

A framework
used to bridge
between the
language of
business and
PLCS

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GLOBAL PRODUCT DATA
INTEROPERABILITY
S U M M I T
2017



ELYSIUM

Parker Aerospace

NORTHROP GRUMMAN

BOEING

ELYSIUM

Parker Aerospace

NORTHROP GRUMMAN

BOEING



2007



**US Army
and AMG**

**PDM,
ERP, LOG**

4%

CDO?

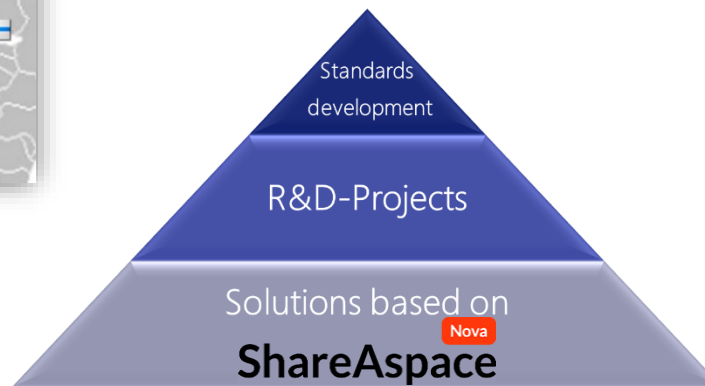
Eurostep

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eurostep

- Eurostep is the company
- PLCS is the ISO Standard
- ShareSpace is the software



Public Safety/National Security



Need for data quality



Speed



Volume



Accuracy



Automation



40%

20%

SPEED
LIMIT
30

Quality



Important!

“Data quality is a perception or an assessment of data's fitness to serve its purpose in a given context.”

- TechTarget

quality

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...or perhaps this is closer to the reality.

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As-Is Architecture

A System of Systems at incredible scale

Comprised of

~ 2,500 Applications

On

~5,000 Servers

Affected by

~ 900 changes annually

Impacting

~ 40,000 Users

With

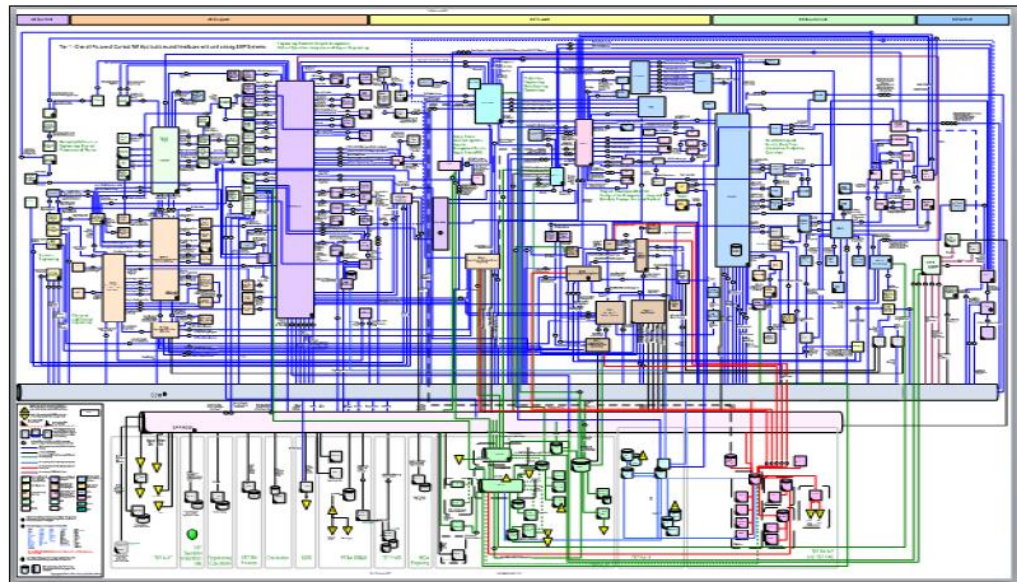
~ 12 copies of the data

And maintaining

~ 9.1 PB of data

Across

7 Countries



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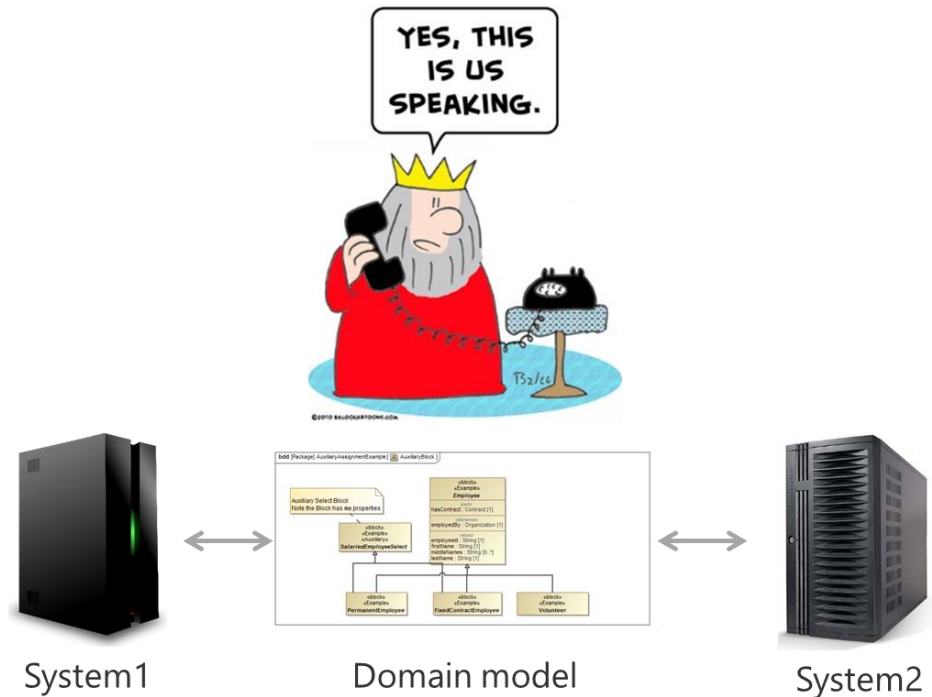
11

Source Boeing, from PDT Europe 2016 in Paris

Pragmatic approach to information management

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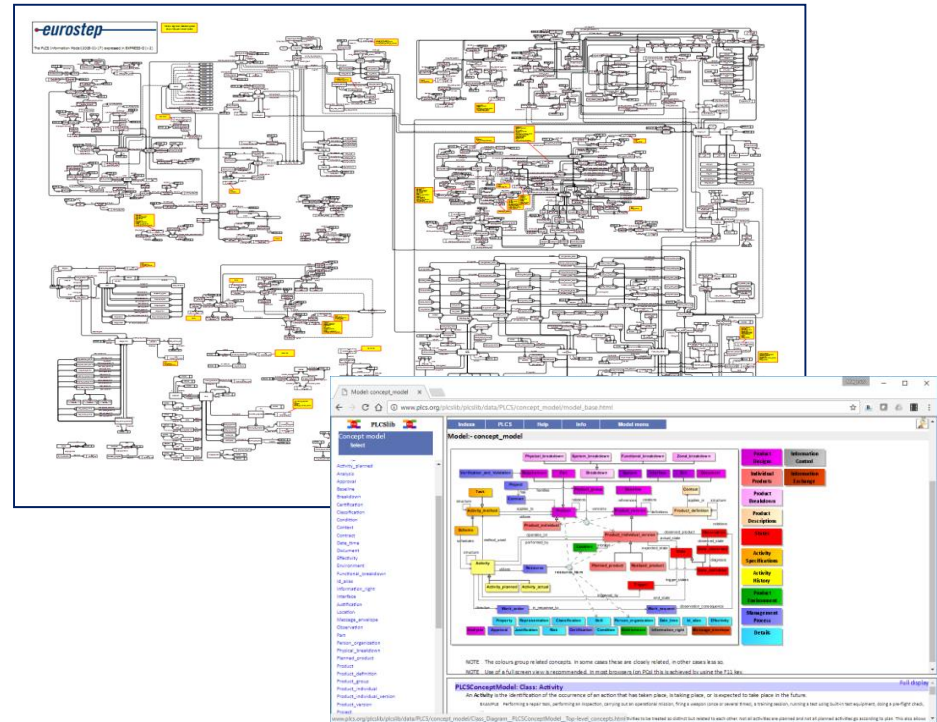
- Define domain model
 - Least-common-denominator
 - Canonical Model
-
- + Easy to understand
 - + Human readable
 - + Quick to execute
-
- Less flexible
 - Hard to extend
 - Re-invent the wheel
 - Not according to standard



Standards approach to information management

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- Rich information model
- Detailed enough to capture all aspects of a product over its complete lifecycle
- Developed by the end users to fit their requirements
- Map customer model to standard



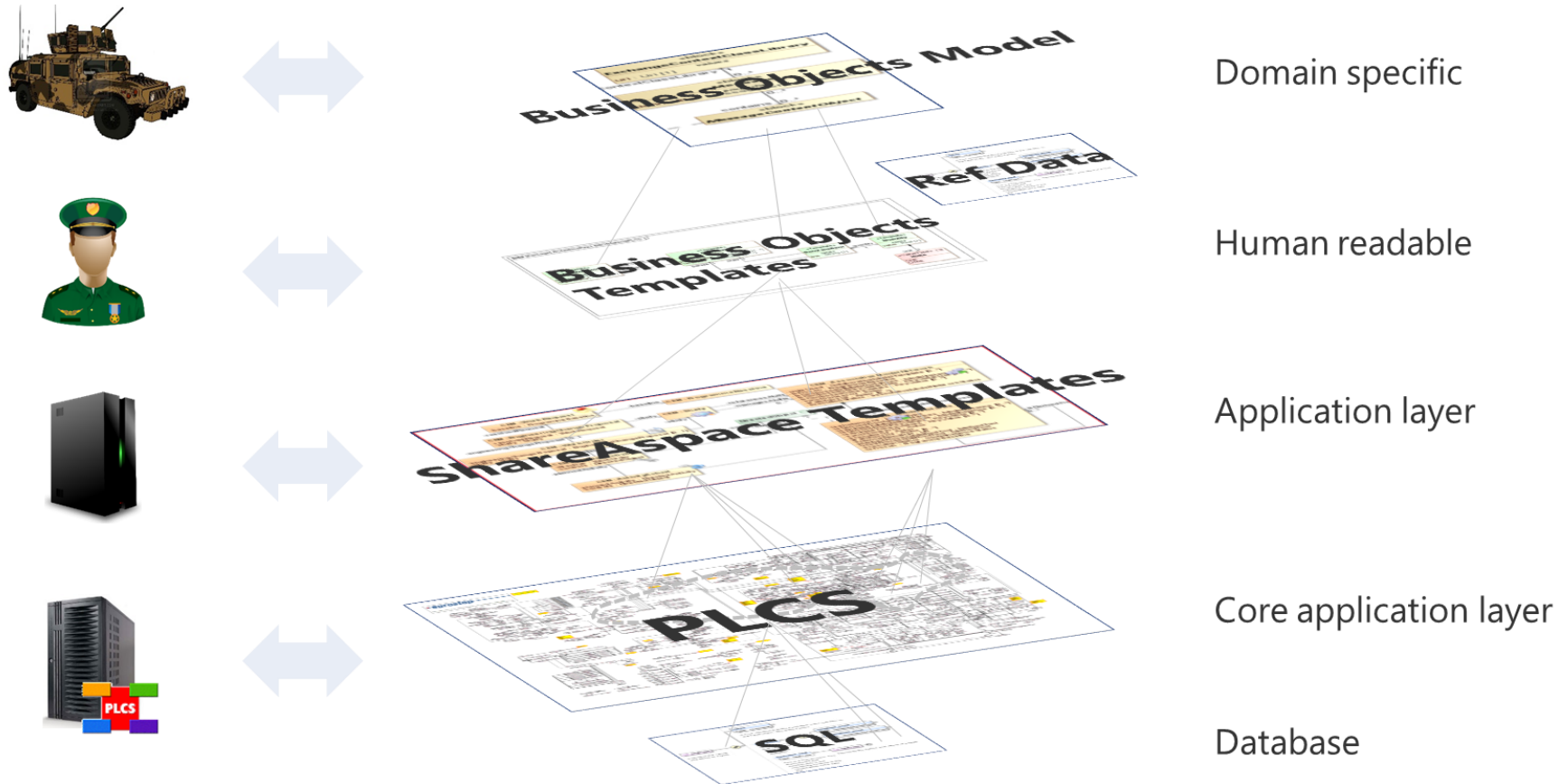
So, which one is the best?

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Focus on your domain, not technical details

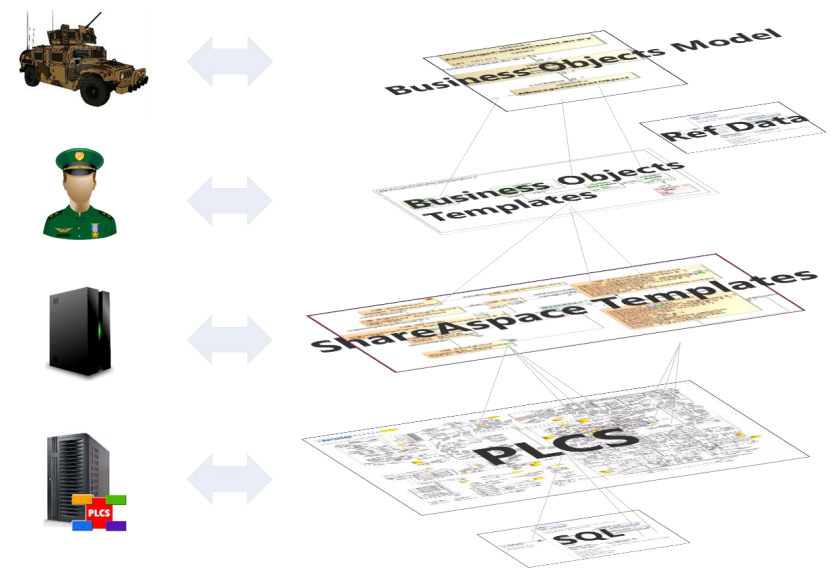
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How to make this happen, in reality

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- Concepts are not new, templates in PLCS have been around for years
- What is new is the realization:
- Modelling language and constructs, SysML & containment
- Datastore



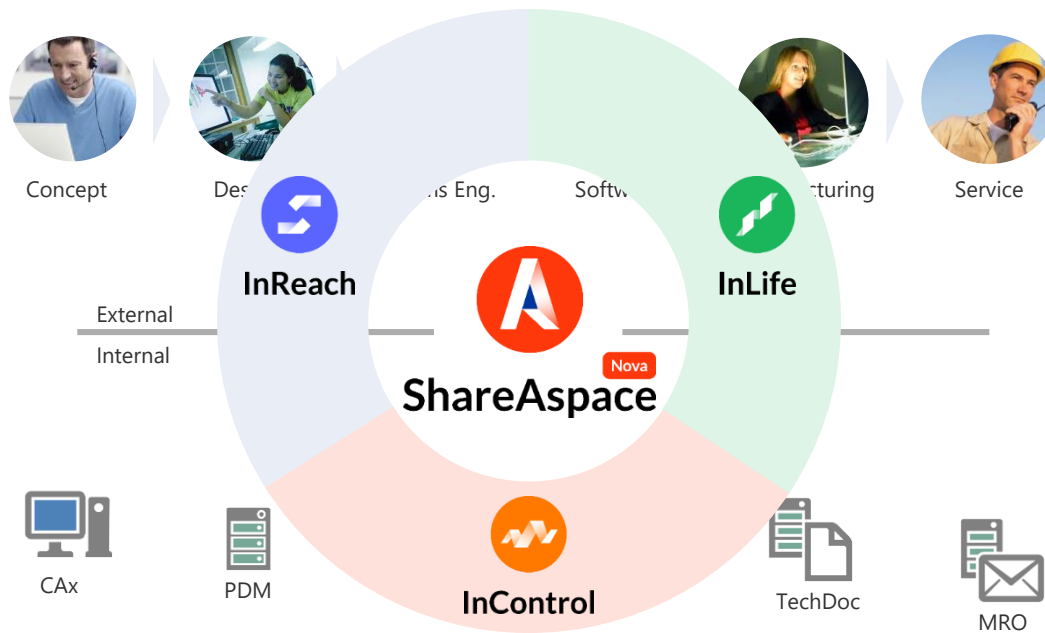
Softtyping in ShareAspace



ShareAspace

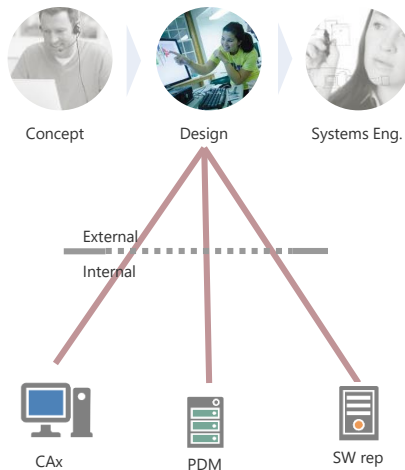
ShareAspace

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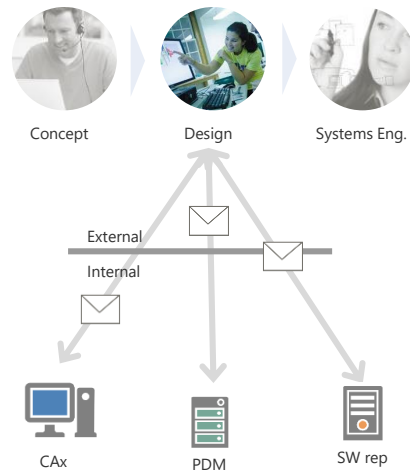


Product data collaboration approaches

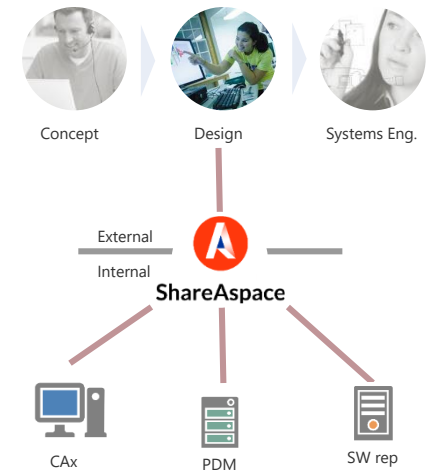
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Common tools



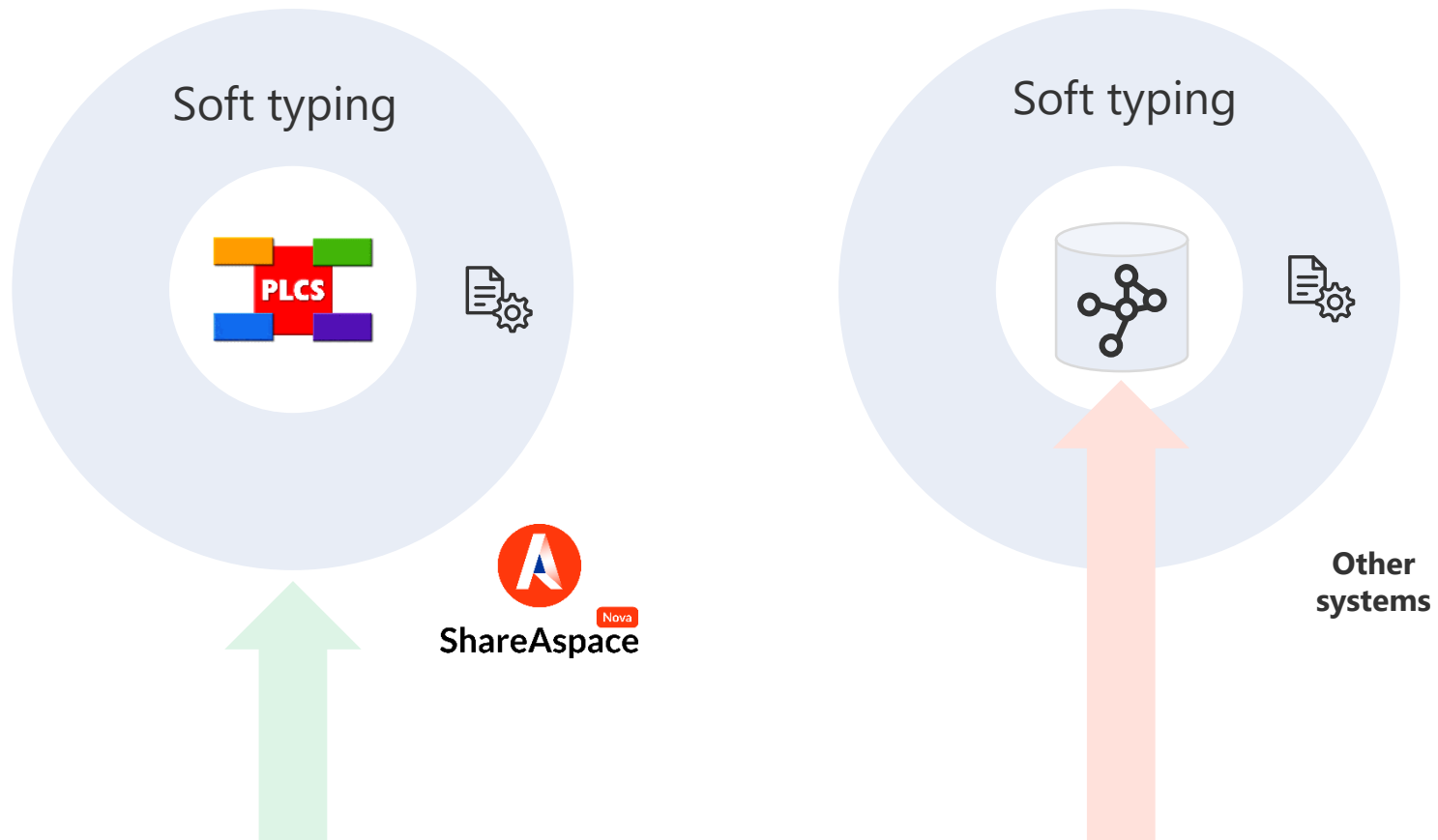
Transactional file exchange



Hub based collaboration

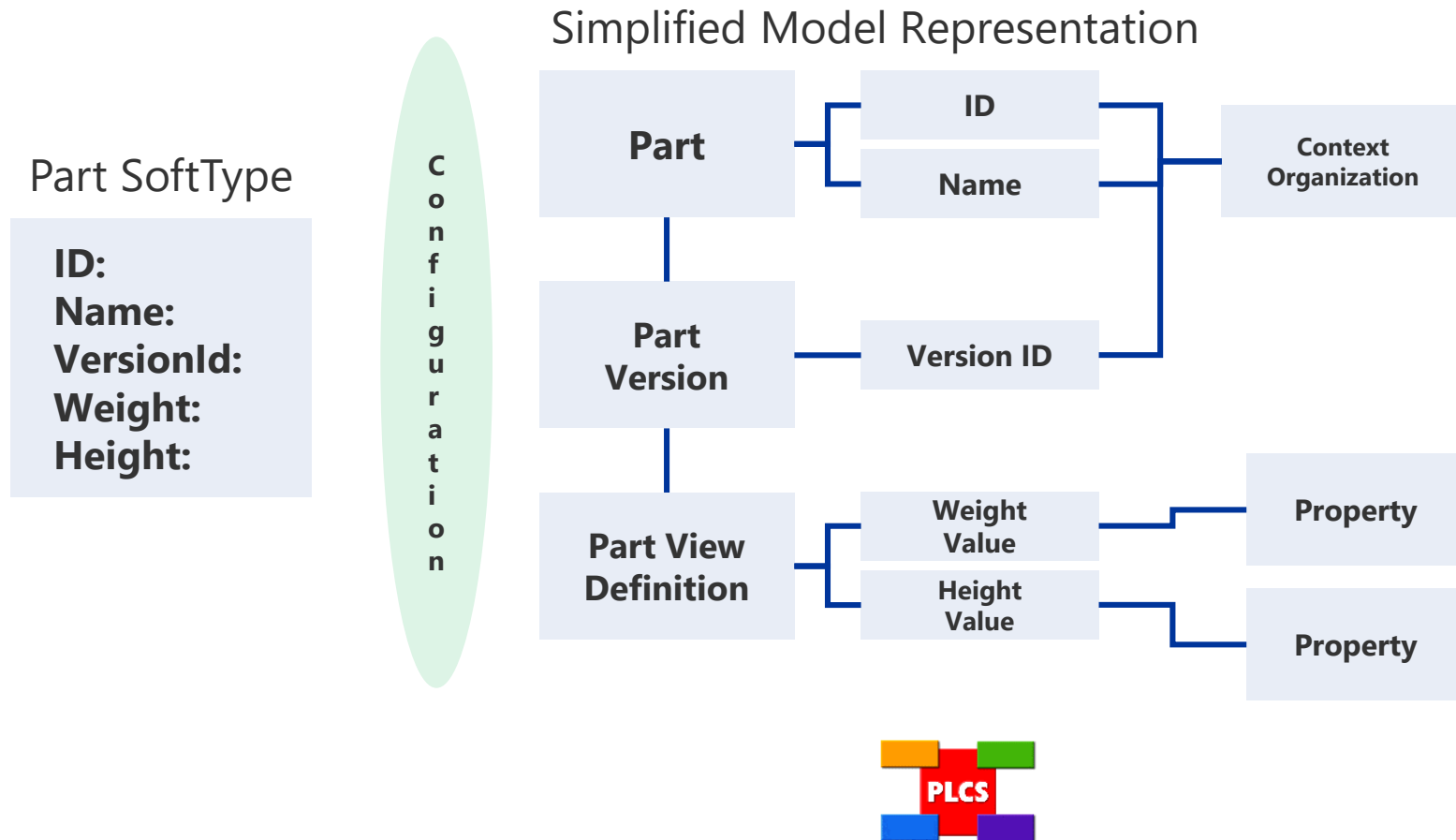
Templates and Soft typing

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SoftType Abstraction

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Typical data

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Bike Manufacturing Inc

PDM
System



CAD Management



ID	V N	NAME	NS N	WEIGH T	HAZ MAT	CRITIC ALITY CODE	OBSL	APPR OVDA TE
13827-LT	4	HEADLIGHT	3055-00-721-4790	0.234	X			20160112
13782-LT	2	TAILLIGHT	3055-00-721-4791	0.167	Q		OBSL ETE	20151212
12974-ST	5	SADDLE, MALE	3055-00-721-4793	0.370				20160324
13654-FR	1	FRAME, MALE	3055-00-721-4766	2.465	A	GMA		20160512

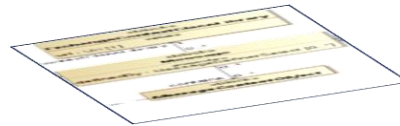
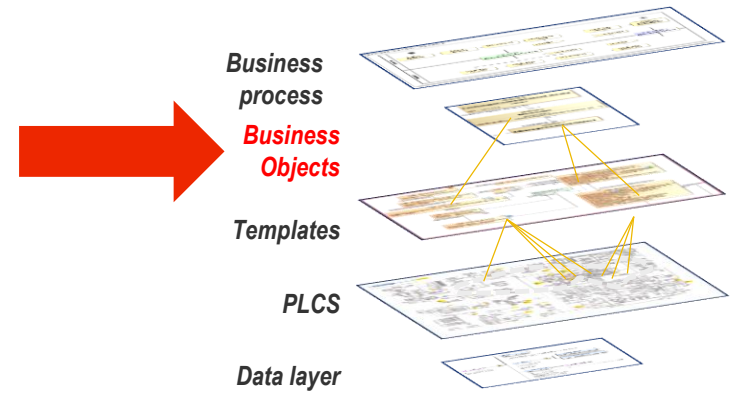
PART	Rev	CAD Model
13827	A	\\bike\headlight.jt
12974	B	\\bike\saddle.jt
13654	A	\\bike\frame.jt

Standard Parts DB



PART_ID	SUPPLIER	CAGE	SUPP_PART_I D	SUPP_PART_NAM E
13827	SEEWELL INC	K1930	HDL27	HEADLIGHT X27
13827	BIKE'N'ALL INC	K1932	232-L82	SUPER BEAM HEADLIGHT
12974	BIKE'N'ALL INC	K1932	345-L21	MALE SADDLE BX
12974	SAD INC	K1933	34 45 65	SOFTCUSHION SADDLE

Business Object Model



PDM System

ID	V N	NAME	NSN	WEIGHT	HAZ MAT	CRITICALITY CODE	OBSL	APPROV DATE
13827-LT	4	HEADLIGHT	3055-00-721-4790	0.234	X			2016 0112
13782-LT	2	TAILLIGHT	3055-00-721-4791	0.167	Q		OBSOLETE	2015 1212
12974-ST	5	SADDLE, MALE	3055-00-721-4793	0.370				2016 0324
13654-FR	1	FRAME, MALE	3055-00-721-4766	2.465	A	GMA		2016 0512

Standard Parts DB

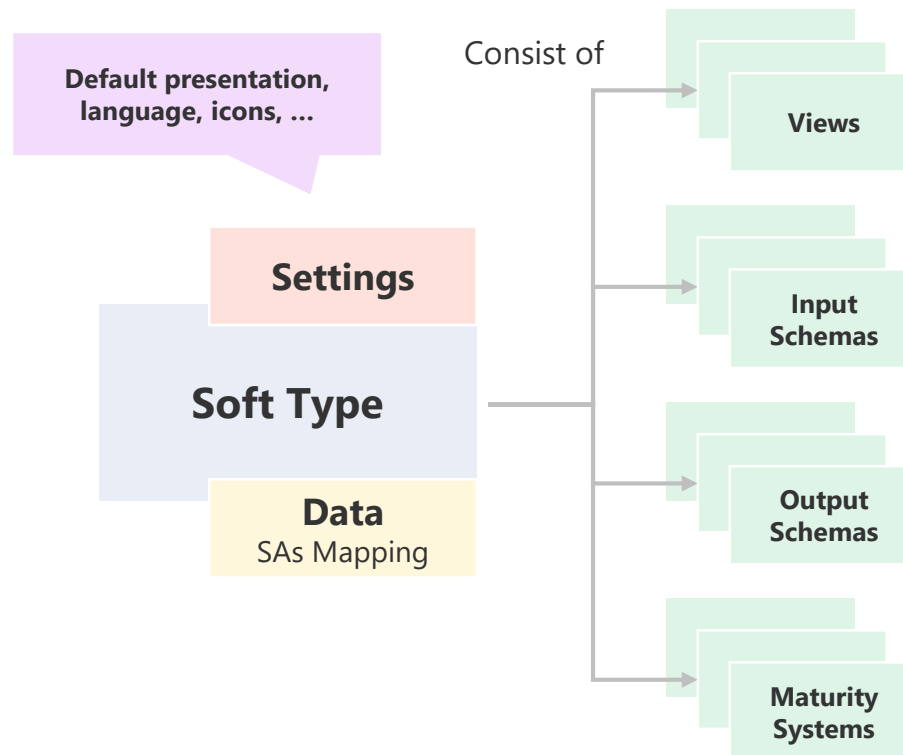
PART_ID	SUPPLIER	CAGE	SUPP_PART_ID	SUPP_PART_NAME
13827	SEEWELL INC	K1930	HDL27	HEADLIGHT X27
13827	BIKE'N'ALL INC	K1932	232-L82	SUPER BEAM HEADLIGHT
12974	BIKE'N'ALL INC	K1932	345-L21	MALE SADDLE BX
12974	SAD INC	K1933	34 45 65	SOFTCUSHION SADDLE

CAD Management

PART	Rev	CAD Model
13827	A	\\bike\headlight.jt
12974	B	\\bike\saddle.jt
13654	A	\\bike\frame.jt

Configuring Soft Types

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Tools available

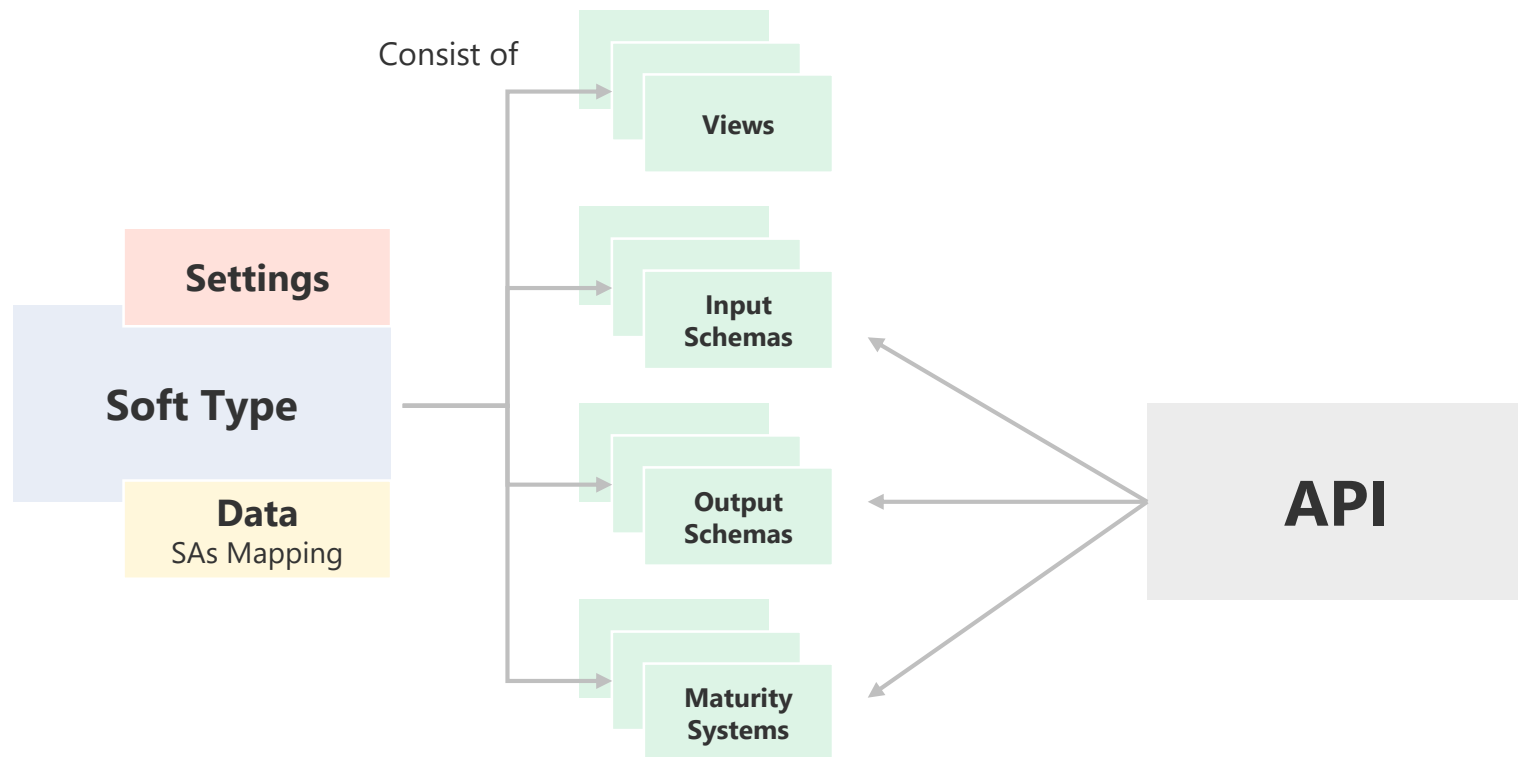
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The screenshot displays the 'start project' window of the Global Product Data Interoperability Summit 2017 software. The interface is divided into several sections:

- Left Sidebar:** A list of project types including PARTICIPANT, ROLE, ORIGINATINGSYSTEM, ORGANIZATION, APPLICATIONCONTEXT, GENERALCLASS, PERSON, PROPERTY, UNIT, LEVELSTATE, SPACEPROFILE, DXQUEUE, DXINSTALLEDTASK, SOFTTYPEEXCELIMPORTJOB, SOFTTYPEEXCELIMPORTJOBADAPTIVE, SOFTTYPEEXCELIMPORTJOBSTAGED, EXCELTEMPLATEJOB, SOFTTYPEIMPORTJOB, AP242IMPORTJOB, PLAINIMPORTJOB, XPDMIMPORTJOB, WORKITEM, SHAREPACK, AP242EXPORTJOB, PLAINEXPORTJOB, SOFTTYPEEXCELEXPORTJOB, SOFTTYPEEXPORTJOB, COLLABORATIONITEM, CONTRACT, **DESIGNPART** (highlighted), DOCUMENT, PROJECT, PROJECTCOLLABORATIONBREAKDOWN, and REGIONALPROJECT. An 'add softtype' button is at the bottom.
- Top Bar:** Includes a 'start project' button and a menu bar with 'TEMPLATE', 'SOFT TYPES', 'INDEXES', 'QUERIES', 'STRUCTURES', 'SHARE PACKS', and 'CLIENTS'. The main menu tabs are 'GENERAL', 'SETTINGS', 'DATA', 'MATURITY SYSTEMS', 'INPUT SCHEMAS', 'OUTPUT SCHEMAS', 'VIEWS', and 'INSTANCES'.
- Central Panel:** Displays the 'GENERAL' settings for a project. It shows a tree view of the project structure with nodes like 'Part', 'Design', 'Attributes', and 'Manufacturing'. Each node has associated fields for 'Id', 'Label', 'Input Schema', 'Output Schema', 'Binding', 'Effectivity', and 'Disabled'. For example, the 'Part' node has a 'Label' of '@default' and a 'Description' of 'Part'. The 'Design' node has a 'Label' of '@default' and a 'Description' of 'Design'. The 'Attributes' node has a 'Label' of '@default' and a 'Description' of 'Attributes'. The 'Manufacturing' node has a 'Label' of '@default' and a 'Description' of 'Manufacturing'. Below these, there are sections for 'Add New Label' and 'Column Group'.
- Right Panel:** Contains a vertical toolbar with icons for 'move up', 'move down', 'delete', and 'add view'.

Configuring Soft Types - API

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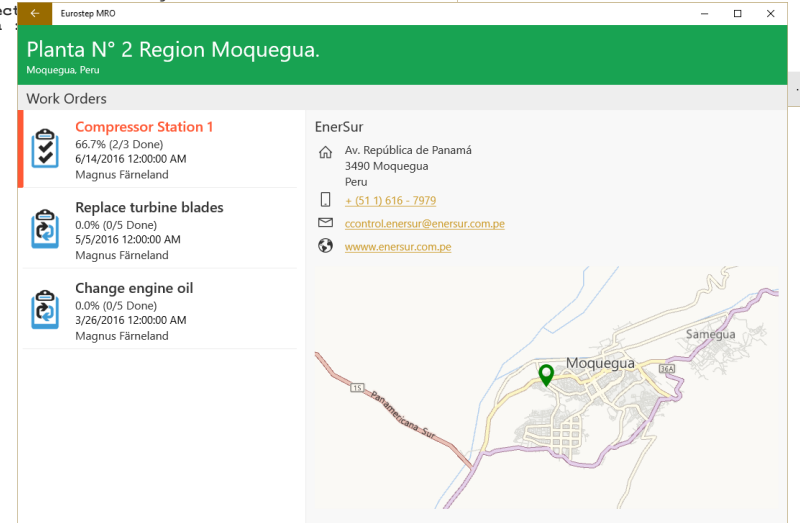
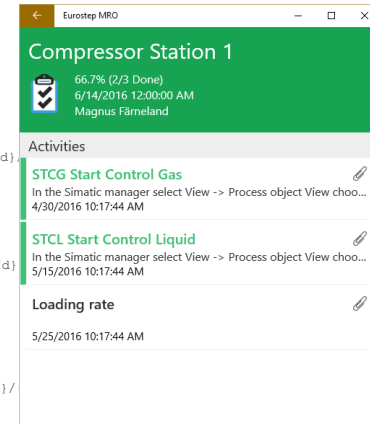
REST APIs

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- Open and Documented
- OAuth 2.0
 - Industry standard REST authorization approach
- The User Interface is only using the REST APIs
- Dynamic based on configuration
- Stateless
 - Industry standard REST approach
 - Using HATEOAS, Hypermedia as the Engine of Application State

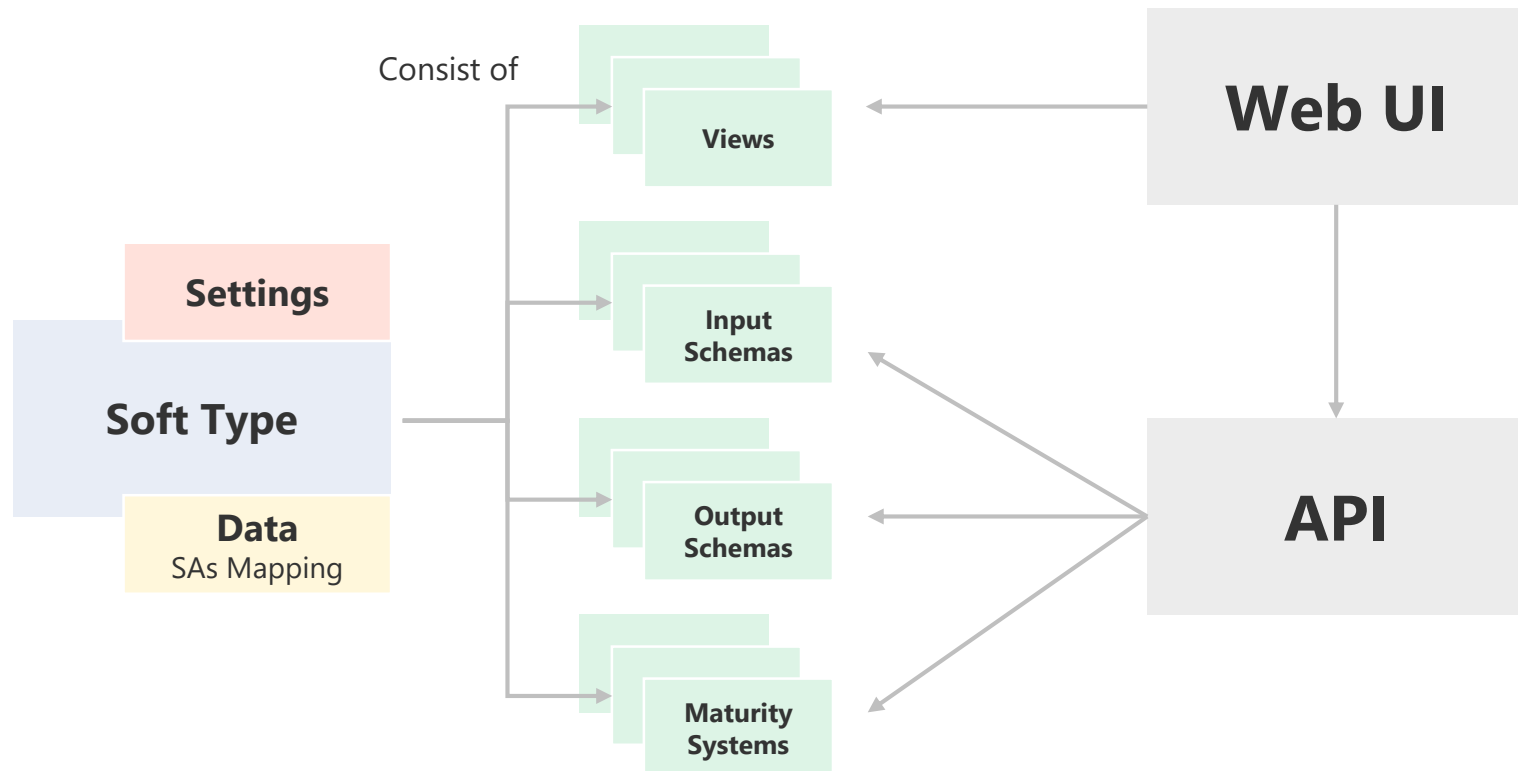
SoftType REST API

```
GET - /project/{!_projectId}/softtype/{definitionId}.swagger
      definitionId : String
GET - /project/{!_projectId}/softtype/{name}.schema.json
      name : String
GET - /project/{!_projectId}/softtype/{objectId}
      objectId : String
GET - /project/{!_projectId}/softtype/{definitionId}/{objectId}
      definitionId : String
      objectId : String
GET - /project/{!_projectId}/softtype/{definitionId}/{outputSchemaId}
      definitionId : String
      outputSchemaId : String
      objectId : String
POST - /project/{!_projectId}/softtype/{definitionId}
      definitionId : String
      data : [FromBody] JObject
POST - /project/{!_projectId}/softtype/{definitionId}/{inputSchemaId}
      definitionId : String
      inputSchemaId : String
      data : [FromBody] JObject
PUT - /project/{!_projectId}/softtype/{definitionId}/{objectId}
      definitionId : String
      objectId : String
      data : [FromBody] JObject
PUT - /project/{!_projectId}/softtype/{definitionId}/{inputSchemaId}/
      definitionId : String
      inputSchemaId : String
      objectId : String
      data : [FromBody] JObject
```



Configuring Soft Types - UI

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Example of configured UI

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The screenshot displays the ShareAspace web application interface. The browser address bar shows the URL: <https://esaz011.eurostep.com/SASWEB/#/space/TrendBikes/COMMON.DocumentMgmt>. The user is logged in as 'OEMColManager' with the email 'CollaborationManager@OEM@TrendBikes'.

The main navigation bar includes a 'Documents' tab. A 'Create document' modal is open, featuring a 'Type definition' dropdown set to 'Document'. Below this, a 'Description of the document.' field is present.

The 'Document' section contains the following fields:

- Id:** 0114 (marked with a green checkmark)
- Name:** (empty text field)
- Version Id:** (empty text field, marked with a red X)
- Description:** (empty text field)
- Type Class:** Choose... (marked with a red X)
- Subject:** (empty text field)
- Title:** (empty text field)
- Language Code:** Choose... (marked with a red X)
- Document Format:** Choose... (marked with a red X)

The background interface shows a 'Quick search' bar and a list of documents, including 'Sketch1, 1'.

Example of configured UI

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The screenshot displays the 'ShareSpace / TrendBikes' application interface. The top navigation bar includes the 'ShareSpace / TrendBikes' logo and the user 'OEMColManager' with the email 'CollaborationManager@OEM@TrendBikes'. The main content area is divided into a left sidebar, a central document list, and a right sidebar.

Left Sidebar: Contains a 'Quick search' bar and a list of queries, including 'Created by me', 'All documents', and 'All documents ordered by version'.

Central Document List: Titled 'All documents' with '(1 selected) 999 hits'. It contains a table with the following data:

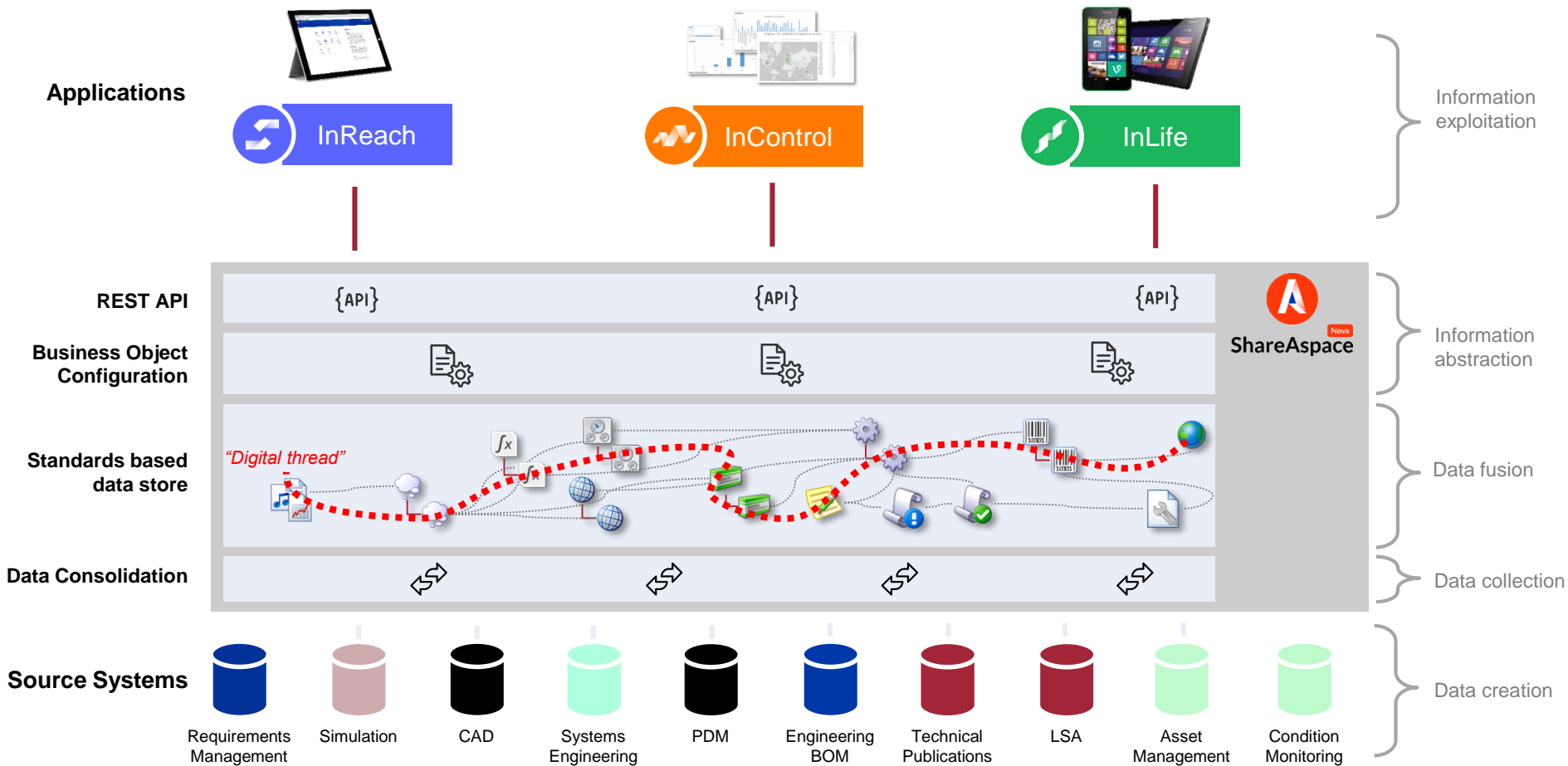
Id	Version	Language	Name	Subject
0023	1		Crank Sketch1	Crank Sketch

Right Sidebar: Displays the maturity system configuration for the selected document '(0023) Crank Sketch1, 1'. It includes a 'Select Maturity System' section with a dropdown menu set to 'Common - Release Process'. Below this, the 'States' section shows the 'Current State' as 'InWork' and the 'Next State' as 'Review', both marked with red 'X' icons. The 'State Machine' is labeled 'Release Process'. A state machine diagram shows a flow from 'InWork' to 'Review' to 'Released'. The 'Attribute Maturity' section contains a table with the following data:

Attribute	InWork	Review	Compliance
Id	✓	✓	
Name	✓	✓	

Framework architecture

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Summary

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- Data quality is very important!
- Use standard data layers (e.g. PLCS) to ensure data consistency and quality, but...
- ...focus on the business processes to build your differentiator.
- You can have the best of both worlds!



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[illegible]

ShareAspace