

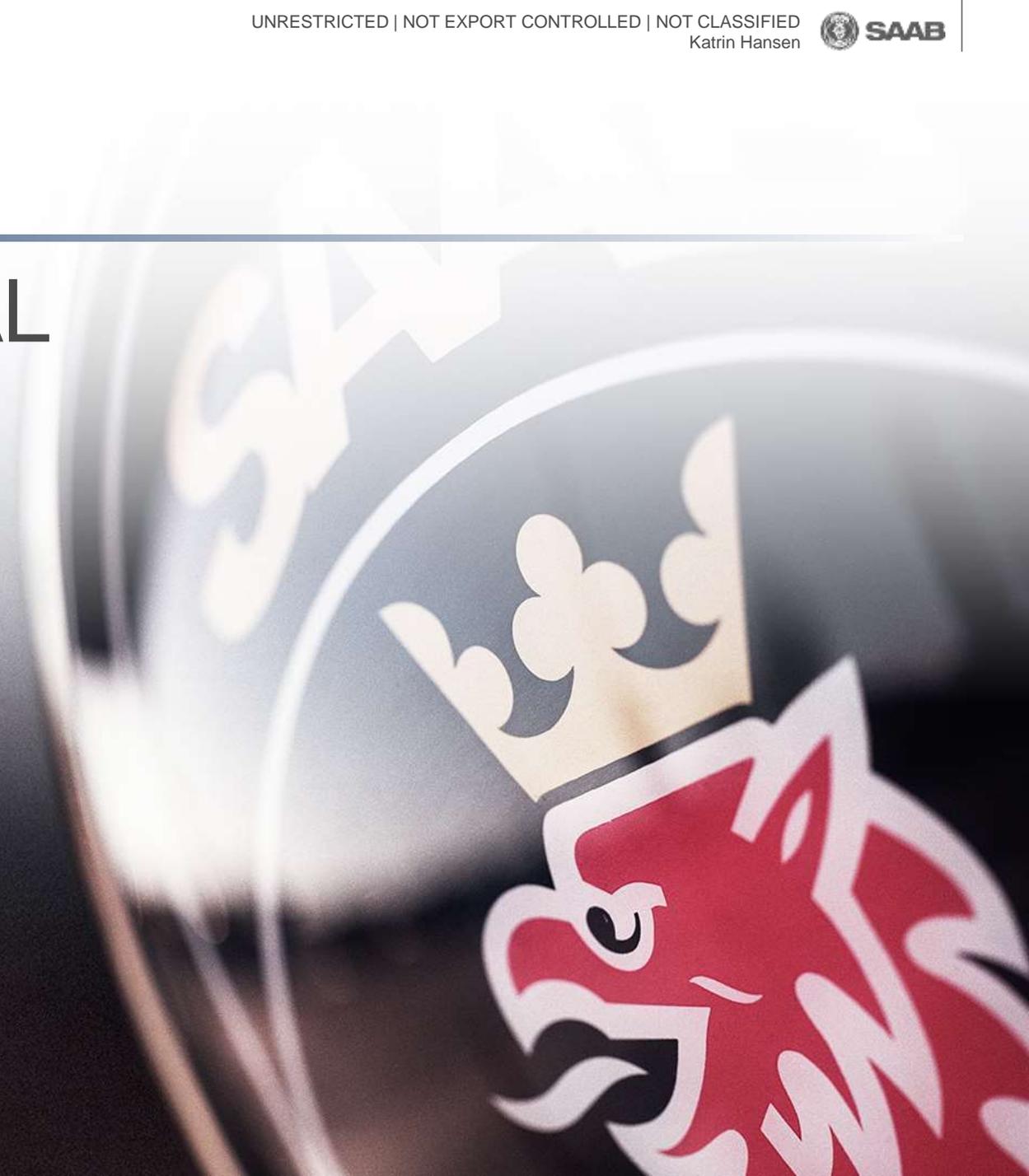


CONVERTING TECHNICAL INFORMATION FROM S1000D 2.0 TO 4.0.1

A case study

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CONTENT

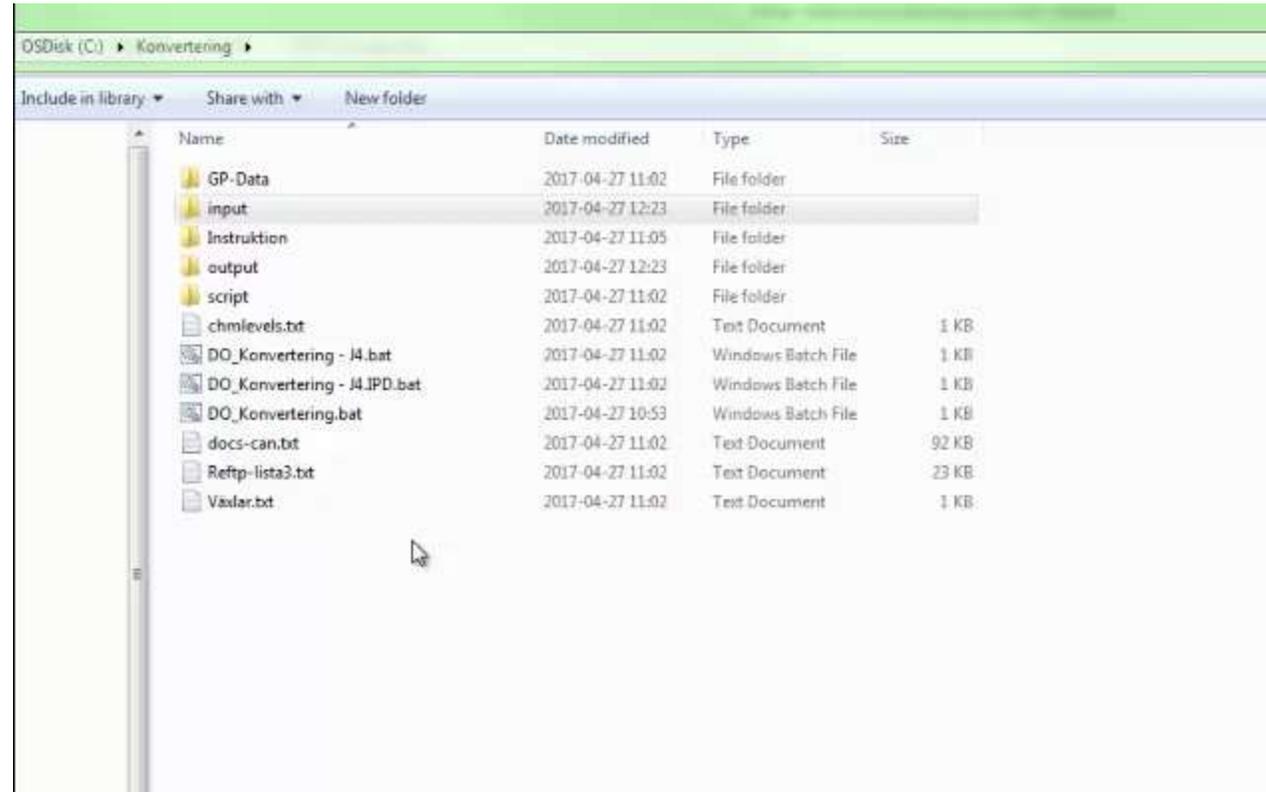
- The Product, Gripen C/D
- Why convert from 2.0 to 4.0.1?
- Analysis phase
- Preparation phase
- Conversion phase
- Implementation phase
- Challenges
- Lessons learned



GRIPEN C/D



CONVERTING IS EASY...



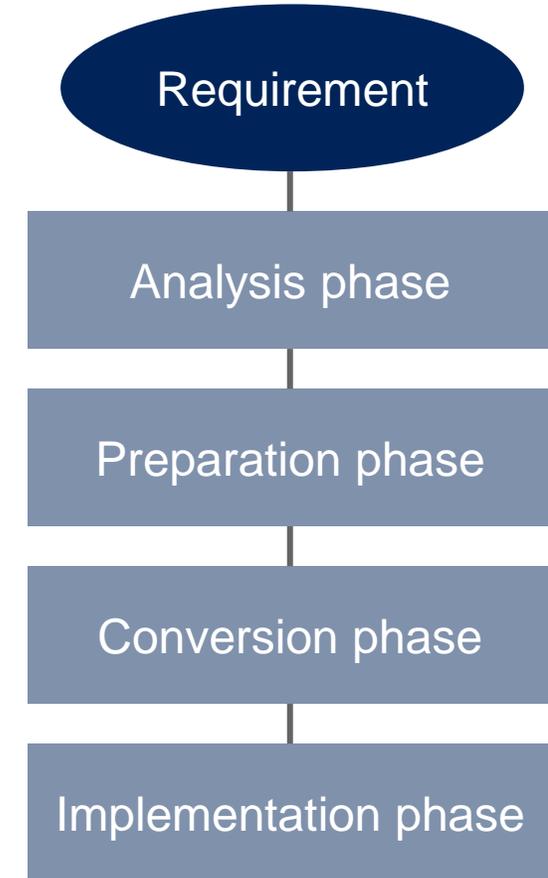
...but the rest is hard work!

WHY CONVERT FROM 2.0 TO 4.0.1?

- Requirement from customer to improve IPD
 - Add more data for items with element <genericPartData>

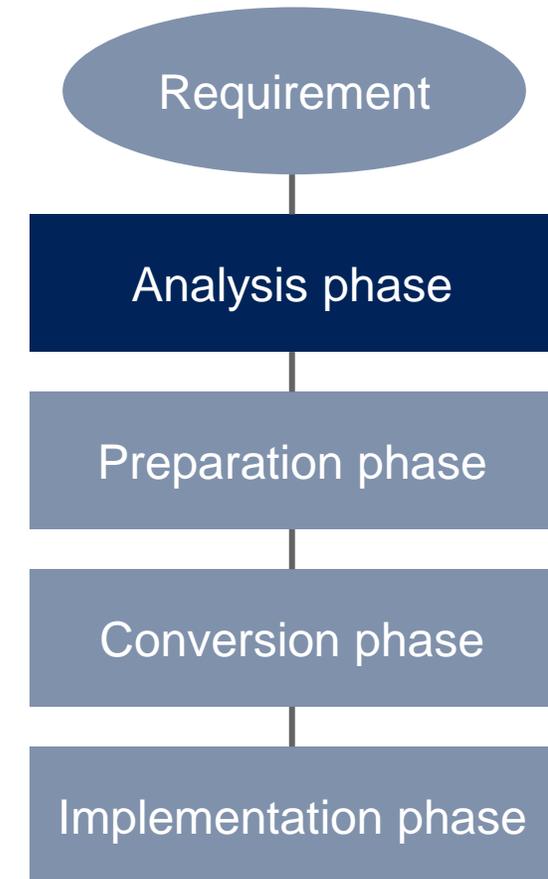
Item	ISN	QNA	Part No.	Nomenclature	* UCA • MV EFY	RFD
-0	00A	REF	DM	SEE ALSO J3-A-31-12-00-Y2E-941A-A		
1	00A	1	1933197-243 F6400-088346	INSERT		
2	00A	2	9911064-283 M1430-612692	SCREW Th=M10, Ls=37, Countersunk Head 100 Deg, Torq-Set recess, Titanium, Anodised LN29956S10022A		

- Mid-life upgrade due to other benefits like:
 - XML
 - IETP
 - TIR
 - BREX
- To meet the new requirements Saab started analyzing issue 2.3.1, 3.0 and 4.0.1



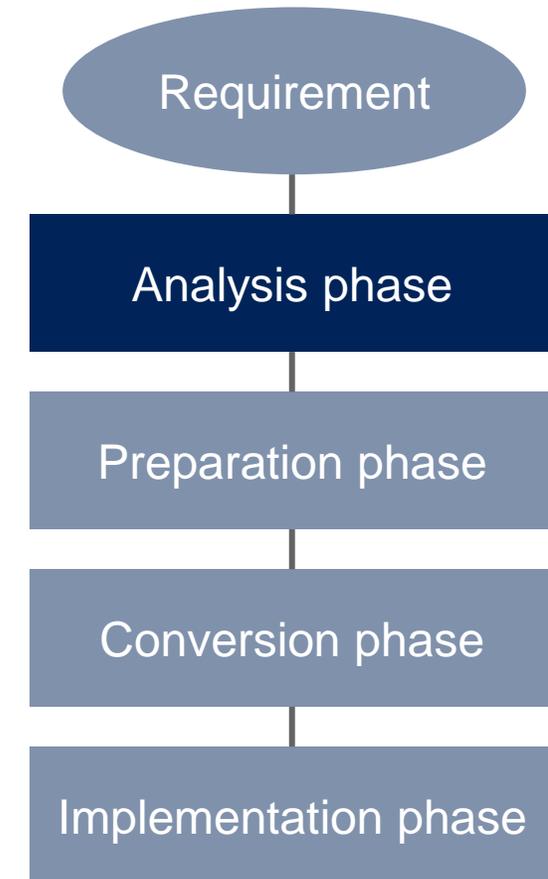
ANALYSIS PHASE

- Analysis was made through conversion tests
 - IPD, procedural, descriptive, crew, schedule
- Analysis from issue 2.3.1:
 - Structural changes, for example
 - Element <closeup> replaced by the element <closereqs> (<closeRqmts> in issues 4.0.1)
 - Element <figure>, <foldout> and <table>
 - TIR
- Analysis from issue 3.0:
 - New applicability concept



ANALYSIS PHASE

- Analysis from issue 4.0.1:
 - Changes to all element and attribute names
 - Some elements were changed to attributes and vice versa
 - Attributes Level and Rfc were removed
 - Previous allowed project specific information codes
 - 091 Standard practices
 - 133 Special remarks and limitations



ANALYSIS PHASE - <CLOSEUP>

- <closeRqmts> has a defined structure compared to <closeup>
- Difficult to find a consistent converting rule

Issue 2.0

```
<closeup><step1>
<table colsep="0" frame="topbot" pgwide="1" rowsep="0">
  <title>Required conditions after job completion</title>
  <tgroup cols="2"><colspec colname="col1" colwidth="130mm">
  <colspec colname="col2" colwidth="50mm"><thead>
  <row rowsep="1"><entry><para>Action/condition</para>
  </entry><entry><para>Data module</para></entry></row>
  </thead><tbody>
  <row><entry><para></para></entry><entry><para></para></entry></row>
  <row><entry><para>Requirements after maintenance, completed</para>
  </entry><entry><para><refdm><avee><modelic>J4</modelic><sd>A</sd>
  <chapnum>01</chapnum><section>4</section><subsect>0</subsect>
  <subject>00</subject><discode>00</discode><discodev>A</discodev>
  <incode>150</incode><incodev>A</incodev><itemloc>A</itemloc></avee>
  <dmtitle><techname>Requirements after maintenance</techname>
  <infoname>Post-operation</infoname></dmtitle></refdm></para>
  </entry></row></tbody></tgroup></table>
</step1>
</closeup>
```

Issue 4.0.1

```
<closeRqmts>
<reqCondGroup>
  <reqCondDm>
  <reqCond>Requirements after maintenance, completed</reqCond>
  <dmRef><dmRefIdent>
  <dmCode assyCode="00" disassyCode="00" disassyCodeVariant="A"
  infoCode="150" infoCodeVariant="A" itemLocationCode="A"
  modelIdentCode="J4" subSubSystemCode="0" subSystemCode="4"
  systemCode="01" systemDiffCode="A"/>
  </dmRefIdent>
  <dmRefAddressItems>
  <dmTitle><techName>Requirements after maintenance</techName>
  <infoName>Post-operation</infoName>
  </dmTitle>
  </dmRefAddressItems>
  </dmRef>
  </reqCondDm>
</reqCondGroup>
</closeRqmts>
```

ANALYSIS PHASE - <FIGURE>

- In issue 2.0 it was possible to use <figure> almost anywhere in the DTD
- In later issues <figure> cannot be placed between steps in nested steps
- Difficult to find a consistent converting rule

Issue 2.0

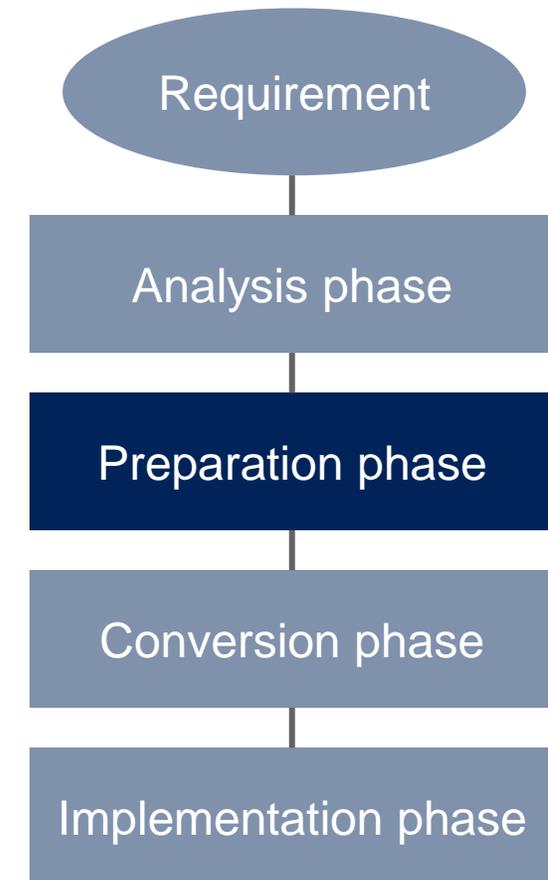
```
<step4><para>Text</para>
</step4>
<figure id="fig006">
  <title>Title</title>
  <graphic boardno="ICN-J3-A-032100-S-S3627-02376-A-01-1"
  id="gra006"></graphic>
  <legend>
  <deflist>
    <term>1</term><def>Text</def>
    <term>2</term><def>Text</def>
  </deflist>
  </legend>
</figure>
</step3>
```

Issue 4.0.1

```
proceduralStep>
  <para>Text</para>
  <figure id="fig006">
    <title>Title</title>
    <graphic id="gra006" infoEntityIdent=
    "ICN-J3-A-032100-S-S3627-02376-A-01-1"></graphic>
    <legend>
    <definitionList>
    <definitionListItem>
      <listItemTerm>1</listItemTerm>
    <listItemDefinition><para>Text</para>
    </listItemDefinition>
    </definitionListItem>
    <definitionListItem>
      <listItemTerm>2</listItemTerm>
    <listItemDefinition><para>Text</para>
    </listItemDefinition>
    </definitionListItem>
    </definitionList>
    </legend>
  </figure>
</proceduralStep>
```

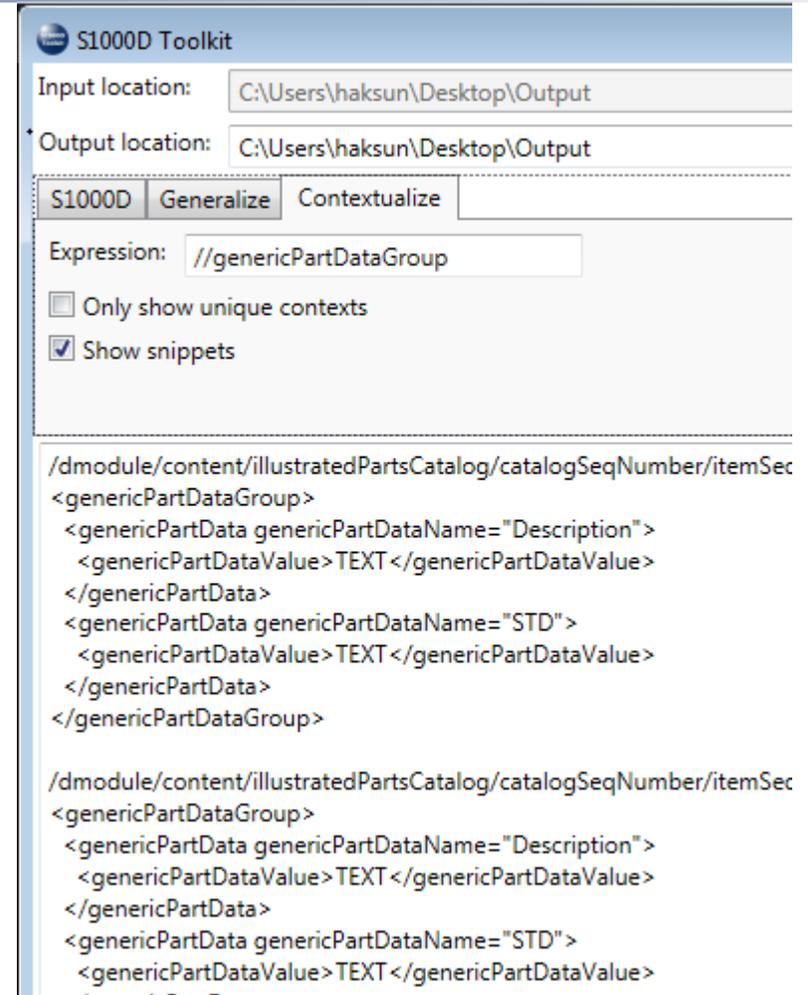
PREPARATION PHASE

- Saab decided to convert the publications for Gripen C/D to issue 4.0.1
- Saab build an analyzing engine for analyzing XML structures called S1000D Toolkit
- Decided new structure when needed
- It was good to use the mapping excel sheet provided by S1000D (S1000D-EPWG-2009-002-001-00)
- Saab created conversion script in Perl
- Created conversion plan for DM and PM



PREPARATION PHASE - ANALYZING ENGINE

- S1000D Toolkit finds patterns in element structures
- Generalize element content and attribute values
- Big help to initially create conversion scripts
- Ongoing development of scripts where an iterative process
- S1000D Toolkit can be used for other XML conversions and other projects



S1000D Toolkit

Input location: C:\Users\haksun\Desktop\Output

Output location: C:\Users\haksun\Desktop\Output

S1000D Generalize Contextualize

Expression: //genericPartDataGroup

Only show unique contexts

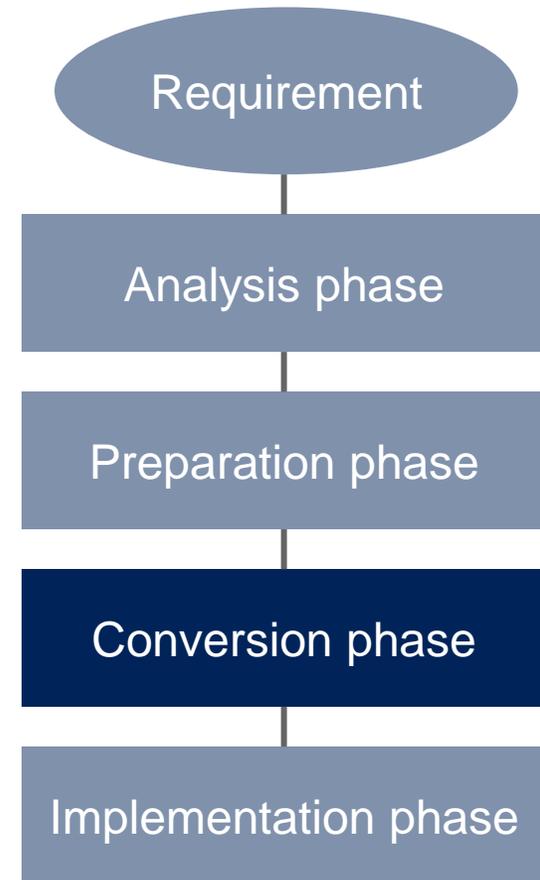
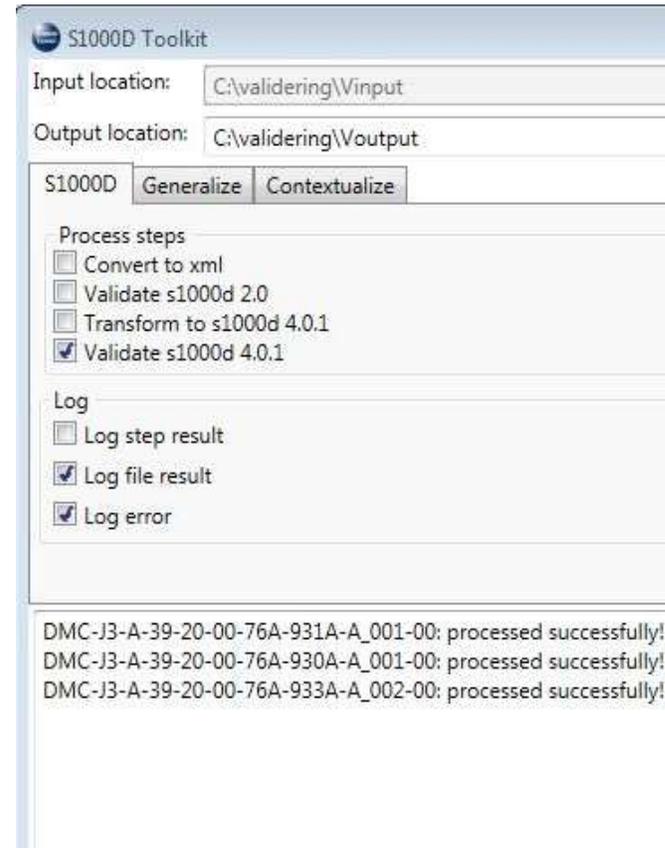
Show snippets

```
/dmodule/content/illustratedPartsCatalog/catalogSeqNumber/itemSec
<genericPartDataGroup>
  <genericPartData genericPartDataName="Description">
    <genericPartDataValue>TEXT</genericPartDataValue>
  </genericPartData>
  <genericPartData genericPartDataName="STD">
    <genericPartDataValue>TEXT</genericPartDataValue>
  </genericPartData>
</genericPartDataGroup>

/dmodule/content/illustratedPartsCatalog/catalogSeqNumber/itemSec
<genericPartDataGroup>
  <genericPartData genericPartDataName="Description">
    <genericPartDataValue>TEXT</genericPartDataValue>
  </genericPartData>
  <genericPartData genericPartDataName="STD">
    <genericPartDataValue>TEXT</genericPartDataValue>
```

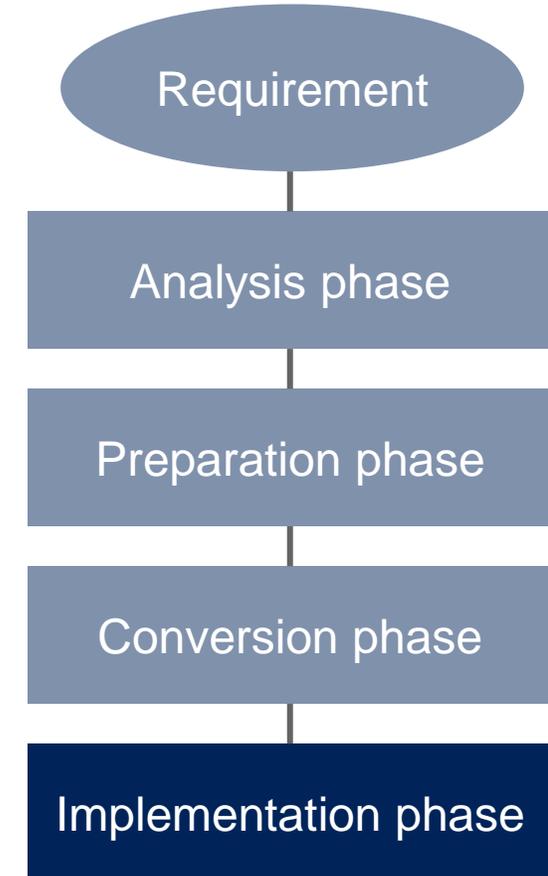
CONVERSION PHASE

- The script also made improvements to the DMs
- Some corrections were also made manually
- S1000D Toolkit was also used to validate DM
- Quality assurance was also made by the people responsible for each publication



IMPLEMENTATION PHASE

- The converted DMs were gradually, publication by publication, imported into production in the new 4.0.1 CSDB
- All DMs needed to be converted before next delivery
- The privileges in the old CSDB were set to “Read only” after completed conversion



CHALLENGES

- Issue 2.0 is an immature issue of S1000D
- Agreement within the organization and with customers regarding new structures
- Acceptance from other projects that share the same CSDB
- What DMs and PMs to convert
- Coordinate release plan with scheduled deliveries



LESSONS LEARNED

- Thorough analysis and test of data for each DTD/schema for each customer and project is VERY important
- It is important to have good documentation of all customization and deviations from S1000D
- It is good to use an analyzing engine
- It is good to have cohesive publication strategy
- Issue 4.0.1 gives more controlled and consistent technical information
- It is never a one-to-one conversion
- It is important for the organization to accept and understand
- It was more time consuming than expected



THANK YOU FOR YOUR ATTENTION!

ANY QUESTIONS?

