



**Rolls-Royce**

# **Business rules**

## **Overview - making S1000D work for you**

Dr. Mike Day, Rolls-Royce, Defence Aerospace

S1000D User Forum, 21st-23rd October 2008, Budapest

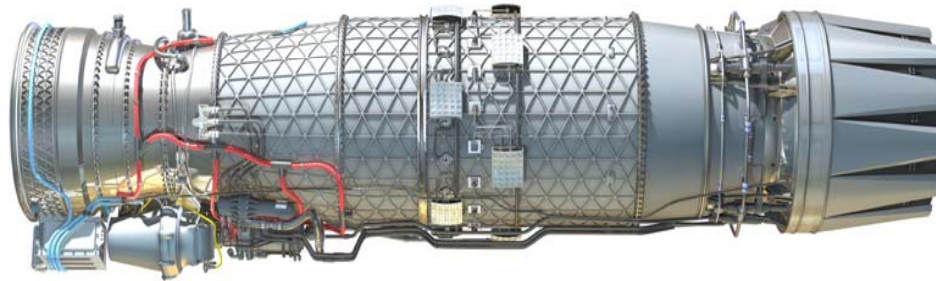
# Objectives

- **Describe ...**
  - **why business rules are needed**
  - **what a business rule is?**
  - **the categories and layers of business rules (and give examples)**
  - **how we can improve things?**
  - **how software can help control quality**
  - **where S1000D is going next?**
  - **Business rules and data reuse**

**Why are business rules needed?**

# The early days...

**Customer:** I want a state-of-the-art Engine to power my latest fighter aircraft, it's just a dart without it!



**Project:** We have just the thing, but....  
...how would you like your Technical Publications?

# Why are business rules needed?

- **Scenario 1** – the project and the customer are relatively new to S1000D.

# Scenario 1

- **Customer:** *(having been to one of those wonderful User Forums)* Please deliver technical documentation to S1000D. It's the latest and greatest!

# Scenario 1

- **Customer:** *(having been to one of those wonderful User Forums)* Please deliver technical documentation to S1000D. It's the latest and greatest!
- **Project:** Brilliant. We've done that before for our UK customer; we'll deliver the first batch of data modules next month!

# Scenario 1

- **Next month arrives...**

# Scenario 1

- **Project:** Here you are, 2000 data modules as promised. Haven't we done well to deliver on time!

# Scenario 1

- **Customer:** What is this? They won't load into my system! What are all these lonnnnggg tag names! You have not followed the rules of S1000D!

# Scenario 1

- **Customer:** What is this? They won't load into my system! What are all these lonnnnggg tag names! You have not followed the rules of S1000D!
- **Project:** We've used Issue 4, it's the latest!

# Scenario 1

- **Customer:** What is this? They won't load into my system! What are all these loonnnggg tag names! You have not followed the rules of S1000D!
- **Project:** We've used Issue 4, it's the latest!
- **Customer:** Our software doesn't support Issue 4 yet! Please put it right!

# Scenario 1

- **Customer:** What is this? They won't load into my system! What are all these loonnnggg tag names! You have not followed the rules of S1000D!
- **Project:** We've used Issue 4, it's the latest!
- **Customer:** Our software doesn't support Issue 4 yet! Please put it right!
- **Project:** That's going to be expensive!

# Why are business rules needed?

- **Scenario 2** – the project has learned that it must ask more questions of the customer in order to save money...

# Scenario 2

- **Customer:** Please deliver technical documentation to S1000D. It's the latest and greatest!

# Scenario 2

- **Customer:** Please deliver technical documentation to S1000D. It's the latest and greatest!
- **Project:** Which version? 1.8, 1.9, 2.0, 2.1, 2.2, 2.3, 2.3.1, 3.0, 3.0.1, 4.0?

# Scenario 2

- **Customer:** Okay, please use Issue 2.3. Is that enough?

# Scenario 2

- **Customer:** Okay, please use Issue 2.3. Is that enough?
- **Project:** No! Do you want SGML or XML?

# Scenario 2

- **Customer:** XML, of course! Why would we want anything else? Please deliver as soon as possible?

# Scenario 2

- **Customer:** XML, of course! Why would we want anything else? Please deliver as soon as possible?
- **Project:** But I can't! I need more information! How about the illustrations?

# Scenario 2

- **Customer:** I've asked my expert. Isometric. Thick and thin lines. Helvetica for the text.

# Scenario 2

- **Customer:** I've asked my expert. Isometric. Thick and thin lines. Helvetica for the text.
- **Project:** No. We mean the format. Web CGM?, CALS raster, VRML?

# Scenario 2

- **Customer:** I've asked my expert. Isometric. Thick and thin lines. Helvetica for the text.
- **Project:** No. We mean the format. Web CGM?, CALS raster, VRML?
- **Customer:** Uhh?

# Scenario 2

- **Project (partner 1):** What is needed is a detailed set of business rules drawn up by the project and agreed with the customer - so that there is no ambiguity next time!

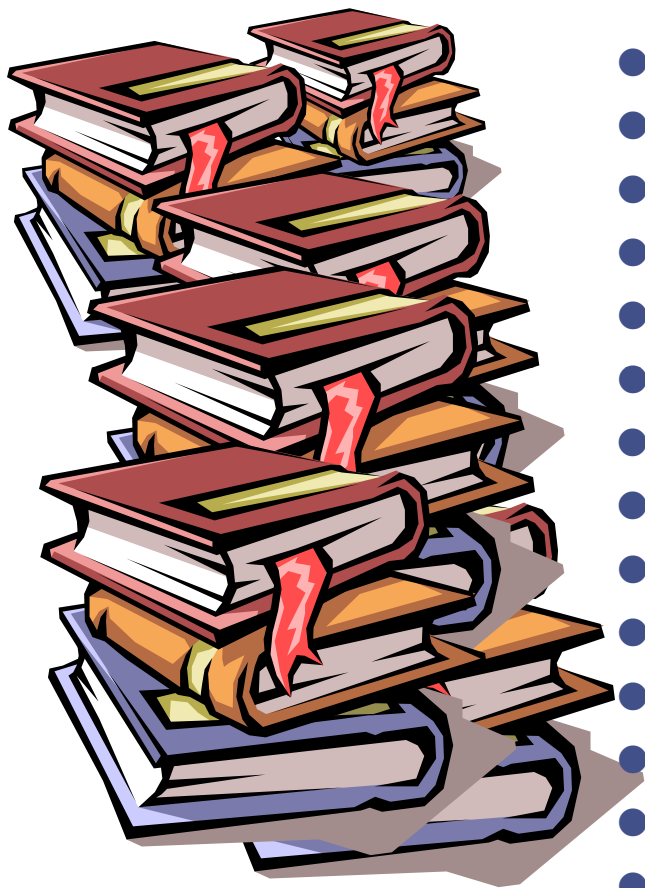
# Scenario 2

- **Project (partner 1):** What is needed is a detailed set of business rules drawn up by the project and agreed with the customer - so that there is no ambiguity next time!
- **Project (partner 2,3,4):** Great idea! Let's get down to writing the project documentation!

# Scenario 2

- ...a year later...

# Scenario 2: Project documentation

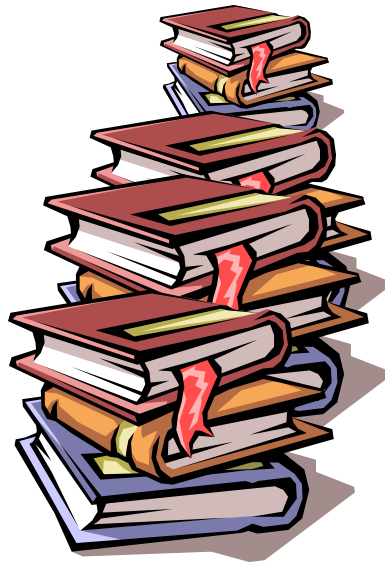


- Contract documents
- Project organisation and protocols
- Customer acceptance documents
- Technical publications plans
- Specifications for publications types
- Information codes specifications
- Standard numbering system specifications
- CSDB systems specifications
- Author's style guide
- Graphics guide
- National publications guides
- QA and in-process review guides
- IETP specification
- Interchange specifications
- etc. etc.

**50-100 different documents**

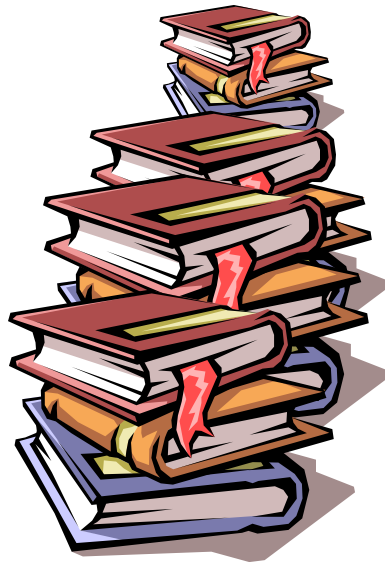
# Scenario 2

- **Project:** Here are our project documents that say how we are going to deliver information.



# Scenario 2

- **Project:** Here are our project documents that say how we are going to deliver information.
- **Customer:** I am going to need a big shelf! Thank-you, please make your first delivery next month.



# Scenario 2

- **The first batch of DMs are produced and exchanged between the partners...**

# Scenario 2

- **Project (partner 1):** Here you are partner 2,3,4, please load these DM into your CSDB

# Scenario 2

- **Project (partner 1):** Here you are partner 2,3,4, please load these DM into your CSDB
- **Project (partner 2,3,4):** We can't load them, you have populated the <rpc> tag the wrong way!

# Scenario 2

- **Project (partner 1):** Here you are partner 2,3,4, please load these DM into your CSDB
- **Project (partner 2,3,4):** We can't load them, you have populated the <rpc> tag the wrong way!
- **Project (partner 1):** But it does not say that in the Style Guide!!!

# Scenario 2

- ...the style guide gets updated, and eventually...

# Scenario 2:

- **Next month arrives...**

# Scenario 2

- **Project:** Here you are Mr. Customer, 2000 data modules as promised. Okay, we are slightly late, we did our best!

# Scenario 2

- **Customer:** The hyperlinks are not working in my IETP – it looks like you forgot to add this attribute. Please put it right.

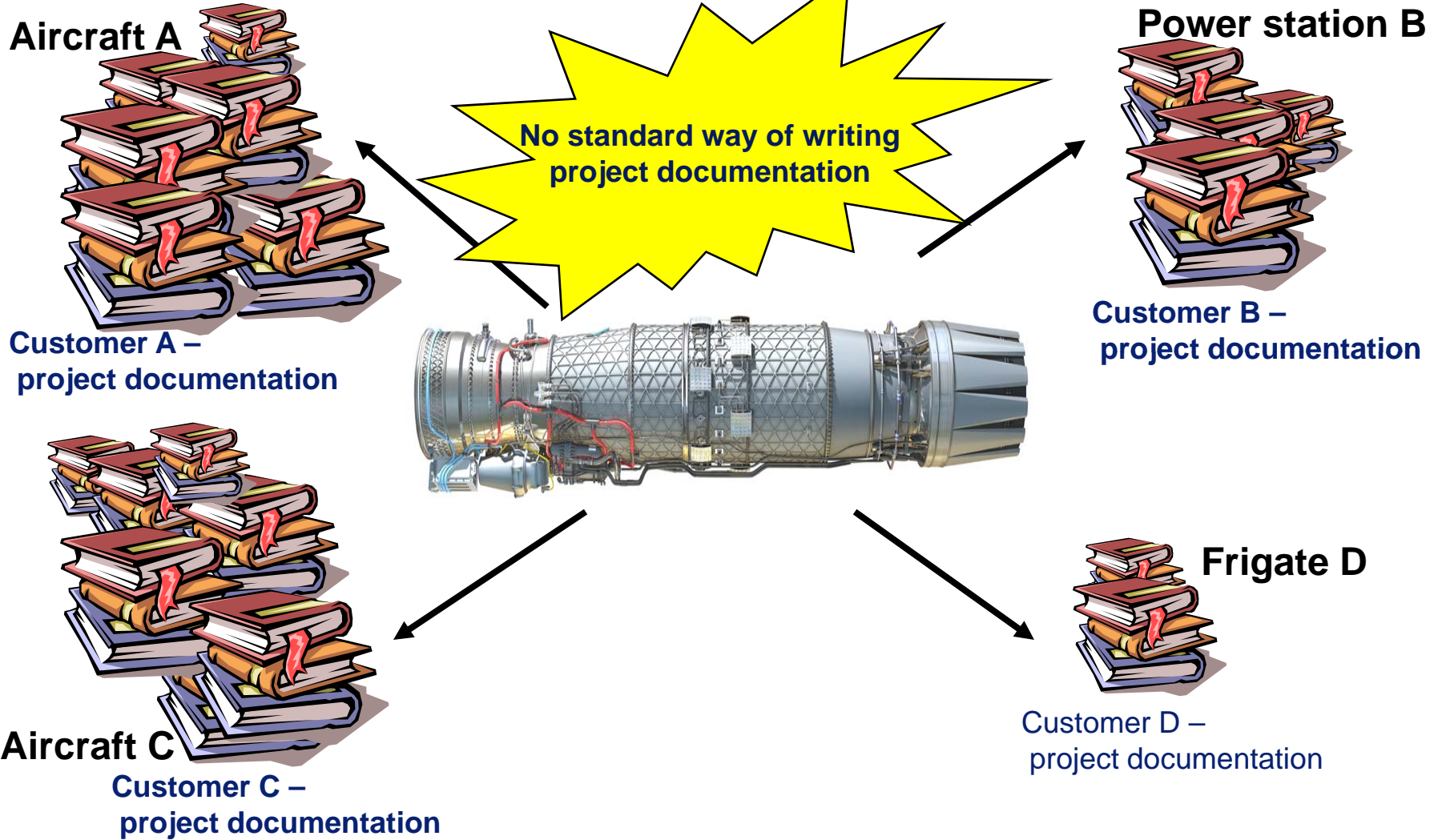
# Scenario 2

- **Customer:** The hyperlinks are not working in my IETP – it looks like you forgot to add this attribute. Please put it right.
- **Project:** Oops! We forgot that attribute in our author's style guide. It's optional in the spec.

# Scenario 2

- **Customer:** The hyperlinks are not working in my IETP – it looks like you forgot to add this attribute. Please put it right.
- **Project:** Oops! We forgot that attribute in our author's style guide. It's optional in the spec.
- **Project:** That's going to be expensive to put right!

# Multiple customers



# Implications

- **No standard way of writing project documentation means:**
  - **difficult to find information as business rules are “dotted” around different specifications**
  - **Information is often ambiguous and contradictory**
  - **some projects provide too much information, while others have not enough**
  - **Important information may have been missed**
  - **the project may have misinterpreted specifications**
  - **Poor interoperability**
  - **unfamiliarity with documentation when personnel move from one project to another**

# Lessons learned...

- **Define your business rules at the very start of the project**
- **Document your business rules within project documentation (as data modules)**
- **Make sure that you have covered them all**
- **Test your business rules by using test exchanges before you start for real**
- **Don't forget the graphics**
- **Don't forget the other data types (publication module, data module lists...)**

# Lessons learned (cont'd)

- **Police your business rules**
- **Use automated processes to help you**
- **Define acceptance / rejection criteria**
- **Use the methods and formats that are recommended by S1000D to set up the rules**
- **Standardise the format of your documentation**
- **Create a checklist for any further projects so that nothing is forgotten**
- **Involve ALL parties in creating the rules**
  - **Include the customers**
  - **Include the suppliers**
  - **Include other disciplines in your organisation**

# Lessons learned (cont'd)

- **S1000D needs a standard format for business rules**
- **S1000D needs a business rules index**
- **S1000D needs an acquisition guide that provides guidelines**
  
- **....these are all coming as part of the delivery from the S1000D implementation and business rules task team**

**What is a business rule?**

# So, what are business rules

- In this section, we describe the different types of business rules that have to be considered and **MUST be DOCUMENTED** when setting up a new project

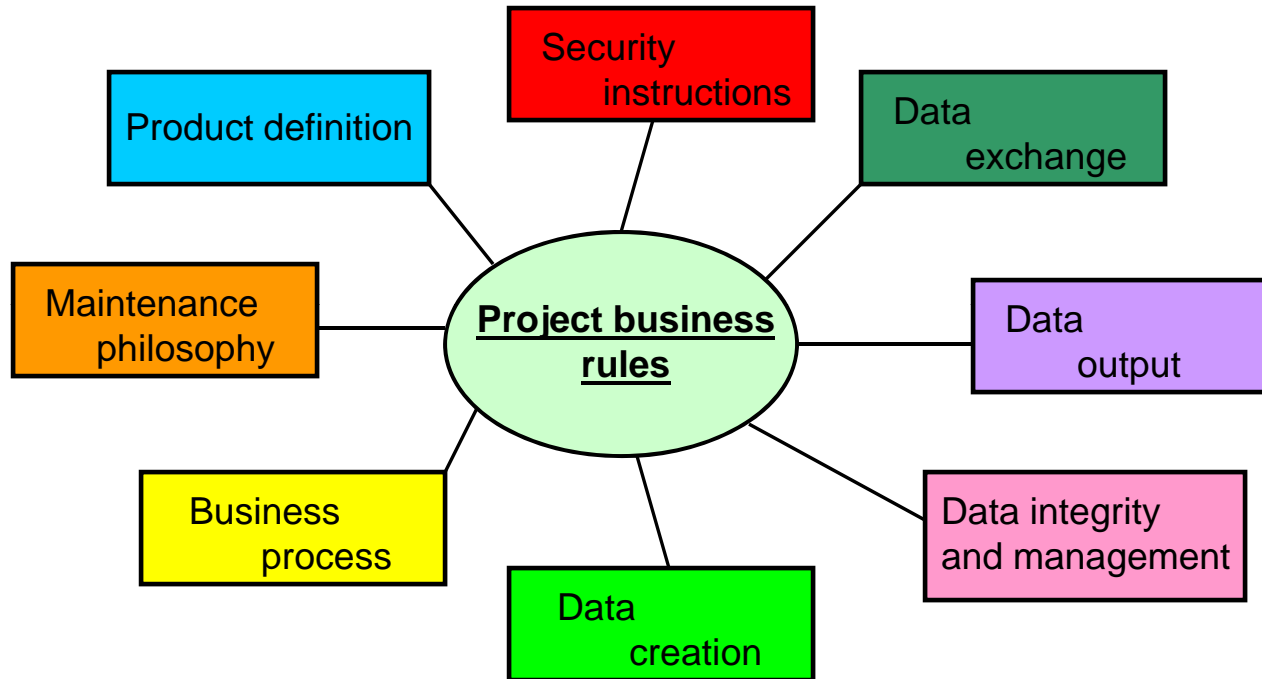
# Define “business rule”

- **A rule that tells the author what elements and attributes to use as defined in an “authors’ style guide”**
- **When most people talk about S1000D business rules, this is what they mean**
- **Business rules cover far more than that...**

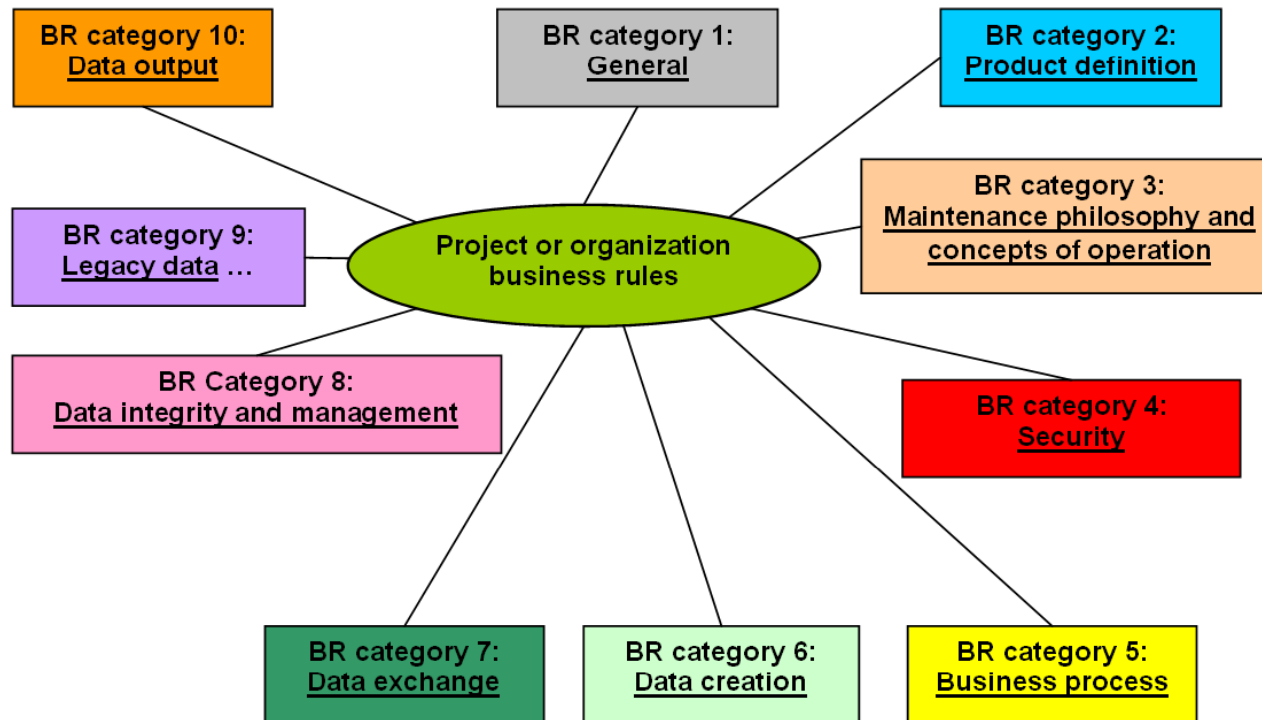
# A definition

- **A business rule is the result of any decision that has been made during the implementation of an S1000D project or business process**
- **They are not only for authoring**
- **There are different types of rules**

# My original types of business rules

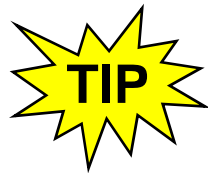


# S1000D's categories...



# Types of BRs

- In what follows, we shall see some examples of BRs of each type
- The list is not extensive



Where you find this, it is information that may help you gain from lessons learned



Where you find this, it will help you not to fall into the same traps that we did. Getting out of them is often expensive

# Security BRs

Security  
instructions

- **The security classifications and data restrictions for the project**
- **Important to set up first**
- **Cover the rules for data creation and dissemination**
- **Will control how your system is set up and managed**
- **Copyright markings**
- **Vital to defence projects**

# Security BRs

Security  
instructions

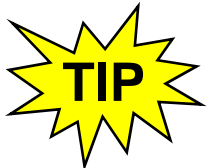


Define security classifications and data restrictions

- Define security classifications based on project security instructions
  - Define data restrictions (copyright, destruction, etc.)
- 



There may be restrictions on who is allowed to create / view and modify data. Consider these when implementing you systems



- In multi-partner projects, the product is typically broken down into areas of responsibility - you should control who is allowed to create / modify / amend data for each hardware item



Consider access for sub-contractors

# Product definition BRs

Product definition

- **How the product is defined and structured**
- **Includes:**
  - **Application of model identification codes**
  - **Application of the product standard numbering systems SNSs**
  - **Applicability encoding**

# Product definition BRs

Product definition

- **Include but are not limited to...**



Define the Model Identification Codes



Define the SNS definitions



Define the applicability rules

# Product definition BRs

---

Product definition



## Define the Model Identification Codes

- Apply for them and document them. Decide on lengths
- Consider different model identification codes for major components (eg engines)
- Consider the model identification for support equipment that may be used across projects
- Consider the relationship with the system difference codes

---

**TIP**

- Work together with logistic support analysis. Match the model identification code to the End Item Acronym Code.

**TIP**

- Consider using DMs that already exist without change to codings this promotes reusability. Don't change for the sake of it.

**!**

- Make sure that your CSDB management system allows for multiple model identification codes and SNS structures within the same CSDB

# Model identification

Product definition

## ● Example

These are the only model identification code and system difference code combinations allowed for the project.

Modelic / SDC	Meaning	Definition
1B-A	Eurofighter typhoon (development)	to be used for all data modules that are specific for the development airframe
1B-B	Eurofighter typhoon	to be used for all data modules that are for the airframe that are not development only
E1-A	Eurojet EJ200 EFGOI	to be used for all data modules that are specific to the EFGOI
E2-A	Eurojet EJ200 Mk 101	to be used for all data modules that are for the EJ200 Mk 101 engine

# SNS - definitions

---

Product definition



## Define the SNS definitions

- Select the SNS structure from Chapter 8 of S1000D
  - Define the third to sixth characters of the SNS
  - Create a “Technical name” for each SNS that is to be used for all data modules (and maybe illustration titles)
  - Define the third to sixth characters of the SNS
  - Define any project defined SNSs (not given in S1000D) and any SNS that must not be used
- 



- Work together with Initial Provisioning, Maintainability and your engineering departments to create a common structure (this will provide better traceability throughout your organisation). Eg Use the same number for LCN and SNS; use S1000D identifiers throughout the organisation



- in multi-national or multi-partner projects, check for multiple claims to SNSs for different hardware items

# SNS - definitions

Product definition



**TIP**

- Mandate and check that the technical names as delivered in the data modules matches the one given in your SNS definition document. If you don't, the table of contents looks strange! Also this is a consistency check!



**TIP**

- Standardise on the case of the technical names

# SNS definitions

Product definition



Use S1000D technical names for XX-X0-00 SNSs

## ● Example

Provide guidance and rules

Define responsible companies for each SNS

SNS	Technical name	Definition	RPCs
72-00-00-00A	Engine	to be used for all data modules that are for the whole engine	K0378, A3460, D3309, 8338B
72-30-00-00A	Compressor, general	to be used for all data modules that are for the whole compressor system	D3309
72-31-00-00A	Compressor, Low Pressure	to be used for all data modules that are for the low pressure compressor	D3309
72-31-10-00A	Compressor, Low Stage One	Stage one of the LP compressor. Do not include any attaching parts - these should be included in the relevant SNS for their functional system (eg air tubes will be system 75)	D3309

# Applicability BRs

---

Product definition



## Define the Applicability rules

- Define values for type, model and version (and other values)
- Decide if “inline” applicability is to be used and how. Consider creating separate DMs and manage the content in a content management system instead
- If inline applicabilities are used, define filtering constraints



- 
- Don't underestimate the effort needed to define applicability rules
  - Don't start work on a project until applicability issues have been resolved and you are clear how it is to be managed
  - Be careful sending data to a customer that contains different inline applicabilities

# Maintenance philosophy BRs

Maintenance  
philosophy

- This covers the types of data modules that you have to write
- For example, are you delivering first line, second line, third line information?
- Which information codes are needed?
- Which item location codes are needed?
- Which data module types are needed?

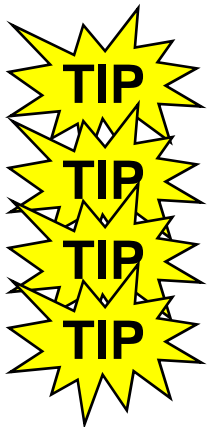
# Define information types

Maintenance  
philosophy



## Define the Information codes

- Select the information codes Chapter 8 of S1000D
  - Use the “information names” that are provided in S1000D
  - Create an “information name” for each project defined information code in S1000D (not given) - **Use with care!**
  - Decide which information names may be extended by a qualifier
  - Define which Data Module Types are to be used with each information code
- 



- Use the information names as provided in S1000D, this will make sure that your data module titles are standardised
- Standardise on “Case” of information names
- Define how information name qualifiers are written - suggest in brackets
- Where an LSA is used, consider a map between information codes and LSA task codes

# Information code definitions

Maintenance philosophy



Provide guidance and rules

Check that delivered DMs match the required DM type

Check infoname qualifier rules

Information code	Information name	Definition	Infoname qualifier allowed?	DMType
251	Clean procedures	To cover all cleaning with chemical agents. You must specify the chemical in the information name eg "Clean procedures (Trichlorethylene)" Use the information code variant to encode different procedures.	Mandated	Proced
...				
520	Remove procedures	to be used for all data modules that describe how to remove equipment, components,....	No	Proced

# Define item location codes

Maintenance  
philosophy



Define the Item location codes

- Use as defined in S1000D
- According to the maintenance philosophy and contract, you may want to ban some item location codes (eg if there is no overhaul requirement, item location “C” should not be used)



- 
- Make sure that your project does not confuse “line of information” (eg first, second and third) with item location code - they are quite different!

# Item location codes

Maintenance philosophy



Make the descriptions apply to your product and not use the generic ones provided in S1000D.

State use of “D” code for IPC and D&O (common mistake to use “A”)

Item location code	Meaning
A	Procedures that are to be performed when the engine is installed in the airframe
B	Procedures that are to be performed on the item when the engine is removed from the airframe
C	Procedures that are to be performed when the item is removed from the engine. DO NOT USE FOR PRODUCTION AIRCRAFT DATA MODULES.
D	Procedures that can be performed at A, B or C. Use this for IPC and Description and operation as well
T	Training data



State conditions of use, here, ILC “C” is not to be used for production DMs as the customer does not want “overhaul DMs”.

# Business process BRs

Business  
process

- Define how your technical publications are created inline with your other business processes
- These are often “internal” within an organisation of a project and may form part of “departmental operating procedures”
- An example of an external Business Process BR is the QA procedures for second verification
- Include, for example, data sources, links between LSA, IP (2000M), engineering and publications
- Too numerous to list them all, but some examples follow
- Remember that technical publications is an integral part of the product definition process and is not an island on its own!



- Make sure that you consider the whole “product” when creating your business rules. Make any that are applicable internally to one organisation supplement the complete project business rules.

# Business process BRs

Business  
process

## ● Examples

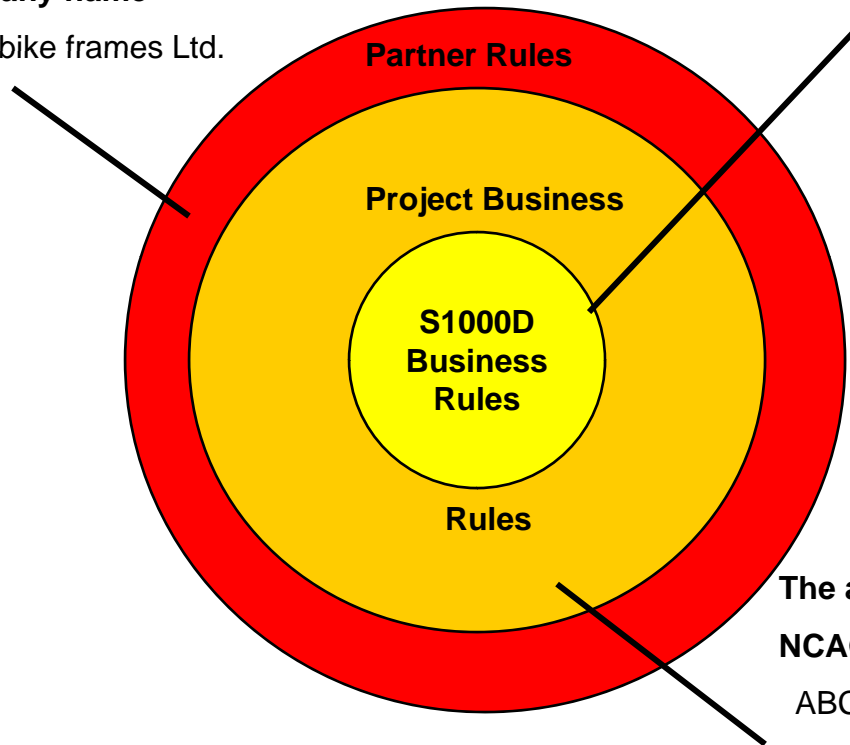
- There will be a one to one relationship between LSA tasks and data modules
- When a comment is received on a data module, raise an LSA change request and inform engineering; log all comments in the “resolve customer problems” database
- The engineering number, LCN and SNS must be the same number. Any changes are to be agreed by internal project decision
- etc.. etc... etc..

# Layered model of business rules

The only allowed NCAGE values for Bikey DMs is:

NCAGE	Company name
ABC12	Bikey bike frames Ltd.

A list of permitted NCAGE for RPC. A project, in its business rules, should define a list of acceptable RPC NCAGE values.



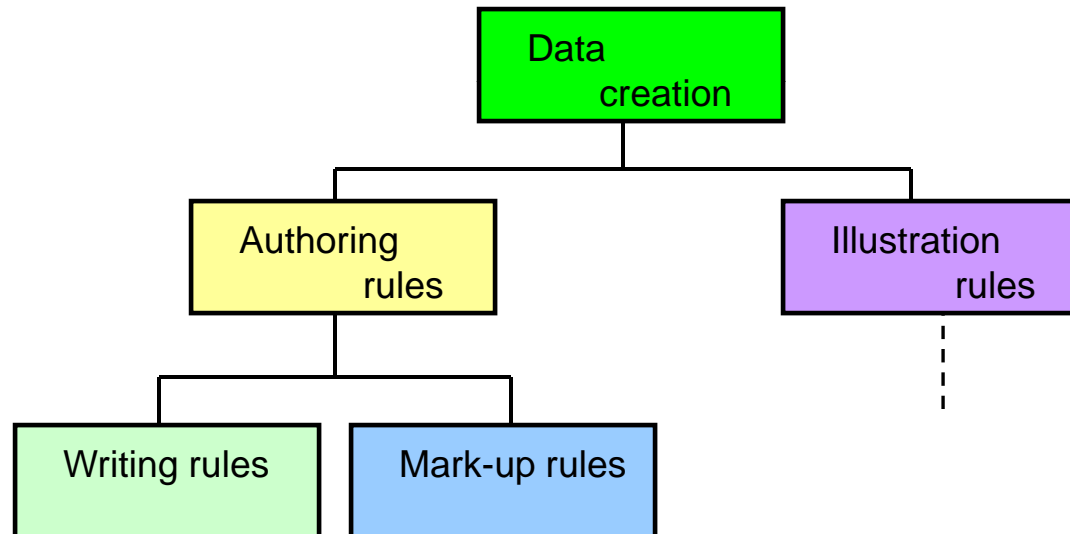
The allowed NCAGE values for this project are:

NCAGE	Company name
ABC12	Bikey bike frames Ltd.
CVF56	Headset handlebar company
HH092	Wheels and bits

# Data creation BRs

Data  
creation

- Covers authoring business rules
- Covers illustration business rules



# Writing rules

Data  
creation

- **Covers all BRs that are not necessarily connected to mark-up**
  - Covered in S1000D in Chap 3.9.1
  - Includes language, if STE is to be used. Any deviations?
  - Abbreviations
  - How numeric values are to be included
  - The units of measurement
  - Basic punctuation and writing rules
  - The project dictionary of allowed technical terms and manufacturing processes
  - The use of capitals
  - rules for warnings, cautions and notes
  - etc.

# Authoring BRs - markup

Data  
creation

- These are the rules that are commonly referred to as the “Author’s Style Guide”
- In these rules, define which elements and attributes are:
  - mandated
  - not allowed
- It should also define the content of elements and attributes (what they are to contain)
- Many of these rules are “context dependant”
- It is recommended that you use S1000D Chap. 3.9.5.2 as a template for constructing your rules



# Business rules decisions

Data  
creation

## 2.2.15 Responsible partner company (M)

### 2.2.15.1 Definition

This element is used to capture the company or organization responsible for the data module. Only one entry is permissible. The responsible partner company shall indicate the company or organization responsible for the data module.....

### 2.2.15.2 Business rules decisions

The project based decisions include, but are not limited to, the following:

**The use of rpcname.** As the rpcname is optional, a project has to decide on its use. If used, then its use must be consistent and mandatory for the whole project.

**Use of the NCAGE.** RPC has a mandatory NCAGE value and an optional company name. The company name, if the project decides to use it, is stored in rpcname attribute.

**A list of permitted NCAGE for RPC.** A project, in its business rules, should define a list of acceptable RPC NCAGE values. If rpcname is used, it should also be included in the list. RPC NCAGE and RPC name should be typed exactly as in the RPC list given in the business rules.

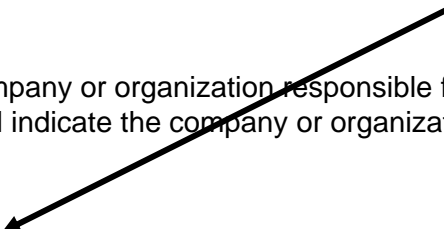
### 2.2.15.3 Markup example

The first example is for a project which does not use the attribute `rpcname` . `<rpc>U8025</rpc>`

This example is for a project that uses the attribute `rpcname` .

```
<rpc rpcname ="UK MoD">U8025</rpc>
```

**S1000D gives the decisions you have to make for your project**



# Business rules decisions

Data  
creation

## 2.2.15 Responsible partner company (M)

### 2.2.15.1 Definition

This element is used to capture the company or organization responsible for the data module. Only one entry is permissible. The responsible partner company shall indicate the company or organization responsible for the data module.....

### 2.2.15.2 Business rules decisions

The project based decisions are defined below.

**The use of rpcname.** The rpcname attribute shall contain the company name.

**Use of the NCAGE.** RPC has a mandatory NCAGE value and an optional company name. The company name, if the project decides to use it, is stored in rpcname attribute.

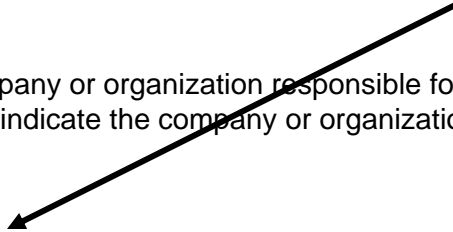
**A list of permitted NCAGE for RPC.** The allowed values for NCAGE and company name are given below.

NCAGE	Company name (value of rpcname attribute)
ABC12	Bikey bike frames Ltd.
CVF56	Headset handlebar company
HH092	Wheels and bits

### 2.2.15.3 Markup example

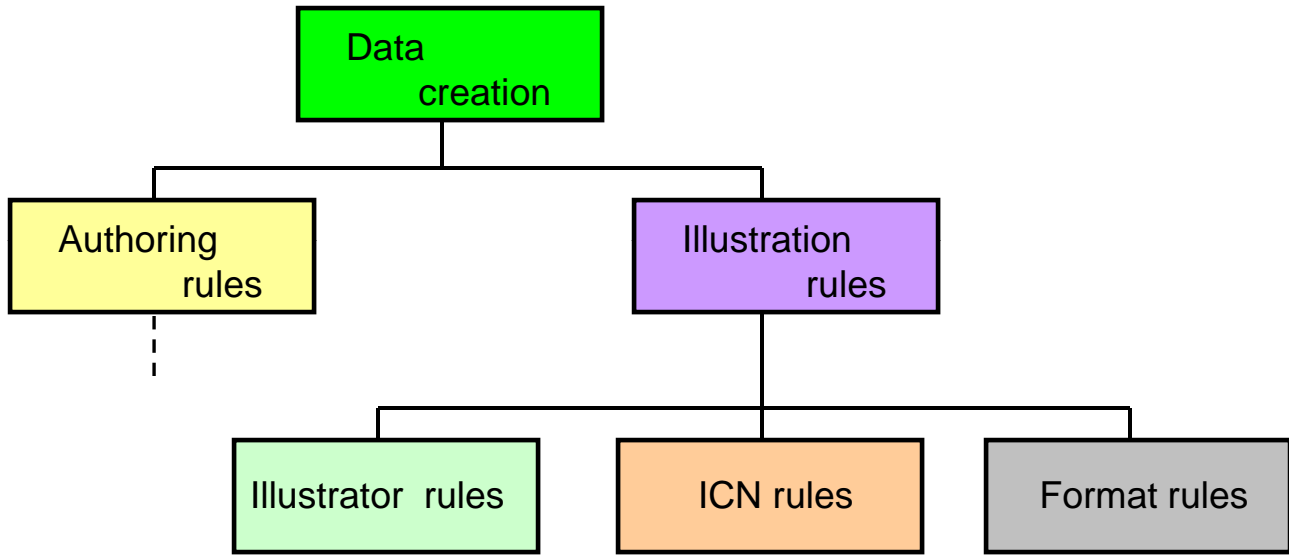
```
<rpc rpcname ="Bikey bike frames Ltd">ABC12</rpc>
```

**These are the decisions that a project has made in its business rules.**



# Illustration & multimedia BRs

Data  
creation



# Illustrator rules

Data  
creation

- **Covers rules for creating illustrations**
  - **line weights,**
  - **fonts and sizes**
  - **illustration sizes**
  - **symbols**
  - **methods of projection**
  - **IPD illustration rules**
  - **colours**
  - **When to use line art, photographs, 3D etc.**
  - **Interactivity and intelligence**
  - **Boardno - on illustration or not?**



- These rules should be created by an illustrator working group but not in isolation.

# Illustration format rules

Data  
creation



## Define allowed illustration formats

- detail which illustration file formats are allowed
- describe the uses for each type
- detail any internal file details (eg Profiles, versions, specs)
- detail any other restrictions (file size etc)
- detail hotspot formats as appropriate
- for raster illustrations, define minimum and maximum densities
- etc.



---

- Illustration size (dimensions) is very important for page-oriented publications as oversize illustrations can cause big problems



- Illustration orientation is very important for page-oriented publications (landscape may have to be turned portrait)

# Illustration format rules

Data  
creation

## 2.1 Illustration formats

The following illustration formats are allowed for this project.

CGM - for 2d line art and hybrid raster / vector and photographs

JPEG - for photographs (note that CGM is preferred)

CALS raster (CG4) for scanned raster images (note that CGM is preferred)

## 2.2 Illustration filenames

Illustration files are to be named in accordance with S1000D.

Examples:

ICN-E2-A-723200-R-K0378-00232-A-01-1.CGM

ICN-E2-A-723200-R-K0378-00132-A-01-1.JPG

ICN-E2-A-782700-R-K0378-00291-A-01-1.CG4 ( CALS raster)

Note that illustrations of the same ICN but different extensions are considered as the same illustration



- Always look inside an illustration. Don't accept it until you have checked it out.

## 2.3 CGM rules

### 2.3.1 Profile

CGM files shall conform to the S1000D CGM profile

# Illustration format rules

Data  
creation

## 2.3.2 Number of pictures

The CGM file shall contain exactly one picture

## 2.3.3 Metafile Identifier

Shall contain the ICN of the file without the extension  
example: ICN-E2-A-723200-R-K0378-00212-A-01-1



- Beware of files claiming to be of types they are not. For example, we have seen files that have extension CG4 actually containing TIFF data

## 2.3.3 Metafile description

Shall indicate that the file conforms to the S1000D profile....

And so on for all allowed elements in a CGM file

## 2.4 CALS raster files

### 2.4.1 Source document identifier

Shall contain the illustration control number without the extension  
eg ICN-E2-A-723200-R-K0378-00023-A-01-1

....

### 2.4.6 Raster density

Shall be a minimum of 240 dots per inch and a maximum of 600 dots per inch

# Data exchange BRs

Data  
exchange

- **This covers how data is to be exchanged between partners and customers**

# Data exchange BRs

Data  
exchange



Define data exchange method



File based transfer protocol to be used

- Compressions allowed (zip, tar, ...)
- How is it transferred (email, CD, DVD,...)
- Uppercase filenames?
- Dashes between parts of data module code in file name, or none?
- Data format: SGML or XML or both?



Data dispatch note (DDN) rules

- Include a DDN? If so define receivers and senders
- define the DDN DTD /Schema versions and XML or SGML
- Include delivery list in DDN? What do you do if the files do not match what is listed?
- if the DDN says the exchange isn't for me, reject it

# Data exchange BRs (cont'd)

Data  
exchange



## Periodicity of exchanges

- define when exchanges are to be made (eg once a month, or on agreed dates)
- define the relationship between data module issue date and exchange date
- In multi-partner CSDBs define the exchange protocol (master CSDB concept)



## Exchange content

- Can data types be mixed in an exchange (ie can an exchange contain DMs, Comments, DMLs or are separate exchanges needed)
- What do you do if the exchange contains a DM but it does not have its accompanying illustrations? This could be because the illustrations are previously received or are not ready yet.
- demand that the exchange is complete and illustrations are sent again even if they have been previously received. Overwrite illustrations received before with the ones on the exchange
- define the relationship between data module issue date and exchange date

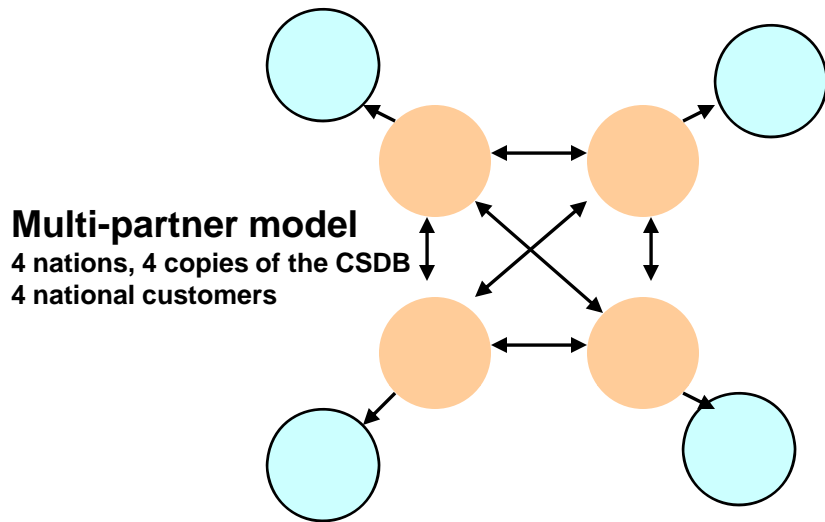


# Management BRs

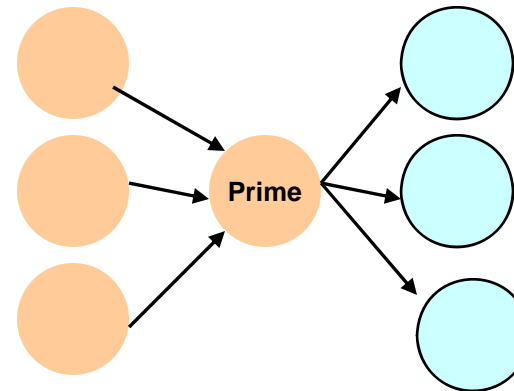
- **These cover how the data is managed in a multi-partner or contractor-prime or prime-customer relationship**
- **There are many different models and S1000D does not provide detailed information (yet!)**
- **These are connected with workflow within the CSDB management system**

# Types of CSDB management

Data integrity and management



Partner - prime One "master" CSDB



Business rules exist that are dependant on the method of CSDB management

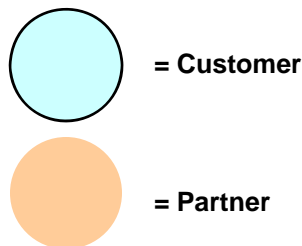
Examples:

## Partner-prime

- What happens to issue number of DM, if they are rejected by the prime

## Multi-partner

- What happens if the DMs are rejected by one partner but accepted by another?



# Integrity BRs

- **These rules police the integrity of the CSDB and include:**
  - Checks for missing issues of a DM
  - Checks for missing illustrations
  - Checks for wrong RPC (design authority) for data modules
- **They stop data modules being loaded that can destroy the integrity of the CSDB**
- **The CSDB status list provides a method of checking integrity**

# Data output BRs

Data  
output

- These BRs are concerned with how the data is presented and with display method
- Font sizes
- How elements are rendered
- Can be described in stylesheets
- How the data is to be presented will affect the way you write it



Use the example output formats in S1000D



Try to use one output style for all projects. This will give your publications a corporate look and feel. Maintaining stylesheets is expensive.

# Legacy conversion BRs

- **These rules are for projects that have data existing in other formats.**
  - **S1000D says little about these at the moment**
  - **They are a big issue for projects adopting S1000D**
  - **They are quite different if you have to maintain the data in old and new standards**
  - **They are produced after a document analysis. This needs to be done in detail**
  - **Document them and don't just rely on the formal descriptions in conversion scripts**

# **Standardising business rules**

# **A Standard set of business rules**

- **Why not make a standard, generic set of business rules for S1000D!**
- **This is possible only to a certain extent. Certain things have to be configured for the project and for the way the information is to be delivered and presented.**
- **But, the rules for business rules could be generic.**

# How can we improve things?

- **We have already started. But it is not yet perfect.**
- **What's needed is a standard way of writing business rules**
- **S1000D Issue 4 contains “Business rules decisions”**
- **This provides a checklist to help ensure that the project at least considers the choices to be made and includes the decision in the business rules.**
- **And, hopefully, nothing is missed.**

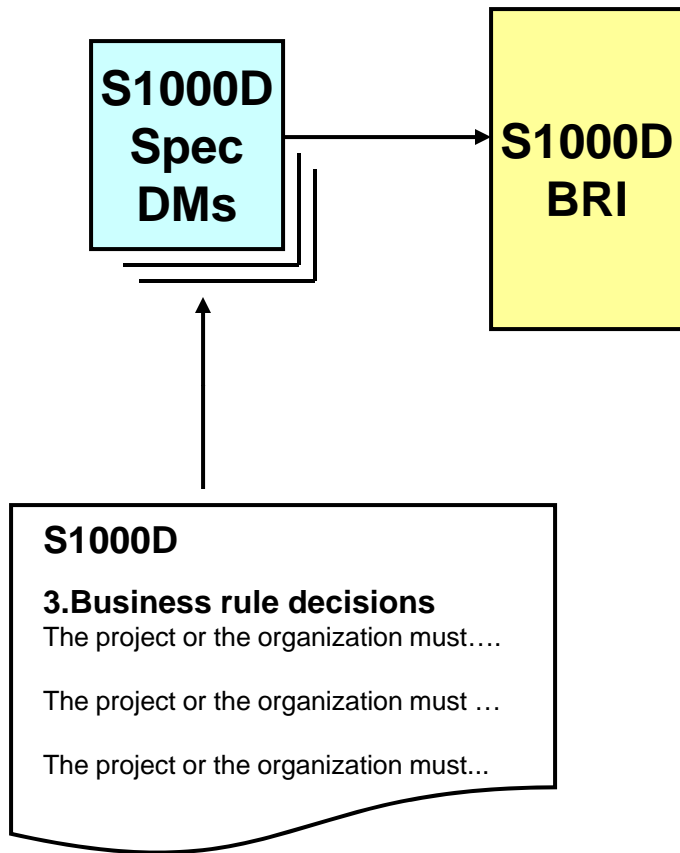
# How can we improve things?

- **We can only improve by standardisation**
- **Standard formats will mean that we know where to find things for all projects**
- **A check list will make sure that nothing is missed**

# How can we improve things?

- **Maybe software can help build the business rules?  
For example, a system that stops and asks questions and builds the business rules documents for you as it goes...**

# Building BRs - the vision

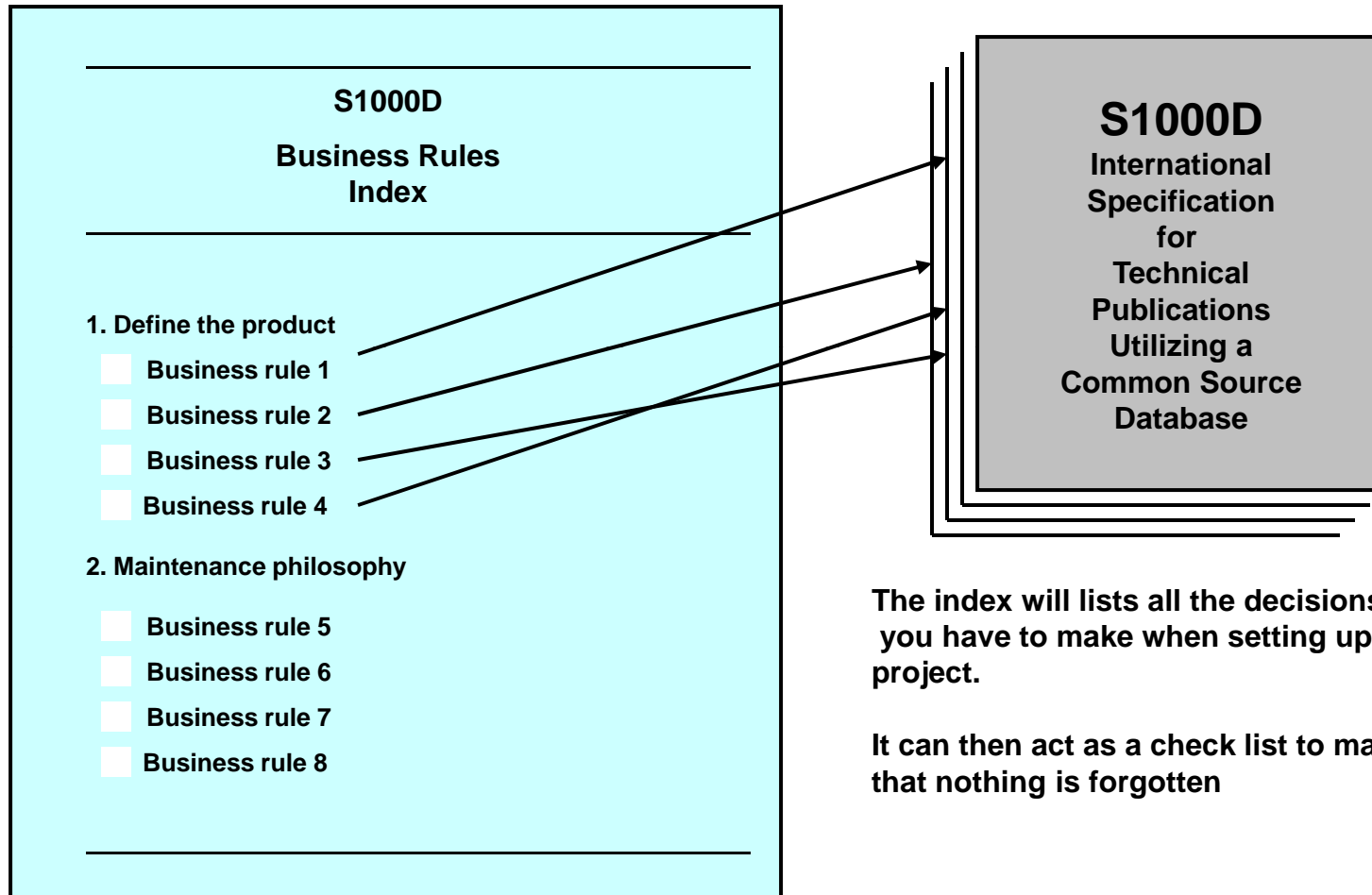


**S1000D now has “business rules decisions”**

**These help a project or organization to know what they must decide and document in their business rules**

**The BRDs can be used to generate an S1000D business rules index**

# What's needed is an index of BRs



# The BR builder....

1. Enter the Model Identification Code for the project:

E2 - Eurojet EJ200  
1B - Eurofighter Typhoon

2. What are the Project Security classifications?

01 - Unclassified  
02 - Restricted

3. Which version of S1000D?

Issue 2.2

4. SGML or XML?

XML

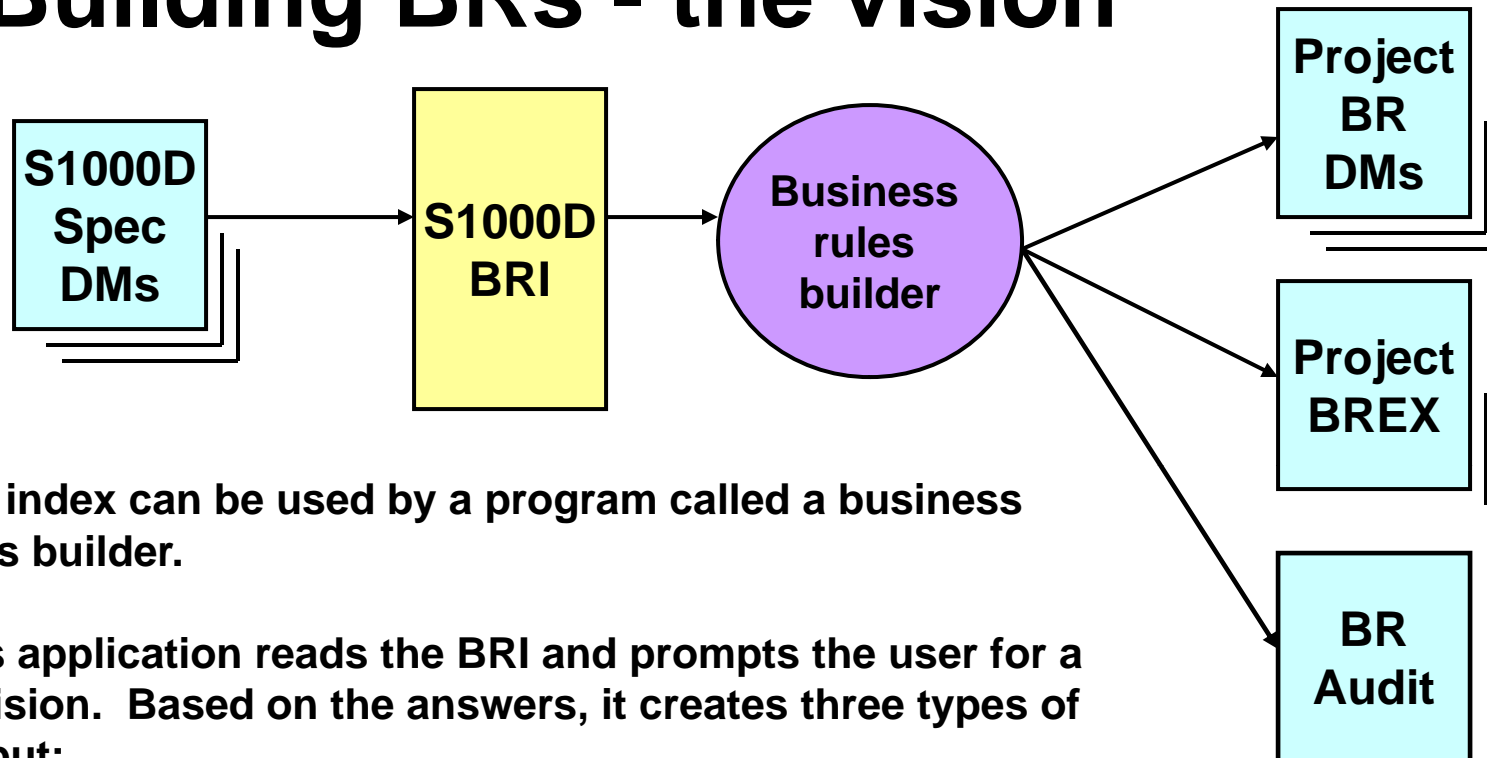


Project business rules  
in a standard format  
**WITH NOTHING MISSED**

Auto-generation of BR  
data module(s)

Auto-generation of  
Business Rules Exchange  
data module(s) (Brex)

# Building BRs - the vision



The index can be used by a program called a business rules builder.

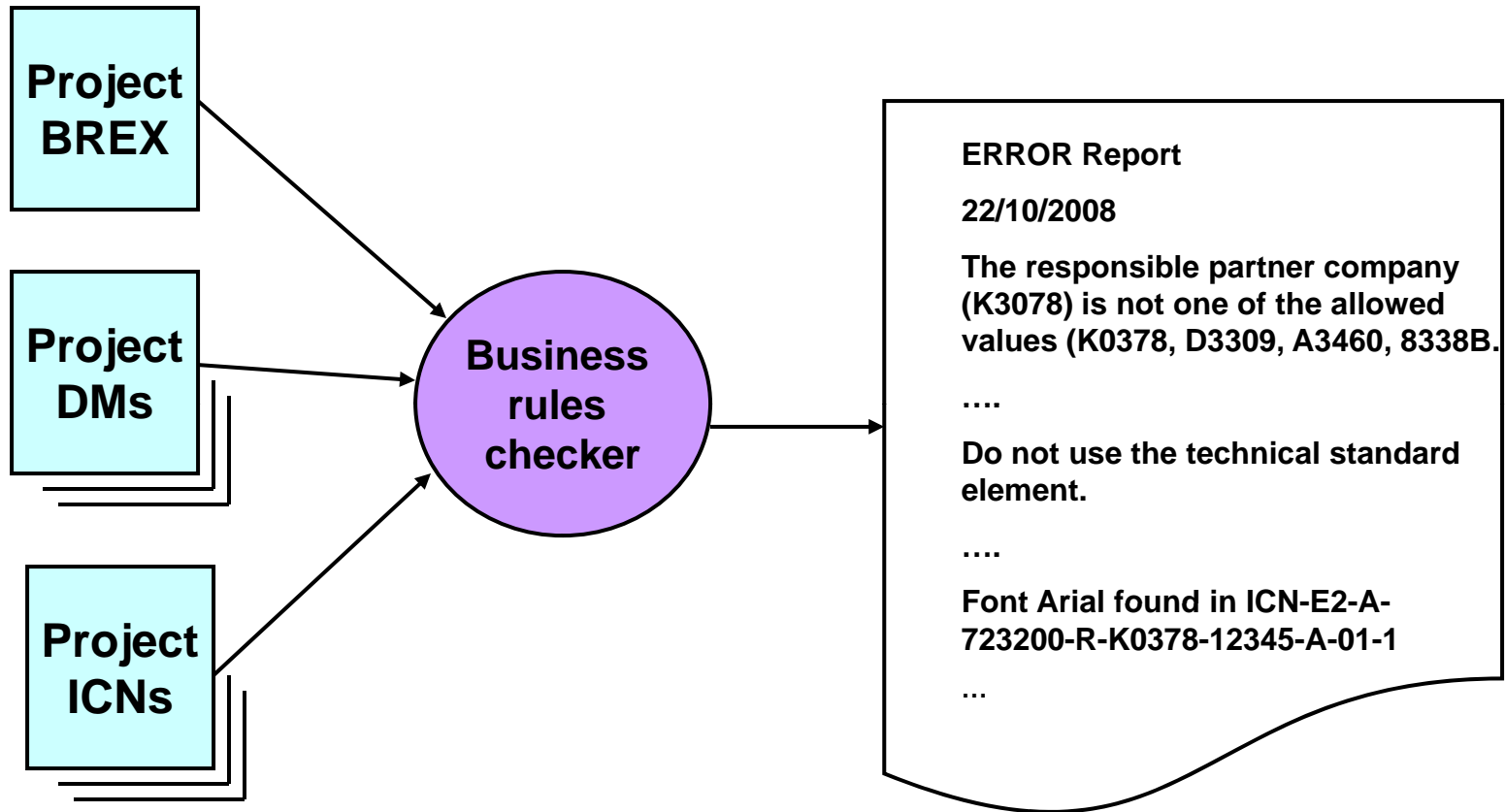
This application reads the BRI and prompts the user for a decision. Based on the answers, it creates three types of output:

First, it generates the business rules data modules. These create the author's guide, illustrator's guide, etc etc. In a standard way.

Second, it generates the project BREX

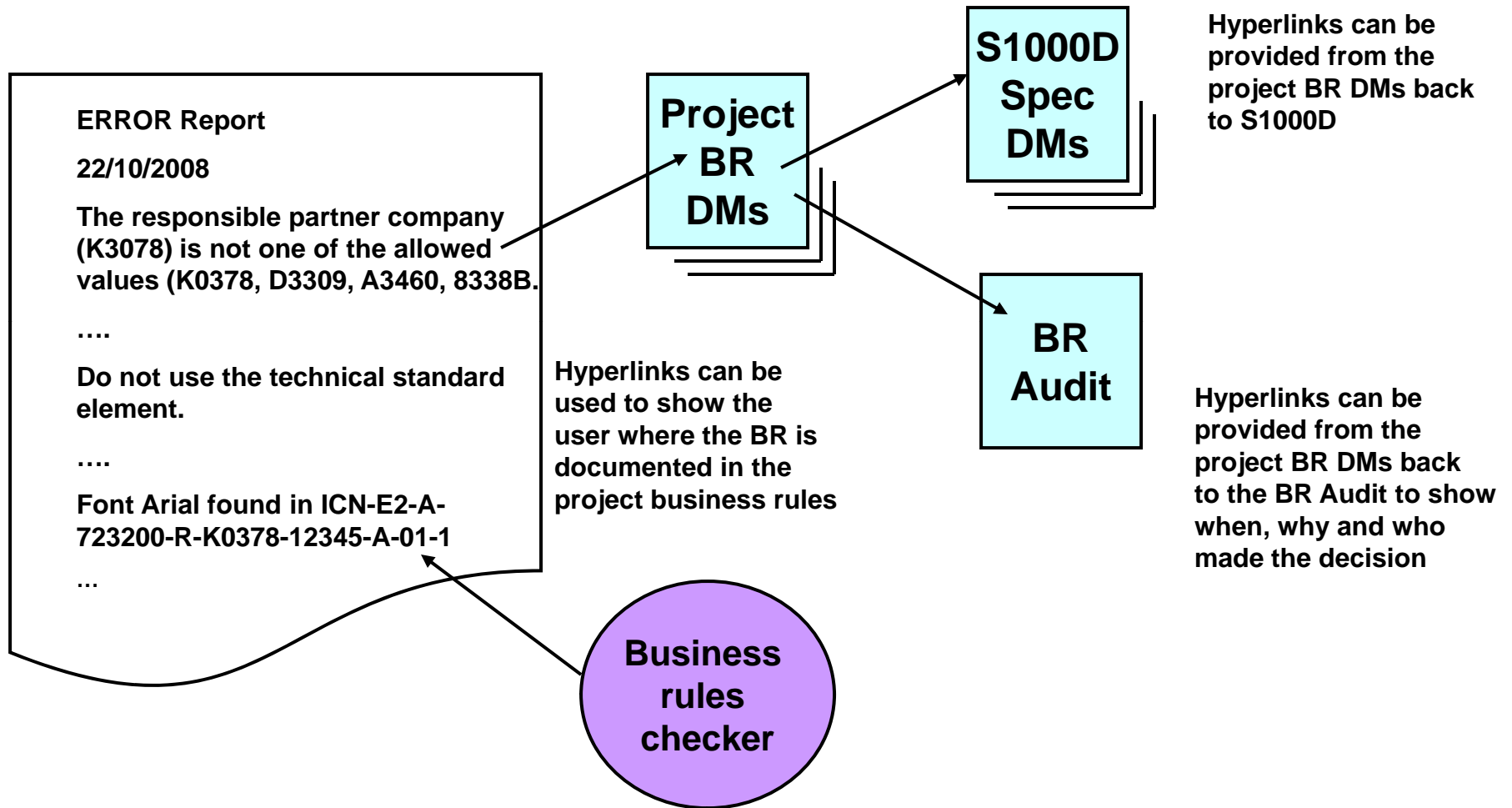
Third, it creates an audit log of the reason for the decision, who made it and when

# Building BRs - the vision



The BREX can be used by a Business Rules Checker application. This is used to test that the CSDB objects (DM, ICN, DML,...) conform to the project business rules. It can operate in batch mode (for example, testing an incoming exchange from a supplier) or it can be integrated with the author's environment.

# Building BRs - the vision



**Why parsing is not enough**

# Example 1 - parsing is not enough!

```
<dmodule>
  ...
<content>
  <step1>
    <para>Refer to Figure <xref xrefid="F0001"
                                xidtype="Figure"/> ....
  </step1>
...
<table id="F0001">
<thead>...</thead>
<tbody>...</tbody>
</table>
...
```

A reference  
to a figure

...but the ID is that of a table

The Data Module parses fine, but this is a business rule error!

# Example 2

```
<!DOCTYPE dmodule PUBLIC...  
[  
  <!ENTITY ICN-E2-A-723200-R-K0378-00121-A-01-1  
    SYSTEM ICN-E2-A-723200-R-K0378-00121-A-02-1.CG4  
    NDATA fax>  
]  
<dmodule>  
...  
  <figure id="F0001">  
    <title>LP Compressor details</title>  
    <graphic boardno="ICN-E2-A-723200-R-K0378-00121-A-01-1"/>  
  </figure>  
</dmodule>
```

Entity name and file name do not agree

**The Data Module parses fine, but this is a business rule error!**

# Example 3

```
<dmodule>
... <step1>
  <para>Remove the widget, refer to
    <refdm>
      <avee>
        <modelic>E 2</modelic>
        <sdcc>A</sdcc>
        <chapnum>72</chapnum>
        <section>9</section>
        <subsect>2</subsect>
        <subject>10</subject>
        <discode>00</discode>
        <discodev>A</discodev>
        <incode>520</incode>
        <incodev>A</incodev>
        <itemloc>A.</itemloc>
      </avee>
    </refdm>
  </para>
</step1>...
```

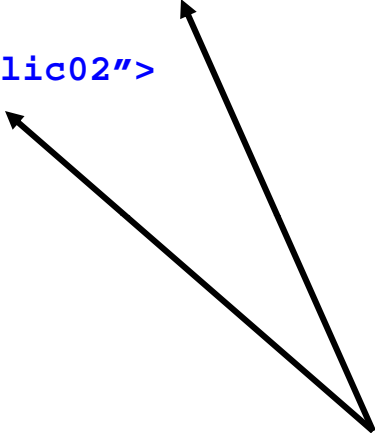
Author has placed the sentence full-stop  
In the reference data module code and Modelic has a space

Difficult to spot  
Manually and critical  
as a hyperlink will not work!

The Data Module parses fine, but this is a business rule error!

# Example 4

```
<dmodule>
...
<proceduralStep applicRefId="applic01 applic03">
  <para>Blah blah blah</para>
  <proceduralStep applicRefId="applic02">
    <para>Blah blah.</para>
  </proceduralStep>
  <ProceduralStep>
    <para>Blah blah.</para>
  </proceduralStep>
</proceduralStep>
...
```



**A subordinate step at level 2 is set for a different applicability to its parent at level 1**

**The Data Module parses fine, but this is a business rule error!**

# How can we prevent these errors?

- **Some of the errors are easy to detect by the author**
- **Others are very difficult to detect manually**
- **A business rules checker program is able to detect many of these problems automatically**
- **It is not unusual for automated checkers to contain hundreds of rules**

# Automated business rules checker



- **Implementation of an automated checker will make you very unpopular with the authors and illustrators.**
- **Works in batch mode or individually integrated with the editing system**

# An example batch check

Business Rules Check - Microsoft Internet Explorer

File Edit View Favorites Tools Help

← Back → Search Favorites History

Address H:\BUSRULES.HTM Go Links

<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: ([K0378]length: 5) RPC of this DM:([D3309] length: 5)
<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	2	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	3	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	4	CHARACTER ENTITIES	Invalid character entities found. These characters should be typed directly from the keyboard. Hash (ASCII) character entities are also not allowed. ( & (2 invalid character entities))
<a href="#">DMC-E2AAJ443124A090KA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: ([K0378]length: 5) RPC of this DM:([D3309] length: 5)
<a href="#">DMC-E2AAJ443124A090KA_001.SGM</a>	2	ENTRY	Check ? usage(Click to stop the download procedure. A message -Do you really want to stop download?- comes into view.)
<a href="#">DMC-E2AAJ443124A090KA_001.SGM</a>	3	ENTRY	Check ? usage(Click to start the software download procedure. A message -Do you really want to download selected DECU SW Version?- comes into view.)
<a href="#">DMC-E2AAJ443124A090KA_001.SGM</a>	4	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443124A090KA_001.SGM</a>	5	CHARACTER ENTITIES	Invalid character entities found. These characters should be typed directly from the keyboard. Hash (ASCII) character entities are also not allowed. ( " (2 invalid character entities))
<a href="#">DMC-E2AAJ443124A090SA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: ([K0378]length: 5) RPC of this DM:([D3309] length: 5)
<a href="#">DMC-E2AAJ443124A090SA_001.SGM</a>	2	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443124A090SA_001.SGM</a>	3	CHARACTER ENTITIES	Invalid character entities found. These characters should be typed directly from the keyboard. Hash (ASCII) character entities are also not allowed. ( " (2 invalid character entities))
<a href="#">DMC-E2AAJ443124A090TA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: ([K0378]length: 5) RPC of this DM:([D3309] length: 5)
<a href="#">DMC-E2AAJ443124A090TA_001.SGM</a>	2	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443124A090TA_001.SGM</a>		CHARACTER ENTITIES	Invalid character entities found. These characters should be typed directly from the keyboard. Hash (ASCII) character entities are also not allowed. ( " (2 invalid character entities))

Done My Computer

# An example batch check

File Name	Line Number	Category	Description
<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: ([K0378]length: 5) RPC of this DM:([D3309] length: 5)
<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	2	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	3	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	4	CHARACTER ENTITIES	Invalid character entities found. These characters should be typed directly from the keyboard. Hash (ASCII) character enties are also not allowed. ( amp (2 invalid character entities))
<a href="#">DMC-E2AAJ443124A090KA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: ([K0378]length: 5) RPC of this DM:([D3309] length: 5)
<a href="#">DMC-E2AAJ443124A090KA_001.SGM</a>	2	ENTRY	Check ? usage(Click to stop the download procedure. A message -Do you really want to stop download?- comes into view )
<a href="#">DMC-E2AAJ443124A090KA_001.SGM</a>	4	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443124A090KA_001.SGM</a>		CHARACTER ENTITIES	Invalid character entities found. These characters should be typed directly from the keyboard. Hash (ASCII) character enties are also not allowed. ( amp (2 invalid character entities))
<a href="#">DMC-E2AAJ443124A090TA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: ([K0378]length: 5) RPC of this DM:([D3309] length: 5)
<a href="#">DMC-E2AAJ443124A090TA_001.SGM</a>	2	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443124A090TA_001.SGM</a>		CHARACTER ENTITIES	Invalid character entities found. These characters should be typed directly from the keyboard. Hash (ASCII) character enties are also not allowed. ( amp (2 invalid character entities))

# An example batch check

Business Rules Check - Microsoft Internet Explorer

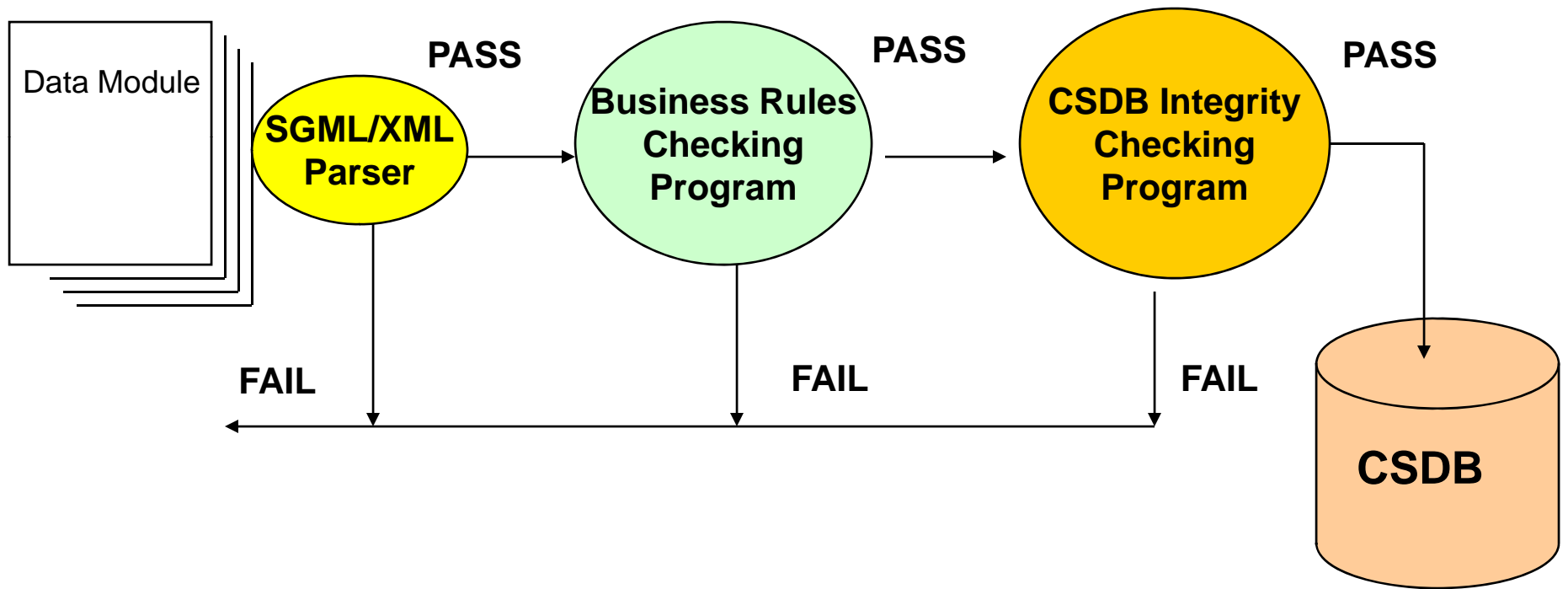
Address: H:\BUSRULES.HTM

<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: ([K0378]length: 5) RPC of this DM:([D3309] length: 5)
<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	2	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	3	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443123A090AA_001.SGM</a>	4	CHARACTER ENTITIES	Invalid character entities found. These characters should be typed directly from the keyboard. Hash (ASCII) character enties are also not allowed. ( & (2 invalid character entities))
<a href="#">DMC-E2AAJ443124A090AA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: (ldquo rdquo (2 invalid character entities))
<a href="#">DMC-E2AAJ443124A090SA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: ([K0378]length: 5) RPC of this DM:([D3309] length: 5)
<a href="#">DMC-E2AAJ443124A090SA_001.SGM</a>	2	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443124A090SA_001.SGM</a>	3	CHARACTER ENTITIES	Invalid character entities found. These characters should be typed directly from the keyboard. Hash (ASCII) character enties are also not allowed. (ldquo rdquo (2 invalid character entities))
<a href="#">DMC-E2AAJ443124A090TA_001.SGM</a>	1	RPC	RPC. RPC is not the RPC specified for the check. RPC specified: ([K0378]length: 5) RPC of this DM:([D3309] length: 5)
<a href="#">DMC-E2AAJ443124A090TA_001.SGM</a>	2	GRAPHIC	BOARDNO attribute position 17 should be R for Rolls-Royce. Found (T).
<a href="#">DMC-E2AAJ443124A090TA_001.SGM</a>	3	CHARACTER ENTITIES	Invalid character entities found. These characters should be typed directly from the keyboard. Hash (ASCII) character enties are also not allowed. (ldquo rdquo (2 invalid character entities))


Done My Computer

# The process

Partner Company  
Data Exchange  
(~200 DM per month)



# The process - lessons learned

- Do not “automatically” reject DMs that fail the business rules check
- Get the CSDB planner to say yes or no
- We rejected a DM that were missing a title on a subpara...
- ...but that DM was the single most important reason for the exchange in the first place
- Assign a priority rating to each BR 
- Have a non-S1000D teckky help define the error messages and warnings!
- Offer “extended” help for non-experienced users and provide “how to correct” and “causes” information
- Allow user to open DMs at exact point where error exists.

# **Automated business rules checking**

## **- Benefits**

- **When a project first adopted a BR checker, it detected a 90% non-compliance rate in its data modules – in its internal procedures**
- **After implementation, failures down to 5%-10%**
- **This has significantly contributed to publications quality and customer satisfaction. And...**
- **It means that the IETP works!**

# **Business rules checking is not enough!**

- **There are always some things that you cannot pick up by an automated process.**
- **These are mainly connected to the content of the data module itself**
- **There are other things that need to be checked in addition to the business rules within a data module, for example**
- **Simplified English checking, and**
- **Illustration checking...**

# Illustration checker –demo slide

H:\ILLSREP\_OVERSIZE\_ONLY.HTM - Microsoft Internet Explorer

Address [H:\ILLSREP\\_OVERSIZE\\_ONLY.HTM](H:\ILLSREP_OVERSIZE_ONLY.HTM)

ICN- E2A717006I8338B00198A011.CG4	000,270	1	2056	2672	300	226.23	174.07	8.91	6.85	
ICN- E2A717006I8338B00199A011.CG4	000,270	1	2056	2672	300	226.23	174.07	8.91	6.85	
ICN- E2A717006I8338B00457A011.CG4	000,270	1	2056	3184	300	269.58	174.07	10.61	6.85	Image height is not 222mm +/- 10mm.
ICN- E2A717006I8338B00691A011.CG4	000,270	1	2056	2672	300	226.23	174.07	8.91	6.85	
ICN- E2A717006I8338B00692A011.CG4	000,270	1	2056	2672	300	226.23	174.07	8.91	6.85	
ICN- E2A717009I8338B01109A011.CG4	000,270	1	2064	2616	300	221.49	174.75	8.72	6.88	
ICN- E2A717009I8338B01113A011.CG4	000,270	1	1752	1384	300	117.18	148.34	4.61	5.84	Image height is not 222mm +/- 10mm. Image width is not 170mm +/- 10mm.
ICN- E2A717009I8338B01310A011.CG4	000,270	1	1304	1592	200	202.18	165.61	7.96	6.52	Resolution should be 300 dpi. Image height is not 222mm +/- 10mm.
ICN- E2A718100RK037800183A022.CG4	000,270	1	1962	2284	300	193.38	166.12	7.61	6.54	Image height is not 222mm +/- 10mm.
ICN- E2A718100RK037800184A022.CG4	000,270	1	1829	2609	300	220.9	154.86	8.7	6.1	Image width is not 170mm +/- 10mm.
ICN- E2A718100RK037800961A012.CG4	000,270	1	1950	2280	300	193.04	165.1	7.6	6.5	Image height is not 222mm +/- 10mm.
ICN- E2A718301RK037800182A012.CG4	000,270	1	1994	2613	300	221.23	168.83	8.71	6.65	
ICN- E2A718600RK037800181A012.CG4	000,270	1	1846	2607	300	220.73	156.29	8.69	6.15	Image width is not 170mm +/- 10mm.
ICN- E2A718800RK037800185A012.CG4	000,270	1	1993	2457	300	208.03	168.74	8.19	6.64	Image height is not 222mm +/- 10mm.
ICN- E2A720000TD330900585A021.CG4	000,270	1	968	1312	150	222.17	163.91	8.75	6.45	Resolution should be 300 dpi.
ICN- E2A720000TD330900726A011.CG4	000,270	1	848	1552	150	262.81	143.59	10.35	5.65	Resolution should be 300 dpi. Image height is not 222mm +/- 10mm. Image width is not 170mm +/- 10mm.
ICN- E2A720000TD330900727A011.CG4	000,270	1	992	1312	150	222.17	167.98	8.75	6.61	Resolution should be 300 dpi.
ICN- E2A720000TD330900728A011.CG4	000,270	1	688	1544	150	261.45	116.5	10.29	4.59	Resolution should be 300 dpi. Image height is not 222mm +/- 10mm. Image width is not 170mm +/- 10mm.
ICN- E2A720000TD330900729A011.CG4	000,270	1	776	1552	150	262.81	131.4	10.35	5.17	Resolution should be 300 dpi. Image height is not 222mm +/- 10mm. Image width is not 170mm +/- 10mm.

Done My Computer

# Illustration checker –demo slide

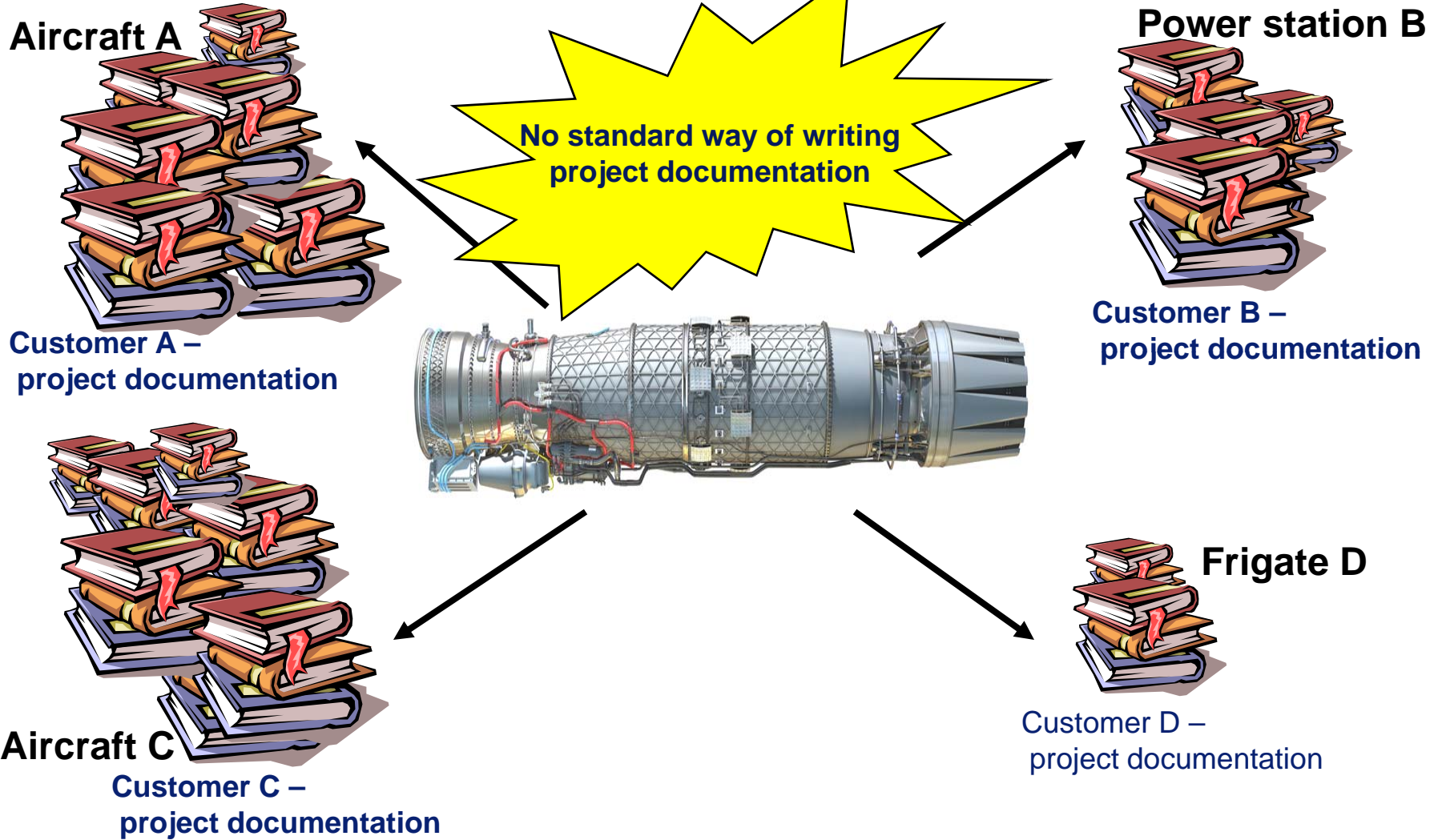
Microsoft Internet Explorer window showing a table of illustration data. The table lists various image files with their dimensions and associated error messages.

ICN-E2A717006I8338B00198A011.CG4	000,270	1	2056	2672	300	226.23	174.07	8.91	6.85	
ICN-E2A717006I8338B00199A011.CG4	000,270	1	2056	2672	300	226.23	174.07	8.91	6.85	
ICN-E2A717006I8338B00457A011.CG4	000,270	1	2056	3184	300	269.58	174.07	10.61	6.85	Image height is not 222mm +/- 10mm.
ICN-E2A717006I8338B00691A011.CG4	000,270	1	2056	2672	300	226.23	174.07	8.91	6.85	
ICN-E2A717006I8338B00692A011.CG4	000,270	1	2056	2672	300	226.23	174.07	8.91	6.85	
ICN-E2A717006I8338B00693A011.CG4	000,270	1	2064	2616	300	221.49	174.75	8.72	6.88	
ICN-E2A717009I8338B01113A011.CG4	000,270	1	1752	1384	300	117.18	148.34	4.61	5.84	Image height is not 222mm +/- 10mm. Image width is not 170mm +/- 10mm.
ICN-E2A717009I8338B01310A011.CG4	000,270	1	1304	1592	200	202.18	165.61	7.96	6.52	Resolution should be 300 dpi. Image height is not 222mm +/- 10mm.
ICN-E2A718100RK037800183A022.CG4	000,270	1	1962	2284	300	193.38	166.12	7.61	6.54	Image height is not 222mm +/- 10mm.
ICN-E2A718800RK037800185A012.CG4	000,270	1	1993	2457	300	208.03	168.74	8.19	6.64	Image height is not 222mm +/- 10mm.
ICN-E2A720000TD330900585A021.CG4	000,270	1	968	1312	150	222.17	163.91	8.75	6.45	Resolution should be 300 dpi.
ICN-E2A720000TD330900726A011.CG4	000,270	1	848	1552	150	262.81	143.59	10.35	5.65	Resolution should be 300 dpi. Image height is not 222mm +/- 10mm. Image width is not 170mm +/- 10mm.
ICN-E2A720000TD330900727A011.CG4	000,270	1	992	1312	150	222.17	167.98	8.75	6.61	Resolution should be 300 dpi.
ICN-E2A720000TD330900728A011.CG4	000,270	1	688	1544	150	261.45	116.5	10.29	4.59	Resolution should be 300 dpi. Image height is not 222mm +/- 10mm. Image width is not 170mm +/- 10mm.
ICN-E2A720000TD330900729A011.CG4	000,270	1	776	1552	150	262.81	131.4	10.35	5.17	Resolution should be 300 dpi. Image height is not 222mm +/- 10mm. Image width is not 170mm +/- 10mm.

# Are there any disadvantages?

- **Yes.**
- **When the project has to deliver the same data to two different customers with two sets different sets of business rules can, at worst, mean a rewrite of the information**

# Multiple customers

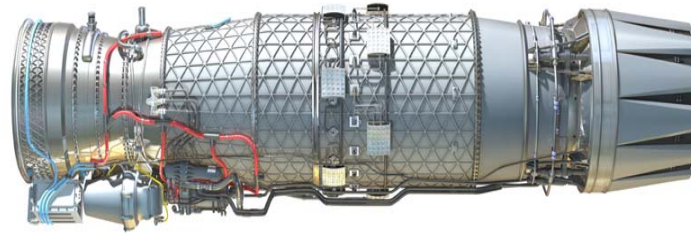


# Business rules and interoperability

## CUSTOMER A

- S1000D Issue 2.0
- Emph01 means BOLD
- DMSIZE is mandatory
- Techstd shall contain LSA baseline
- Hotspot ids shall be "HOTnnn"
- Graphics as CGM
- Do not use the process data module
- My trade codes are BHJ, HPJ for required persons

...



## CUSTOMER B

- S1000D Issue 2.1
- Emph01 means "red"
- DMSIZE is must not be used
- Techstd shall contain the project  
-release ID
- Hotspot ids shall be "fig-~~nnn~~-hotnn"
- Graphics as CG4, photos as JPEG
- The process data module must be  
used for fault isolation
- Do not use the <trade> element

-....

# How can this be overcome?

- **Business rules waivers**
- **S1000D is about data reuse and without waivers, reuse of the same data between projects means reworking the information**

# **The business rules task team**

- **the Business Rules Task Team is underway and we have started to create the business rules index. But these are early days.**
- **Join up! Speak to Mike and Victoria**

**...and finally**

- **Thanks for listening**
- **Any questions?**