

S1000D


ATA e-BUSINESS PROGRAM


AJA
AEROSPACE AND DEFENCE
INDUSTRIES ASSOCIATION

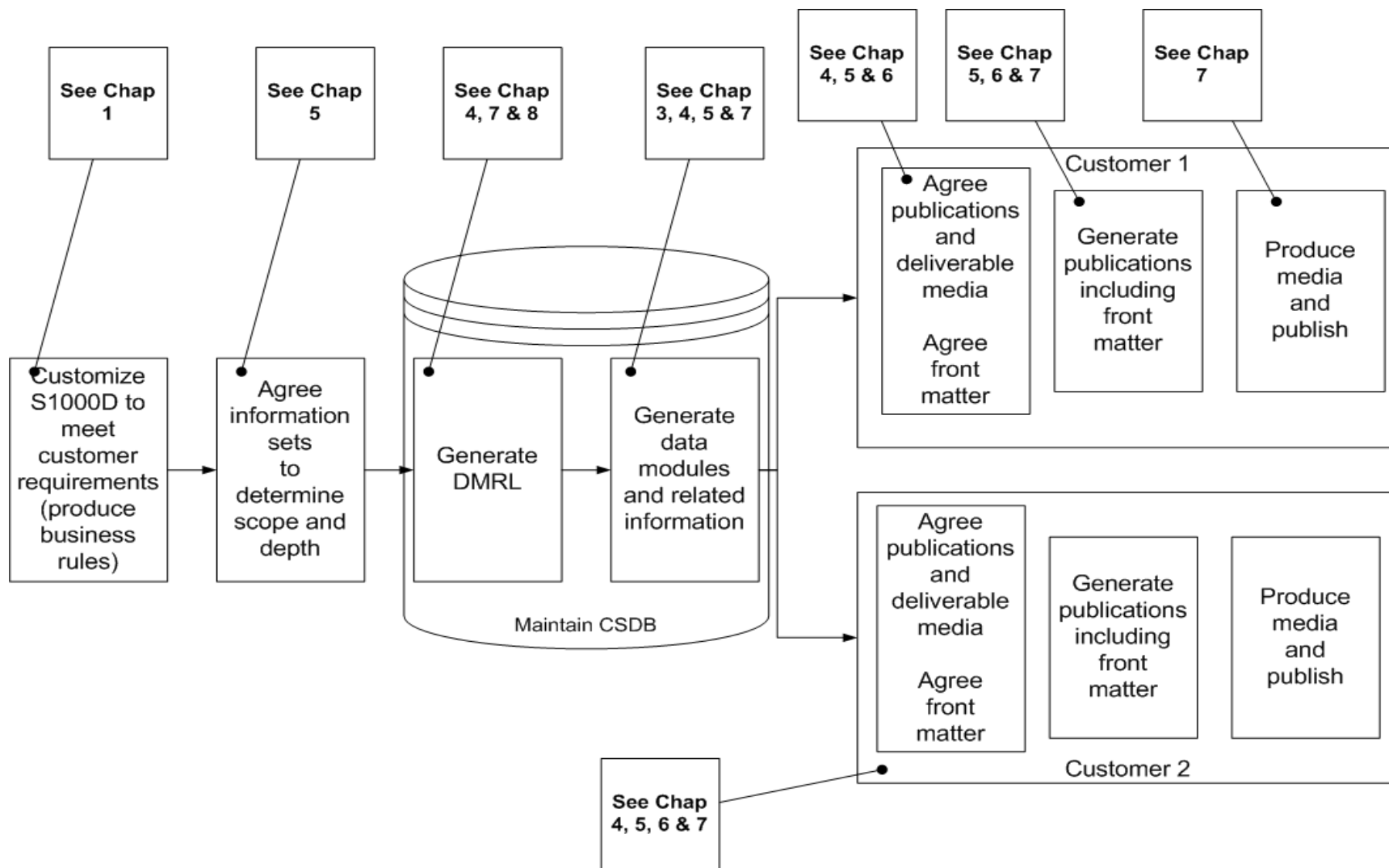
 ASD
AeroSpace and Defence
Industries Association of Europe

S1000D Tutorial

Paul Haslam

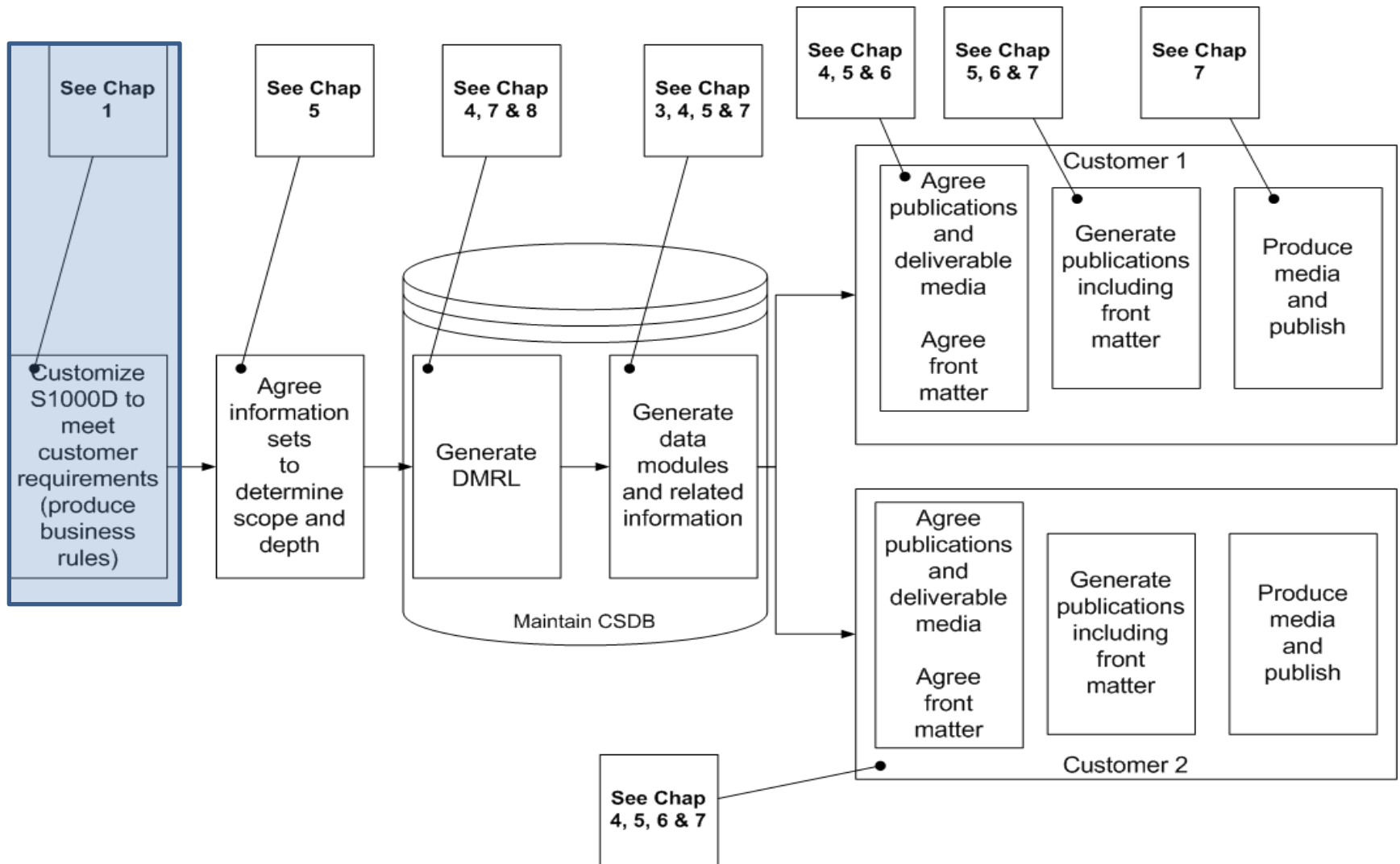
&

Thomas Malloy



Chapter breakdown in the spec

- Chap x
 - X.x
 - X.x.x
 - X.x.x.x
 - » X.x.x.x.x
 - X.x.x.x.x.x
- S1000D has six layers of indenture with chapter 3 (possibly most important) being broken down to this level
- 272 chapters, page count for spec, 2,762



Business Rules

- Next set of slides looks at high level overview of concept.
- Discuss what they are, where they come from and why.

Concept

- Original concept
 - Attempt by S1000D practitioners to input into the specification guidance on what information is required when “doing” an S1000D program.
 - Everybody using the spec needs to understand these as they are probably fundamental to good deployment.
 - Most projects use them already in some capacity
 - Projects can fail/falter if all aspects are not understood.

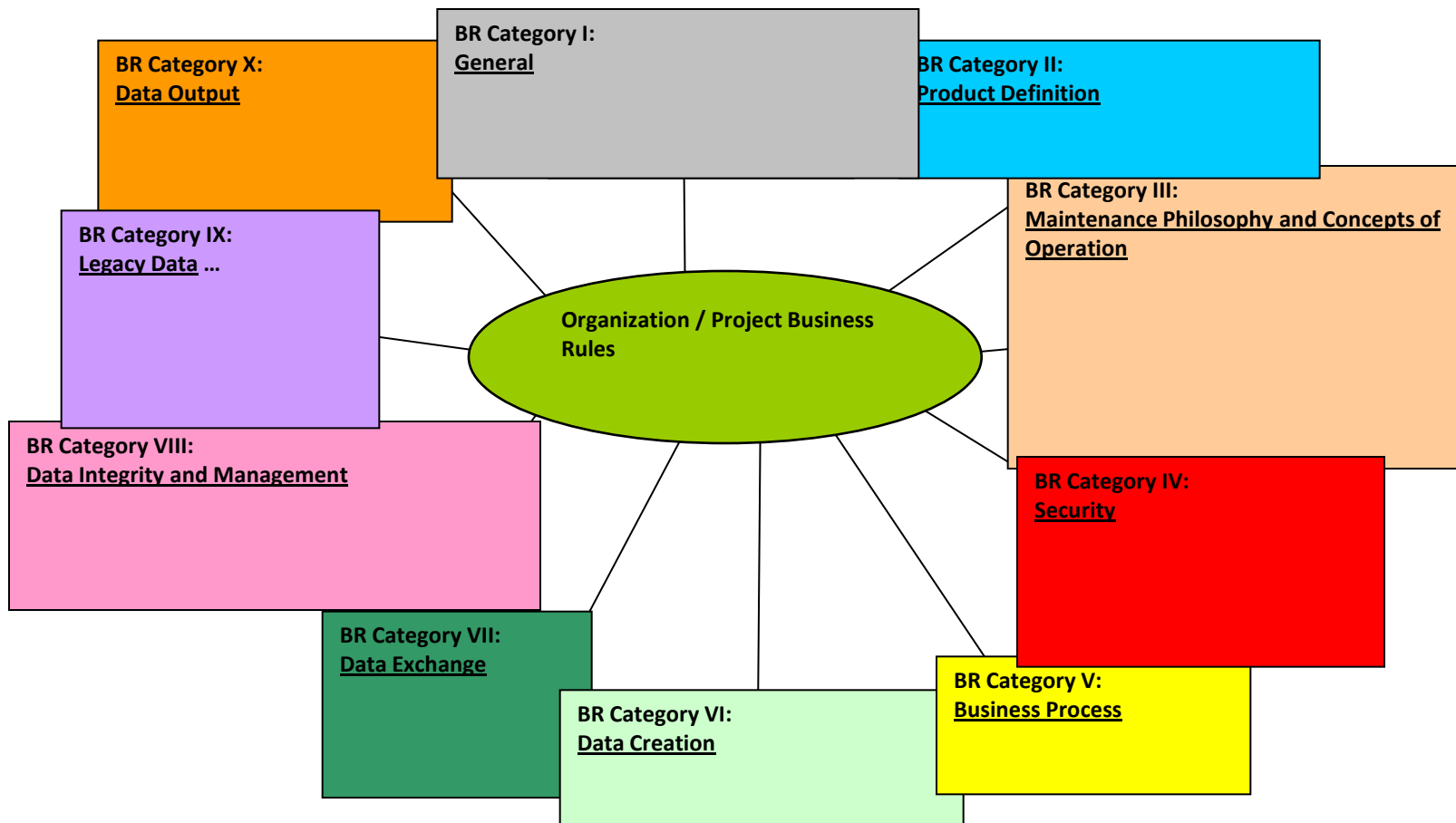
What is a Business Rule?

- Rule:
“A rule is a principle or condition that customarily governs behaviour”
- Business Rule:
“Business rules represent policies, procedures and constraints regarding how an enterprise conducts its business”
- In the past in S1000D programs business rules were deemed to only apply the author/creator of the information
- As knowledge grew within programs it was identified that there were multiple aspects that affected Business
 - Contractual
 - Organisational
 - Geographical
 - etc

Categories of Business Rules

- Within S1000D it was decided that guidance was needed to identify the various types of business rules applicable.
- These would group together “alike” rules and would cover aspects such as;
 - product definition,
 - maintenance philosophy,
 - concepts of operation,
 - security,
 - business processes,
 - data creation,
 - data exchange,
 - data integrity,
 - data output
 - Other possibilities
 - Legacy data conversion,
 - management,
 - handling
 - etc.

Categories

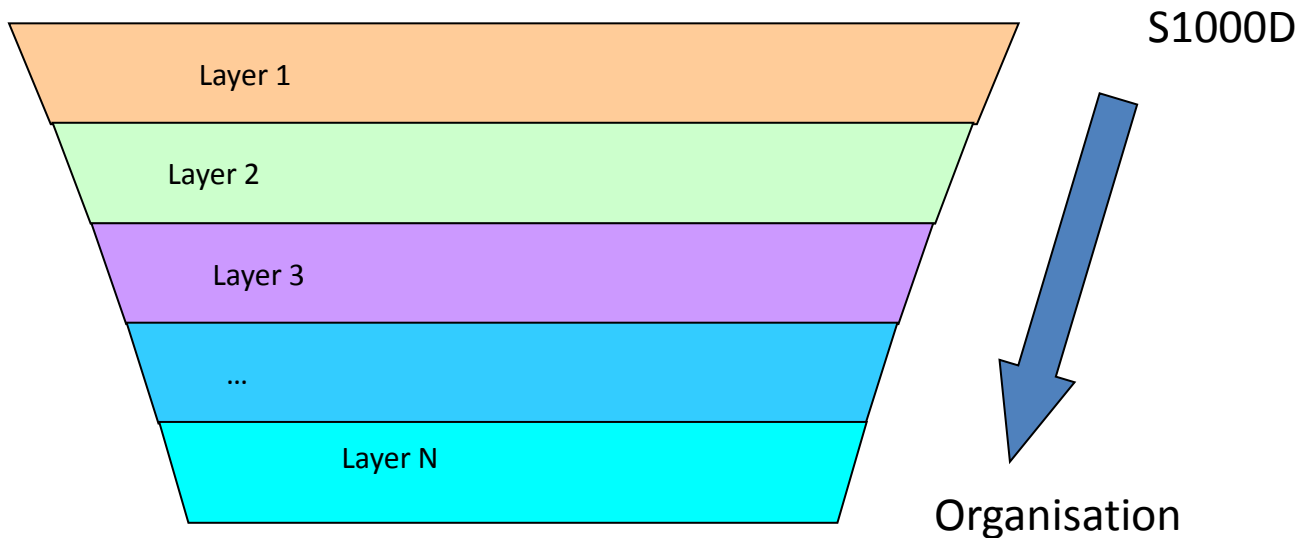


Example Category

- **Data Creation Business Rules**
 - These BRs give information to aid data creation. They can be for the creation of text, illustrations and multimedia.
 - The Data Creation BRs include:
 - Business Rules on creation of textual data
 - Business Rules on creation of graphics, 3D content, and multimedia.
- **Data Creation Business Rules – Text**
 - These BRs consist of writing rules (including terminology rules) and mark-up rules.
 - Writing rules give information about how the technical content is written and specify, for example, the use of dictionaries, how numbers are to be expressed, how the author is to refer to technical terms, and the establishment and use of a Terminology database.
 - Mark-up business rules provide information about which mark-up elements and attributes are to be used and how they are to be used and populated. These rules are often project specific.
 - To summarize, the Data Creation BRs for Text may include:
 - Writing rules (including terminology rules)
 - Markup rules.
- **Example:**
 - All fault data modules must have their fault codes listed in the fault code index
 - The applicability block mark-up requirements are...
 - The <techstd> element must not be used....
 - The <dmsize> element must contain ...

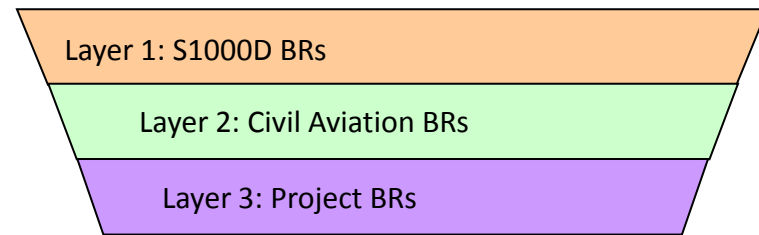
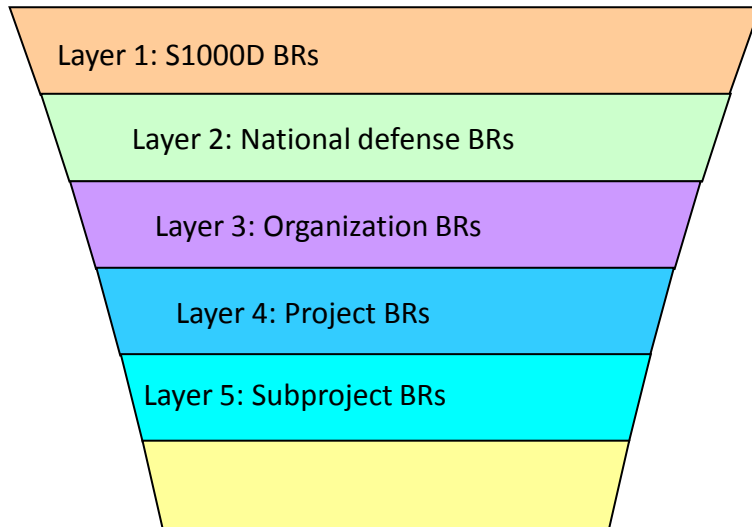
Layering

- Business rules should be layered, by that we mean there is an inherent hierarchy in their applicability within a program.

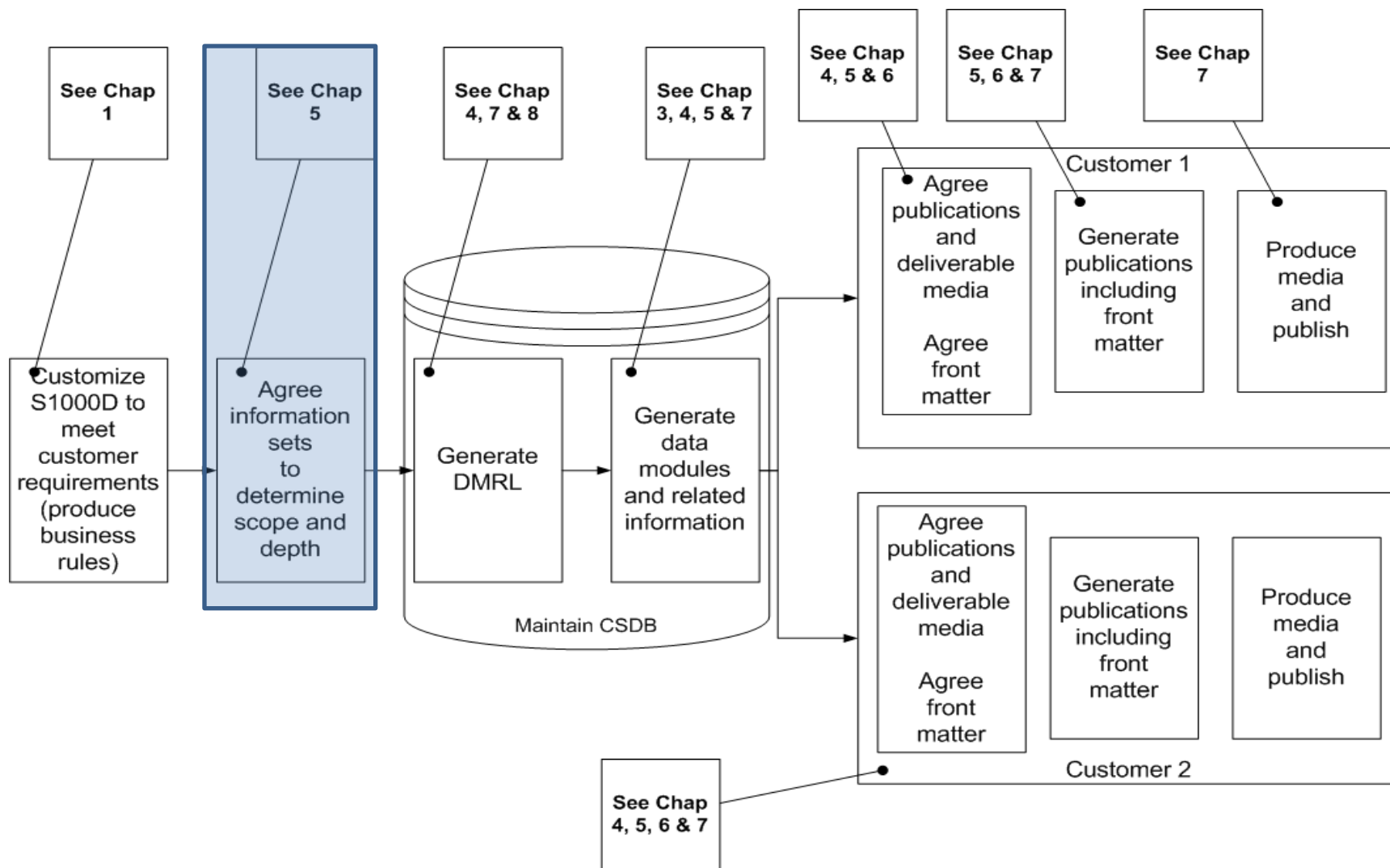


Layering examples

6-layered Defense Business Rules Model



3-layered Civil Business Rules Model



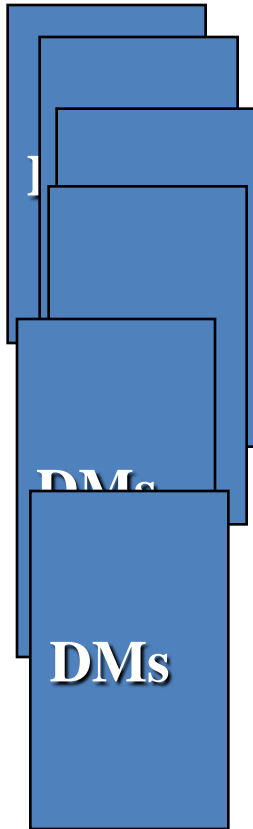
S1000D

ATA e-BUSINESS PROGRAM

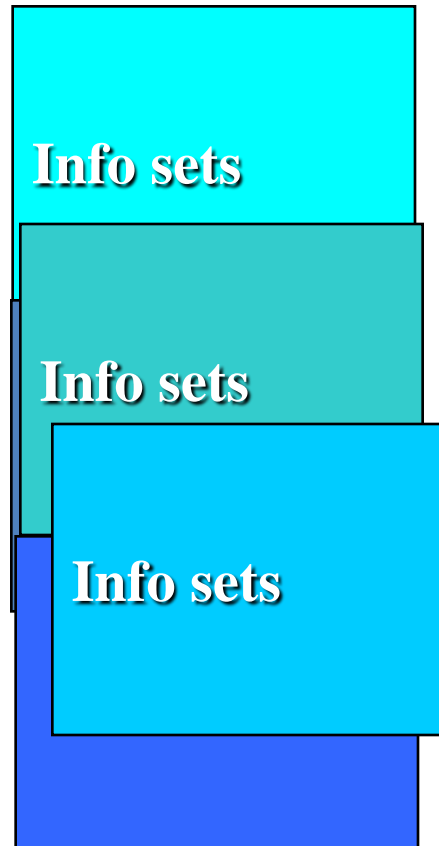
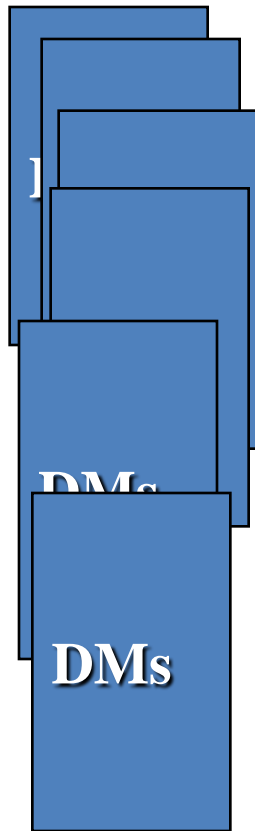
ATA
AEROSPACE AND DEFENCE
INDUSTRIES ASSOCIATION

ASD
AeroSpace and Defence
Industries Association of Europe

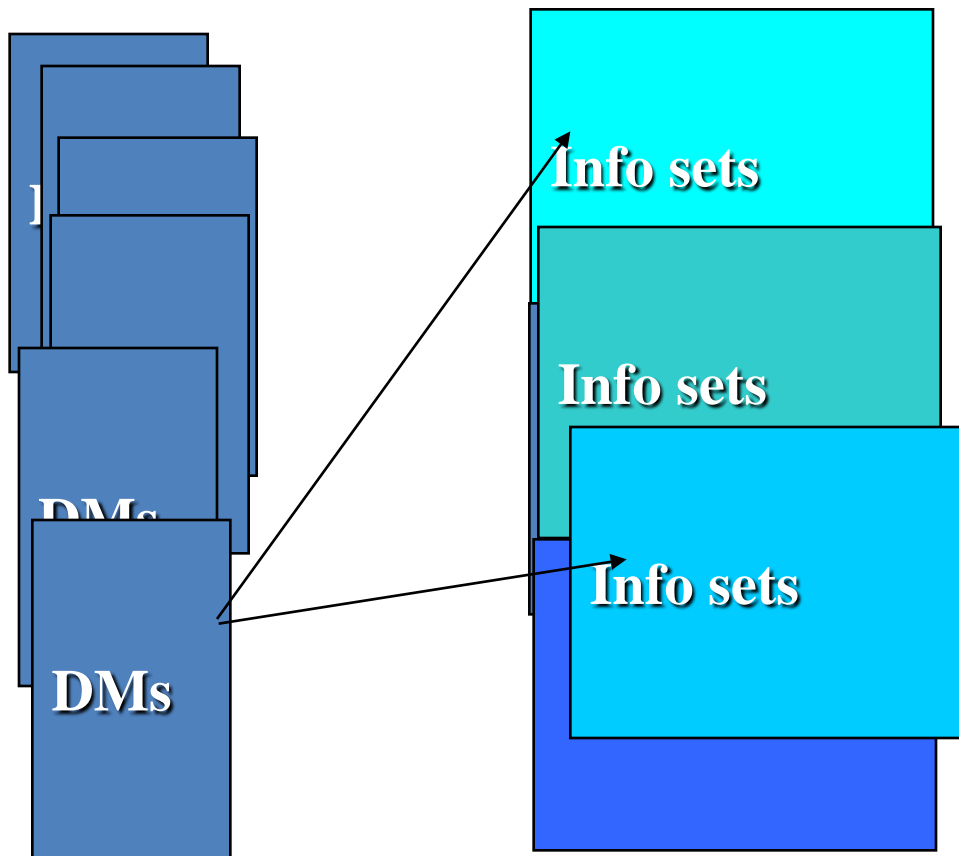
Information Set/Publication?



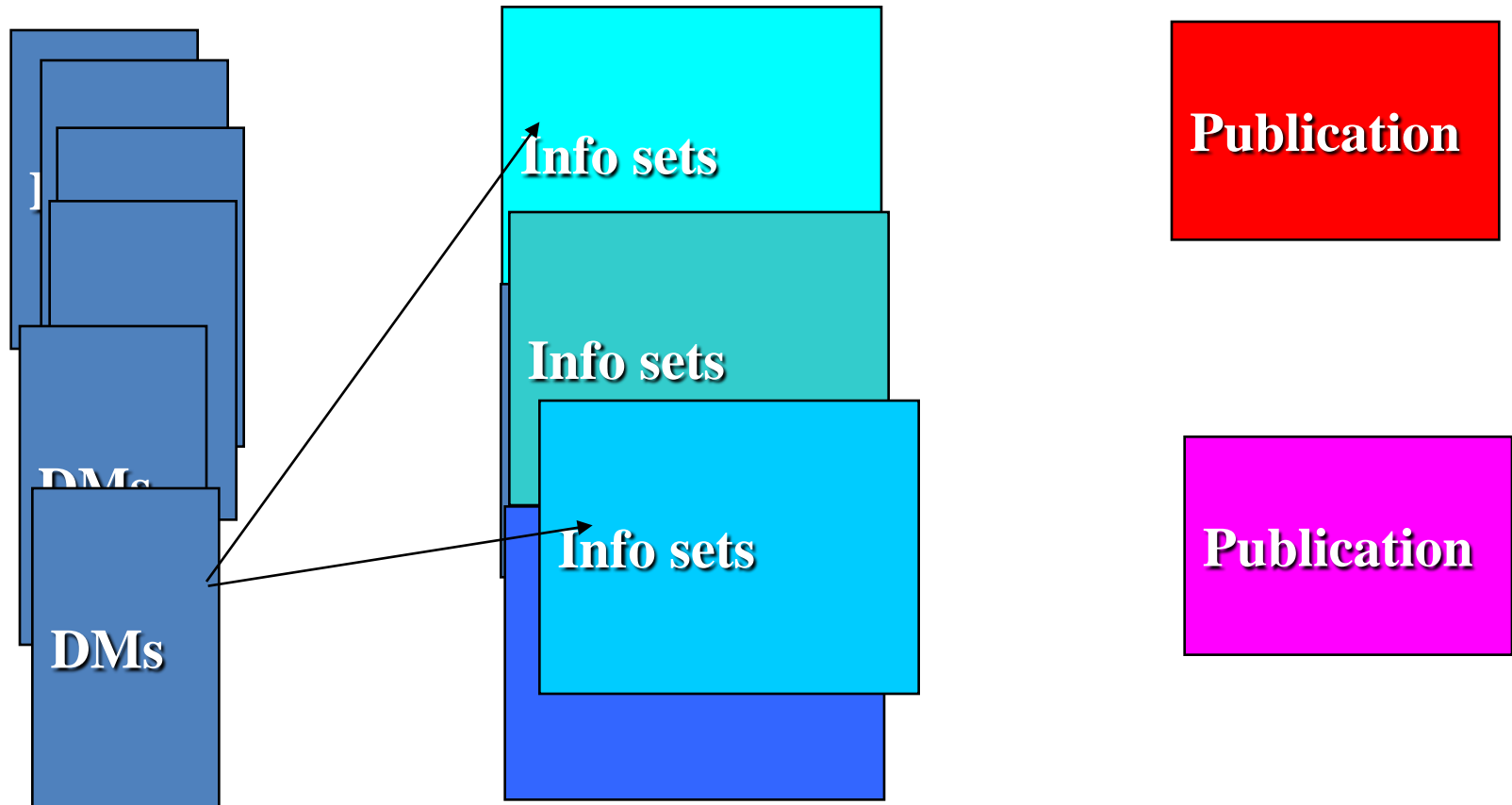
Information Set/Publication?



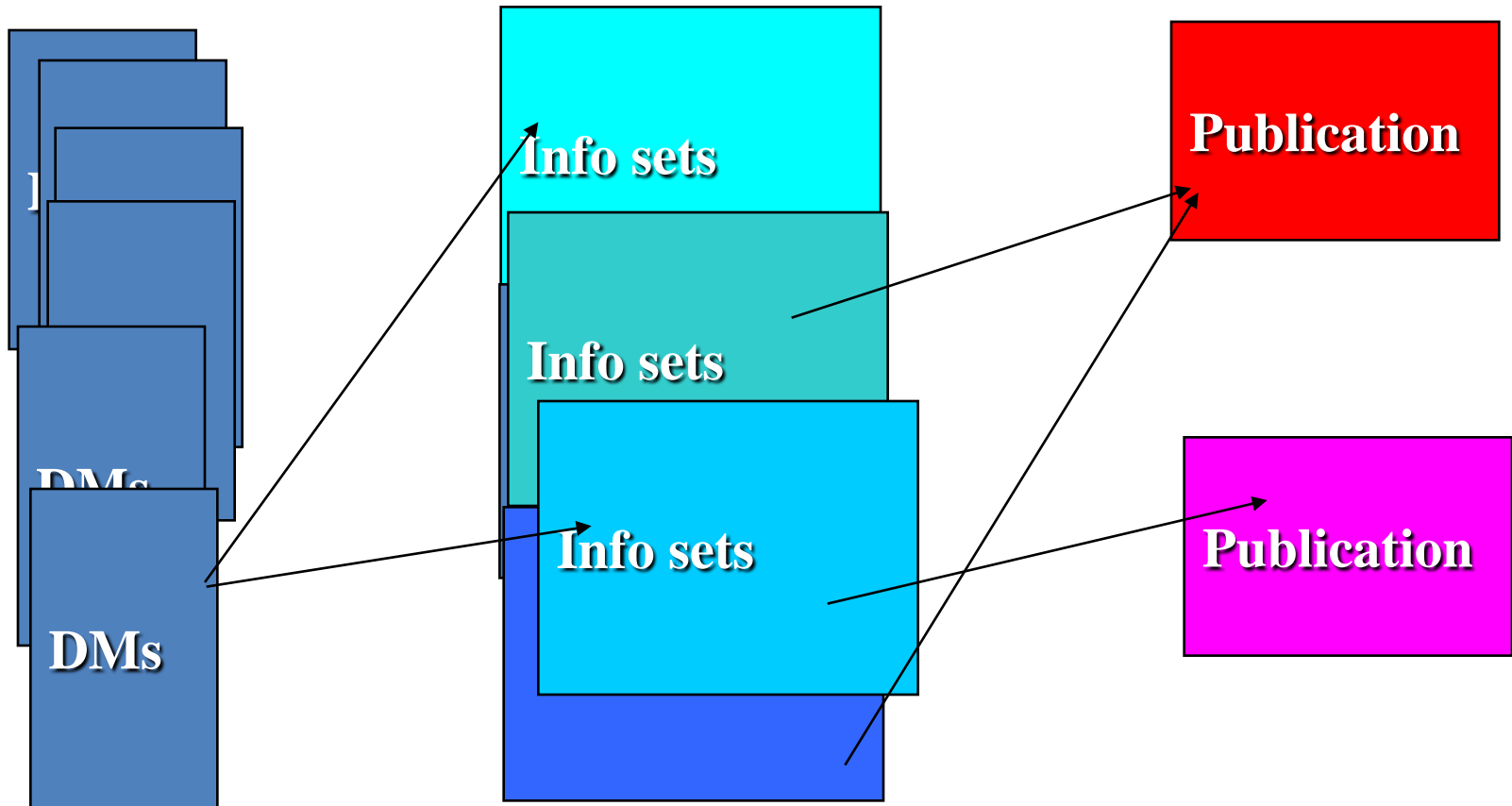
Information Set/Publication?



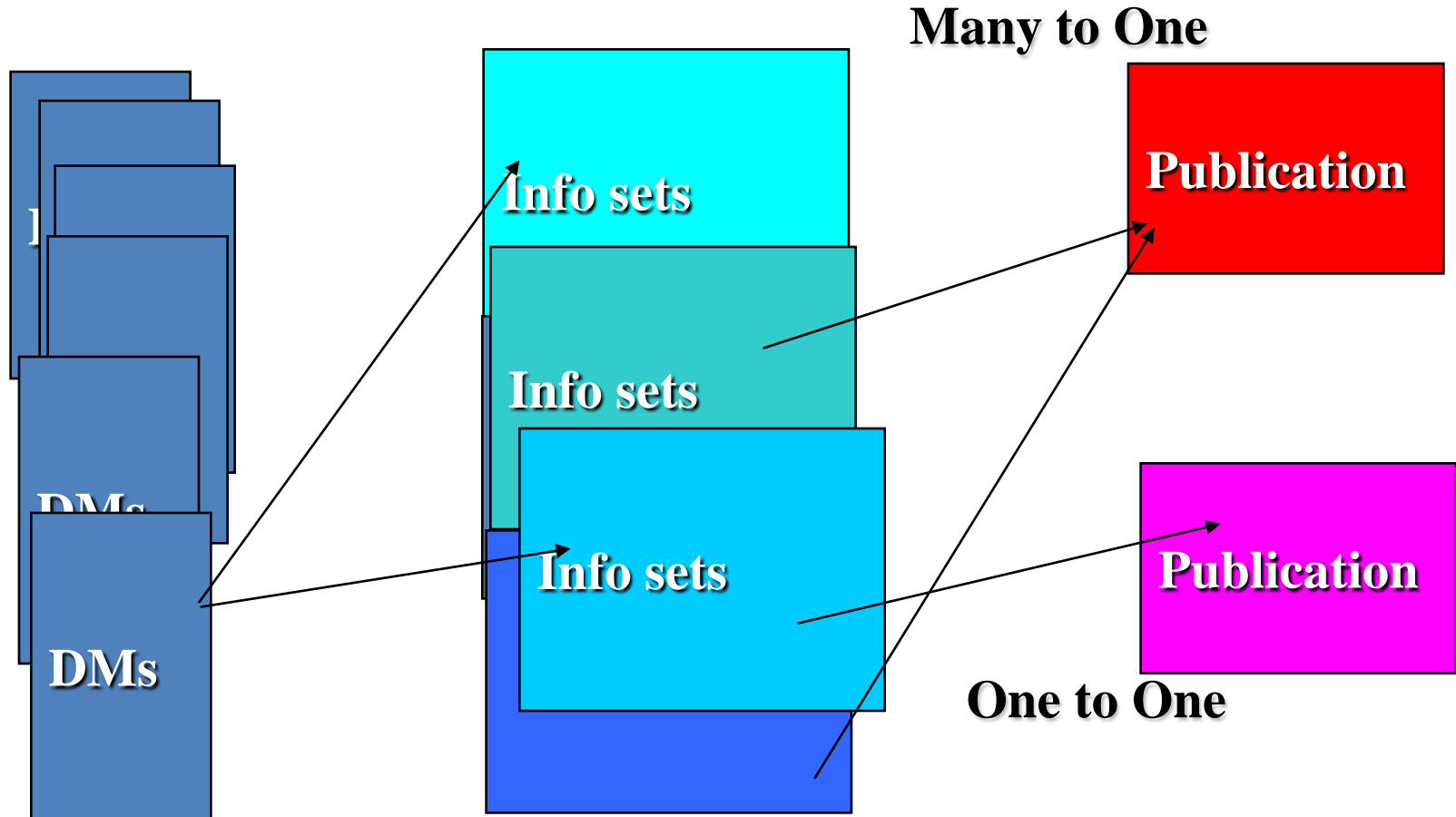
Information Set/Publication?

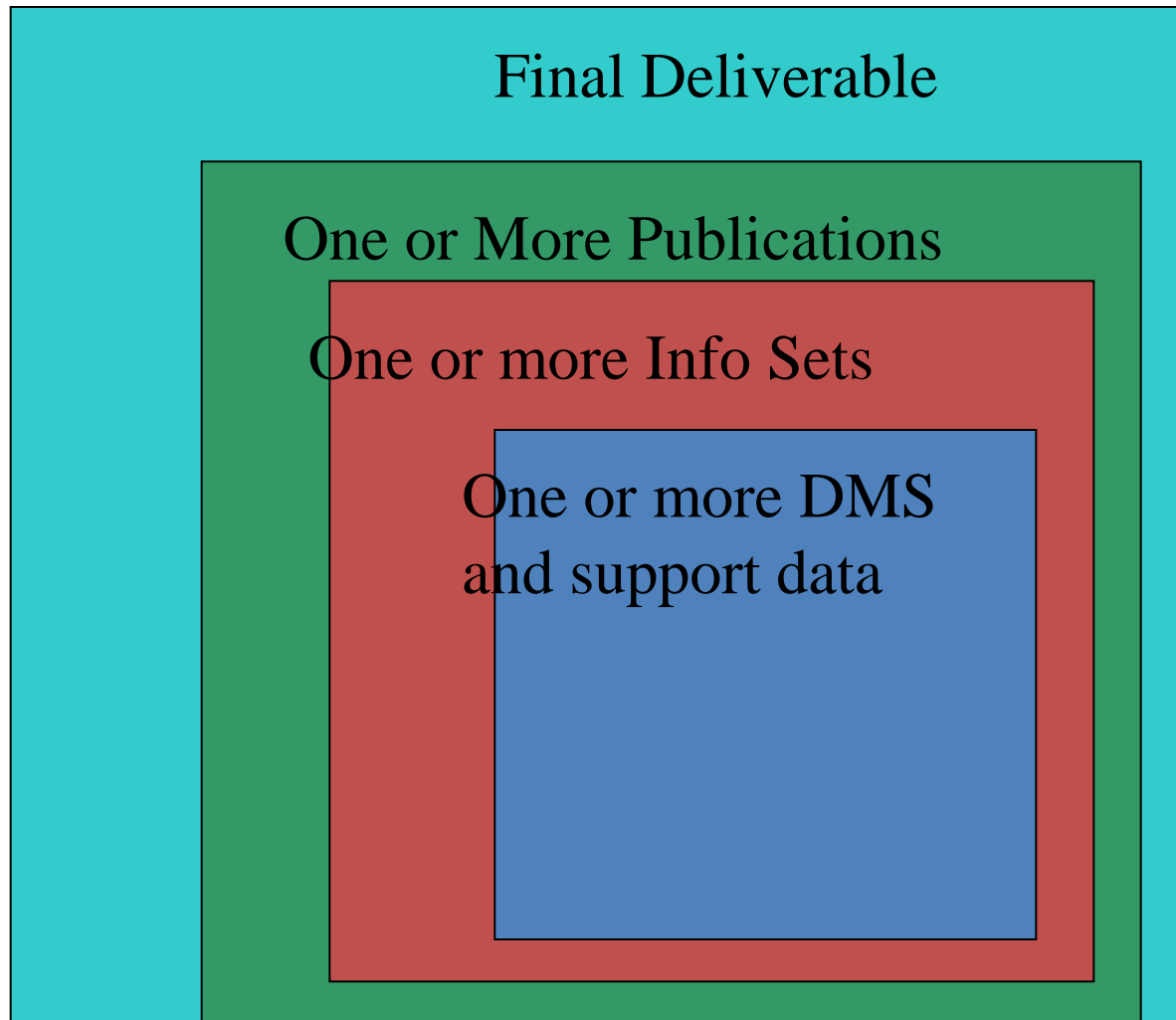


Information Set/Publication?

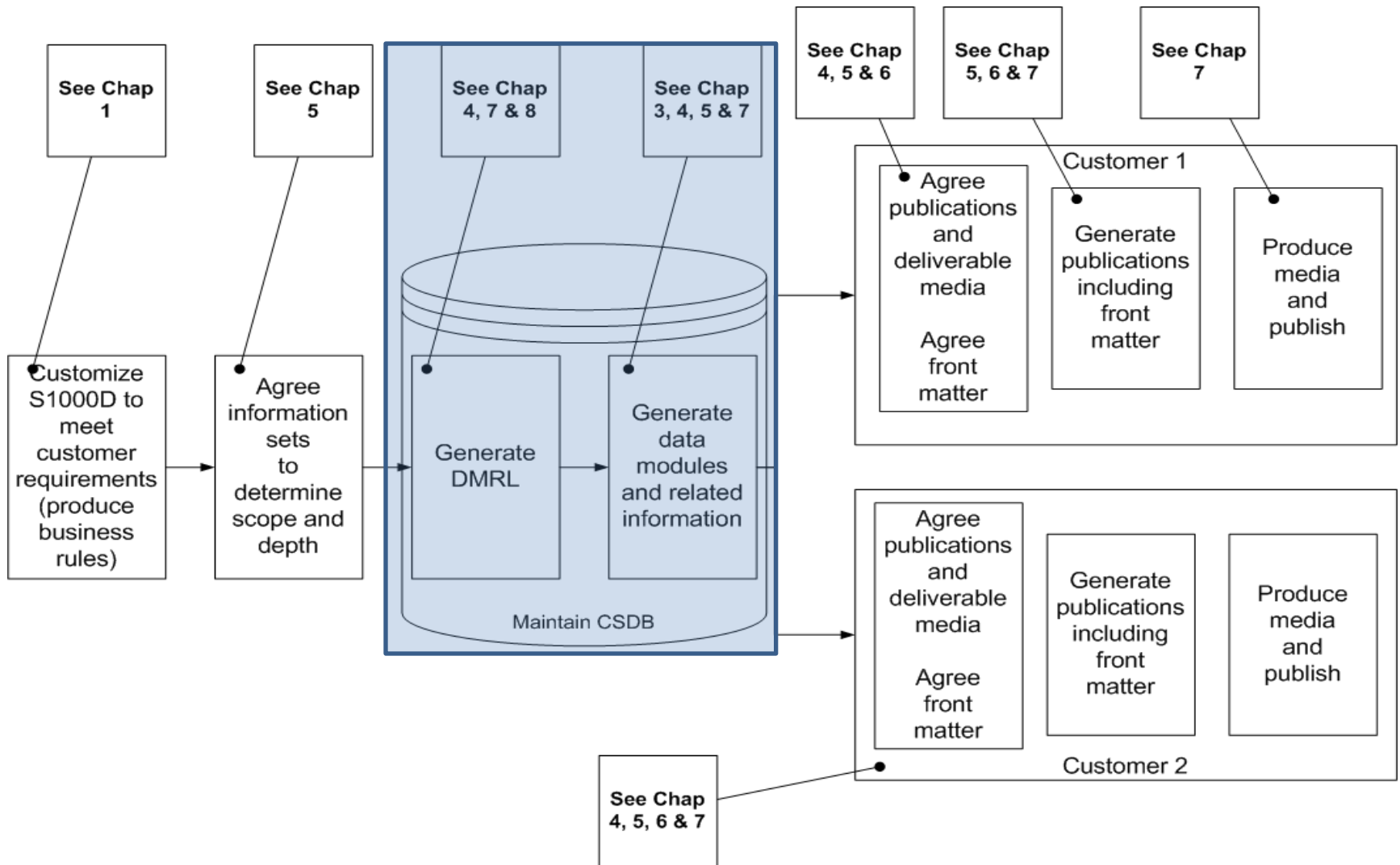


Information Set/Publication?





Info Set/Publication/Deliverable



Data Module Requirements List

- This can be generated from two primary methods
- Product Breakdown structure such as LSA
 - LCN
- From a capture of the information requirements from a review of the information sets
 - DMC coding based on scope and depth.

Data Module Requirements List

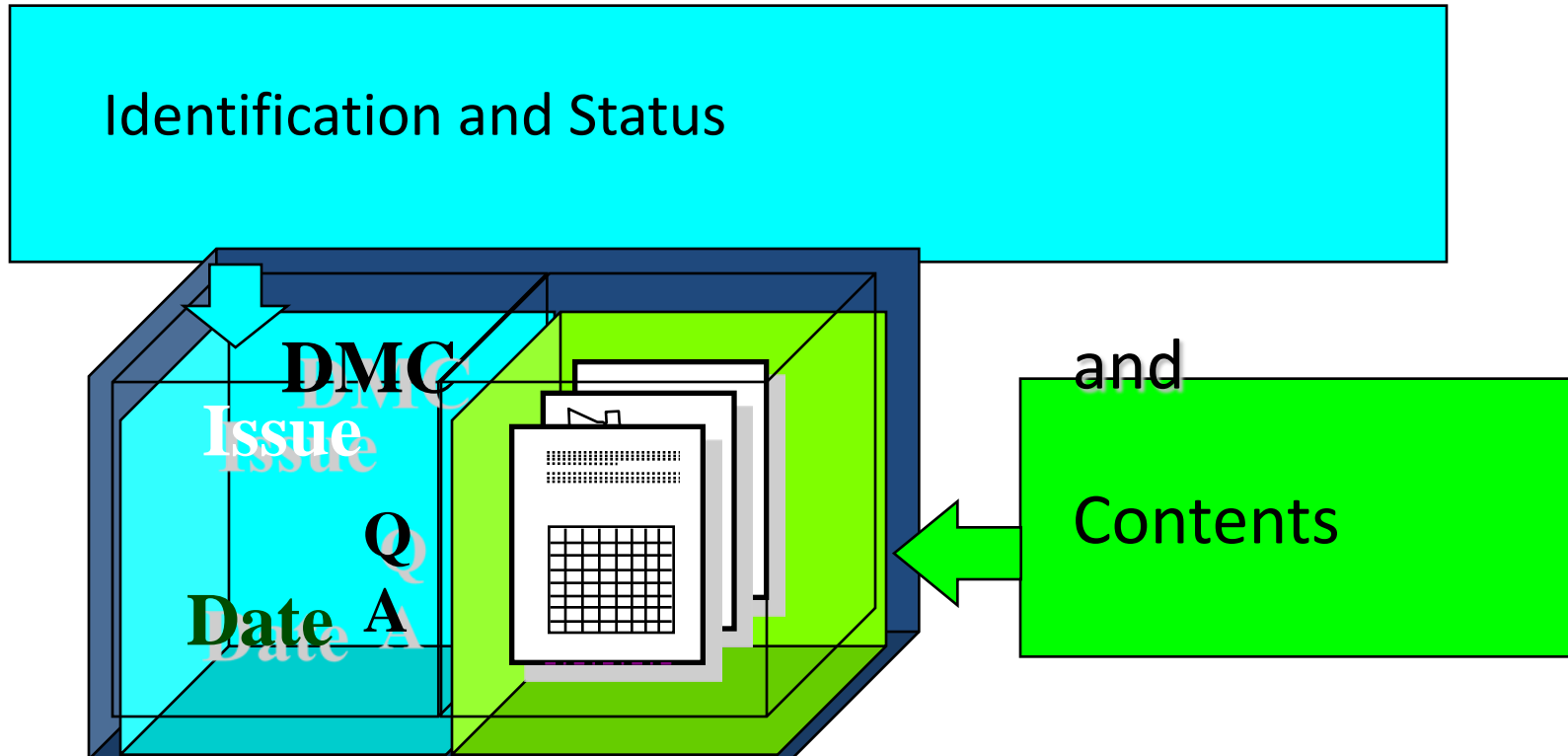
- As this is an iterative process initially you will tend to only identify DMC at a high level aligned with the product but covering all the essential information such as;
 - Descriptive
 - Procedural
 - Spares e.g. IPD
 - Operator

Data Modules

- Data module structure
 - IDSTATUS section
 - Divided into
 - Identification metadata
 - Status metadata
 - Every DM contains the same IDSTATUS structure
 - All other objects (PM, SCM, DMRL, etc...) contain similar structure
 - CONTENT section
 - Content will differ depending on the data module type

Data Modules

- Each Data Module comprises two parts:



The identification and status section

- Contains identification data (eg data module code, title, issue number, issue date, language) and and status data (eg security classification, responsible partner company and originator, applicability, technical standard, QA status, skill, reason for update).
- The identification and status section provides data that can be used for:
 - management of the data module within the CSDB
 - management of the use of applicability
 - management of the quality control process
 - management and control of retrieval functions
 - automatic compilation of sets or subsets of information
 - general information for users accessing the CSDB

Data Module Types

- Descriptive information
- Procedural information
- Fault isolation information
- Maintenance planning information
- Crew/Operator information
- IPD information
- Wiring data
- Process data module
- Technical information repository data module
- Container data module
- Learning data module
- Maintenance checklists and inspections

Data module code extension

- Data module code extension
 - Description:** The element <identExtension> establishes a producer unique subdomain for instance identification. The data module identification extension gives the additional parameters needed to establish a unique identification of a data module in those cases when
data module code, issue and in-work numbers together with the language and country are insufficient to form a universally unique identity.
- **Markup element:** <identExtension> (O)
- **Attributes:**
 - extensionProducer (M), the data module producer the value of which forms part of the universally unique identifier of a data module instance and contains the CAGE code of the producer of the data module instance.
 - extensionCode (M), the data module extended code the value of which is decided by the data module producer. Typically, but not necessarily, it will contain a customer related content, eg customer CAGE amended with a sequence number. If it is used, it must contain uppercase alphabetic (A-Z) and numeric (0-9) characters.

S1000D


ATA e-BUSINESS PROGRAM


AIA
AEROSPACE AND DEFENCE
INDUSTRIES ASSOCIATION


ASD
AeroSpace and Defence
Industries Association of Europe

Container Alternate

- Next set of slides looks at high level overview of concept.

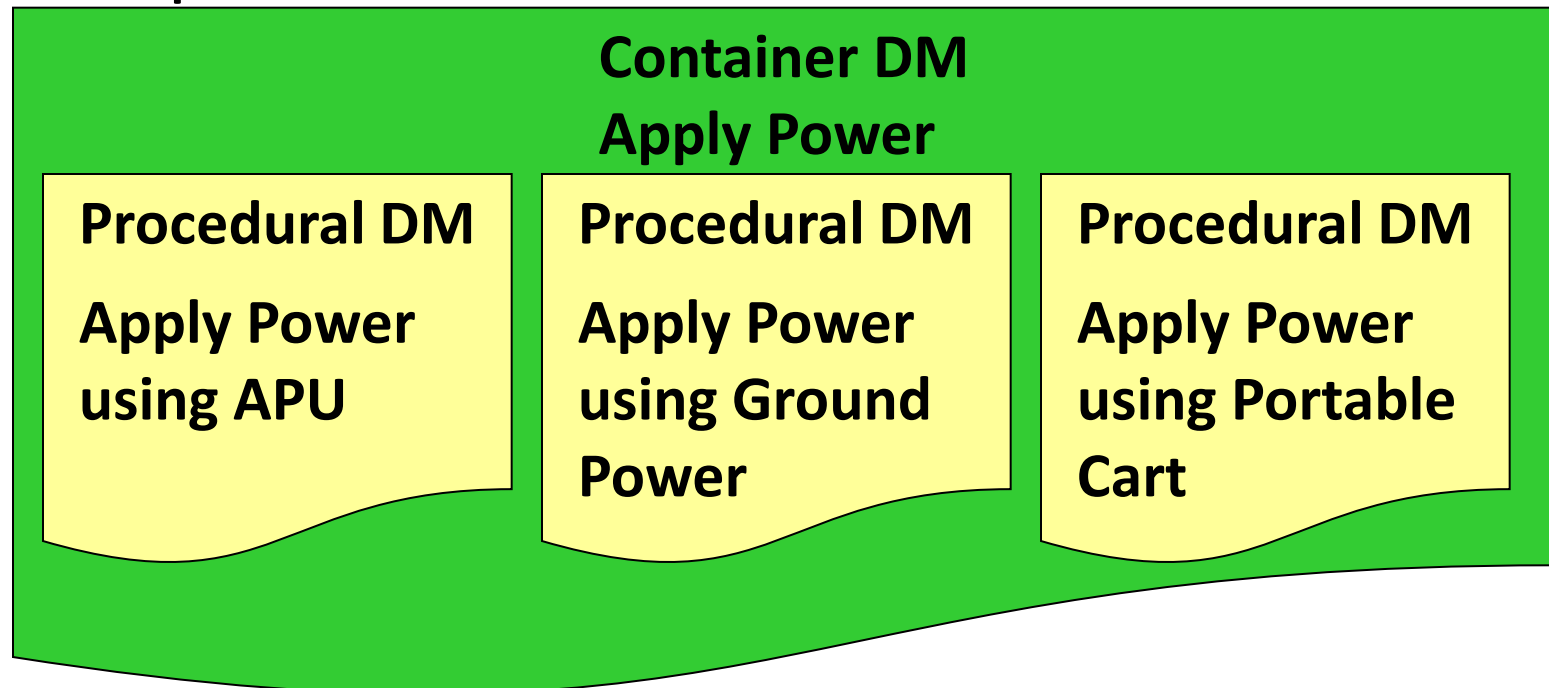
Concept

- Original concept

- Methodology to ensure simpler management of links.
- Management is the operative word was not intended to be part of output
- However....

Concept

- A Container DM is used group DMs together that achieve the same maintenance goal
- Container DM references the other DMs
- Example:



Concept

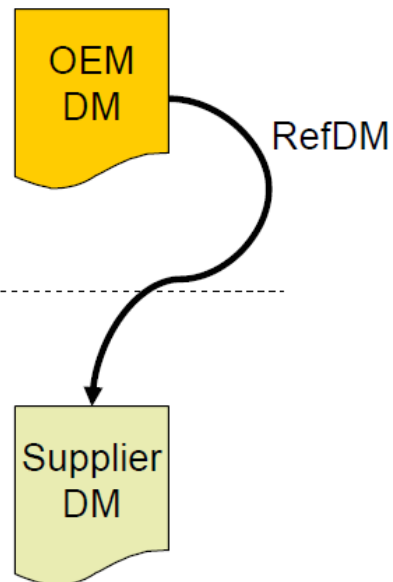
- The Container DM can also be used to isolate referencing DMs when the references change
- Examples:
 - Taking the previous example with applying power, suppose a new power source (Apply Power DM) is added
 - Suppose a supplier adds an alternate method in the data they provide to the integrator

Principle

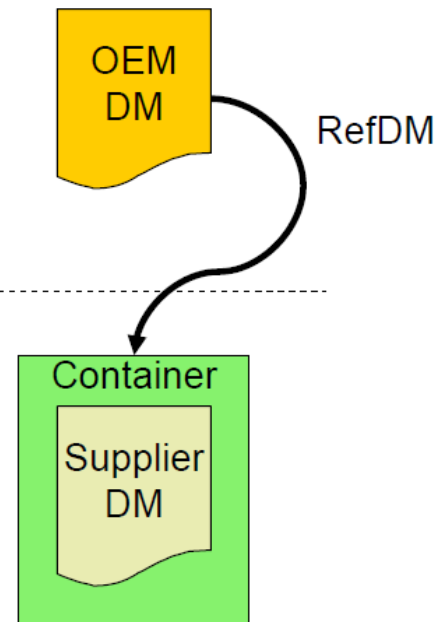
No container concept

Container concept

- Current S1000D



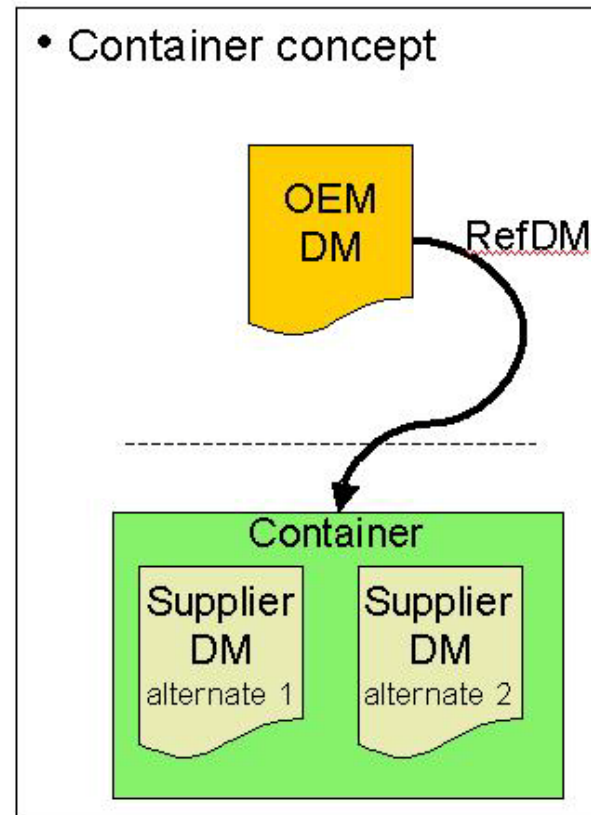
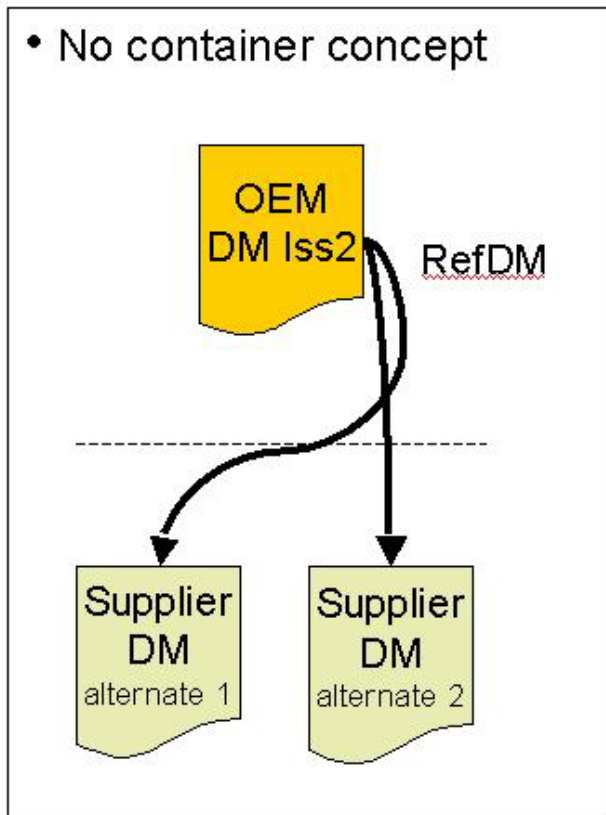
- Container Alternate Concept



Principle

No container concept

Container concept

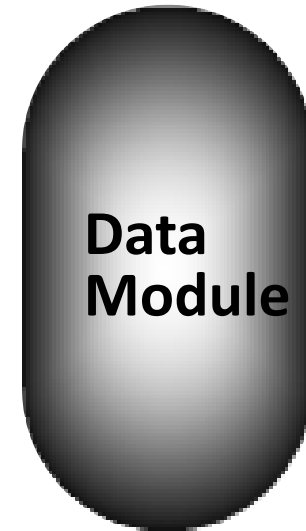


Information Objects

- The information objects to be stored and managed in the CSDB are the following addressable and exchangeable units:
 - data modules
 - illustrations, multimedia and other data associated with and called up by data
 - Data module lists
 - Comments
 - Publication modules
 - Data dispatch notes

Data Module Code (1)

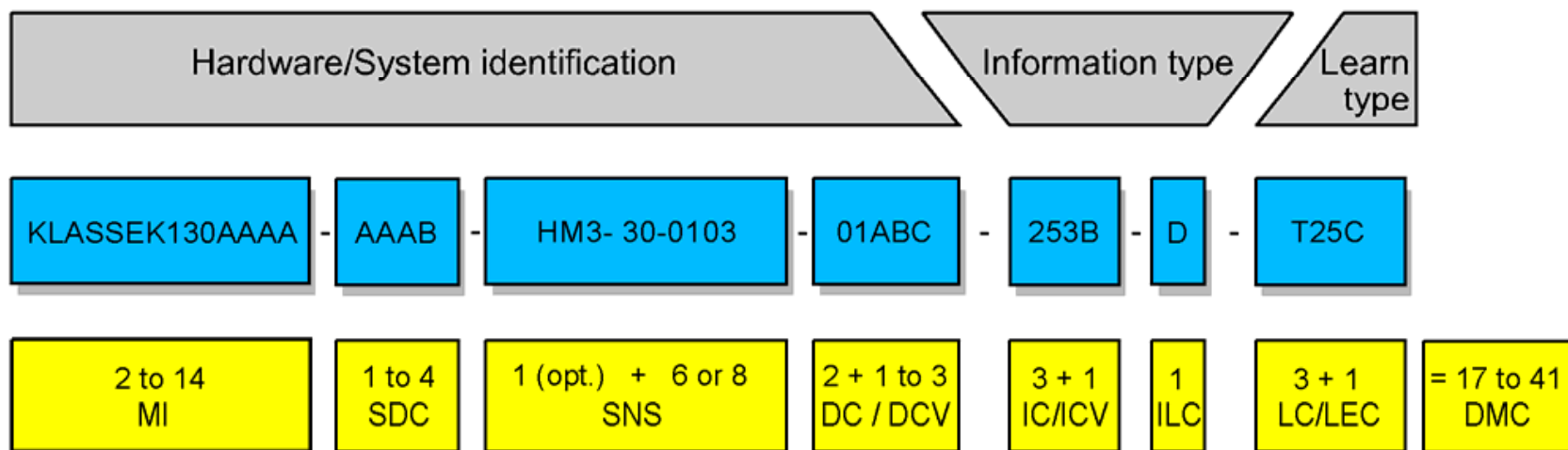
- Are unique 'packages' of information.
- Are associated with a particular element/item of equipment.
- Contain textual and may reference non textual information.



Data Module Code (2)

- Defines the Data Module in terms of;
 - Assembly/sub-assembly/item information, providing information about the equipment being documented.
 - Equipment.
 - Hierarchical position
 - Disassembly sequence
 - Module usage information, providing information about the Data Module.
 - Information Contents
 - Location

DMC Structure - Generic



Model Identification - MI

- Project can allocate and register with NAMSA to avoid duplication.
- Example
- Rules use of Zeros

BATTLETANK1234

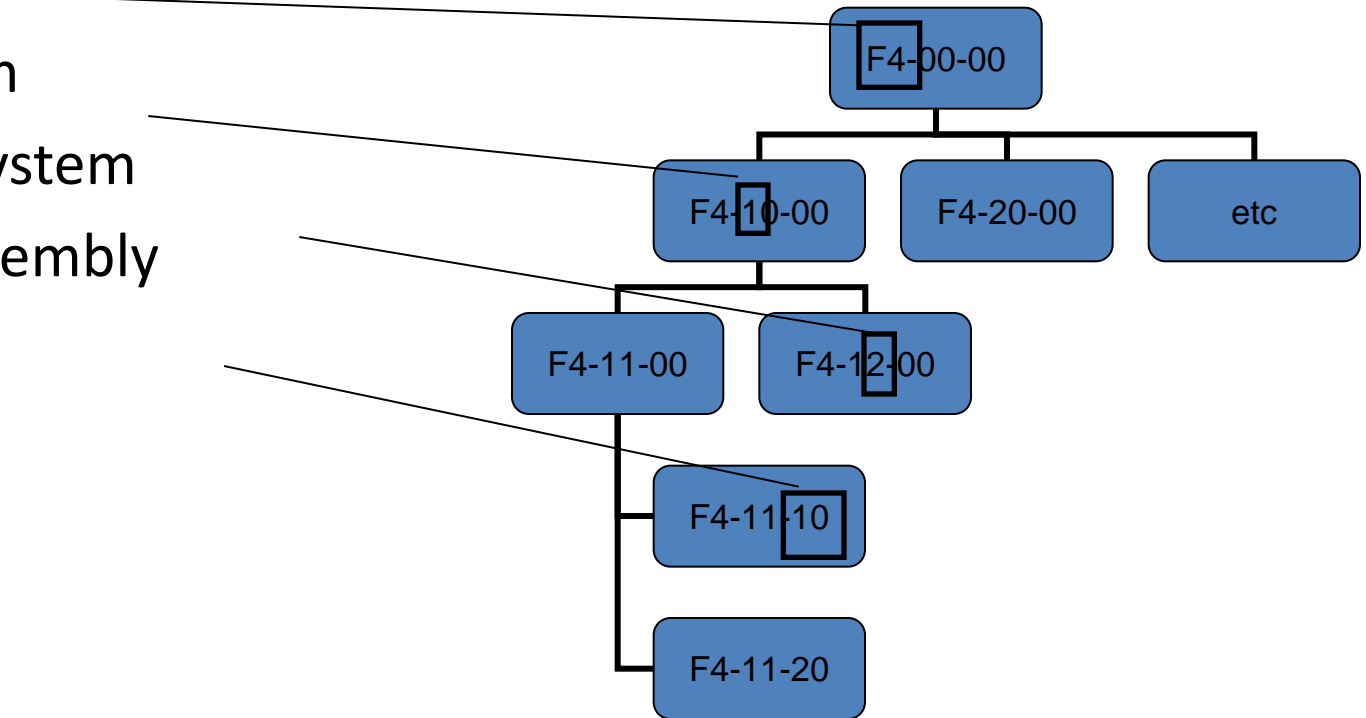
MI

SNS

- Identifies the physical location within the Material or Equipment
- Note
 - An element of a unique ID
- SNS breakdown is similar to ATA and to Mil-Spec -1808 for air vehicles
- Various SNS and exemplar SNS in spec

SNS Generic breakdown rules

- System
- Sub System
- Sub, sub system
- Unit or assembly



DMC Integration

Next slide



Information Codes (1)

- The information codes identify the type of information contained within a data module there is a grouping structure. The primary codes are defined as
 - 000 Function, data for plans and description
 - 100 Operation
 - 200 Servicing
 - 300 Examinations, tests and checks
 - 400 Fault report and isolation procedures
 - 500 Disconnect, remove and disassemble procedures
 - 600 Repairs and locally make procedures and data
 - 700 Assemble, install and connect procedures
 - 800 Storage procedures and data
 - 900 Miscellaneous

Information Codes (2)

- Each of these have secondary codes, examples are below;
 - 210 Fill
 - 211 Refuel
 - 212 Fill with oil
 - 213 Fill with oxygen
 - 214 Fill with nitrogen
 - 215 Fill with air

Illustrations

- Illustration Rules:
 - S1000D describes in detail how illustrations should be prepared and controlled. It covers:
 - Presentation techniques.
 - Symbols.
 - Types of Illustrations.
 - Illustration sizes, formats, line weights, typefaces etc.
 - Layout – including reference locations, call-outs etc.
 - Information Control Number (ICN).

Illustrations

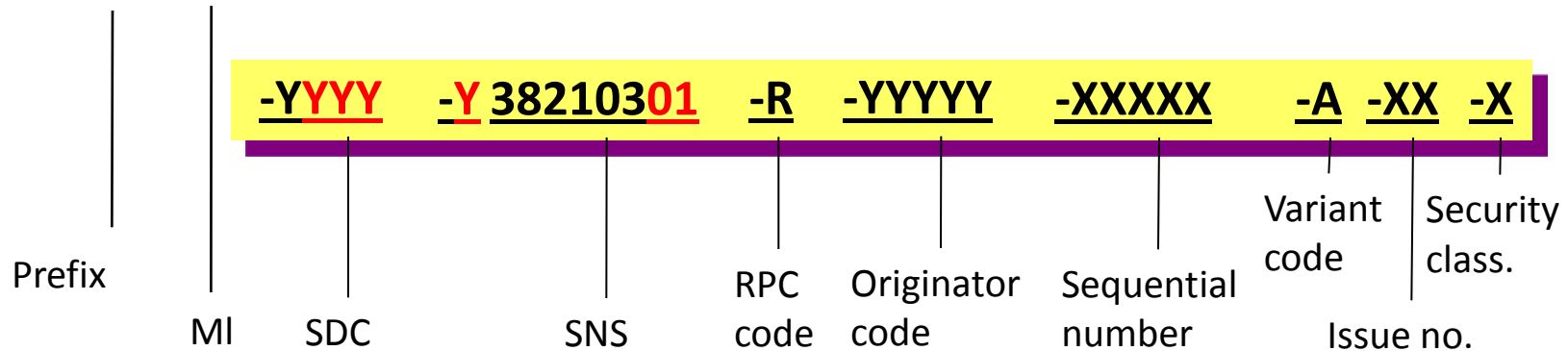
- Why have them;
 - To clarify text
 - To avoid lengthy explanations
 - When information cannot be conveyed through text
 - Ease in multi lingual situations

Illustrations

- Hot spotting. This allows linking:
 - From data module to location(s) within a graphic.
 - From data module to location(s) within several graphics.
 - From within graphic to within data modules.
 - From graphic to graphic.
- Screen tips.
 - There is meant to be an example here!

S1000D - ICN

ICN-BATTLETANK1234



CSDB

- The major objectives for a CSDB are:
 - – support the technical publication process
 - – support the controlled authoring
 - – support the QA process
 - – support the data exchange with partners, suppliers and customers
 - – support delivery of technical

Applicability

ATA e-BUSINESS PROGRAM



ASD
AeroSpace and Defence
Industries Association of Europe

- Next set of slides looks at high level overview of concept.
- Discuss what should affect application of applicability.

Technical Repositories

- Next set of slides looks at high level overview of concept.
- Discuss what, where and why.

Technical information repository - Principle

ATA e-BUSINESS PROGRAM



AeroSpace and Defence
Industries Association of Europe

- Some technical information is used in many places in many data modules. For example, circuit breakers, panels, zones and access doors appear several times within data modules and across data modules.
- In addition, properties associated to such information types (like description and zone) are duplicated in various data modules,
- The duplication of information can lead to data inconsistency and adds complexity to content management of the technical information. The grouping of all the properties related to technical
- information in the same place, called a technical information repository, ensures data consistency and simplifies the management of technical information.
- This minimization can be done in two ways:
 - internally in the production environment by using "libraries" for repeated information. This is commonly used for tools or consumables, among others.
 - by the use of technical information repository data modules. These data modules can be used within the production environment only or be delivered to the customer as part of the publications or publication package.
- Using the previous example it is possible to minimize data redundancy and simplify data
- management by using a technical information repository.

technical information repository data module

ATA e-BUSINESS PROGRAM



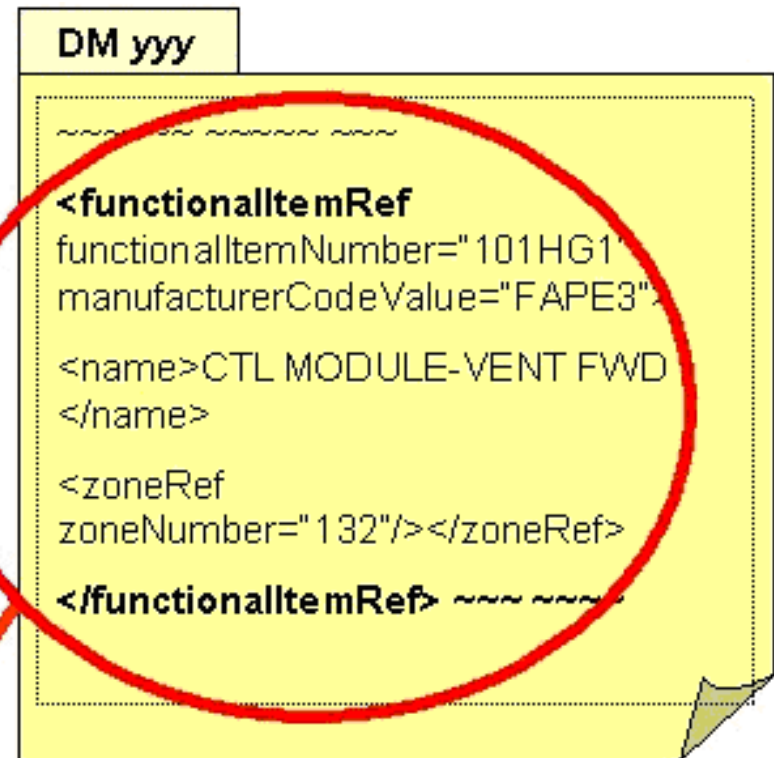
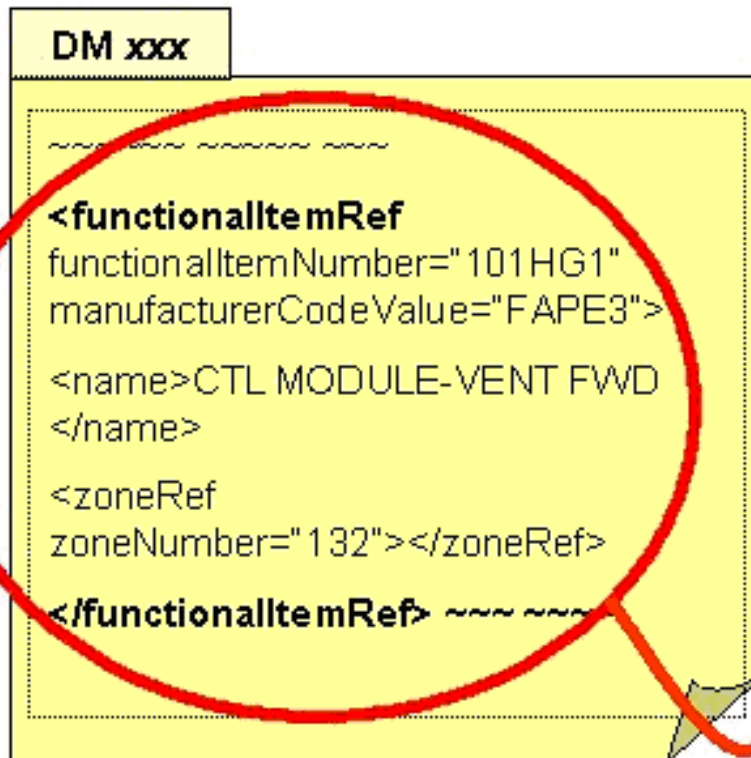
- The content section of a technical information repository data module must be structured in accordance with one of the following information types:
 - Functional items
 - Circuit breakers
 - Parts
 - Zones
 - Access points
 - Organizations
 - Supplies, properties
 - Supplies, requirements
 - Tools
 - Functional and/or Physical areas
 - Controls and Indicators

Technical information repository - Principle

ATA BUSINESS PROGRAM



AeroSpace and Defence Industries Association of Europe



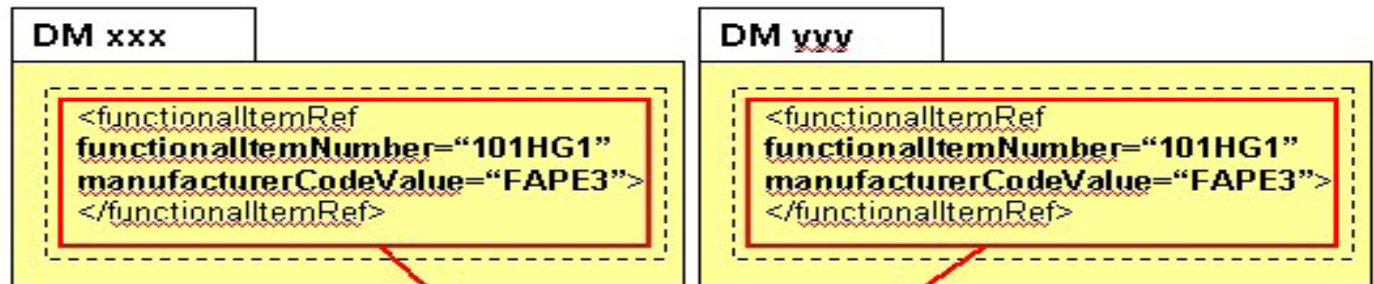
Technical information repository - Principle

ATA e-BUSINESS PROGRAM

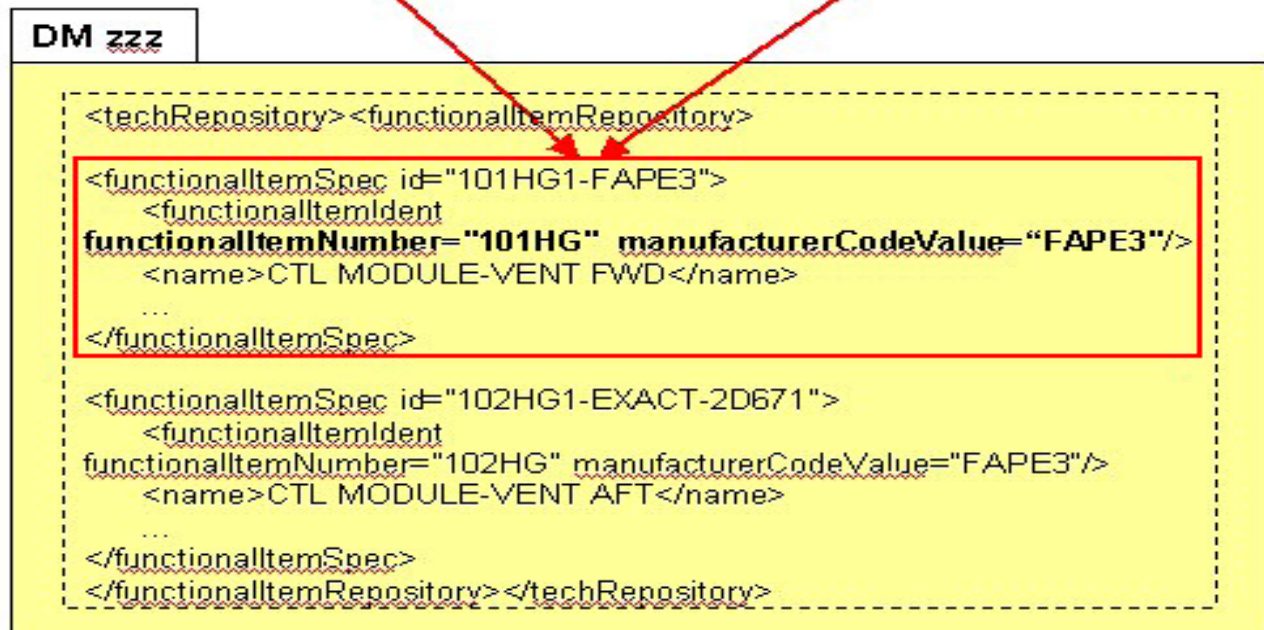
AAA
AEROSPACE INDUSTRIES ASSOCIATION

ASD
AeroSpace and Defence Industries Association of Europe

Data modules



Technical information repository data module



Technical information repository - Implicit Linking

ATA e-BUSINESS PROGRAM



AeroSpace and Defence
Industries Association of Europe

DM xxx

```
<procedure>  
  <functionalItemRef functionalItemNumber="101HG1"  
    manufacturerCodeValue="FAPE3"/>  
  ...  
</procedure>
```

DM zzz

```
<techRepository> <functionalItemRepository>  
  <functionalItemSpec id="101HG1-FAPE3">  
    <functionalItemIdent  
      functionalItemNumber="101HG" manufacturerCodeValue="FAPE3"/>  
    <name>CTL MODULE-VENT FWD</name>  
    ...  
  </functionalItemSpec>  
  <functionalItemSpec id="102HG1-EXACT-2D671">  
    <functionalItemIdent functionalItemNumber="102HG" manufacturerCodeValue="FAPE3"/>  
    <name>CTL MODULE-VENT AFT</name>  
    ...  
  </functionalItemSpec>  
</functionalItemRepository> </techRepository>
```

Technical information repository - Explicit Linking

ATA e-BUSINESS PROGRAM



AeroSpace and Defence
Industries Association of Europe

DM xxx

```
<procedure>  
...  
<functionalItemRef functionalItemNumber="101HG1"  
manufacturerCodeValue="FAPE3">  
  <dmRef target="101HG1-FAPE3">DM zzz</dmRef>  
</functionalItemRef>  
...  
</procedure>
```

DM zzz

```
<techRepository> <functionalItemRepository>  
  <functionalItemSpec id="101HG1-FAPE3">  
    <functionalItemIdent functionalItemNumber="101HG" manufacturerCodeValue="FAPE3"/>  
    <name>CTL MODULE-VENT FWD</name>  
    ...  
  </functionalItemSpec>  
  <functionalItemSpec id="102HG1-EXACT-2D671">  
    <functionalItemIdent functionalItemNumber="102HG" manufacturerCodeValue="FAPE3"/>  
    <name>CTL MODULE-VENT AFT</name>  
    ...  
  </functionalItemSpec>  
</functionalItemRepository> </techRepository>
```


S1000D

Learning

ATA e-BUSINESS PROGRAM



ASD
AeroSpace and Defence
Industries Association of Europe

- Next set of slides looks at high level overview of enhancement to training.

S1000D


ATA e-BUSINESS PROGRAM

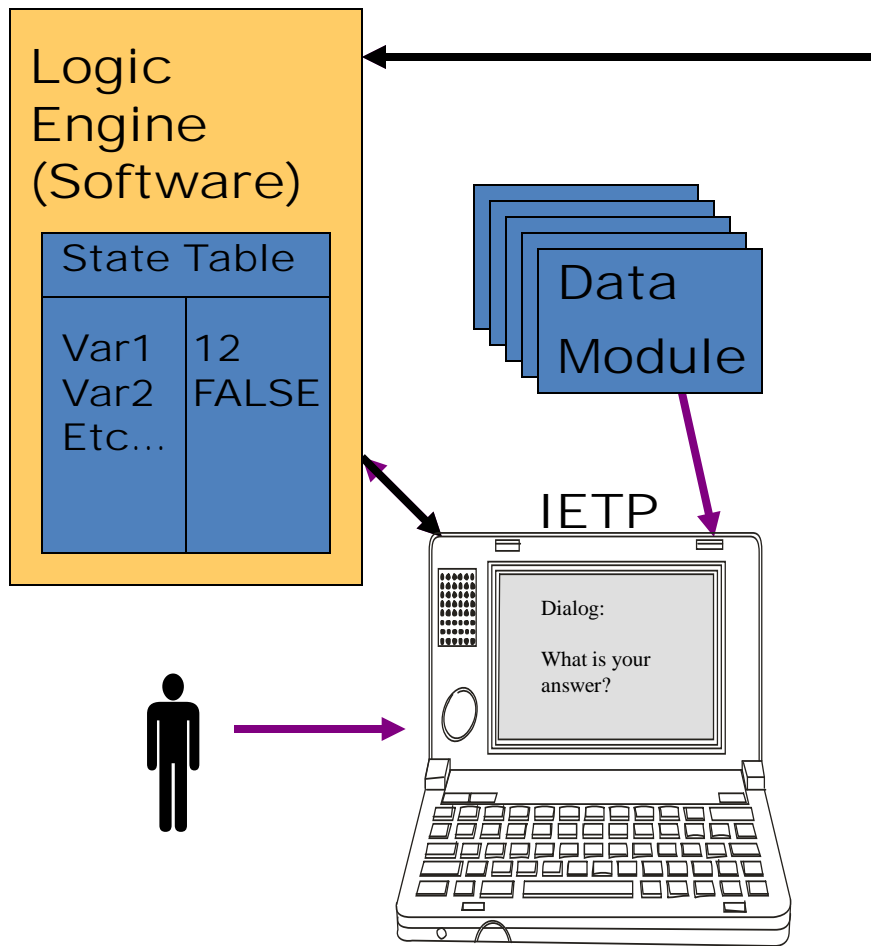

AIA
AEROSPACE AND DEFENCE
INDUSTRIES ASSOCIATION


ASD
AeroSpace and Defence
Industries Association of Europe

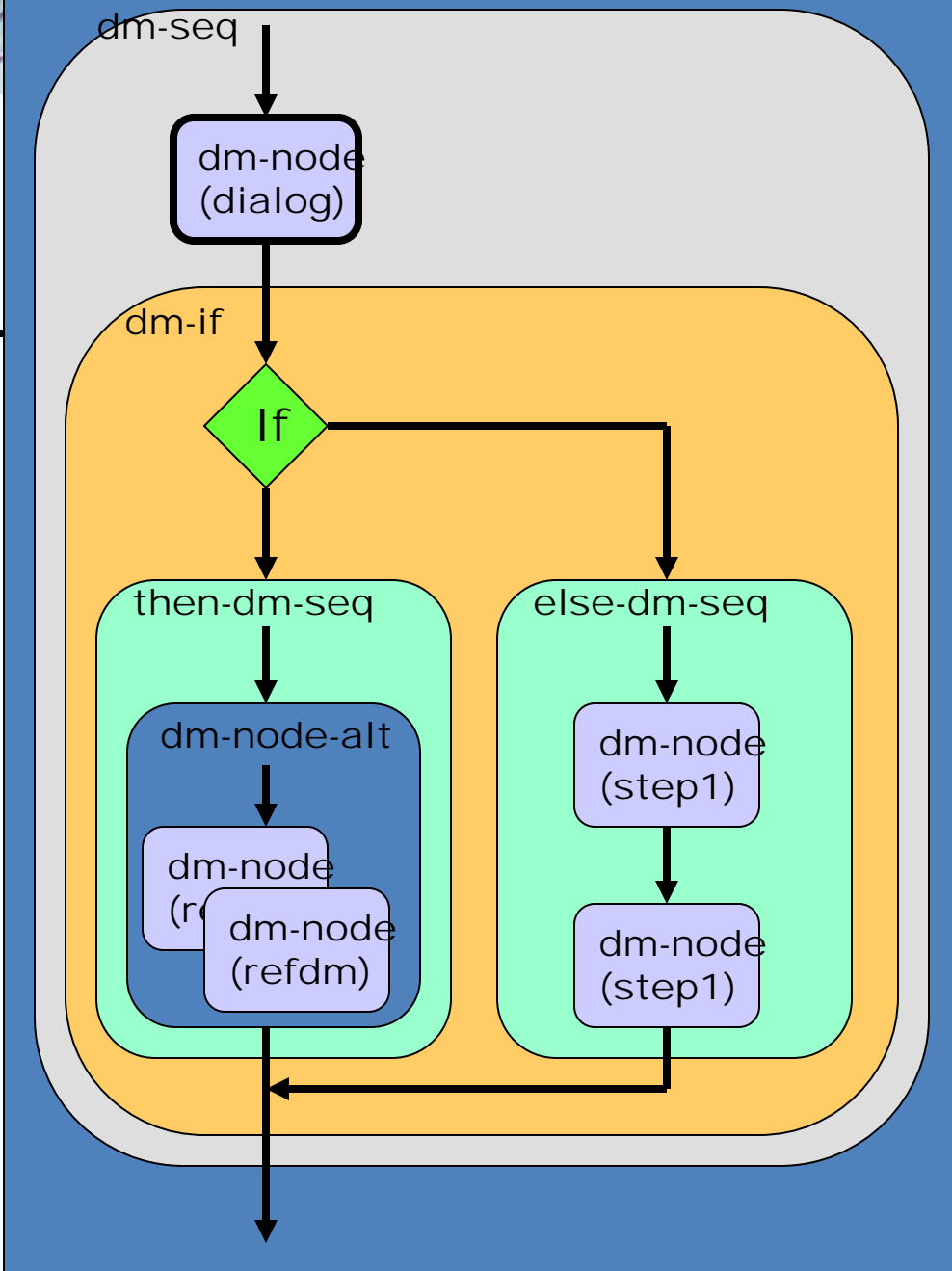
Process DM

Step 1

- Logic Engine starts executing the Process DM
- Dm-node (dialog) executed
- LE sends dialog fragment to IETP for display

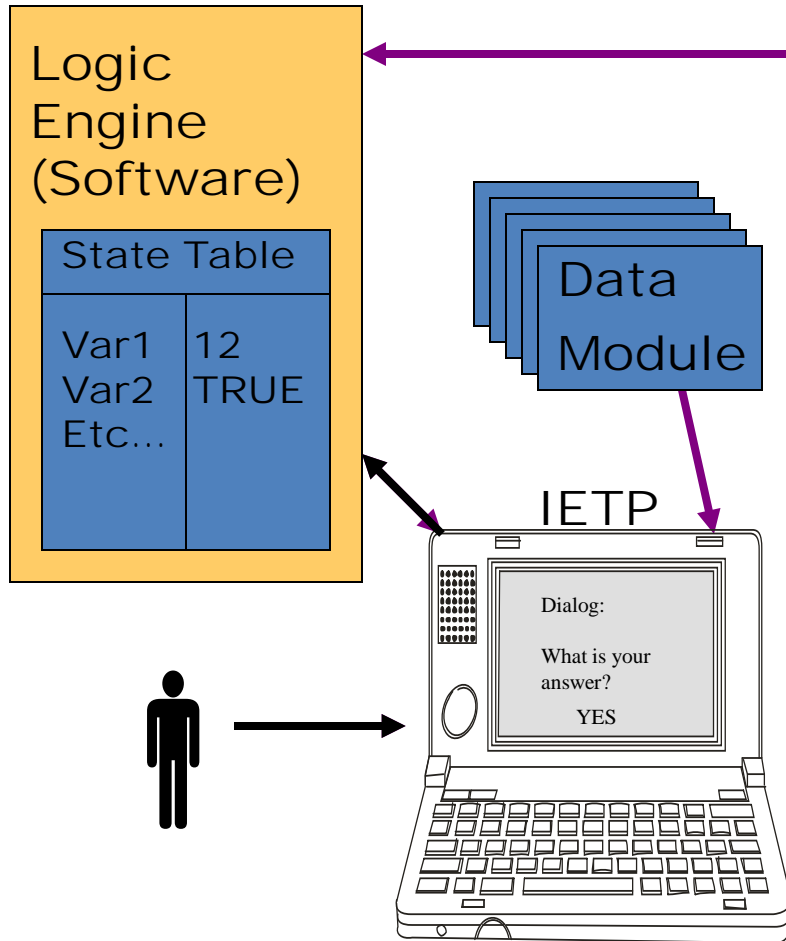


Process Data Module

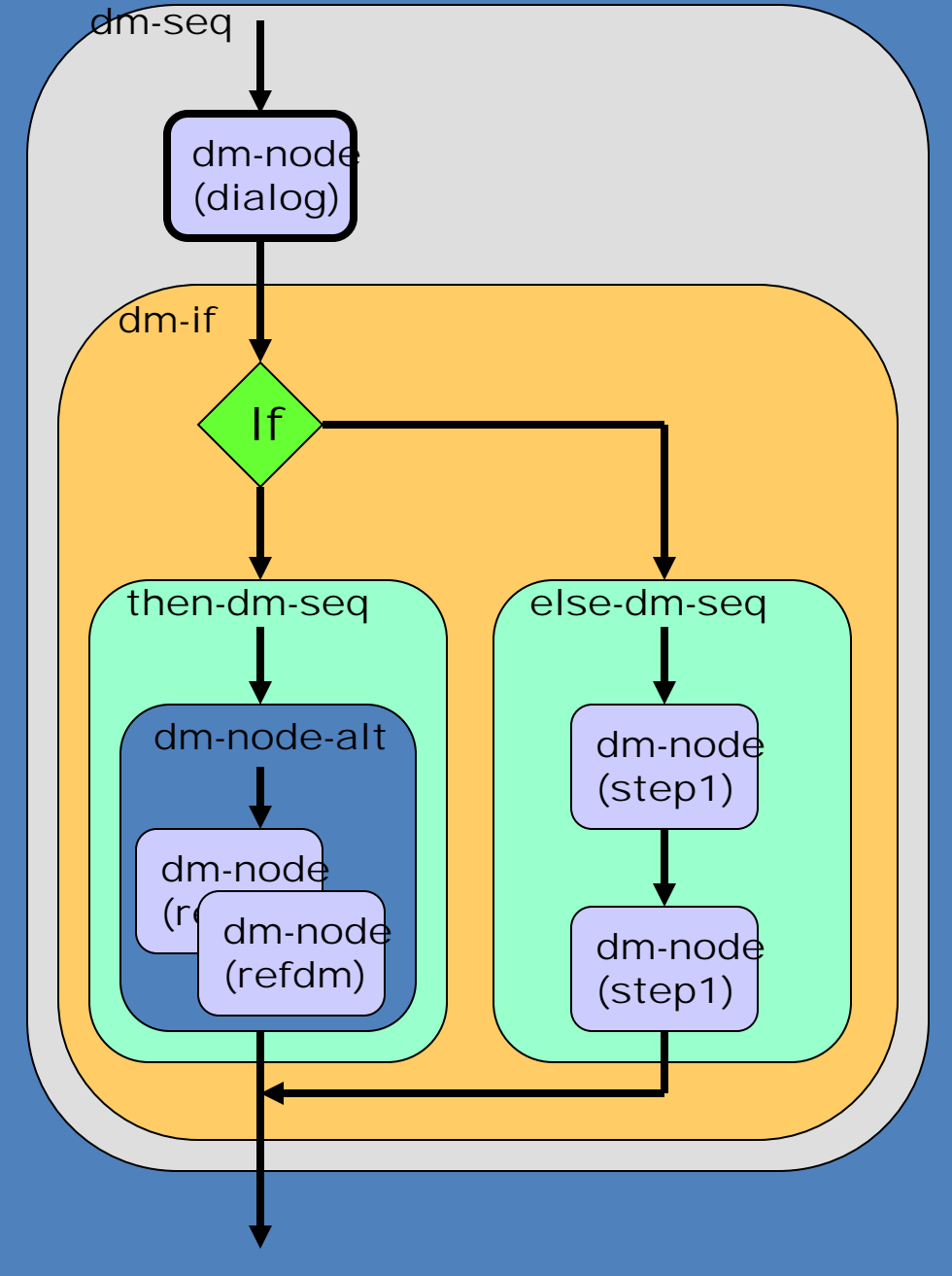


Step 2

- User answers the dialog
- IETP sends user response to LE
- LE updates the appropriate variable in the state table

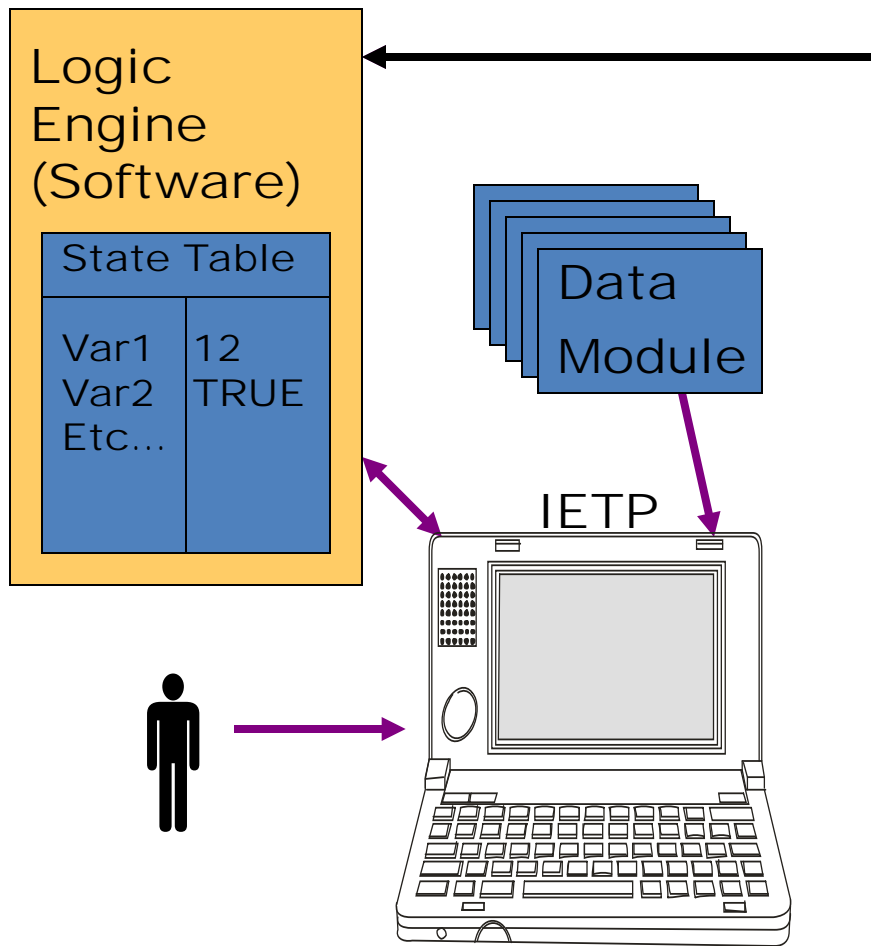


Process Data Module

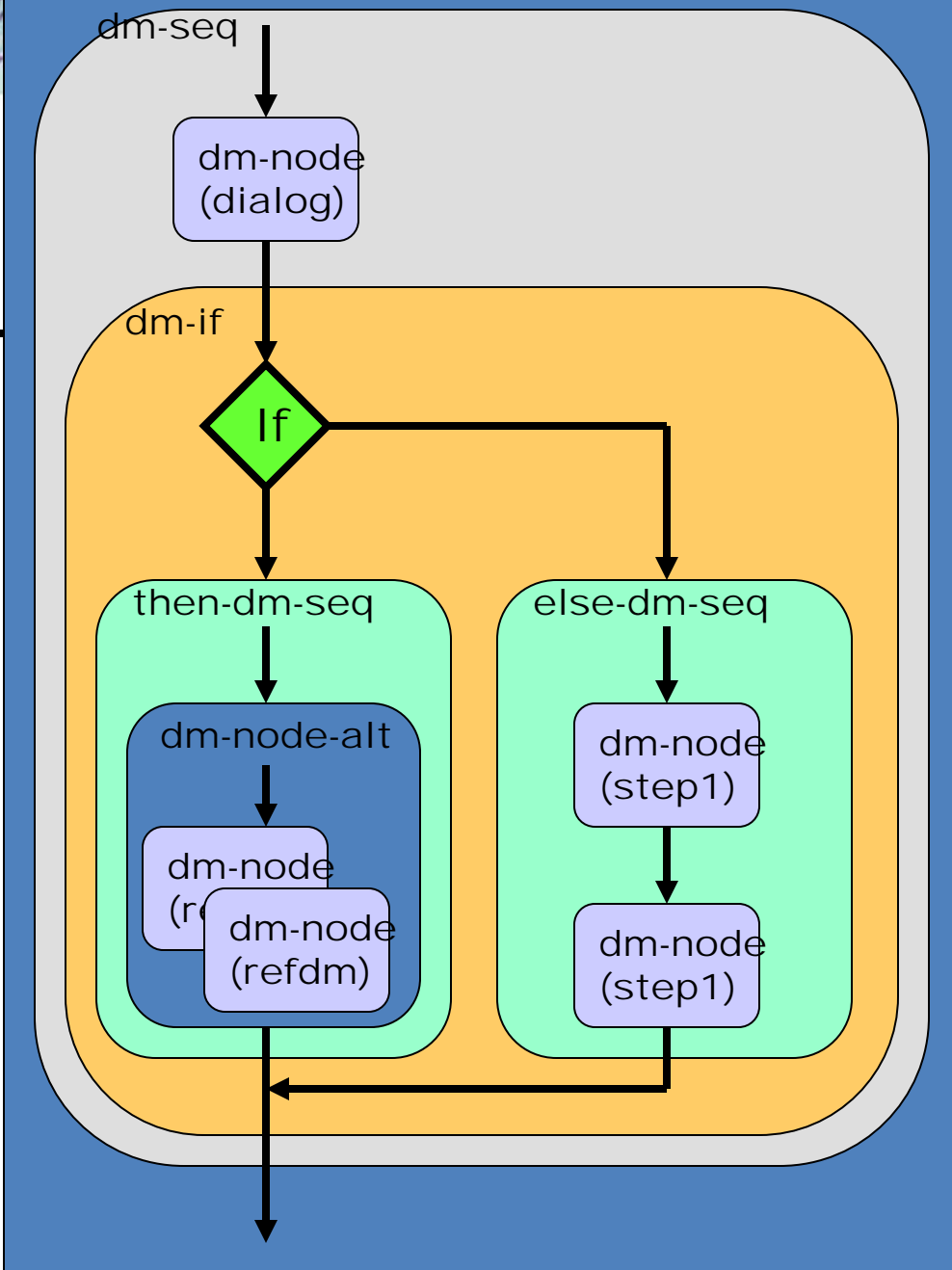


Step 3

- Dm-if executed
- LE evaluates IF expression against variables in the state table
- LE determines path



Process Data Module



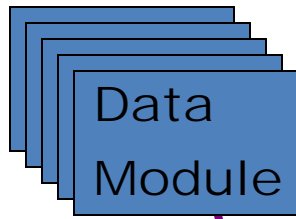
Step 4

- LE takes then-dm-seq path
- Dm-node-alt executed
- Each dm-node applic in the alt is evaluated against variables in the state table
- The first dm-node with applic TRUE is executed

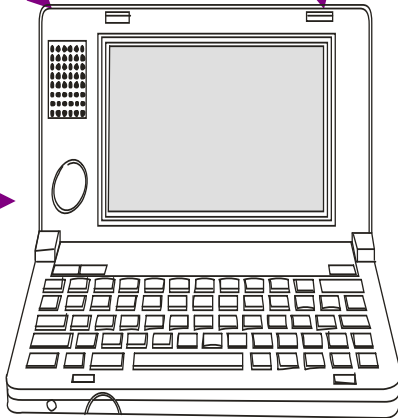
Logic Engine (Software)

State Table

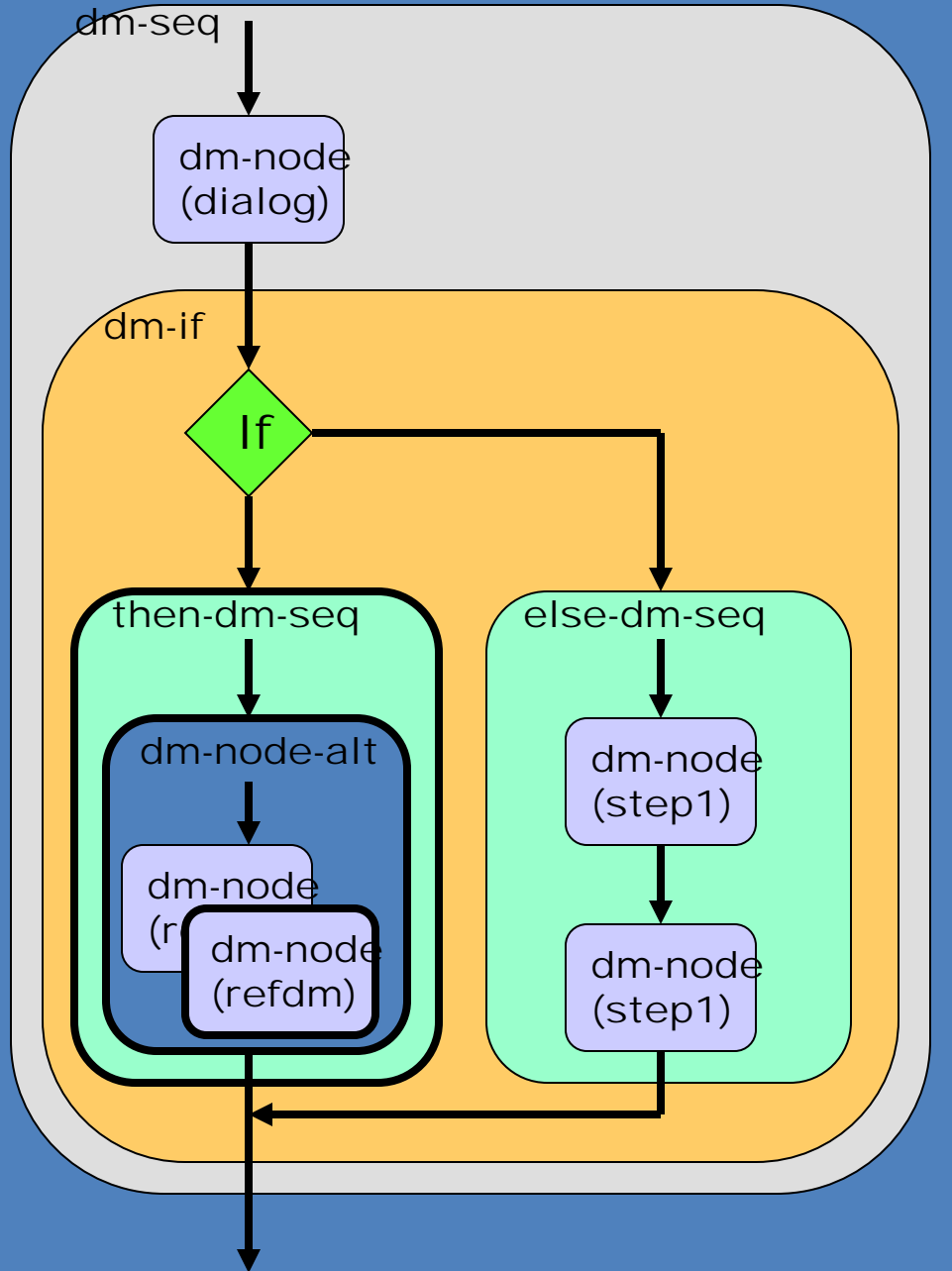
Var1	12
Var2	TRUE
Etc...	



IETP

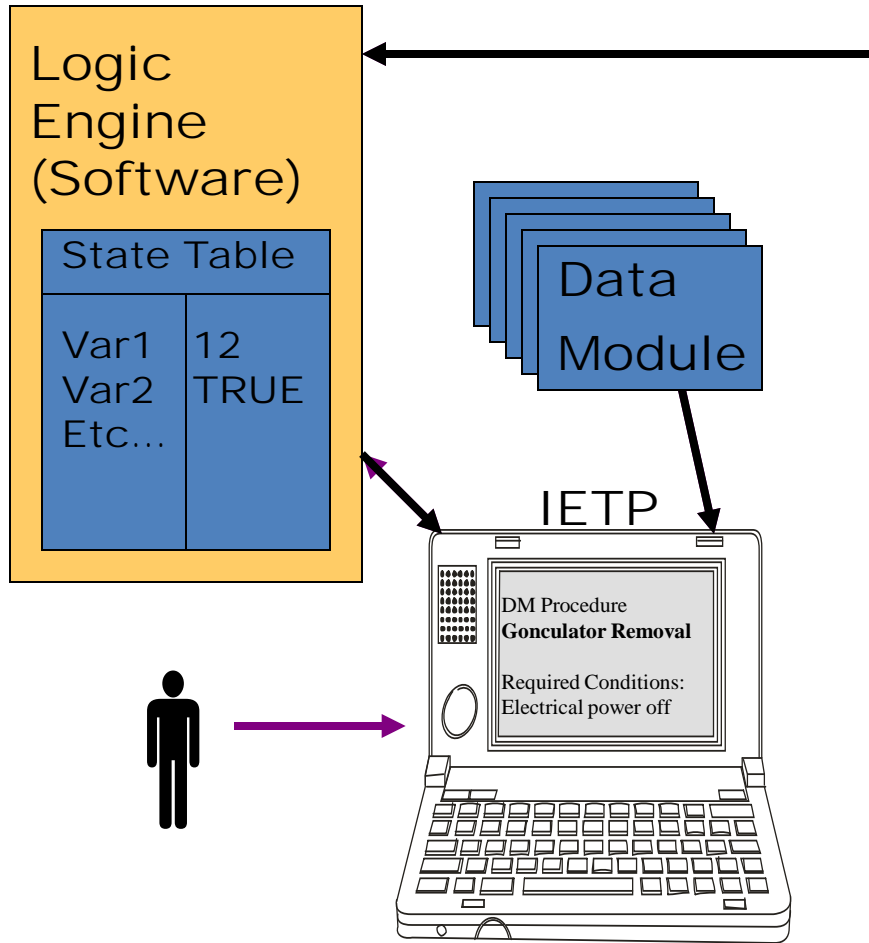


Process Data Module

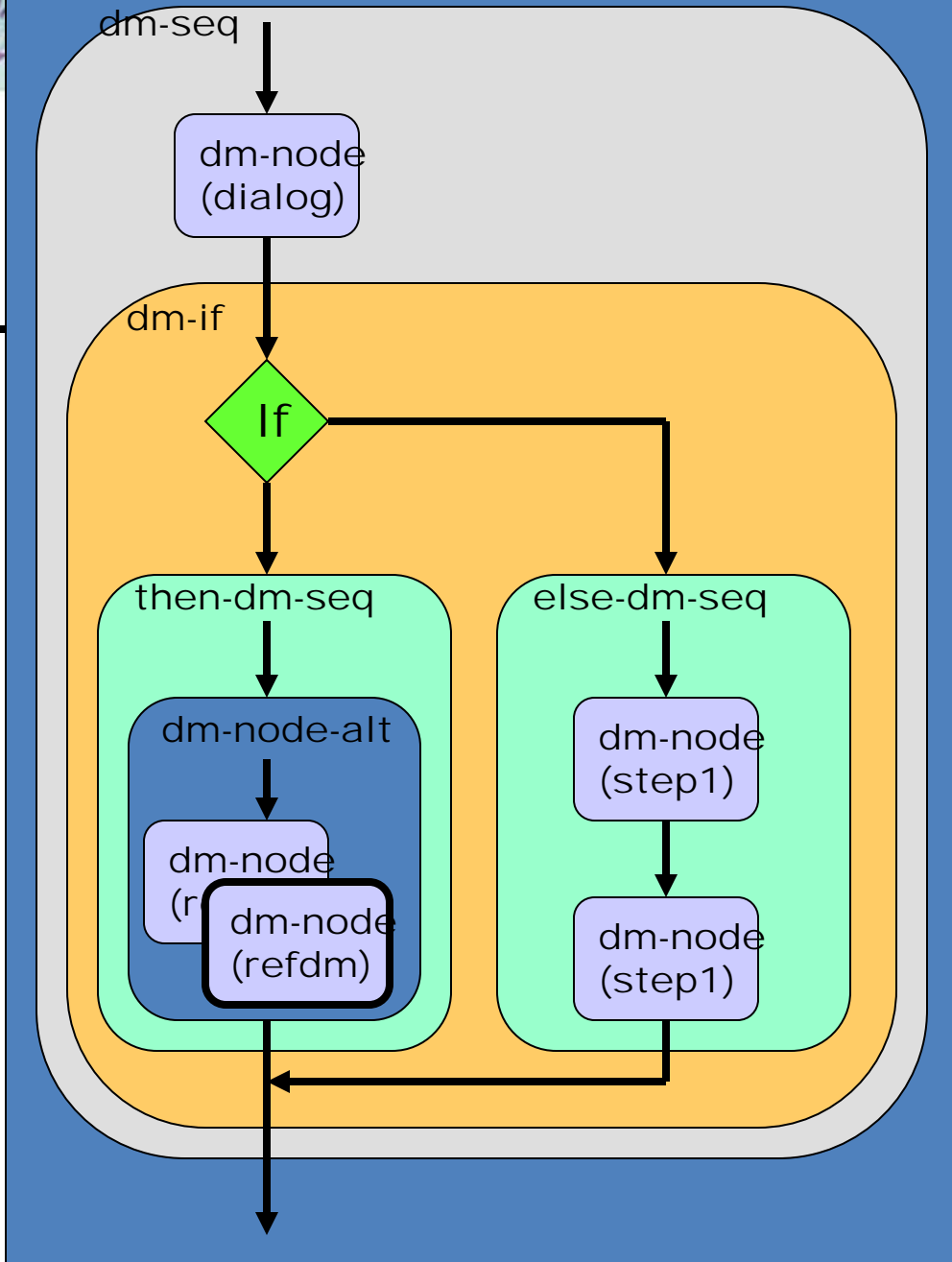


Step 5

- Dm-node indicates refdm to display
- LE notifies IETP to display DM
- IETP locates DM and displays it

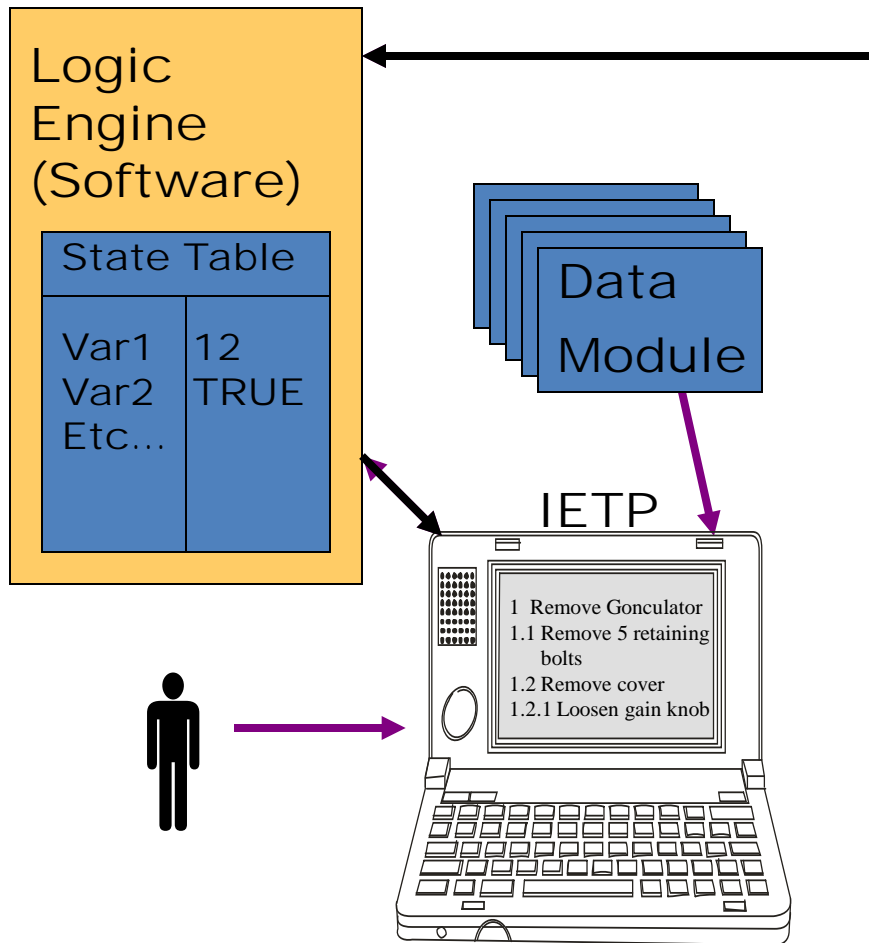


Process Data Module

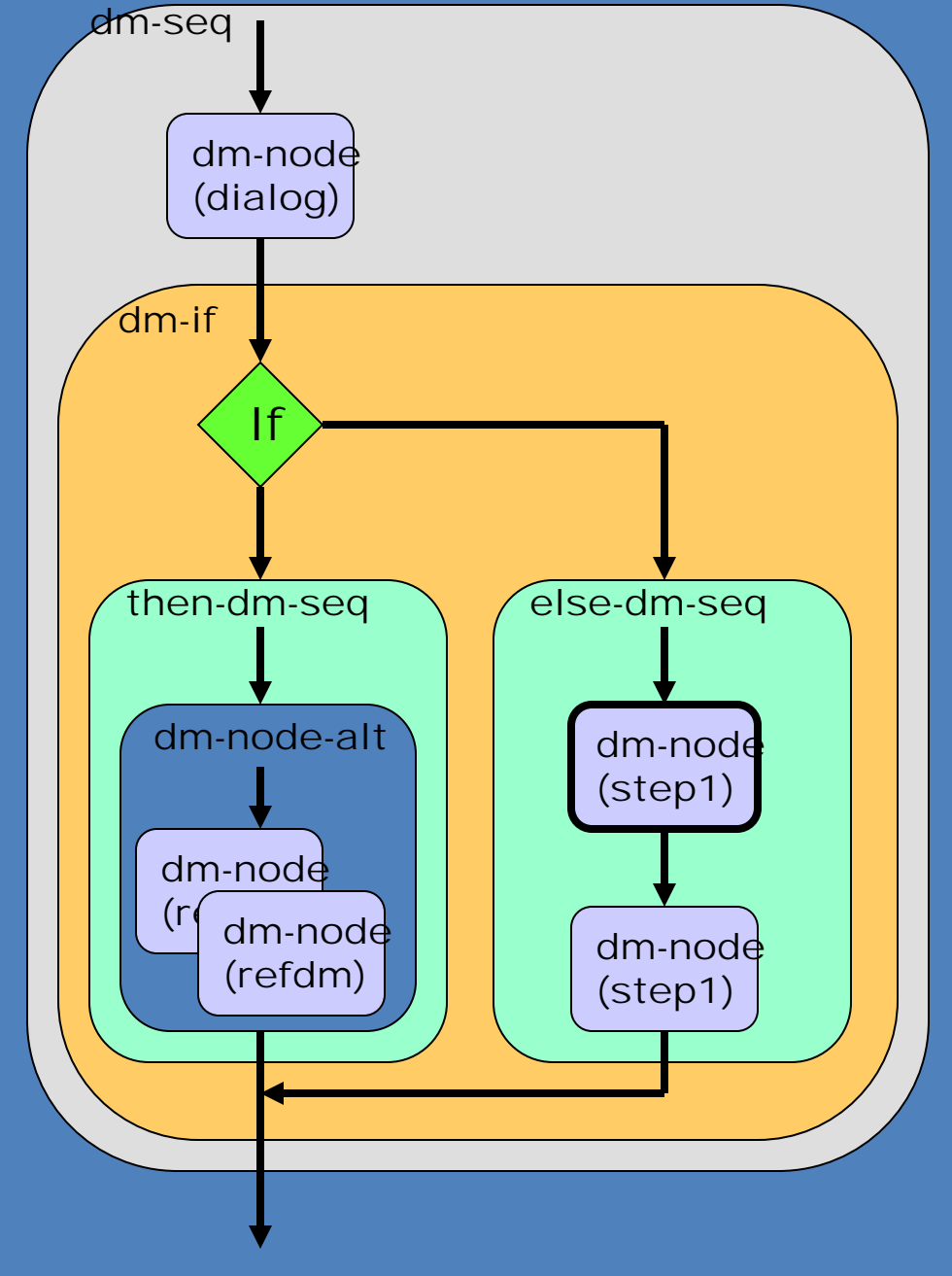


Step 6

- In the else-dm-seq branch
- LE processes dm-node step content
- LE sends step fragment to IETP for display

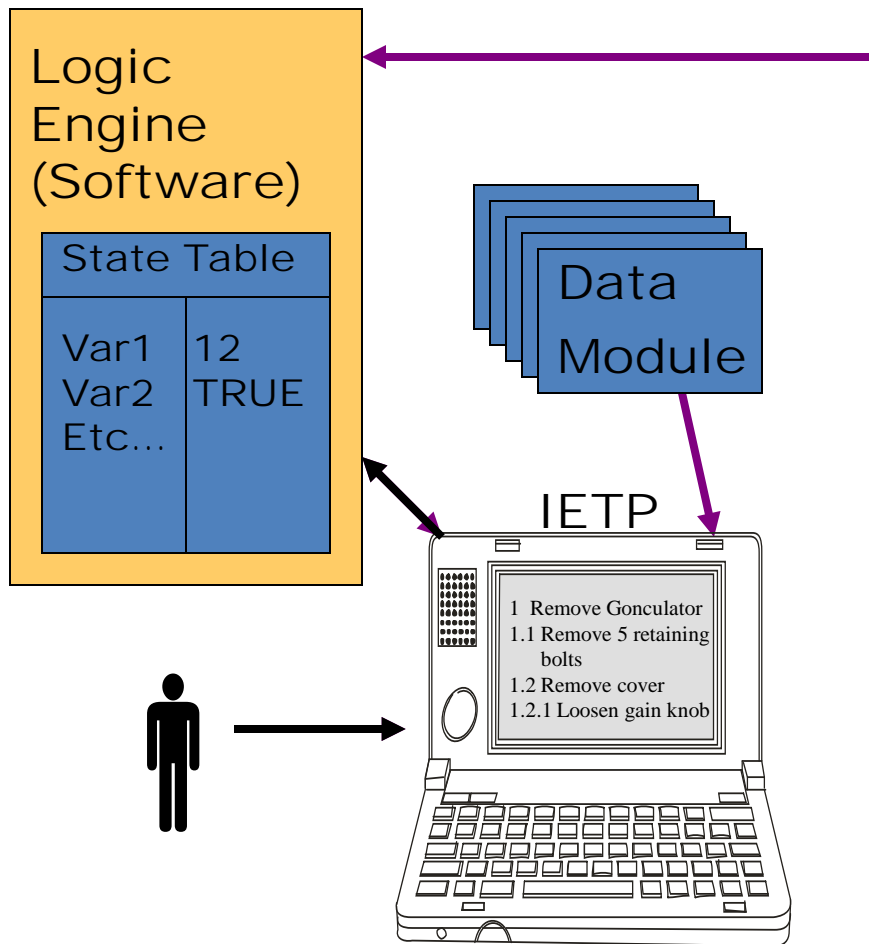


Process Data Module

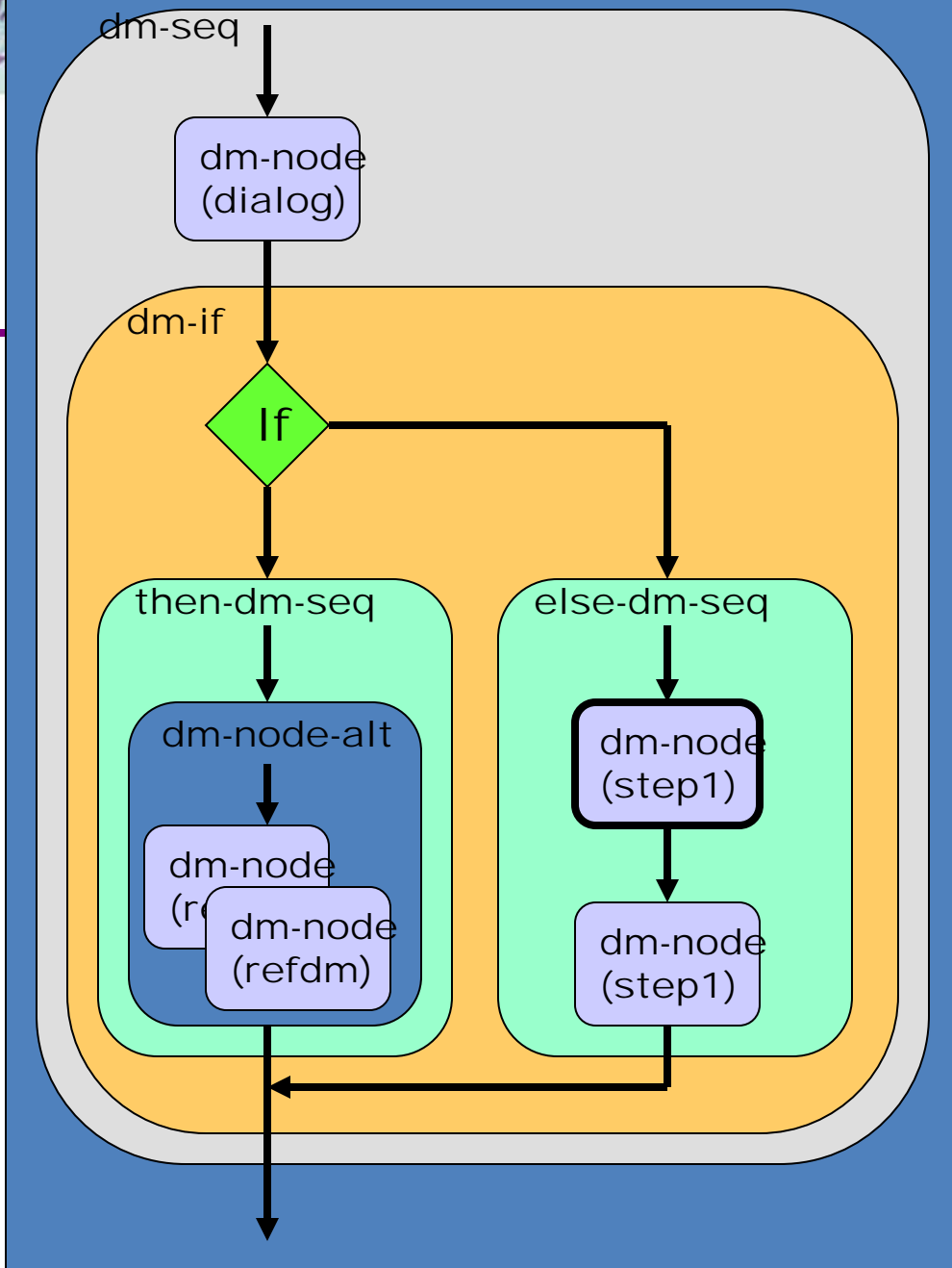


Step 7

- User activates NEXT function in IETP
- IETP notifies LE to move NEXT

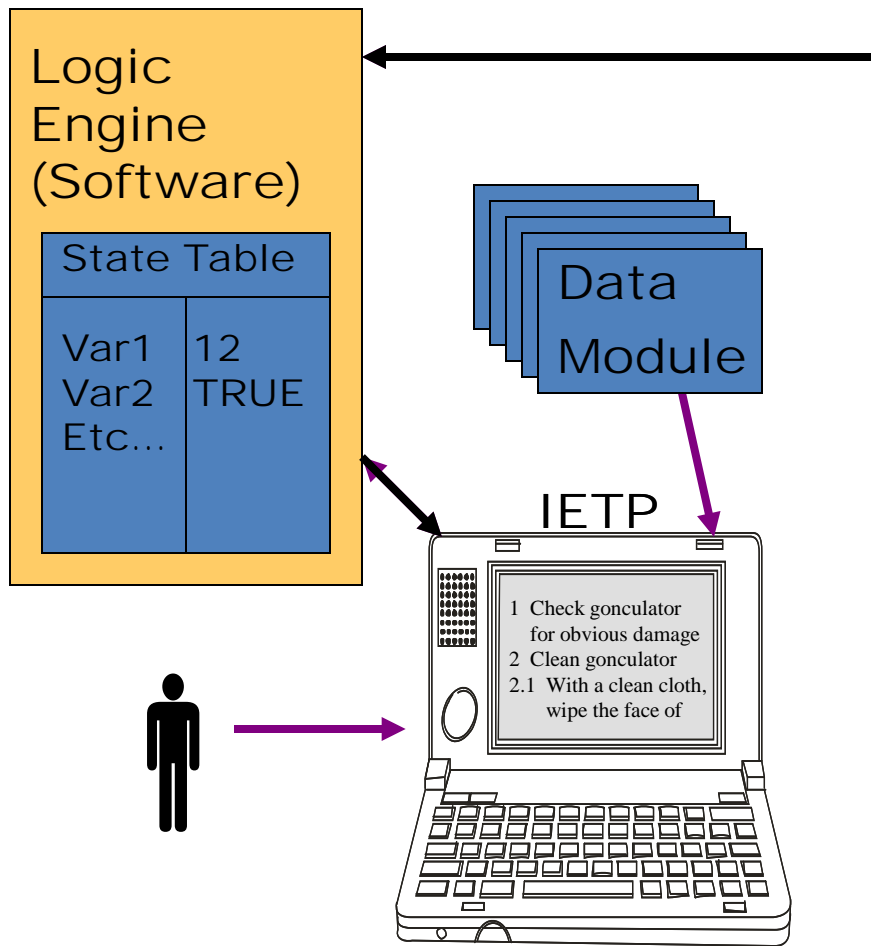


Process Data Module

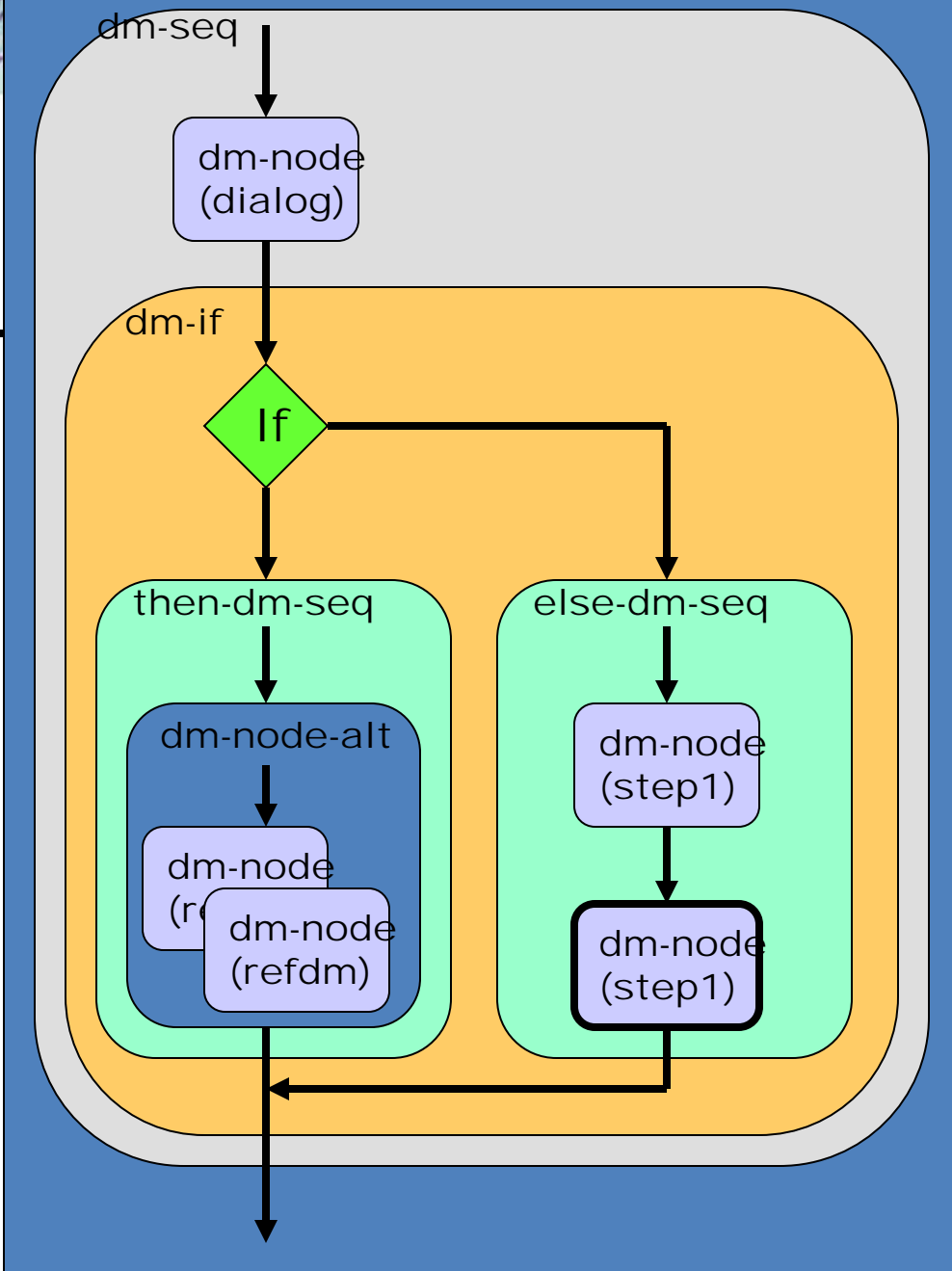


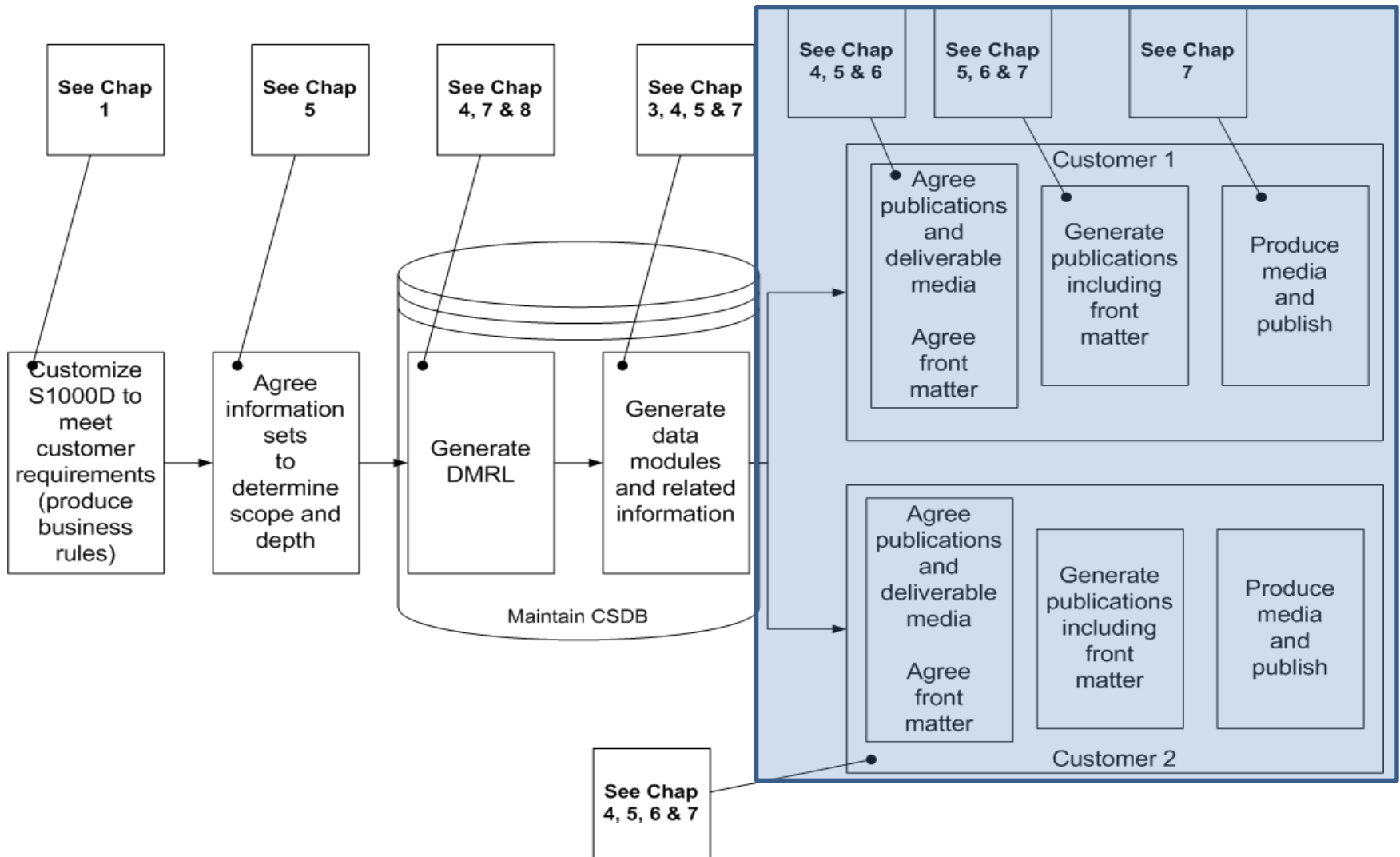
Step 6

- LE processes next dm-node step content
- LE sends step fragment to IETP for display

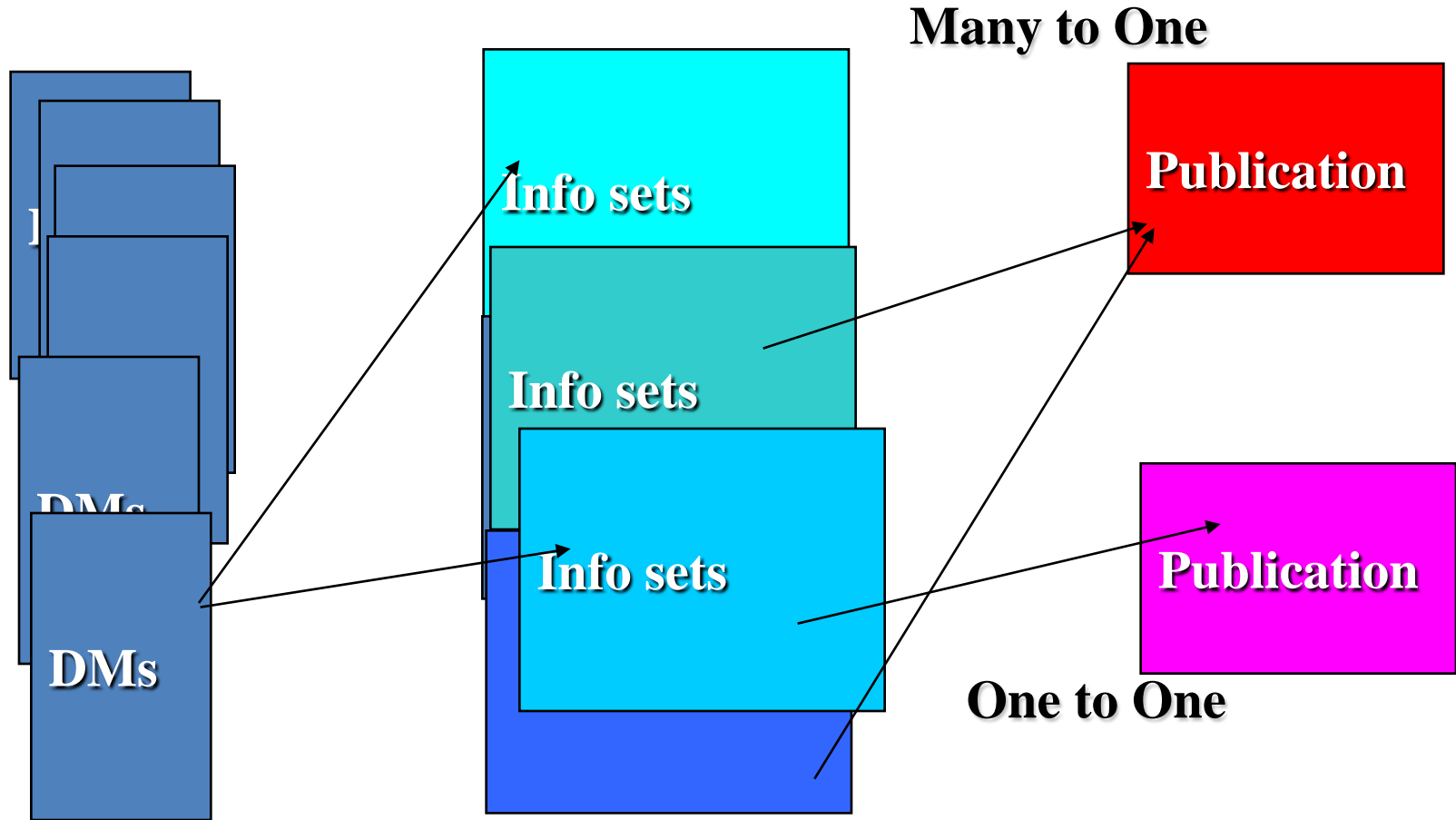


Process Data Module





Publication



S1000D - Outputs

- S1000D allows two forms of output
 - Paper
 - User driven based paradigm
 - Output to suit user
 - Electronic
 - Web based delivery
 - Data in SGML/XML form
 - Starting to increase functionality