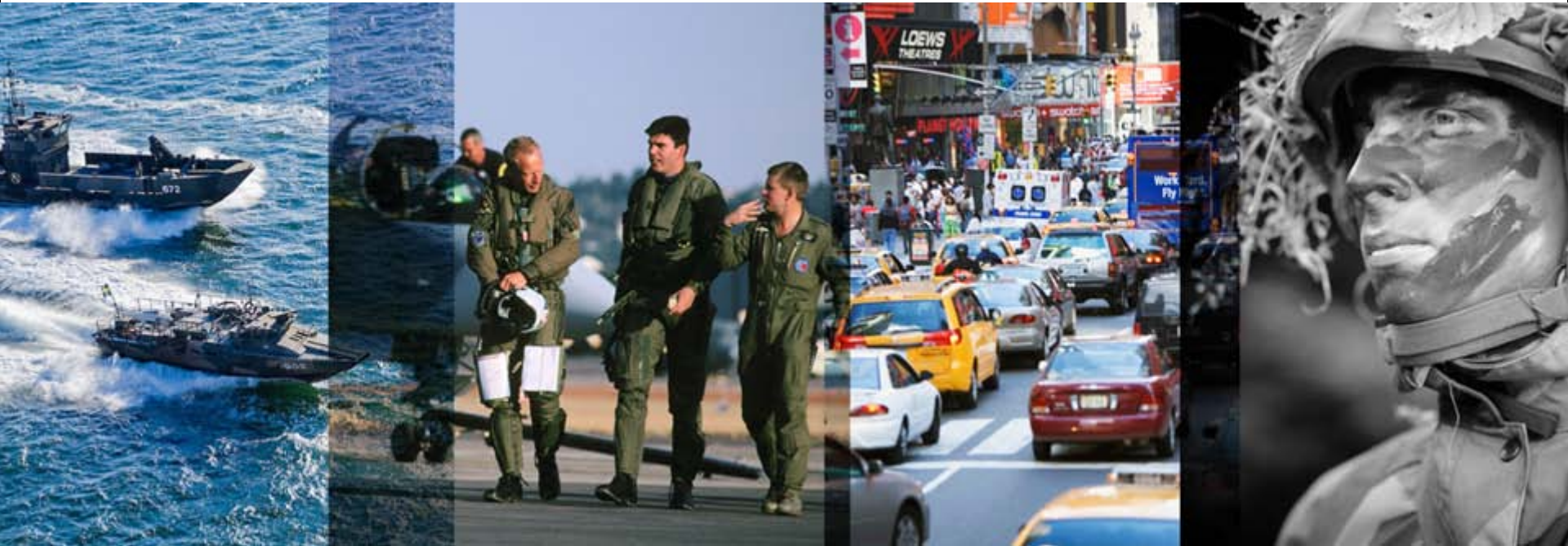




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# Business rules and BREX in a real project



**Joakim Lundqvist and Thomas Härdelin**  
**20<sup>th</sup> of June 2012, Denver**

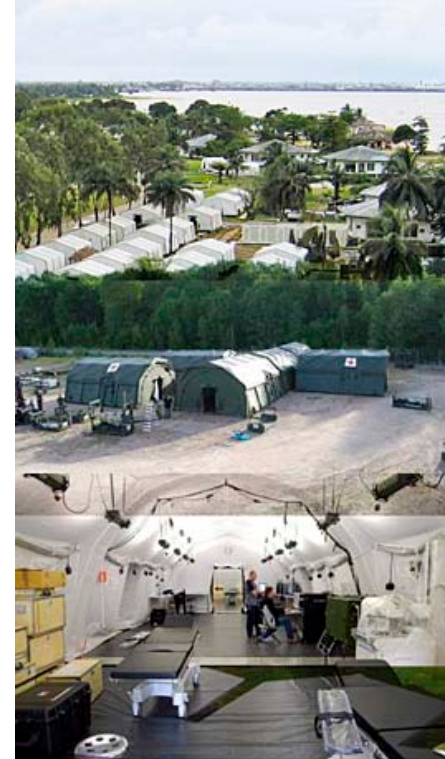
# Agenda

- ▶ Presentation of SAAB
- ▶ Project assumptions
- ▶ Process
- ▶ Development BREX data modules
- ▶ Creation of test cases
- ▶ Why use a BREX data module?
- ▶ BREX checker
- ▶ Demo
- ▶ Lessons learned



# TECHPUB for ...

- ▶ Saab aircraft (Gripen, Saab 340, Saab 2000, SK60, 105OE)
- ▶ Other Regional Jet aircraft
- ▶ Parts for other aircraft types (Boeing, Airbus)
- ▶ Helicopter (military)
- ▶ UAV (Unmanned Air Vehicle)
- ▶ Special vehicle
- ▶ CBRN-equipment
- ▶ Field hospital
- ▶ Field facilities
- ▶ Security solutions (prisons, airports, etc.)



# Project assumptions

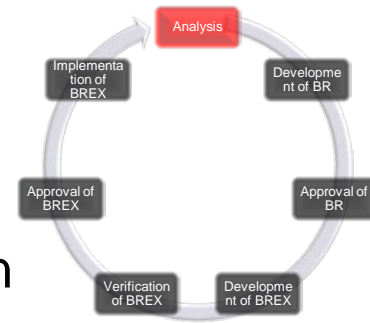
- Issue 4.0.1
  - Production System
  - Layered BREX
  - Business rules are agreed
- 
- Example for this presentation is the “Random list prefix”

# Process



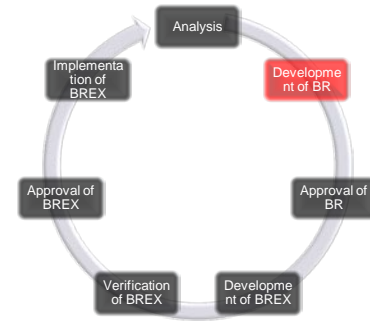
# Analysis

- Search and locate affected chapters in the specification
- Read and understand the specification
- Understand the functions in the production system and limitations
- Discuss the project “actual” requirements
  - Include suppliers and partners
  - Include cost
- Discuss and decide (if possible) the desired output result (hard copy/IETP/communication with other DB)



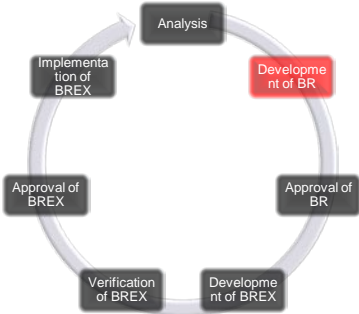
# Development of BR

- Business rules decision points
- Other decisions





# Chap 3.9.5.1.3 Common construct - Lists



## Business rules decisions points (to take):

- define simple and unordered lists and their usage
- use of the attribute listItemPrefix



S1000D-I9005-01000-00

- the same set of child elements as the textElementGroup applicable for the actual data module type (refer to [Chap 3.9.5.2.1.10](#)) and
- `<sequentialList>` (O). Refer to [Para 2.1](#).
- `<randomList>` (O). Refer to [Para 2.2](#).
- `<definitionList>` (O). Refer to [Para 2.3](#).

**Business rules decisions:**

- None identified

**Markup example:**

```
<listItemDefinition>em01</listItemDefinition>
```

### 3 Business rules decisions

Business rules decisions include, but are not limited to, the following:

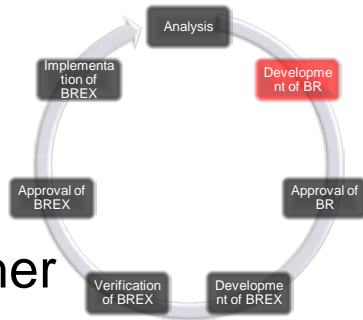
**Use of the element <title>.** For all three list types, the project or the organization must decide whether to use list titles or not. Refer to [Para 2.1](#) and [Para 2.2](#).

**Simple or unordered lists.** For random lists, the project or the organization must define and unordered lists and their usage. Refer to [Para 2.2](#).

**Use of the element <definitionListHeader>.** For the definition list, the organization must decide whether to use the definition list header or not. Refer to



# Chap 3.9.3

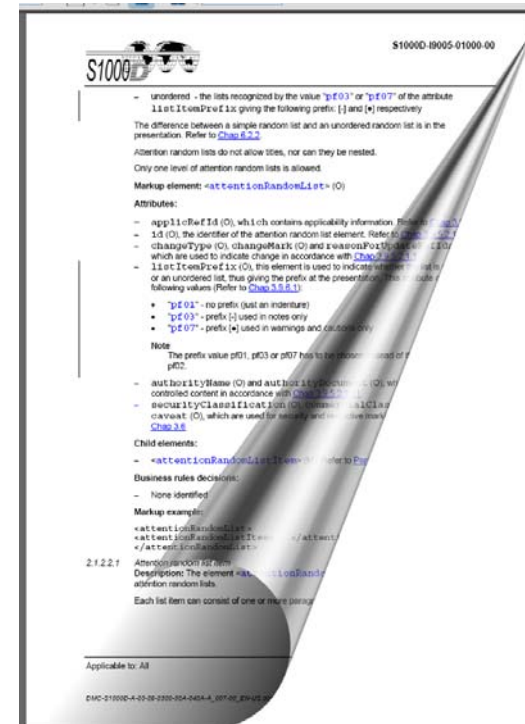


► listItemPrefix (O), this element is used to indicate whether the list is a simple list or an unordered list, thus giving the prefix at the presentation. This attribute can have the following values (Refer to Chap 3.9.6.1):

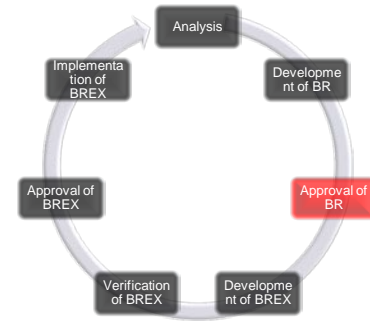
- "pf01" - no prefix (just an indenture)
- "pf03" - prefix [-] used in notes only
- "pf07" - prefix [•] used in warnings and cautions only

## ► Note

The prefix value pf01, pf03 or pf07 has to be chosen instead of the default prefix of pf02.



# BR approved, Chap 3.9.5.2.1.3



## ► Simple or unordered lists

- The normal usage is to use the unordered list.
  - The **default value** of the attribute **listItemPrefix** for unordered list is “pf02”.
  - The simple list can only be used in exceptional cases. For the simple list the value “pf01” must be used.
- The differences between simple and unordered lists are the layout:
  - simple list has no prefix
  - unordered list has the following sequence of prefix [-][•][-].

# BR approved, Chap 3.9.6.1

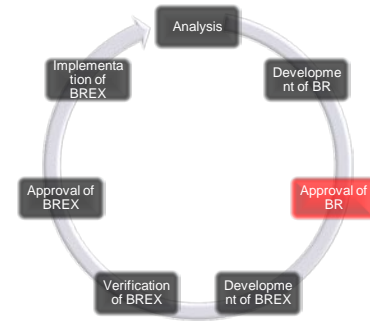
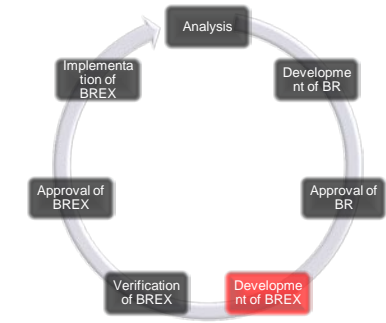


Table 21 `listItemPrefix` - Prefix for list items of random/unordered lists

| Allowable values          | S1000D interpretation  |
|---------------------------|--|
| "pf01"                    | Simple<br>(No prefix, only indent)   |
| "pf02"<br>(Default value) | Unorder [-], [•], [-]<br>(Depending on list level, prefix with short dash for first level, bullet for second, and short dash for third level - ISOpub: bull, dash) |
| "pf03"                    | prefix [-] used in notes only  |
| "pf07"                    | prefix [•] used in warnings and cautions only  |

**No other values (pf04, pf05, pf06, pf08 – pf99) are allowed.**



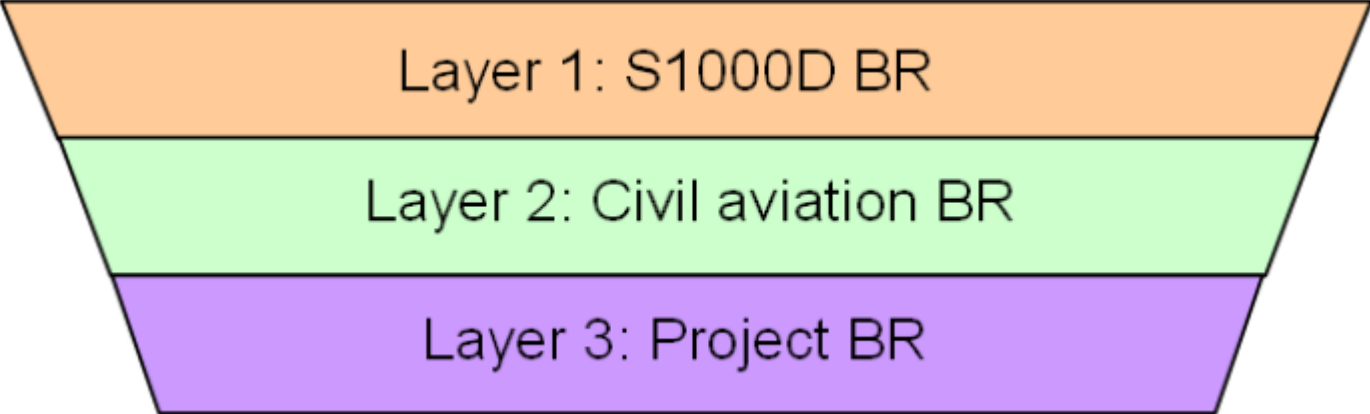
# Layered BREX/Why use BREX data modules?

## ► Layers of BREX

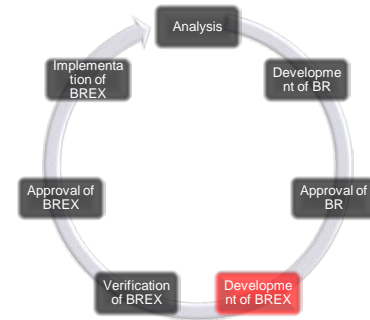
- Mandatory for a project BREX because S1000D default BREX must be used
- More easy to control the development of the project BREX

## ► Why use BREX

- Check that the project business rules are followed
- More stringent than the S1000D XML schemas
- Cost saving



# Development of BREX



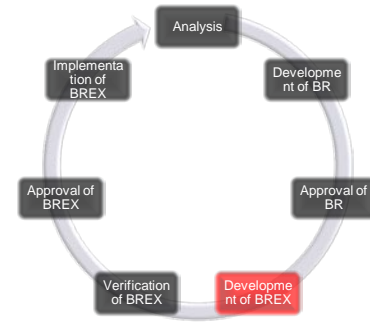
- Can/should this BR be a BREX rule?
- Start to analyze Business Rules, ex:
  - N/A
  - Must not be used
  - The element <infoName> is mandatory
  - The attribute enterpriseCode must contain the permitted CAGE for the RPC
- Not all Business rules are possible to test
  - S2000M, PLCS and SCORM must not be used for project.

The default and normal usage for simple or unordered lists must be to use the unordered list. The default value for attribute listItemPrefix must be "pf02". The simple list can only be used in exceptional cases. For the simple list the value "pf01" must be used.

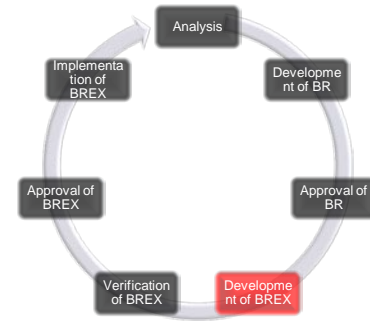
The screenshot shows a technical document with a callout box. The callout box contains the text: "The default and normal usage for simple or unordered lists must be to use the unordered list. The default value for attribute listItemPrefix must be 'pf02'. The simple list can only be used in exceptional cases. For the simple list the value 'pf01' must be used." The document background includes sections like "Business rules decisions", "Table of contents", and "References".

# Creation of layered BREX data modules

- Required high skills in XML and XPath
- No special tools are required to create the BREX



# BREX DM – Creation



## Business rule:

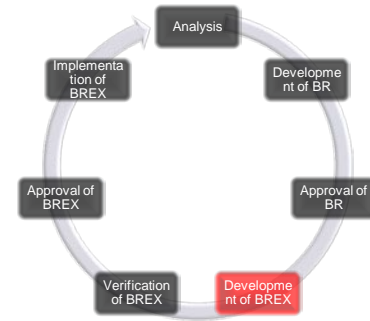
- The default and normal usage for simple or unordered lists must be to use the unordered list. The default value for attribute **listItemPrefix** must be "pf02". The simple list can only be used in exceptional cases. For the simple list the value "pf01" must be used.

## BREX DM:

- `<structureObjectRule>`
- `<objectPath>//@listItemPrefix[not(ancestor::note or ancestor::caution or ancestor::warning)]</objectPath>`
- `<objectUse> The default and normal ...Text from BR ...</objectUse>`
- `<objectValue valueForm="single" valueAllowed="pf01">...</objectValue>`
- `<objectValue valueForm="single" valueAllowed="pf02">...</objectValue>`
- `</structureObjectRule>`



# BREX DM – Creation, cont.



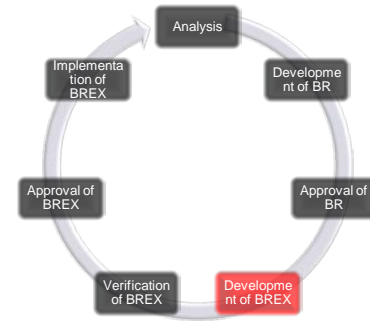
## Chap 3.9.3:

- The prefix value pf01, pf03 (note) or pf07 (warning and caution) has to be chosen instead of the default prefix of pf02.

## BREX DM:

- `<structureObjectRule>`
  - `<objectPath>//@listItemPrefix[ancestor::note</objectPath>`
  - `<objectUse>` The default and normal ...Text from BR ...`</objectUse>`
  - `<objectValue valueForm="single" valueAllowed="pf01">...</objectValue>`
  - `<objectValue valueForm="single" valueAllowed="pf03">...</objectValue>`
- `</structureObjectRule>`

# BREX DM – Creation, cont.



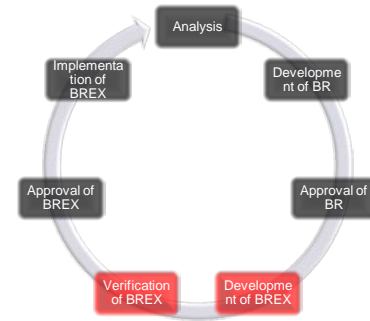
## Chap 3.9.3:

- The prefix value pf01, pf03 (note) or pf07 (warning and caution) has to be chosen instead of the default prefix of pf02.

## BREX DM:

- `<structureObjectRule>`
  - `<objectPath>//@listItemPrefix[ancestor::caution or ancestor::warning]</objectPath>`
  - `<objectUse>...</objectUse>`
  - `<objectValue valueForm="single" valueAllowed="pf01">...</objectValue>`
  - `<objectValue valueForm="single" valueAllowed="pf07">...</objectValue>`
- `</structureObjectRule>`

# Creation of test cases

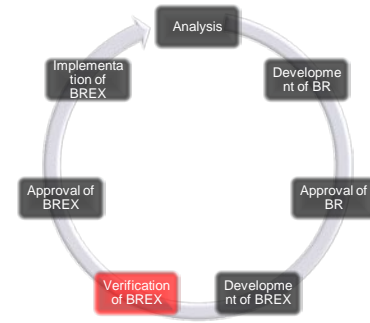


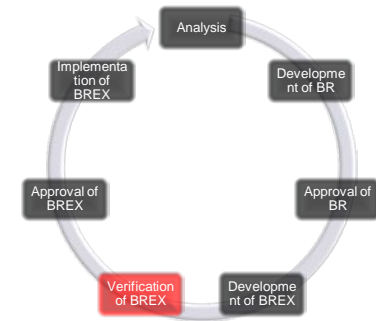
The test cases must include errors and no errors

- Outside the production system
  - For the development of the BREX
  - Import and export
  - Enables testing of all possible errors
- Inside the production system
  - Verification of the production system BREX functionality
  - Problem to create all possible errors
  - Import and export
  - Production of technical information



# BREX checker

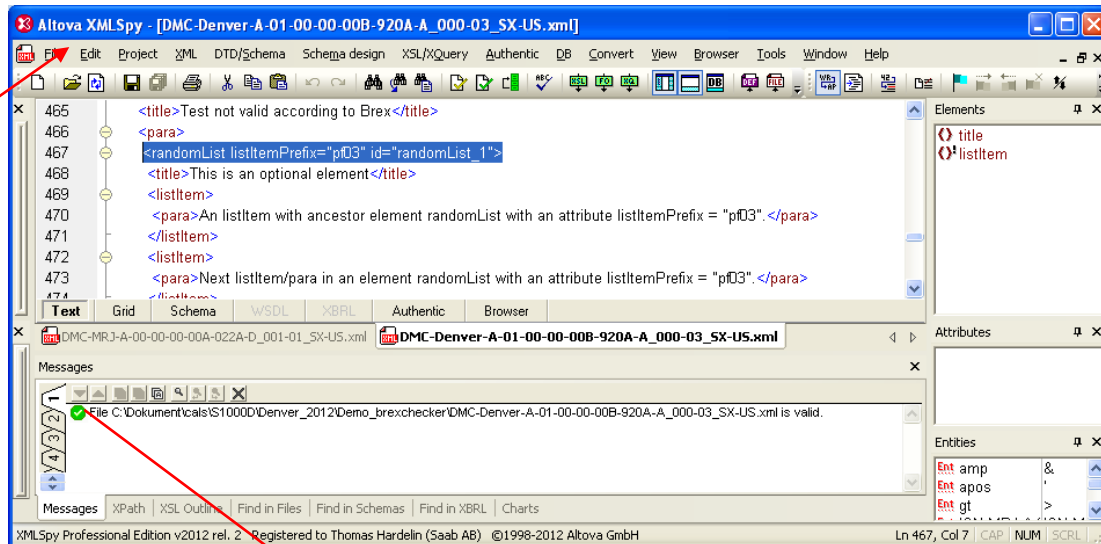
- ▶ Internal BREX checker
  - Inside the production system
- ▶ External BREX checker
  - Use for BREX development and test cases
  - Subcontractors
  - As a check before import/export
  - Check before delivery
  - Batch check





# External BREX checker – What do You need?

- A BREX checker 
- An XSLT Parser 
- S1000D Default BREX
- Project BREX DM
- DM to be tested

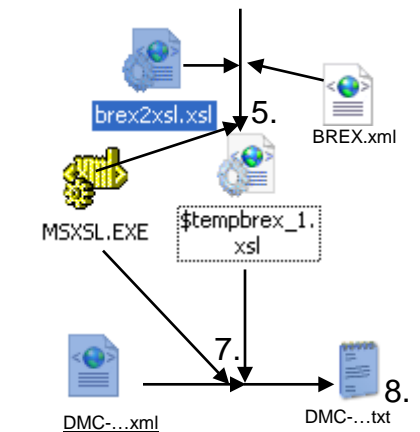
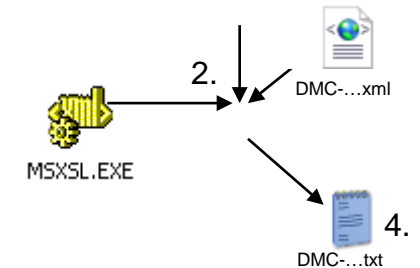
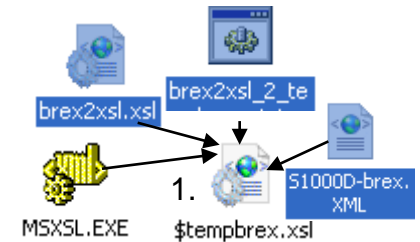
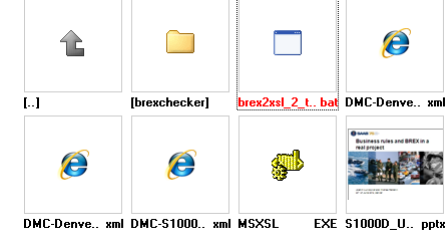


**Valid** according to the corresponding S1000D XML Schema.

# Demo of BREX with BREX checker

1. A bat file creates an new XSLT (\$tempbrex.xml) from S1000D BREX
2. Run test on all \*.xml in current folder with the new XSLT (\$tempbrex.xml)
3. Pause on the bat file
4. Analyze errors (file size > 0 kb)
5. The bat file starts again and creates a new XSLT (\$tempbrex\_1.xml) from project BREX
6. Pause on the bat file
7. Run a new test on all \*.xml in current folder with the new XSLT (\$tempbrex\_1.xml)
8. Analyze errors (file size > 0 kb)

Now it's time for a demo!



# Lessons learned (SAAB experiences)

- Many parameters for a Business rules decision
- Need to have high skills in the specification to have knowledge about all affected chapters for a decision
- BREX doesn't parse against itself!
  - Only to the next layered level
- For some XML Schemas (issue 4.0.1) there are no <brexDmRef>
- Need to have good knowledge in the production system (limitations)
- Good communication between development of business rules and development of the BREX
- Re-decisions will be required when starting the development of the BREX
- A stand alone BREX checker for the development of BREX is required

# Questions?

If you have more questions – feel free to contact us!

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