey Swordfish Owners Manual

As well as the Bismarck front cover and associated maps showing it's final battle. I was also asked by Haynes for diagrams and maps. The diagrams shown are the cockpit instrument panel layout below and the torpedo release system shown

opposite. These were taken from scans of original blueprints which were now very faded, creased and stained. Also illustrated was the Dinky release system for the pilot if he was to ditch the plane. The Map below shows which ships launched the Swordfish aircraft in their battle with the Bismarck.

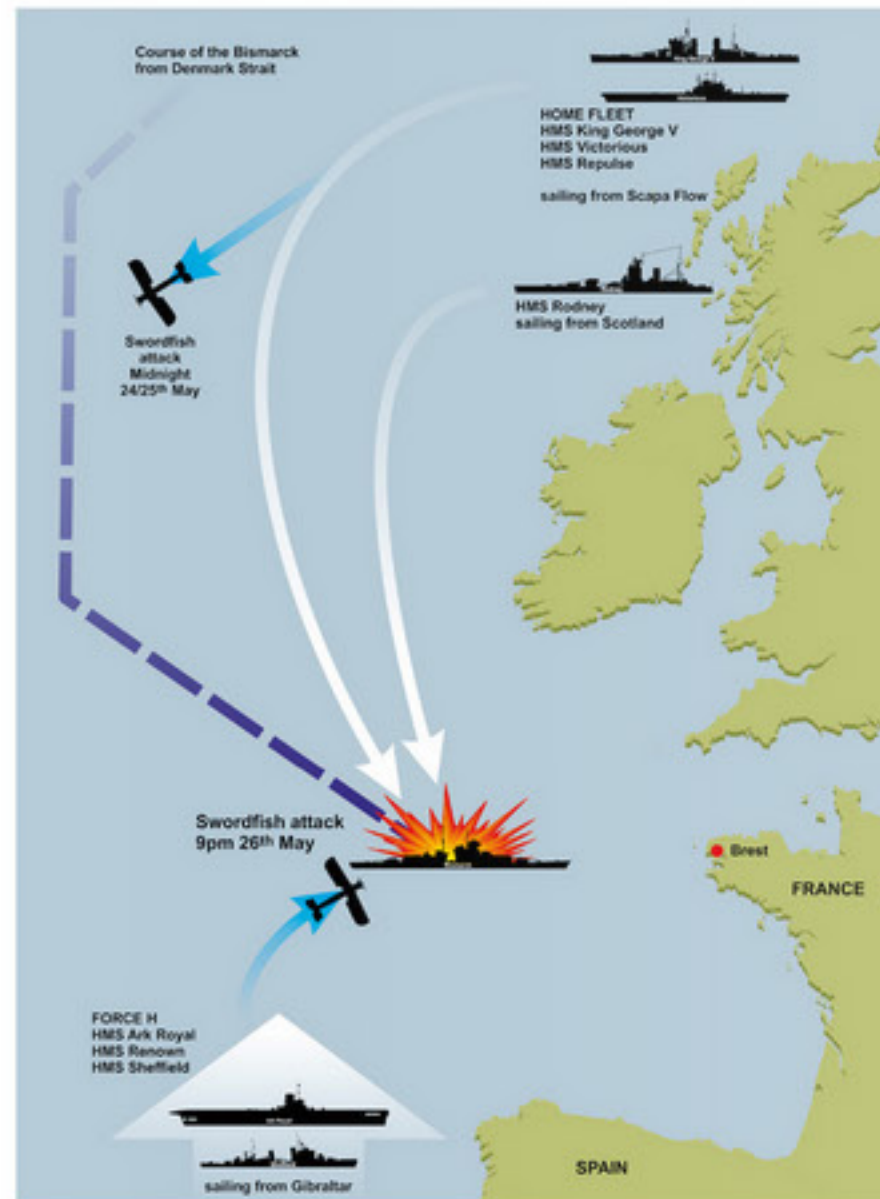


Fairey Swordfish instrument panel layout



Fairey Swordfish torpedo release system

Fairey Swordfish battle with Bismarck map

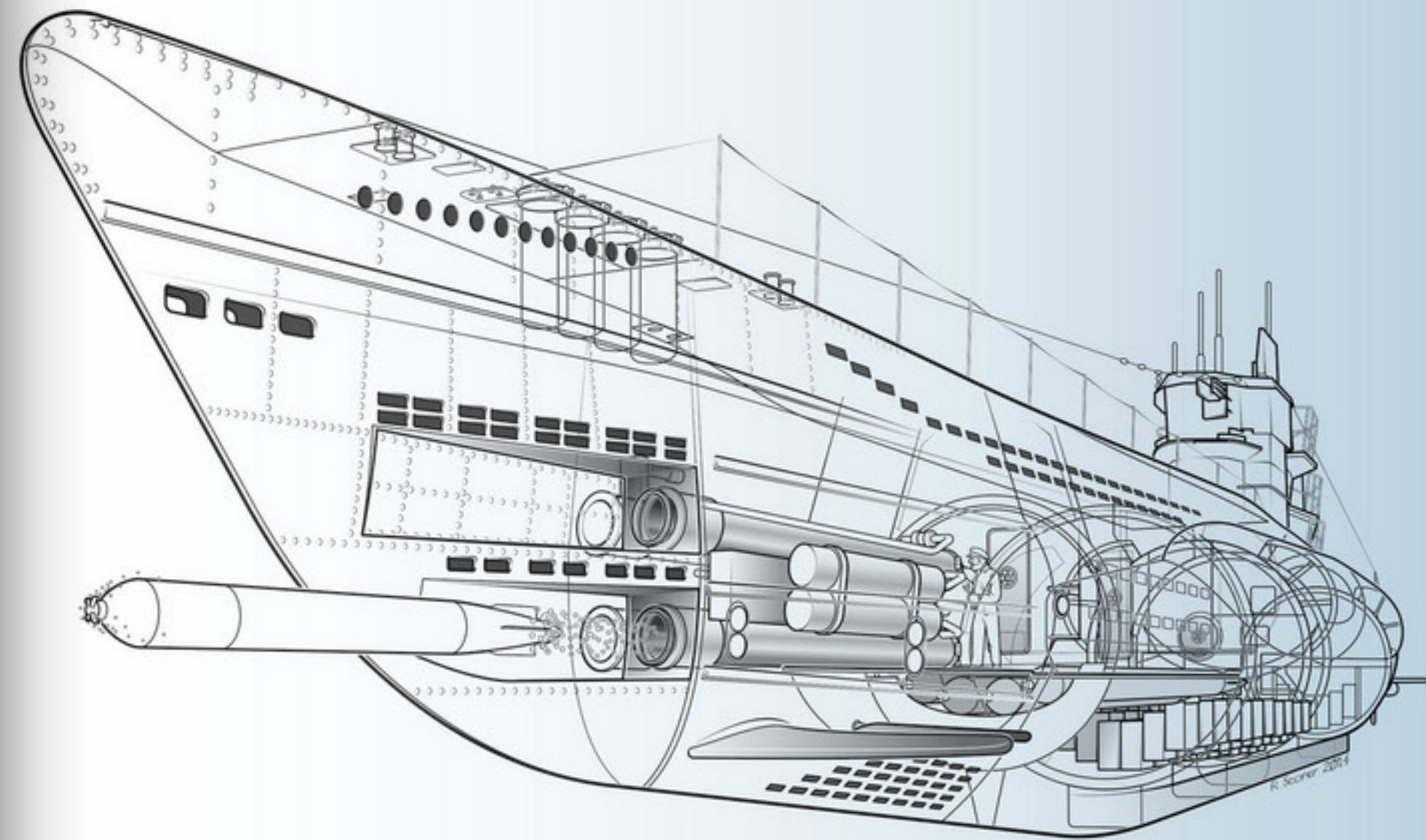


U-Boat 1936 - 1945 Type VIIA, B, C and Type VIIC/41

This illustration for the front cover, shown opposite, was created in a very similar way to the Bismarck illustration. Many hours of internet searching. The majority were images of models that have been used. Unlike the Bismarck, there is still one of these U-boats complete and as a museum so photos of the external and internals were found and used.

I also managed to locate some simple blueprints, which allowed me to add in a few bulkheads. When complete, the U-boat illustration lacked some interest, focal point. So I added a crewman and a torpedo exiting a launch tube. Illustration was then shown to Haynes, who then requested some tone added to match an RN Class A submarine illustration they had for a new publication which I was fortunate to produce some simple illustrations on how torpedo tubes and ballast tanks were flooded and operated.

Technical illustrators love the 3d cutaway ones but it is the 2d diagrams/illustrations that are the bread and butter work.



U-Boat 1936 - 1945 Type VIIA, B, C and Type VIIC/41



The third in a series of in-depth reviews of Adobe's new Technical Communications Suite 2017

Adobe's Technical Communication Suite has been given its biennial refresh. Is this a worthwhile update?

In my previous articles for the TDW magazine we looked at Adobe FrameMaker 2017 and Adobe RoboHelp 2017. This time we'll investigate the merits of the brand new Captivate 2017. The final article will get deep into automaton and integration using ExtendScript.

CAPTIVATE 2017: WHAT'S CHANGED?

This new release of Captivate has only recently been added to the TCS 2017 line-up. It supersedes Captivate 9 and depending on your publishing requirements will provide some useful new features. Let's have a look at what Captivate 2017 delivers.

NEW FEATURES

Captivate 2017's new features list is impressive, some of the highlights are:

- Simple and intuitive new ways to work with responsive design,
- Adobe TypeKit integration. Ensures all users see the content the way it was designed,
- Real SVG support,
- Device specific content previews,
- Auto migrate your legacy captivate content to mobile devices.

I'll explain what these new features really

mean as I walk you through Captivate's variety of operating modes. The new features have been seamlessly merged into the product. If you are familiar with any recent release this latest incarnation will be immediately familiar. This is the right way to update a software product without alienating your loyal users! Please take note FrameMaker development team... However while we're looking at the UI, yes it is yet another unique variation, so we have four TCS applications with four UI designs, why? The good news is that it's clean and balanced with large clear icons in a limited range of colours. It's not quite as classy as RoboHelp 2017 but comes close. I'll get off my hobby-horse now and mention some more important features of the package.

WHAT CAN YOU DO WITH CAPTIVATE?

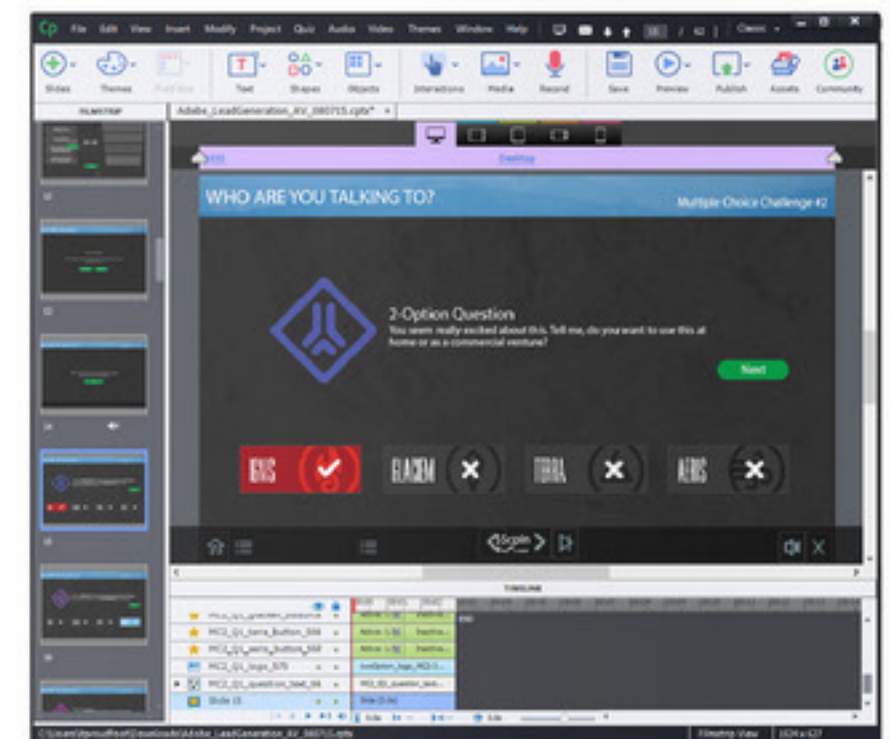
SOFTWARE SIMULATION

Captivate has long been in my tool-kit of really useful stuff. I often use it when designing software add-ons to existing

products as it has the ability to create truly convincing simulations of yet to be realized interface designs. This can be a really effective method for ensuring the user interface is created exactly as intended by the developers. It's also well received by clients as they can get a feel for the design before a line of code is written.

A more conventional use for software simulation is as an interactive training aid for existing products. In this case you would record the use of the software for a given task. Captivate records each action as a separate frame in an animated video presentation. It will automatically add text captions and show the movement of the mouse pointer. After recording you can then edit each frame to suit the results that you are trying to achieve. For each frame the background is fixed, but all other objects can be edited including the mouse pointer path and the text captions. Timing of events such as pointer speed and caption duration can be perfected on an easy to use time-line. Sound can be added and synchronized with the time-line too.

With a little practice you'll be making professional quality training material. The results can be better than a video recorded live because it's so easy to edit out your mistakes, sharpen-up the timing or even add new features for a subsequent update without



WORKSPACE WITH FILMSTRIP AND TIMELINE. EASY ACCESS TO TARGET DEVICES.

the need to re-record an entire presentation. The resulting presentation will also be much faster to download than the equivalent conventional video, saving data usage for mobile users.

Create a responsive project

Responsive design has received a lot of the effort in this update and the results are really worthwhile. The controls that allow you to preview your layouts are right there at the top of the work area at all times. Either use a slider to change the image aspect ratio, or use one of your predefined device settings. It's a lot more immediate and capable than RoboHelp's responsive options, while the ultimate usability seems to be similar for the consumer of your carefully wrought designs. Captivate will of course give you the opportunity to create much more exciting designs due to its new 'Fluid' boxes and TypeKit powered text that can be configured to expand, contract or move according to the change of screen resolution.

All of these new tools will of course mean that the ability to use them to the best effect for

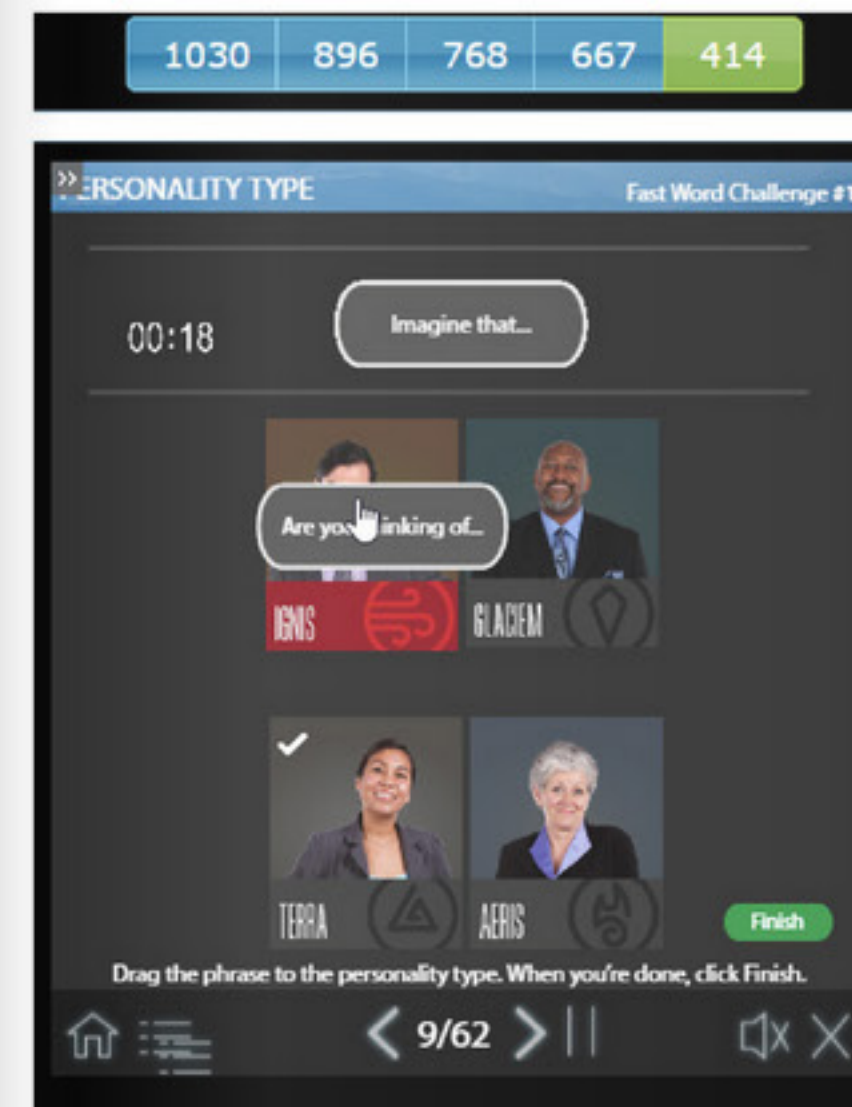
your learning projects will become a valuable skill. One design that makes sense on any device from a full HD desktop down to a smallest mobile phone screen is what your customers will demand very soon if they're not already doing it. Fixed page sizes seems so last century!

VIDEO DEMO RECORDING

If you need to record a conventional video demo, Captivate provides this option too. The video option will record a preconfigured area of your screen along with audio. This is a conventional video and the final content can be edited using a timeline which in this case is useful for editing the length of a clip or when combining several clips into one. Audio, video transitions, zoom and pan instructions and captions can be added too. Simple to use and with a little practice very professional. So I can't help wondering why the Captivate demo videos on the Adobe website are of such low quality with poor audio!

ENHANCE YOUR POWERPOINT PRESENTATIONS

Do you ever feel that PowerPoint just isn't



THE SAME QUIZ SLIDE RESIZED FOR A MOBILE DEVICE

powerful enough for the presentation you want to deliver? I know I do, the animation capabilities of PowerPoint are very basic so that complex, compound movements are just too much trouble. Captivate does an astonishingly good job of importing PPTX files giving results that are identical to the source. Once inside Captivate add all of the animation commands that you need. If an animation it isn't built in it's even possible to define your own animations using Adobe Animate (not included in TCS 2017). Another possibility is to convert the slide set using 'Save as Responsive', then view your slides on any mobile device. The options are endless.

INTEGRATION AND AUTOMATION

Captivate is perhaps a little isolationist in its relationship with other members of TCS 2017. There's no simple way to automate the sharing of content between FrameMaker and Captivate which is unfortunate. When I created the Adobe S1000D application pack for FrameMaker, I had hoped to achieve some level of interchange between Captivate SCORM capability and the S1000D

content package. It wasn't to be as there was no documented way for FrameMaker to talk to Captivate. There is now some evidence of a minimal ExtendScript interface for Captivate but its usage is still a mystery.

Captivate does include the Common JavaScript interface for Adobe Captivate. This feature can be used by developers to either execute JavaScript actions from a Captivate project, or add JavaScript code to the published HTML at runtime. I've not tried it yet but the results could be very powerful. e-Learning features

E-LEARNING FEATURES

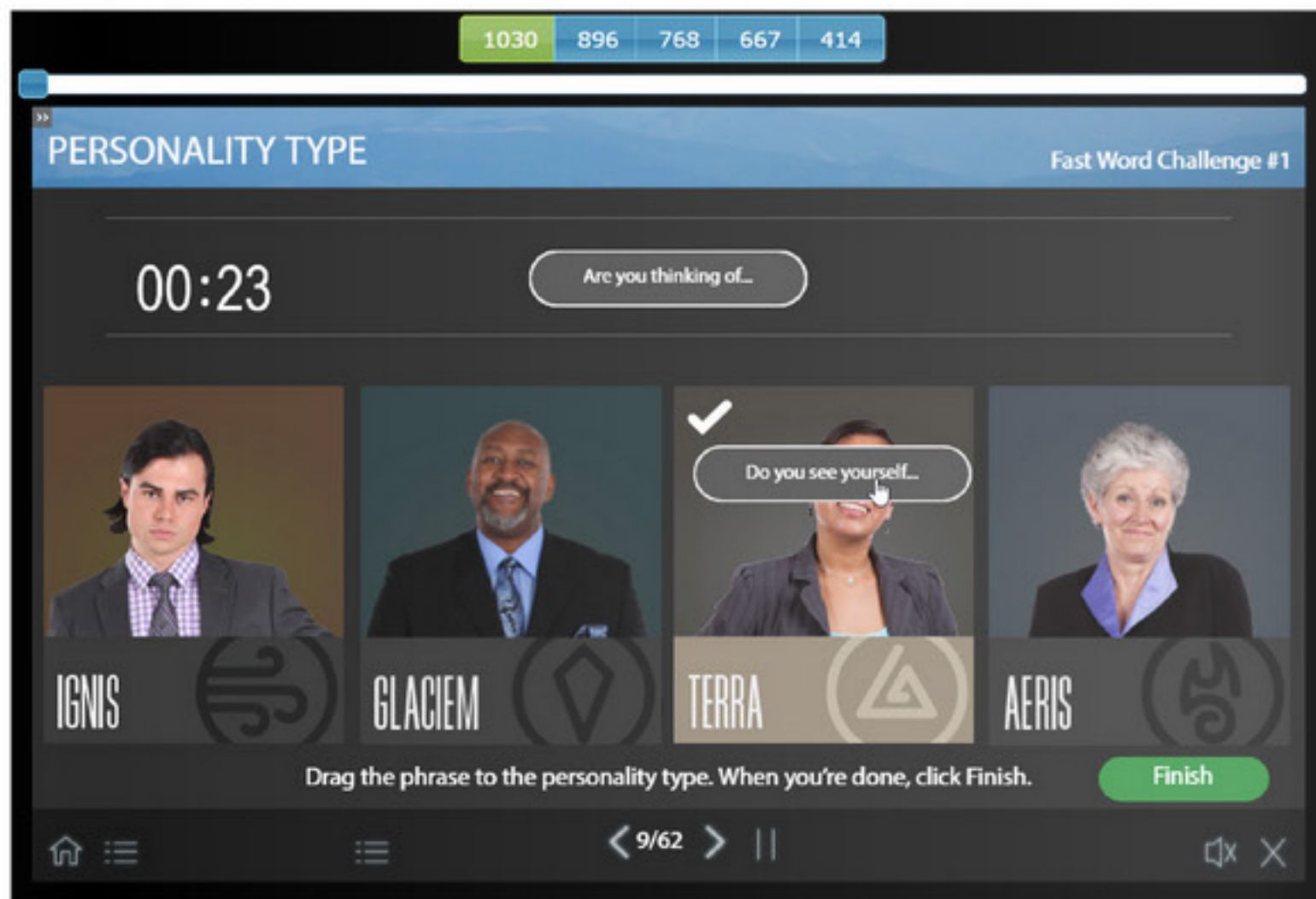
Captivate is a product of the Adobe e-Learning team and as such its focus is the creation of a different type of content when compared to FrameMaker and RoboHelp. Captivate gives you the tools to quickly create all manner of specialized learning content including quizzes with branched question sets. Plus Integration with Learning Management Systems and much more. I don't claim to be an expert in that field, but I want to learn more...

CAPTIVATE 2017 DO YOU NEED IT?

I thought I knew all about Captivate, but I have been genuinely surprised by its wide ranging capabilities. There is much to like here and if e-Learning content creation is your field then you are probably already aware of what it can do. The new features are a major advance and I feel motivated to push it further and finally get that S1000D integration working - I can see a way! Yes, Captivate 2017 has captivated me. Recommended.

ABOUT THE AUTHOR

Ian Proudfoot has spent his entire career in the world of Technical Documentation. He trained as a technical illustrator then progressed to Tech Pubs management in general aviation. In 1996 he moved into structured tech docs system design and has played a major part in the development of publication standards such as S1000D.



TEST YOUR OUTPUT. INTERACTIVE DRAG AND DROP QUIZ - DESKTOP LAYOUT

ONEIL - WORKING BEHIND THE SCENES WITH THE S-SERIES OF ILS SPECIFICATIONS

The Aerospace Industries Association of America (AIA) and the AeroSpace and Defence Industries Association of Europe (ASD) are the parent organizations having established an MOU, for development and maintenance of the S-Series of ILS specifications. The governing body managing this work is the ILS Specification Council. The organizational construct is shown below (Note, ATA e-Business is included in this chart for completeness to show its relationship with S1000D).



PAUL HASLAM
PRINCIPAL S1000D & S-SERIES ILS SPECIFICATIONS EXPERT

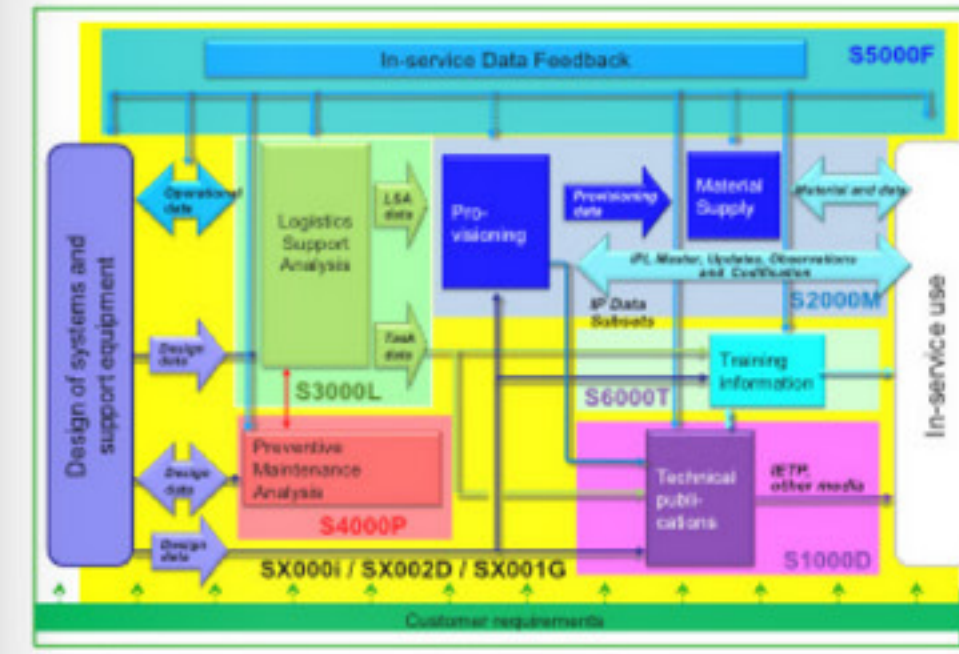
All of the S-Series of ILS specifications are copyright protected and available to download as open source documents at www.sX000i.org.

You can view the S-Series as falling into three types:

- The ILS specifications
- The Interface specifications
- Data Model specifications

This article will talk about the ILS specifications and ONEIL support of them. Under the auspices of the Aerospace Industries Association of America (AIA), ONEIL serves as the AIA membership industry representative. ONEIL provides

The international S-Series of ILS specifications is the first suite of ILS specifications that are truly integrated. This integration is achieved by having the processes of each specification take inputs from the shared domains, ILS elements and outputs from each of the other specifications, thus ensuring deliverables are sourced from the single information repository used by all the specifications. The integration, in terms of data flow, is shown below:



“SX000i IS THE SPECIFICATION THAT OVER-ARCHES THE REST OF THE S-SERIES OF ILS SPECIFICATIONS.”

resources to work alongside the AeroSpace and Defence Industries Association of Europe (ASD) on the maintenance and production of the S-Series. Currently, ONEIL fulfils the role of Co-Chair of the ILS Council and will take over as Chair at the end of October 2017 for a two year term of office. What follows is a brief description of each specification, recent and current activities, and ONEIL input into the support for each specification.

ILS SPECIFICATIONS:

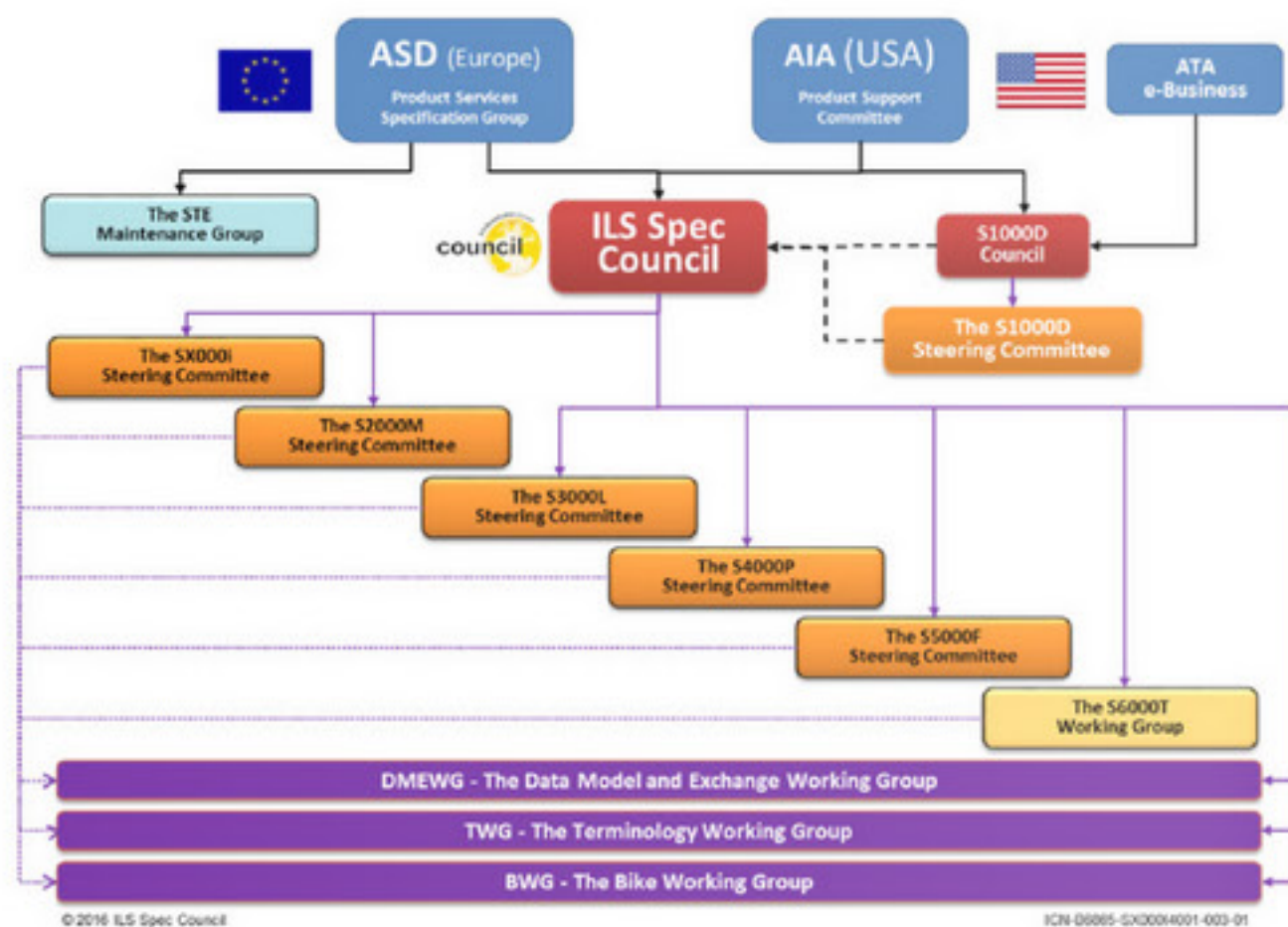
Downloads of each of the S-Series of ILS specifications can be requested or directly downloaded from their own website, which can be accessed directly or via sx000i.org. With the exception of ASD-STE 100 and S1000D, the ILS Council is considering how training for the specifications can be provided. ASD-STE 100 already provides training. It should be noted that the S-Series of ILS specifications do not endorse software. ASD-STE 100 is the Simplified Technical English (STE) specification that provides writing rules and a controlled dictionary that enable consistent technical writing for the preparation of technical documentation. STE itself provides the means by which consistent translation and understanding of technical documentation is ensured for readers whose native language is not English.

ASD-STE 100 is maintained by the Simplified Technical English Maintenance Group (STEMG), which is a working group of ASD

that meets twice a year. The STEMG is staffed by twelve national representatives from the ASD member countries in Europe and with members of the AIA in the United States, the AIA in Canada, the ANAC (Civil Aviation Authority) in Argentina and the Union of Aviation Industrialists of Russia, plus two associate members who represent civil airlines.

Issue 7 of ASD-STE was released in January 2017, and is the result of four year's hard work with six STEMG meetings. Issue 7 includes significant changes: reduction of writing rules from 65 to 53 with extensive clarification for those remaining, together with greatly improved examples for each; review of the numerous examples for the dictionary, removing redundancy and aligning with current technologies; a new colored graphical layout to improve clarity; neutralization of the specification's applicability to aerospace so that it is now more aligned with the S-Series concept of "the Product".

Areas under consideration for the next release of the specification include; consolidation of the writing rules, further neutralization in line with "the Product" concept and further improvements to the dictionary (through the usual change



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ICN 0005-SX0004001-003-01



process).

Downloads of ASD-STE 100 can be requested at www.asd-ste100.org where information about training and STEMG contact details are also available.

S1000D is a specification for developing, producing and exchanging technical publications. It uses XML Schemas to create small chunks of information called "data modules", which are stored in a Common Source Database (CSDB).

S1000D was primarily borne out of the Eurofighter five nation consortium. The specification was first published as Issue 1, Change 6, and had just one DTD with two marked sections; one for descriptive information and one for procedural information. Change 1.7 brought in 6 new DTDs, descriptive, procedural, IPD, Fault, Crew and Schedules. Since then S1000D has grown somewhat and the current Issue 4.2 has 30 Schemas (including dc, rdf, xcf and xlink). Now, on an international level, S1000D is quickly becoming the preferred standard for product documentation across various Industry sectors.

Issues 1.7 through 4.2 can be downloaded at www.s1000d.org. The download packages include the specification, DTDs/Schemas, patches and sample data.

S1000D's previous publishing process was to have a predefined set of change proposals reach a status of final approval before incorporating the changes into the next issue of the specification. Work on any chapters that were also affected by changes to Schemas was delayed until the Schemas were frozen. Formal public releases were planned depending on the scope defined by the set of change proposals. This process is changing to more frequent releases, containing a handful of changes, which will be for the Steering Committee (SC) internal use. A number of new baselines will be produced every year and made accessible to change proposal owners, so that the changes proposals are always based on the latest information in the Common Source Database

(CSDB). Formal releases to the public will be determined by the SC (objective: every two years). The process is also imposing strict rules for originators of change proposals who must provide all the change material in a new White Paper template. When change proposals are approved the Production and Publishing Working Group (PPWG) will update the content of the CSDB. This new process will pave the way for the maintenance of S1000D when it is converted to XML and modularized.

The next S1000D User Forum will be held in **New Orleans, September 10-13 2018**. Between now and December 2018, the SC has two face to face meetings and 14 on-line meetings planned, during which time the new change process will be implemented.

In support of S1000D specifically, ONEIL is responsible for the roles of Chair of the S1000D Council, Chair of the PPWG and Editor-in-Chief, and for formally publishing the specification.

S2000M is a specification that describes the business relationship between contractor and customer by providing the process flow, the relevant transactions and data elements used. It details the rules, processes and guidance for the provisioning, delivery and invoicing for the required spares supply in support of the Product's initial In-Service phase and throughout the whole life cycle of the Product.

The current issue of S2000M contains significant changes such as simplified processes for provisioning, pricing, order administration and invoicing, and a reduction of other types of transactions. The biggest change, though, is that the whole S2000M message structure, which is used to exchange S2000M data, has changed and is available as ULM/XML Schemas.

The S2000M SC is currently staffed by 10 National Organization member companies and 6 MoD departments, from 9 countries. Issue 6.1 of the specification, Unified Markup

Language (UML) and XML Schemas can be downloaded from www.s2000m.org.

S3000L is a specification that provides the rules, procedures and guidance for conducting Logistics Support Analysis (LSA). S3000L is considered as the core specification for the rest of the S-Series of ILS specifications because the LSA activities are closely linked to engineering and design data plus inputs and outputs to and from the rest of the S-Series of ILS specifications. The specification provides the rules, processes and guidelines for the LSA business process (including the interface to engineering and ILS disciplines); Product usage, Product breakdown and configuration management; Justifying events for maintenance tasks (Failures (FMEA/FMECA), damages, special events and scheduled maintenance program, and operation support tasks coming from PHST analysis); Maintenance Tasks details (MTA and determination of maintenance level (by LORA)); Software Support Analysis in the context of maintenance; Additional aspects (Influence on design (interface to Support Engineering), LCC, obsolescence and disposal, human factors, and damage and special events.

The S3000L SC is currently staffed by 14 ASD/AIA member companies and three MoDs from nine countries. The current release of S3000L is Issue 1.1, which is available for download at www.s3000l.org. Also available for download are the Issue 1.1 S3000L data model and XML Schemas. Issue 2.0 is scheduled for mid-2018 and will include a new approach on the FMEA/FMECA and Special Events. The main driver for this is the strong interrelation to S4000P and the need to be more precise in describing the FMEA/FMECA aspect, and to separate the identification of Special Events in S3000L and the determination of Preventive Maintenance Task Requirements (PMTR) after a special event in S4000P. The second main change is an extension to the In-Service LSA activities, which will offer more detailed descriptions of the potential activities. Detailed flowcharts will support the evaluation of the effectiveness of maintenance and operation support tasks with the help of operator's feedback.

S4000P is a specification that gives the rules, processes and guidance for conducting the analysis to determine preventive maintenance task requirements for a new Product prior to its Critical Design Review (CDR) and for continuously improving that maintenance during its In-Service phase.

The analyses of Product systems identify system functions that could potentially result in one or more functional failures. Each identified functional failure is categorized with a functional failure effect code. For each functional failure one or more failure causes are addressed, ultimately resulting in preventive maintenance task types with scheduled intervals or in redesign requirements/recommendations. For Product structure and - zones additional analysis methodologies results in applicable and effective preventive maintenance or in redesign requirements/recommendations, too.

The In-Service Maintenance Optimization (ISMO) process is described in detail and provides a review of the preventive maintenance development during the Product development process and a detailed check of the valid preventive maintenance tasks. The PMTR outputs from S4000P are important inputs to S3000L because they serve as the basis for preventive maintenance tasks in a Product maintenance program.

The S4000P SC is currently staffed by member companies from ASD from six countries, and two MoDs. The current release of S4000P is Issue 1.0, which covers the systems, structural and zonal analyses, with intervals that result in a Preventive Maintenance Task Requirements that are fed into the S3000L processes.

In addition, Issue 1.0 introduced the new and unique concept of In-Service Maintenance Optimization (ISMO) with its three phases of preparation, analysis and follow-up. The ISMO process is described in detail and provides a review of the preventive maintenance development during the Product development process and a detailed check of



the valid preventive maintenance tasks. **S5000F** is a specification that provides the rules, processes and guidance for feedback, which has not previously been covered by a specification. It describes the In-Service data feedback business processes to support design and engineering, the domains related to a Product's life cycle (including those mentioned in this article), the ILS elements and the specifications themselves. **S5000F** provides the actual information related to maintenance and operation, but also allows for an interactive customer-manufacturer exchange for the solution of In-Service problems or the provision of services, adding therefore a new dimension to the classic product support and allowing for the use of big data in this domain.

The **S5000F SC** is currently staffed by six AIA/ASD member companies from five countries, three MoDs from three countries and an international military agency. The current release of **S5000F** is Issue 1.0. The next issue 1.1 is planned for release in Q2 2018 and will mainly cover a data model update to comply with the new Common Data Model (**SX002D**) Issue 2.0, so as to ensure the full interoperability with other specifications.

Interest in **S5000F** has been raised by the shipping industry, and a memorandum of understanding is currently under discussion with ShipDex for the extension of **S5000F** to this domain.

S6000T is currently in the latter stages of the first internal draft, which is planned for release to AIA/ASD members for comment by the end of 2017. This initial issue is based around the Instructional Systems Design **ADDIE** (Analysis, Design, Development, Implementation and Evaluation) model and will be limited to cover the analysis and design phase. In a future issue, part of the development phase will be covered; specifically how **S6000T** can facilitate the use of **S1000D** as the method for developing training content. It is anticipated that as **S6000T** matures, its adherence to the **ADDIE** model will become modified to cover other international methods and processes,

to remain in line with the S-Series Data Model and be aligned, through its interface specification, with the integration of the rest of the S-Series of ILS specifications.

SX000i is the specification that over-arches the rest of the S-Series of ILS specifications. It provides an overview of the global Integrated Logistic Support process (ILS framework) and also explains how the different specifications are to be used on an ILS program. This global framework thus establishes the boundaries and interfaces between the different specifications, facilitating their integration. **SX000i** also establishes the management process for the development and evolution of the specifications, so as to ensure their interoperability even while they evolve.

The future Issue 2.0 (under development) will cover among other things an ILS manager's guide and a data model where the information required for an ILS program will be defined. The **SX000i SC** is currently staffed by eight ASD/AIA companies from eleven countries, two MoDs from two countries and an international military agency. Another MoD from a non-AIA/ASD country has been accepted as a special observer.

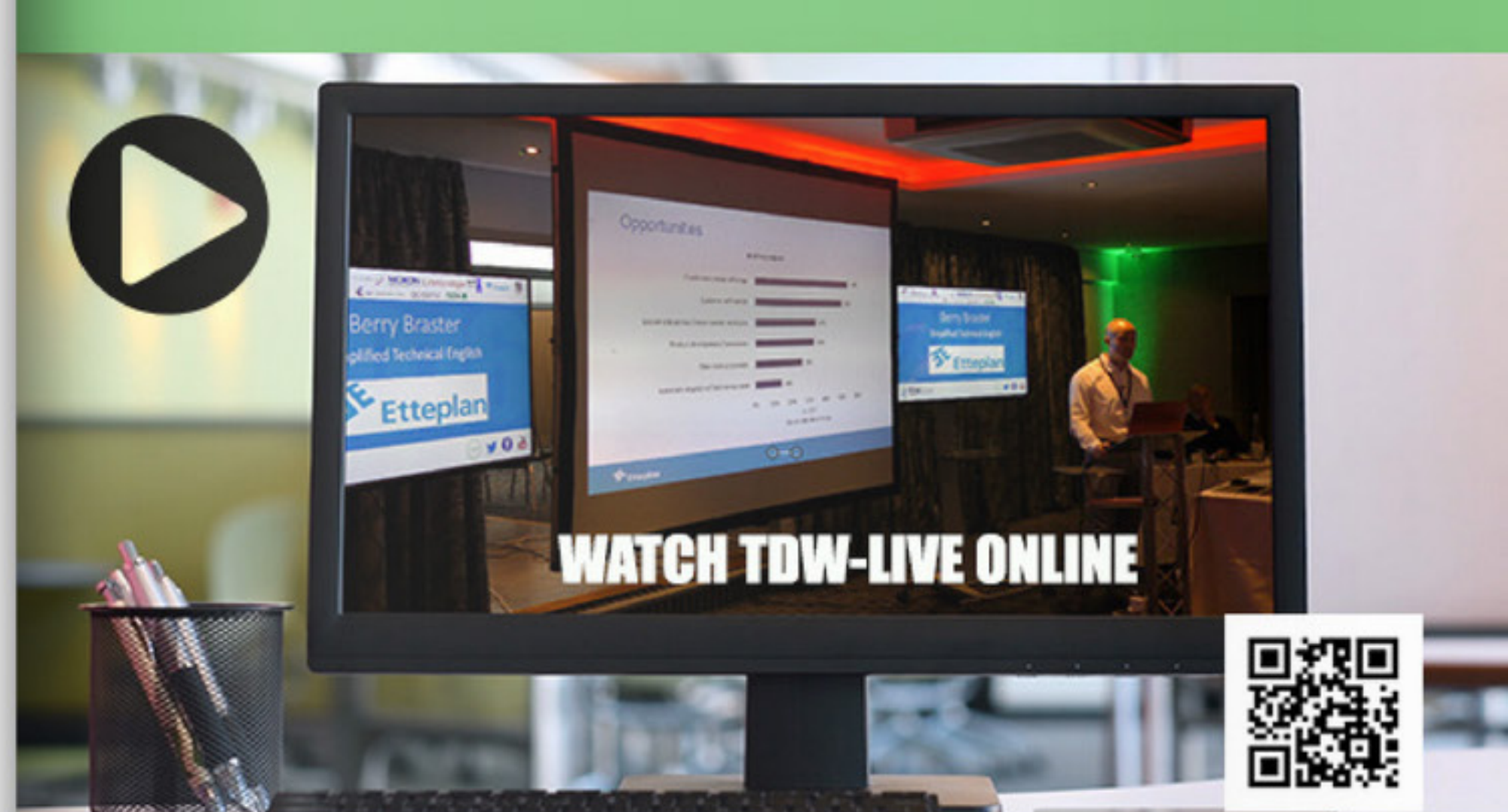
With the exception of ASD-STE 100 and **S2000M**, **ONEIL** is responsible for the Editor-in-Chief role and for publishing the drafts of these S-Series of ILS specifications for AIA/ASD internal reviews, etc. and for formal releases of the specifications for public consumption.

COMING UP IN THE NEXT ISSUE OF THE TDW QUARTERLY MAGAZINE:

ONEIL - Working behind the scenes with the S-Series of ILS Interface specifications. We'll talk about what they are, what, how and why they do what they do, what's been happening and what's next.

and in the Q1 2018 issue:

ONEIL - What do you mean "the specifications are integrated"? We'll show you!



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IT'S ALL IN THE SUCCESSION PLANNING

I remember the first time my last boss (and now mentor) asked me "what's your succession plan Mike?, Who would you employ to replace you?"

I'd never been asked this type of question before 'who would replace me' or 'who would I employ if I was replacing me'!

The shock on my face must have been immediately obvious as his rapid response was to reassure me. This was a new experience for me.

Of course the first thing that races through your mind is a sense of unease, 'I'm being replaced', 'the company is unhappy', 'I'm no longer needed' and so on. The reality was my year had been fantastic, added more clients than anyone else in the company. My efforts had helped the company achieve a fantastic year - yet I still thought - 'How do I pay my mortgage and tell the wife?, I'm being pushed out'. - this was all naturally unfounded.

Of course looking back, my immediate thoughts (which were all self preservation lead) - were incorrect - this was (and still is) a totally logical discussion to have with key members of staff in any business. A business needs to function all all levels if there is a failure. The same is for technical and support information.

Now running TDW it is eternally sensible to have plans in place for all my team, me included! The business is the sum of all its parts, not one individual, me included, should be invaluable! To be reliant on

individuals leaves the business open to risk and complications, this is common in the software and technical publications field, where organisations are reliant on individuals as opposed to spreading the skills, know-how capability, ultimately lowering risk.

The old adage of **Fail to Plan, Plan to Fail** is key at all levels throughout a business and project.

I now see the affects of succession planning in almost all organisations I go in to - the requirement for support information is as strong or in some cases stronger than ever, especially as our products and end-users become more and more sophisticated.

So the information need remains constant - the challenge many technical publications managers face today is how and most importantly who?

The skills are just not coming through and even if you attract the skills, retention is a huge issue - especially when working with contracting folks - where the eye is always on the next job or the slightly better paid option - this is the nature of contracting (and a subject of another upcoming article)!

The software landscape is littered with key software developers who have up and left and taken that next best offer to leave a wake of destruction behind them and mass panic on what to do next.

The same is true for our technical publications experts. Many teams have a

key person, that person who has been producing technical information for our products for years. The big risk right now in the market is that the skills are simply not coming through to be mentored and trained to replace these departmental gurus.

Traditionally in aerospace and defence technical publications was a second career option for those leaving an engineering discipline. After many years as a practicing engineer, retrain as a technical communicator and use your practical engineering knowledge to produce world class support information for like-minded engineers. That was my driver and many of my colleagues who entered the written communications market at the same time.

But the fact that the source pool of these skills (military engineering is a good example), is continuing to dry up - mainly as the number of folks entering a military engineering discipline continues to decline, that traditional second career path into technical publications is being directly affected as the talent pool slowly evaporates.

WHY ARE THESE SKILLS NO LONGER COMING THROUGH?

The answer to this question is multifaceted, as I mentioned there is no longer a trickle feed of engineers leaving the practical hands-on engineering discipline to feed into technical publications. No longer is there the high volume of traffic migrating to technical publications, the exodus of those wishing to escape locking-wire attacks and midnight engine changes.

"TECH DOCS IS JUST NOT A ROCK-STAR CAREER!"



The root of this problem is that engineering itself as a discipline is struggling to encourage youngsters into the domain.

“Another major factor is hard for me to swallow!”

Another major factor is hard for me to swallow! Technical publications is just not a rock-star career! Yep I said it, and I hate saying it as I'm passionate about this discipline. Just look at this from a young 16-year-olds perspective for a second. Technical publications is simply not as attractive as web design, animation creation, video production, augmented reality and so on.

All of these examples are far more rock-star than writing text based instructions and you see the results almost immediately.

With modern technical publication production you often do not see the end result, as your contribution is a component piece and is assembled somewhere down the line!

You may never see the end information product!

BUT THE REALITY?

Technical publications and support information is changing. How we can produce information and deliver it is changing at a rate that the *traditional* technical publications experts simply can't keep pace with. The role of text is changing (another subject of an upcoming article) .

We are in a transitional period where technical publications and the role of the publication is being questioned in many organisations. In many organisations technical publications is just not understood and is seen as a necessary evil, yet the moment a product is delivered one of the first things that is requested - the user/ maintenance guides!

Is there a better, more affordable and engaging way to produce and deliver information? The answer today is yes, quickly followed by - but we don't have the know-how to do it.

As with all technology and ultimately technical support information. There is a race to the bottom! Who can do things quicker, easier and naturally cheaper! All technologies find their way to the [cost] bottom!

A great example, look at Web-design, a website a few years ago would cost you thousands of dollars, now you can deploy a website in minutes with great functionality for a few hundred dollars (or less if you know what you're doing). Drag and drop interfaces that do all the hard work for you means you can produce a functional website in minutes!

The same is true for mobile applications!

A few years ago many thousands of dollars in expense to create and deliver a mobile application. Now for a fraction of the price you can produce cross platform deployable applications within hours! These are all new information skills we are having to learn as information specialists.

SO WHAT ARE ORGANISATIONS DOING NOW TO GET OVER THIS LACK OF SKILL IN THE MARKET AND PLAN FOR THE FUTURE?

There are a few common threads that I am noticing in the market.

Outsourcing of technical publications creation is a major trend, find a dedicated and experienced technical publications provider to worry about the skills, production and software for you! This then frees you to focus on what your core business is all about. The problem with this model is that you continue to lose the skills needed to maintain your product support information. The skills and know-how is externalised and the reliance is then pushed to a third party.

A model that appears to be working well for some technical publication teams is a hybrid approach. Maintain a core internal competence of technical publication experts and identify an external partner that can support the high peak demands of your technical publication product cycles.

The upside of working with an external supplier (technical publications house) is it is incumbent on them to keep abreast of the emerging technology and skills needed to support modern information production needs. If your needs change your supplier will be able to keep pace with those changes - at a cost of course!

This is probably the biggest trend that we are seeing here at TDW. The continued decline in skills availability and know-how is forcing many departments to outsource their technical publication production needs either in entirety or in part.

Having visited many technical publication departments recently, another trend is positioning a career within technical publications with young apprentice engineers

- explaining the role of technical publications and the vital function they perform in supportability.

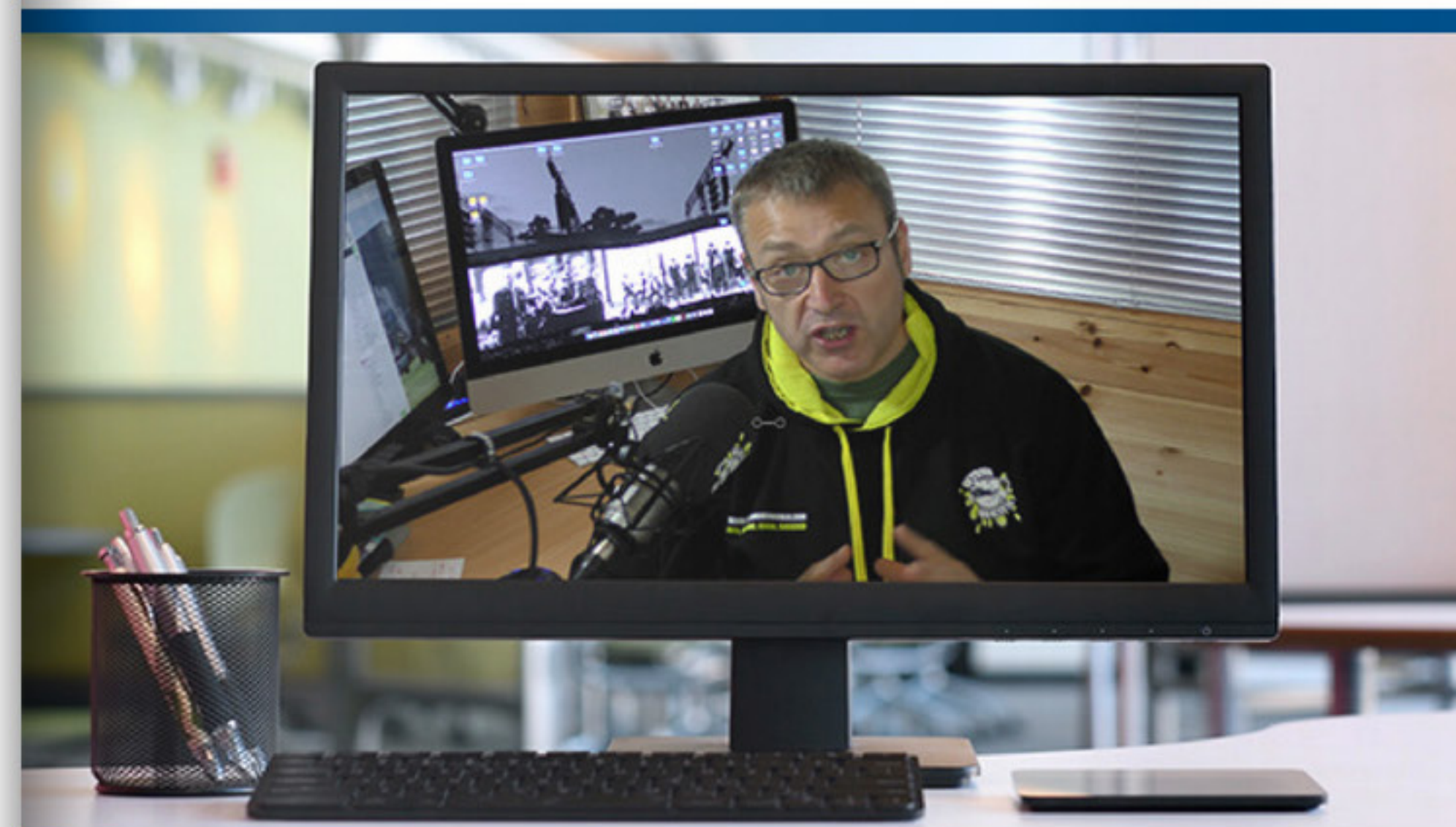
It has been heartening to see that many organisations have accepted that keeping the core technical publications know-how internal is core to product support success.

Of course there are many instances, like security of information, where outsourcing is just not an option and therefore information must be produced internally. This is very common in the defence sector where certain types of information must be 'air locked' or guarded to limit the risk of illegal distribution.

I am seeing that the youngsters coming in to the technical publications arena via these apprentice routes are intelligent, enthusiastic and keen to help progress the information capabilities of their organisations.

This does introduce an interesting dynamic.

With the current skills pool drying up and the apprenticeship schemes being employed by many to fill this internal pool, there is a



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“WHAT’S YOUR SUCCESSION PLAN MIKE?”



risk that these youngsters are tempted to move on and find the next best thing in another technical publications team.

This is where some technical publications managers have been smart! They are offering an internal career recognition path and rewarding loyalty and experience with goals and mentorship to push these younger new skills up the internal ladder offering a clear path to internal progression.

Both the externalisation and internal mentoring of corporate technical publication needs are being seen as the two most sensible approaches to safe-guarding and succession planning for the information needs of products and corporations.

Succession planning is never easy, especially with a lack of skills and talent in the market but more so having the conversation with key members of staff!

In the same way that I originally responded to the question 'Mike who would you employ to replace you?' These are difficult but entirely necessary discussion to have within your organisation and technical publication teams - to ignore succession planning opens the department and wider corporate to risks that with a little planning may be avoided.

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3. For a free trial of the TechScribe checker for ASD-STE100, refer to www.simplified-english.co.uk.

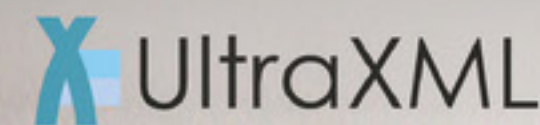
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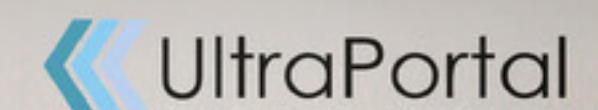
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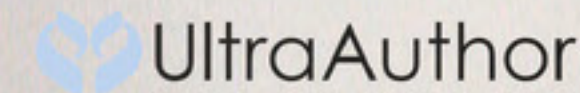
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S1000D AND PRELIMS?

DON'T WORRY THERE'S AN INFO CODE FOR THAT!

We have covered Information Codes before in a previous SpecknowPhobia and indeed we have covered it in detail on TD-iQ, but how do we produce Preliminary Information in an S1000D context without having to do hours of manual and laborious work?

The answer is simple and as always really depends on how your S1000D publishing system permits you to create these vital and important pieces of technical information for your manuals.

Assuming we all understand the role and function of preliminary information how do we automate this creation process within S1000D?

This is where S1000D embraces the power of structured languages like XML - there is simply no point in creating all this information to meet rigid rules and XML schemas then not leverage the automation power that can be achieved from modern publishing tools.

We already know that the standard way of producing an S1000D [published] output is to use an S1000D Publication Module (again we have covered this both here and on TD-iQ).

We chapterise and breakdown our output to meet our desired flow.

It is at these levels that we can create 'ghost' S1000D DMC's that reference a specific INFOCODE (example List of Figures) and your publishing system knows that it should create at that point a list of Figures - the publishing tool will interrogate the structure and extract (from the XML) all the figure information for you, on the fly, no need to do it manually!

The S1000D specification has a raft of INFOCODES listed specifically intended for PRELIM use!

The ability to create 'traditional' preliminary information is already there in the S1000D specification, it is understanding the role of the PM, the Information Code and how your S1000D publishing system uses these components.

You can learn more about Preliminary Information on our TD-iQ platform where we look at traditional preliminary information and then look at how it works in an S1000D context!



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ASK MIKE



Mike Ingledew has been supporting organisations achieve tech data success for over 20 years - here he answers some questions that came in to us at TDW.



Are you seeing the same as us with the lack of fresh skills in the market?

O yes! One of the major reasons I wanted to focus on TDW full-time was to help encourage new talent into the drying talent pool.

Many organisations we support are seeing a real lack of new and fresh talent coming in to the technical information market. This is for a number of key reasons, mainly around the reality that traditional technical information is not a rock-star career and most youngsters want to be in design and more creative ways of producing information, I do think this will change as we embrace technology and innovative ways of producing and deploying information.

There is also a real problem with the traditional pool of resources leaving engineering roles within the military and selecting technical information as a second career - as fewer and fewer people are joining the military - there is a rapidly drying pool of skill moving in to technical publications as a second career!

So to answer your question - yes this is a common and growing problem!

We are being told to focus on using S1000D as our TD departmental strategy, would you say that this was a good idea?

It would be interesting to know who said this to you, I suspect a vendor with an interest in selling you support and software around S1000D as no doubt it is in their interest to have you use S1000D.

The further you go down the Information Supply Chain - the harder it is to justify and maintain an S1000D strategy. Anyone who understands the dynamics of the information flow knows and accepts this - on TD-iQ we talk a lot about the inability to support S1000D across multiple projects and customers making it impossible to use as a single data set for common products!

No I do not believe that the further you sit down the information supply chain that S1000D is a 'strategy' choice - in fact it is for many the very opposite.

Which editing tool do you use at TDW?

At TDW we try to remain software and tool agnostic, but of course we have to use software to show concepts and processes. So we use (where we can) affordable and accessible software so our students and members can follow along.

For example, our TD-iQ courses when we look at conceptual issues around DITA, S1000D or generic structure - we use Adobe FrameMaker. This is simply because off the shelf there is built in support for DITA and S1000D for us to be able to show students what it is we are talking about. Therefore students can Adobe FrameMaker and follow along on our courses without having to invest in heavy software and supporting applications.

We are about to release a new series via our YouTube channel looking at the other affordable (and sometimes FREE) tools we use when it comes to defining, setting-up and working with technical data requirements - make sure you follow along and you may find some nice nuggets and gems that we use here at TDW as part of our day-to-day tech data work.

You said that S1000D should be used by engineers, but there is room for process people too right?

I think you are referring to my last comment about learning S1000D and how it may be a waste of time learning if you are coming from a none-engineering stand-point. You are right, I was coming at it from a technical writing perspective - to have engineering context helps.

Your point about S1000D being process driven and does not require engineering 'skill' to implement a process is a good one - not disagreeing with you and many organisations do have a technical publications process manager - who may not be creating the information, but is controlling the production and delivery.

I agree with you about the S1000D events - "it is mainly for data 'wonks'!"

Thanks for your message LH (via Facebook) - I agree with you, in the main people who attend the 'user' forum are those who know and understand the specifications already. These events are for those that need to understand where specifications are going and how it may affect the information supply chain going forward. In my experience those that actually 'do' the specification day-to-day do not attend these type of events - they are focused on the now and today and not the possible and future implications of changes within standards and specifications.

Loved your vLog on structured editors - would you be a guest blogger on our new channel? We would like to interview you!

Thanks for the feedback on the vLog - I am glad it helped. At TDW we are always interested in supporting other channels and education networks - if your channel is relevant to the same demographic as TDW - then sure, why not!



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S1000D, CSDB, XML, BREX, BPM

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CSDB, EAGLE PUBLISHING SYSTEM, EAGLE EDITOR, EAGLE LOGISTICS TOOLKIT, LSAR

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