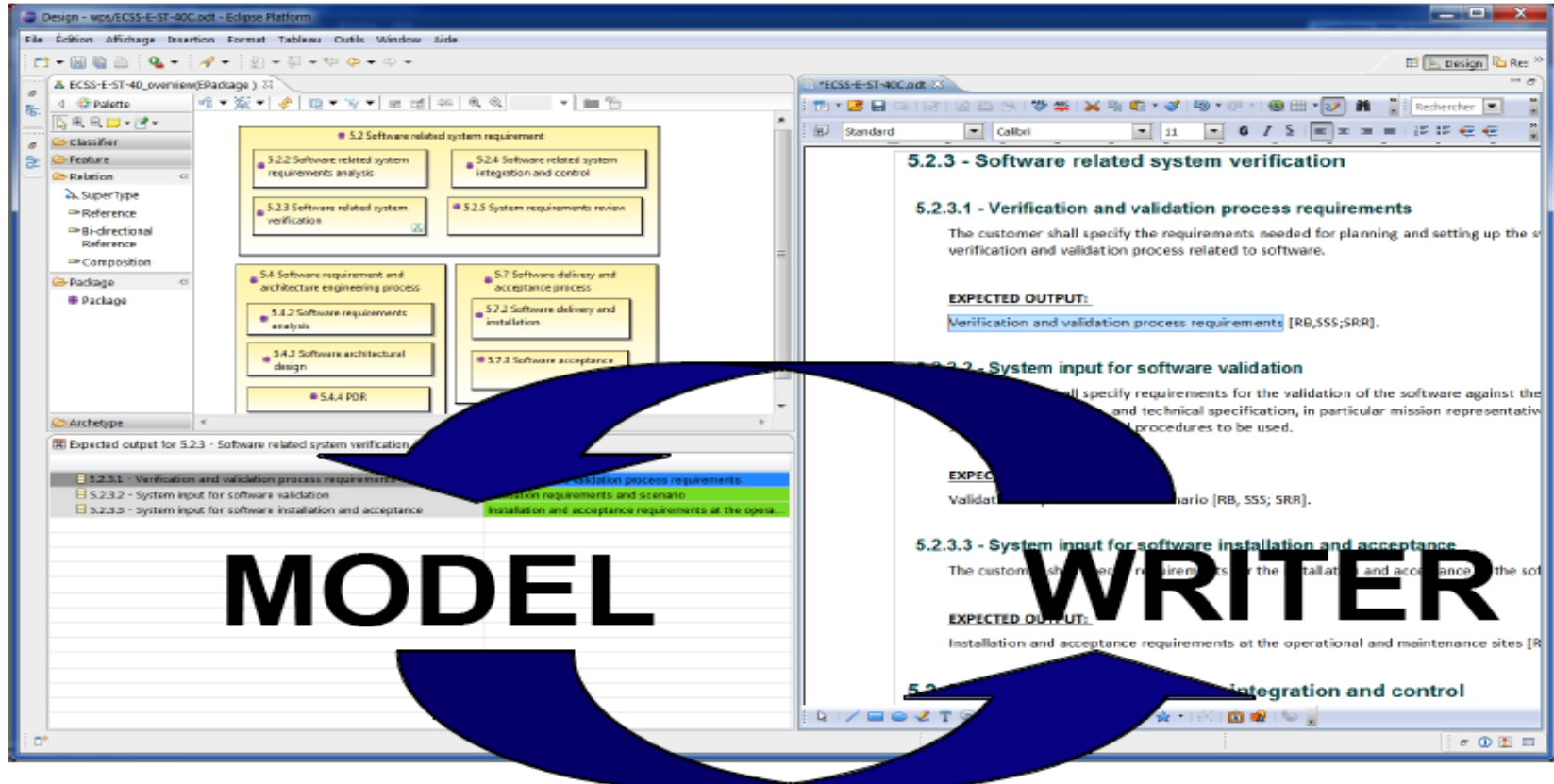


ModelWriter

Text & Model-Synchronized Document Engineering Platform



Project Leader: Ferhat Erata (ferhat@computer.org)




Project Email: project@modelwriter.eu

ModelWriter

Text & Model-Synchronized Document Engineering Platform

The project envisions an integrated authoring environment called "ModelWriter" for Technical Authors (such as Software or Systems Engineers etc.) which will combine a Semantic Word Processor (= the "Writer" part) and a Knowledge Capture Tool (= the "Model" part).

Project information











Project name	13028 ModelWriter
Status	Running
Period	Oct 2014 - Sep 2017
Call	ITEA 2 Call 8
Challenge	Knowledge-based society
Website	www.modelwriter.eu
Partners	10
Countries	 Belgium  France  Turkey

Project leader








Name
 Ferhat Erata
Organisation
 UNIT Information Technologies
 R&D Ltd.
Country
 Turkey
Project involvement
 13028 ModelWriter

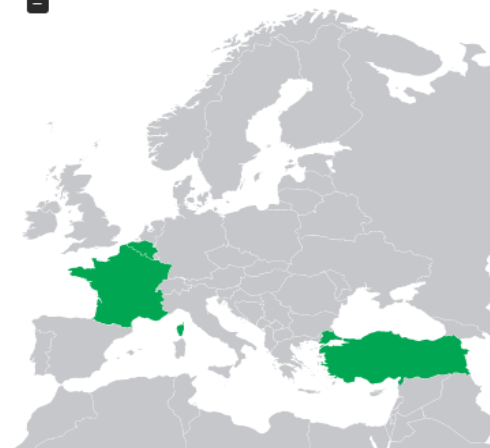
Project partners

Airbus Group SAS  France	Centre National de la Recherche Scientifique  France	Havelsan  Turkey	Hisbim Bilgi ve İletişim Teknolojileri  Turkey
Katholieke Universiteit Leuven  Belgium	KoçSistem  Turkey	Mantis  Turkey	OBEO  France
Sogeti Belgium  Belgium	UNIT Information Technologies R&D Ltd.  Turkey		

Project documents

Project publications

-  [ITEA Annual report 2013 published online](#)
-  [ModelWriter Posters Co-summit 2015](#) 
-  [ModelWriter Project Leaflet](#) 



ModelWriter

Project Overview



Resource Allocation: 68,71 person year

Project Duration: 36 months

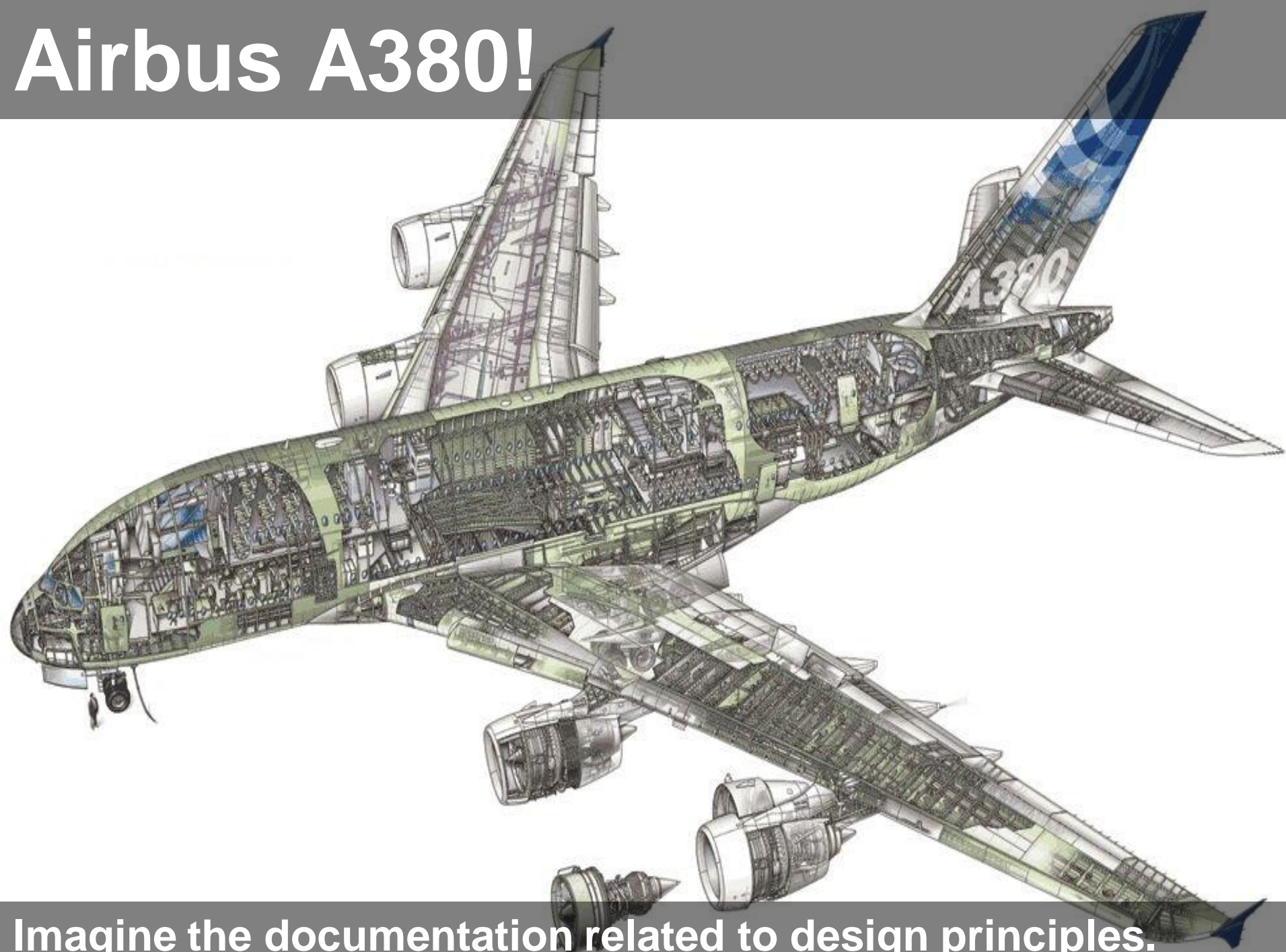
Planned Budget: 5,543,000 Euro

Start and Finish Date: 01 Oct 2014 – 30 Sep 2017

Open-Source Software Platform to be submitted to Eclipse Foundation

What is the problem?

Airbus A380!



Imagine the documentation related to design principles.

Plants!



Imagine the documentation of a construction site.

Documentation!



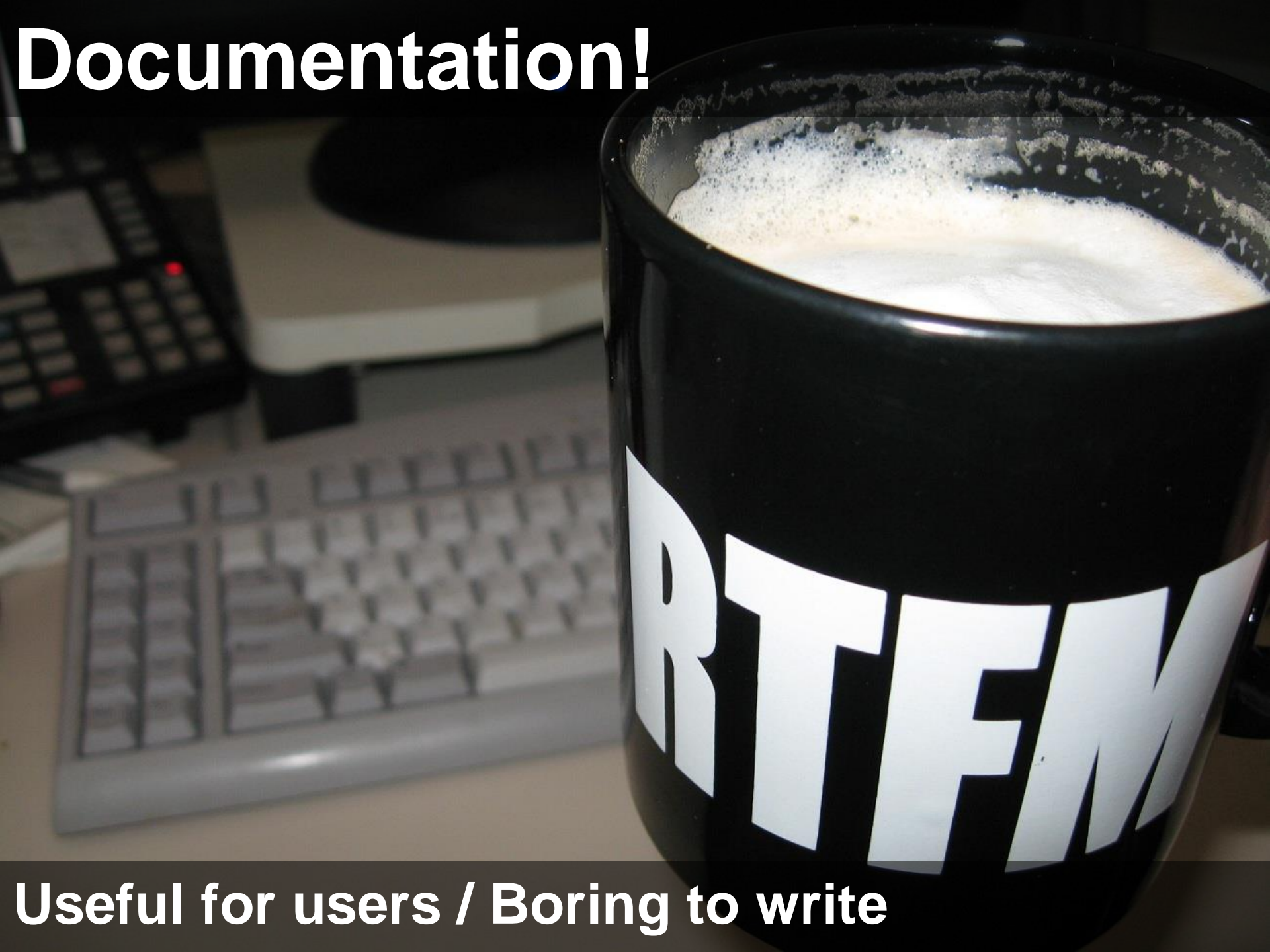
Write once ... and never look at after

Documentation!



Hard to keep it up-to-date

Documentation!



Useful for users / Boring to write

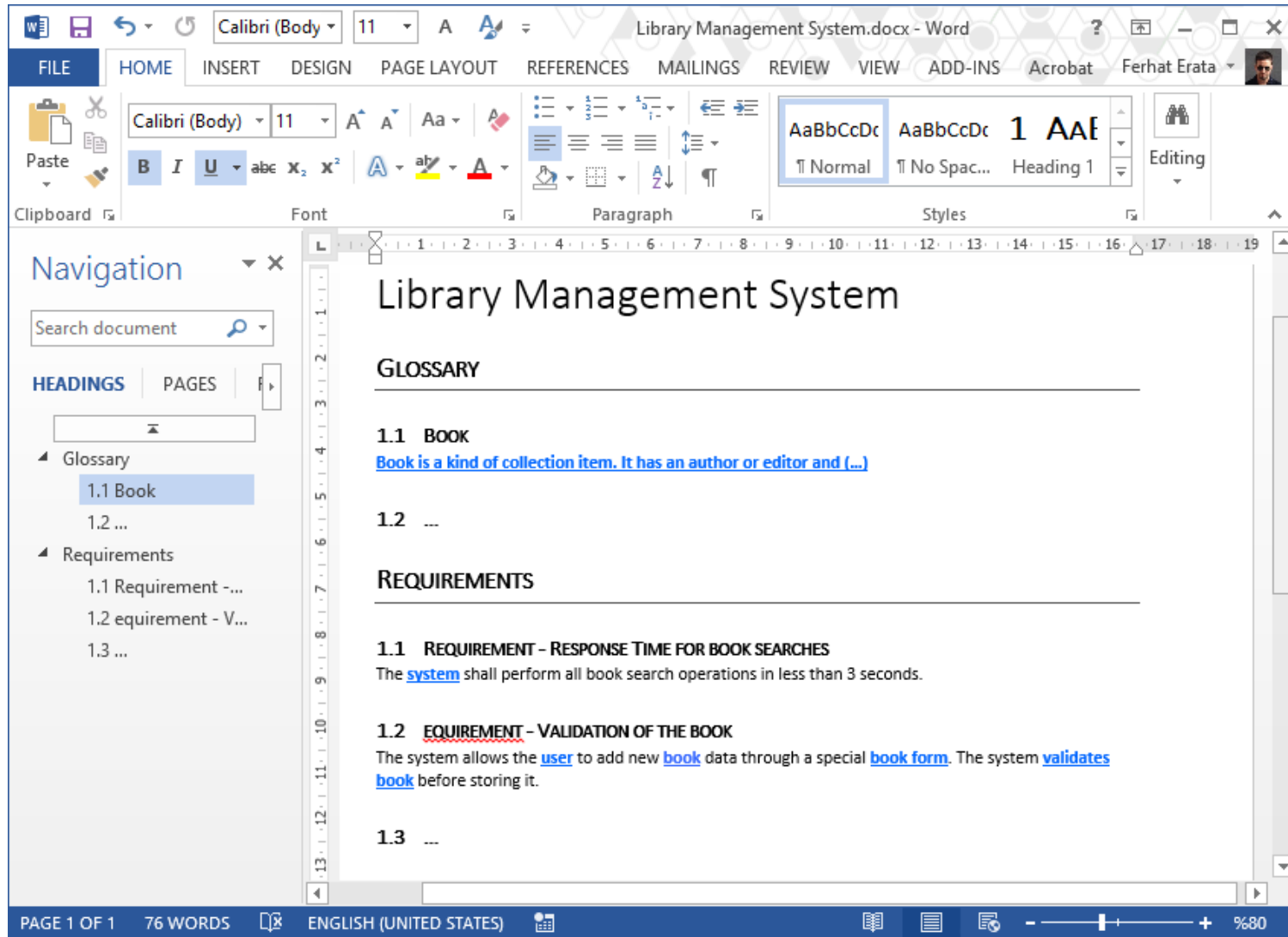
Semantics!

No meaning of syntax (words, sentences ...)

What is a text?

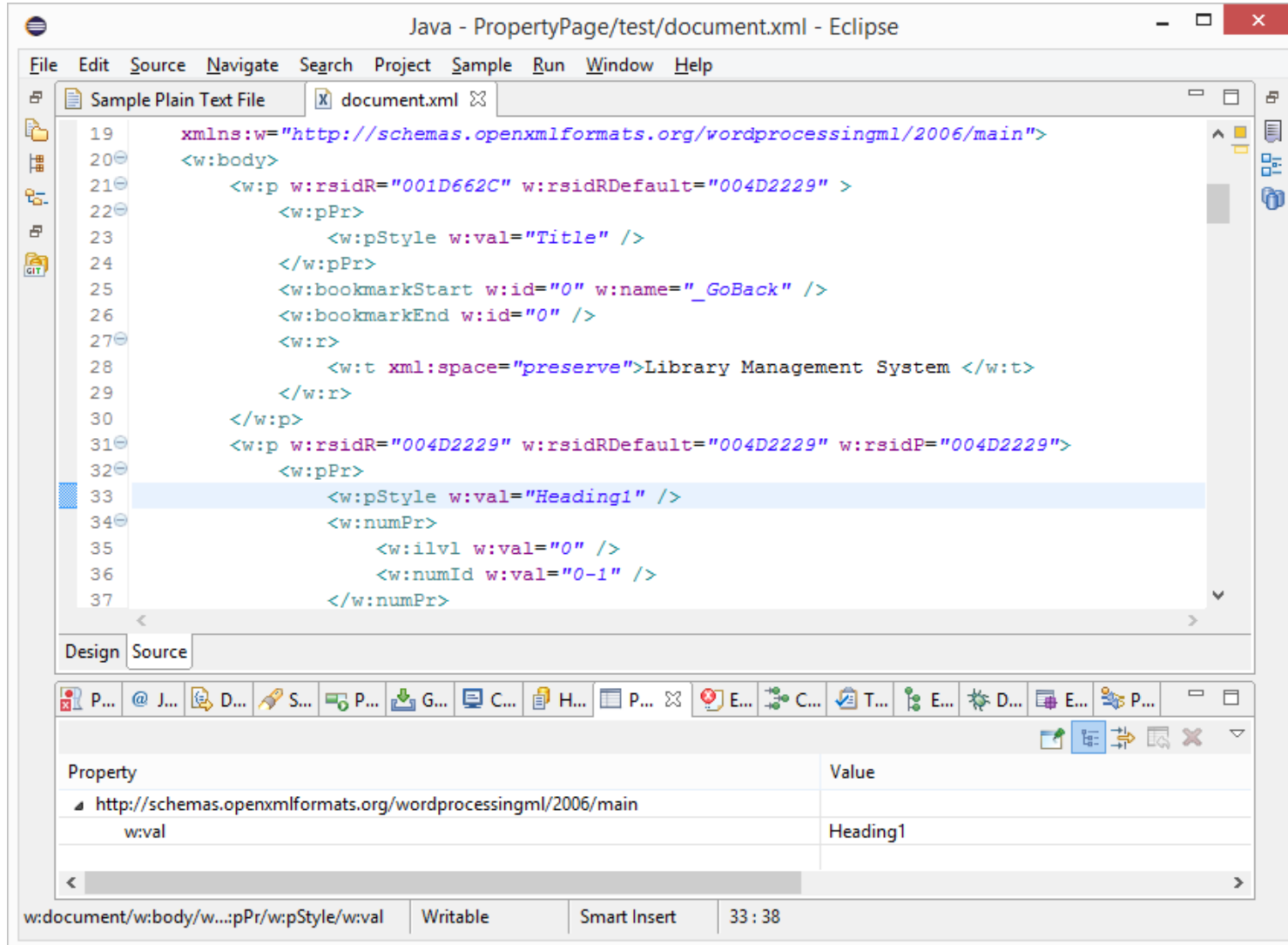
What is a text? (document file formats)

Office Open XML (.docx) (ISO/IEC 29500)



What is a text? (document file formats)

Office Open XML (.docx) (ISO/IEC 29500)



Java - PropertyPage/test/document.xml - Eclipse

File Edit Source Navigate Search Project Sample Run Window Help

Sample Plain Text File document.xml

```
19  xmlns:w="http://schemas.openxmlformats.org/wordprocessingml/2006/main">
20  <w:body>
21    <w:p w:rsidR="001D662C" w:rsidRDefault="004D2229" >
22      <w:pPr>
23        <w:pStyle w:val="Title" />
24      </w:pPr>
25      <w:bookmarkStart w:id="0" w:name="_GoBack" />
26      <w:bookmarkEnd w:id="0" />
27      <w:r>
28        <w:t xml:space="preserve">Library Management System </w:t>
29      </w:r>
30    </w:p>
31    <w:p w:rsidR="004D2229" w:rsidRDefault="004D2229" w:rsidP="004D2229">
32      <w:pPr>
33        <w:pStyle w:val="Heading1" />
34        <w:numPr>
35          <w:ilvl w:val="0" />
36          <w:numId w:val="0-1" />
37        </w:numPr>

```

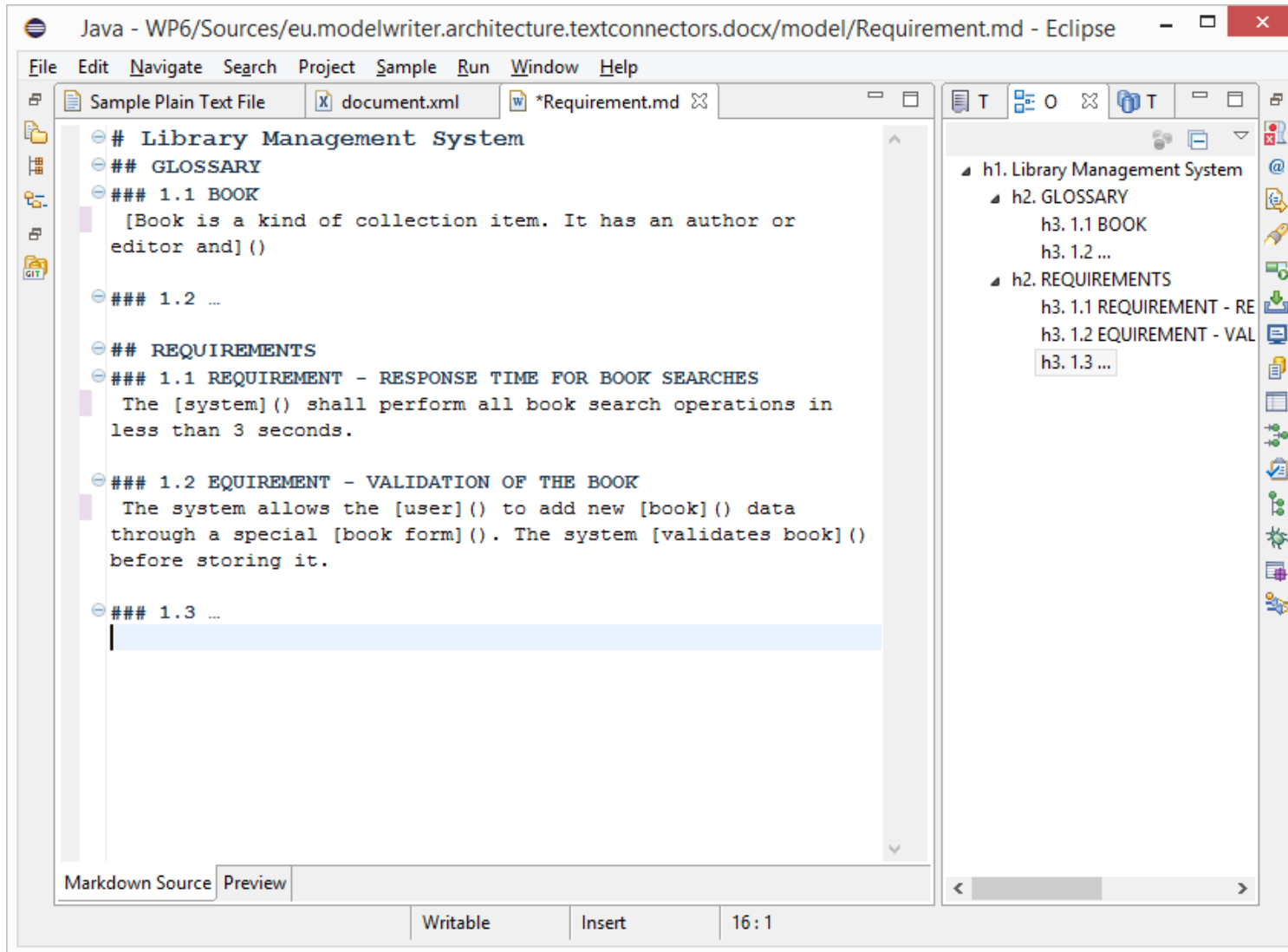
Design Source

Property	Value
http://schemas.openxmlformats.org/wordprocessingml/2006/main	
w:val	Heading1

w:document/w:body/w:wp/w:pPr/w:pStyle/w:val Writable Smart Insert 33 : 38

What is a text? (.md source file)

text/markdown (ICANN Standard)



The screenshot shows the Eclipse IDE interface. The main editor window displays a markdown file named `*Requirement.md`. The content of the file is as follows:

```
# Library Management System
## GLOSSARY
### 1.1 BOOK
[Book is a kind of collection item. It has an author or
editor and]()

### 1.2 ...

## REQUIREMENTS
### 1.1 REQUIREMENT - RESPONSE TIME FOR BOOK SEARCHES
The [system]() shall perform all book search operations in
less than 3 seconds.

### 1.2 EQUIREMENT - VALIDATION OF THE BOOK
The system allows the [user]() to add new [book]() data
through a special [book form]() . The system [validates book]()
before storing it.

### 1.3 ...
```

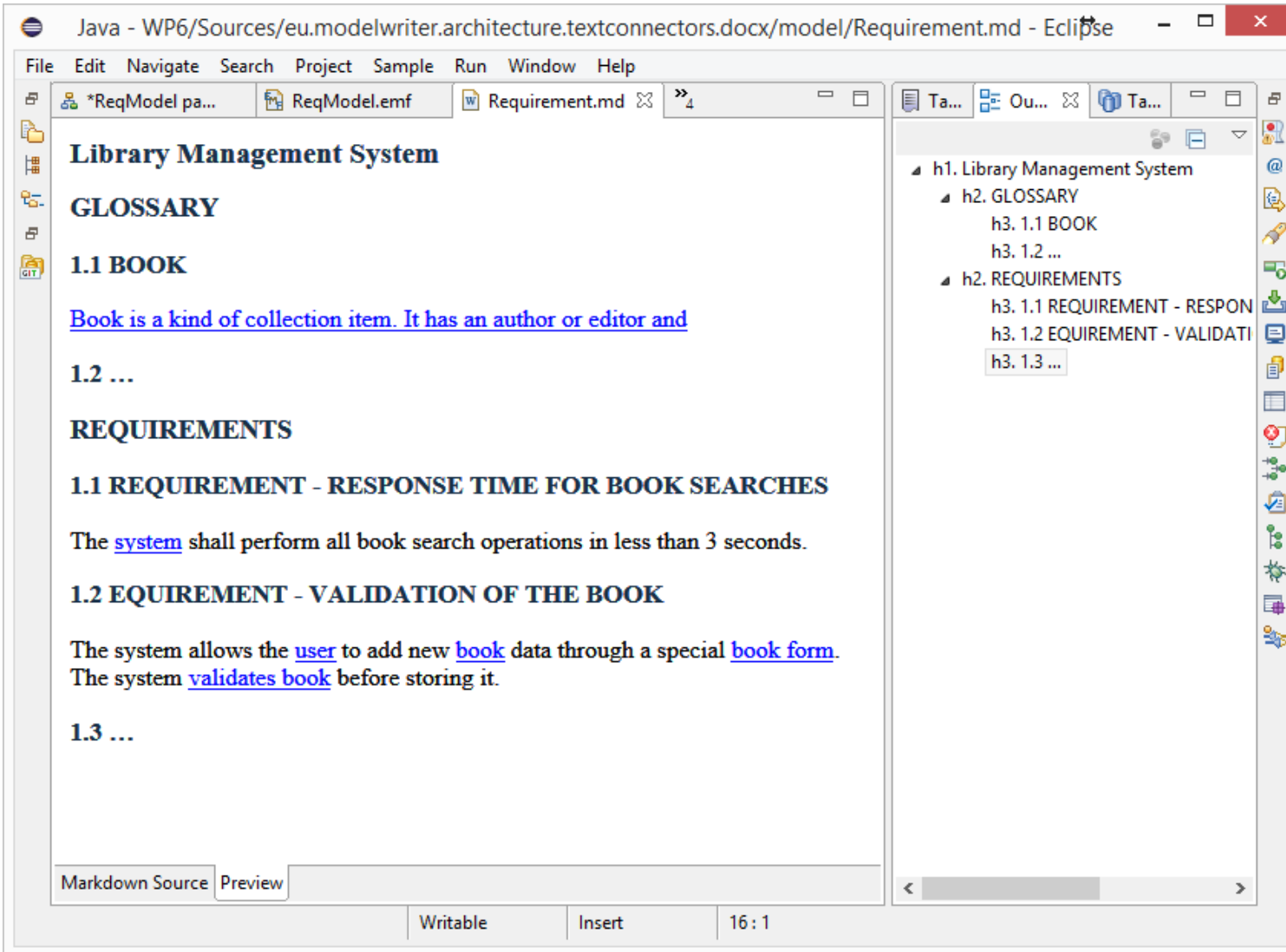
On the right side, there is a preview view showing the rendered markdown structure:

- h1. Library Management System
 - h2. GLOSSARY
 - h3. 1.1 BOOK
 - h3. 1.2 ...
 - h2. REQUIREMENTS
 - h3. 1.1 REQUIREMENT - RE
 - h3. 1.2 EQUIREMENT - VAL
 - h3. 1.3 ...

At the bottom of the editor, there are tabs for 'Markdown Source' and 'Preview'. The status bar at the very bottom indicates 'Writable', 'Insert' mode, and the cursor position '16:1'.

What is a text? (HTML Preview)

text/markdown (ICANN Standard)



Java - WP6/Sources/eu.modelwriter.architecture.textconnectors.docx/model/Requirement.md - Eclipse

File Edit Navigate Search Project Sample Run Window Help

*ReqModel pa... ReqModel.emf Requirement.md »4

Library Management System

GLOSSARY

1.1 BOOK

[Book is a kind of collection item. It has an author or editor and](#)

1.2 ...

REQUIREMENTS

1.1 REQUIREMENT - RESPONSE TIME FOR BOOK SEARCHES

The [system](#) shall perform all book search operations in less than 3 seconds.

1.2 EQUIREMENT - VALIDATION OF THE BOOK

The system allows the [user](#) to add new [book](#) data through a special [book form](#).
The system [validates book](#) before storing it.

1.3 ...

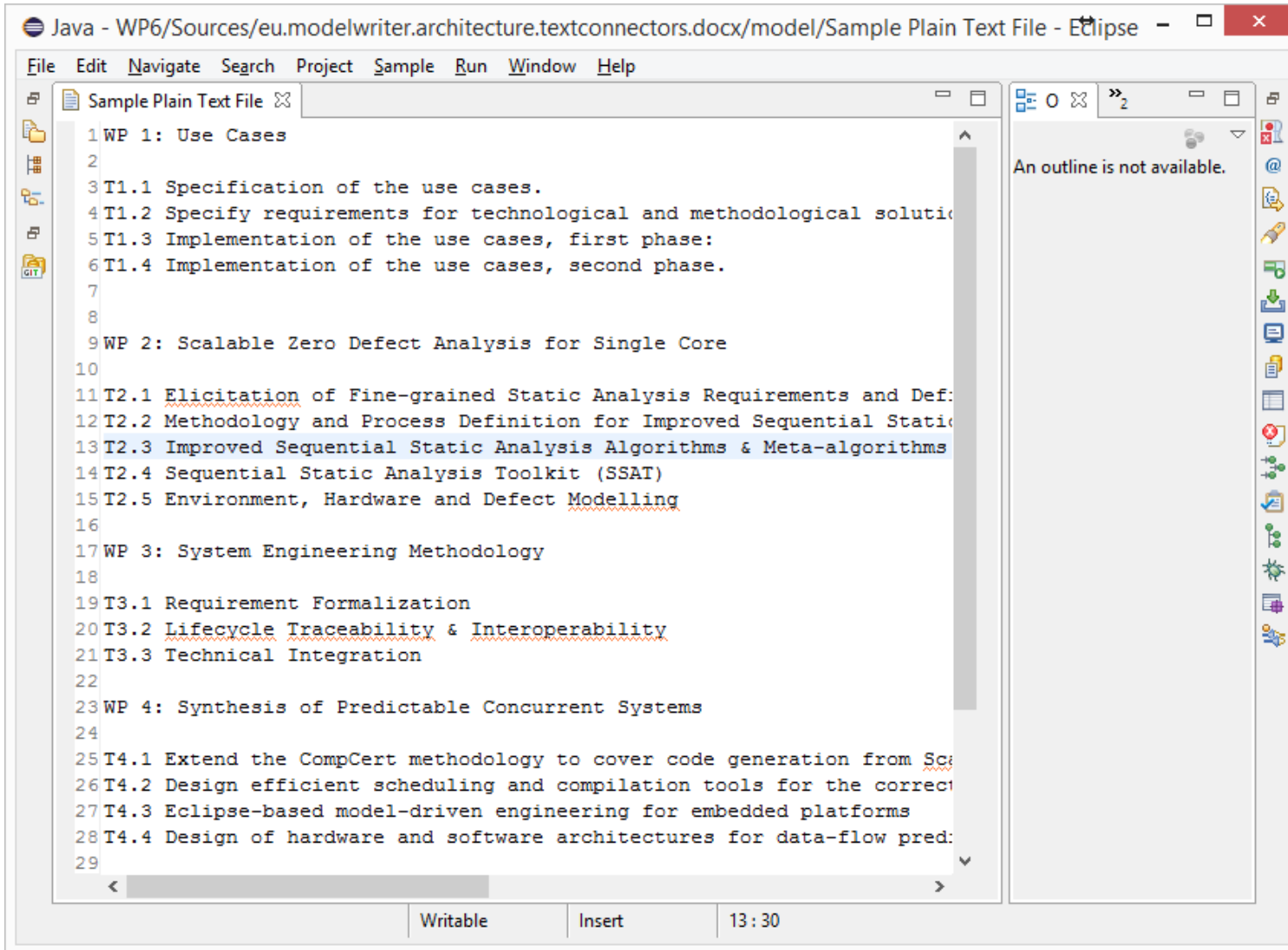
- h1. Library Management System
 - h2. GLOSSARY
 - h3. 1.1 BOOK
 - h3. 1.2 ...
 - h2. REQUIREMENTS
 - h3. 1.1 REQUIREMENT - RESPON
 - h3. 1.2 EQUIREMENT - VALIDATI
 - h3. 1.3 ...

Markdown Source Preview

Writable Insert 16 : 1

What is a text? (unformatted text)

text/plain (ICANN Standard)



Java - WP6/Sources/eu.modelwriter.architecture.textconnectors.docx/model/Sample Plain Text File - Eclipse

File Edit Navigate Search Project Sample Run Window Help

Sample Plain Text File

```
1 WP 1: Use Cases
2
3 T1.1 Specification of the use cases.
4 T1.2 Specify requirements for technological and methodological solutions
5 T1.3 Implementation of the use cases, first phase:
6 T1.4 Implementation of the use cases, second phase.
7
8
9 WP 2: Scalable Zero Defect Analysis for Single Core
10
11 T2.1 Elicitation of Fine-grained Static Analysis Requirements and Definitions
12 T2.2 Methodology and Process Definition for Improved Sequential Static Analysis
13 T2.3 Improved Sequential Static Analysis Algorithms & Meta-algorithms
14 T2.4 Sequential Static Analysis Toolkit (SSAT)
15 T2.5 Environment, Hardware and Defect Modelling
16
17 WP 3: System Engineering Methodology
18
19 T3.1 Requirement Formalization
20 T3.2 Lifecycle Traceability & Interoperability
21 T3.3 Technical Integration
22
23 WP 4: Synthesis of Predictable Concurrent Systems
24
25 T4.1 Extend the CompCert methodology to cover code generation from Specifications
26 T4.2 Design efficient scheduling and compilation tools for the correct compilation
27 T4.3 Eclipse-based model-driven engineering for embedded platforms
28 T4.4 Design of hardware and software architectures for data-flow prediction
29
```

An outline is not available.

Writable Insert 13:30

What is a model?

Everything is a model! (ReqIF Standard)

Requirements Interchange Format



ProR - platform:/resource/LibraryManagementSystem/My.reqif - formalmind Studio

File Edit Search Requirements fmStudio Window Help

Quick Access ProR

My.reqif Requirements Document

ID	Name	Description
1		
1.1	Librarian	Librarian
1.2	Response Time for Book Searches	The system shall perform all book search operations in less than 3 second
1.3	Add new Book	A user form to add new book
1.4	Validation of the Book	Validation of the Book

Outline

- Spec Hierarchy
 - Librarian
 - The system shall
 - A user form to
 - Validation of th

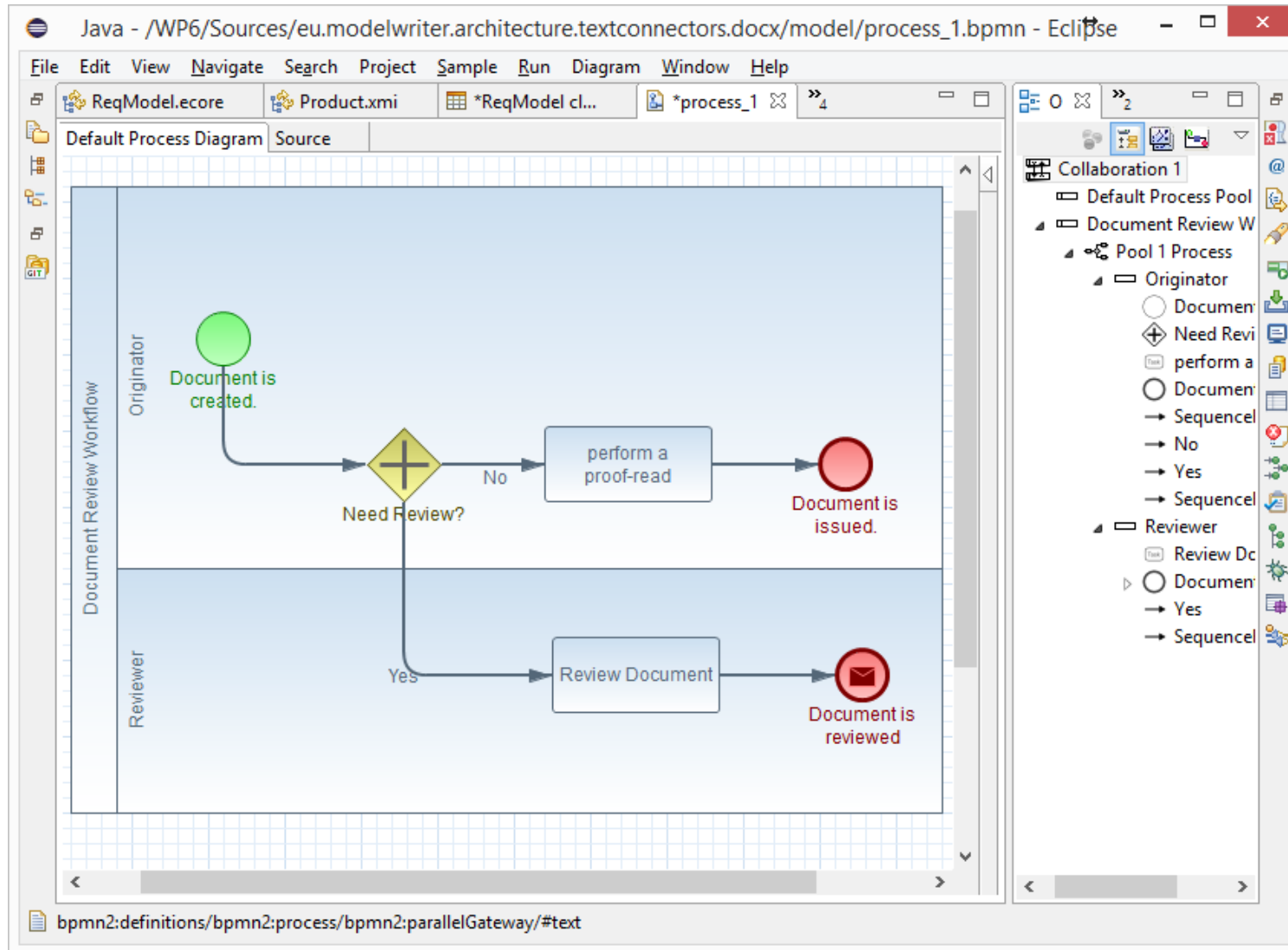
Properties

Property	Value
Requirement Type	
Description	The system shall perform all book search operations in less than 3 second
ID	R123
Name	Response Time for Book Searches
Responsible	Ferhat
Version	1
Spec Object	
Type	Requirement Type (Spec Object)

Standard Attributes All Attributes

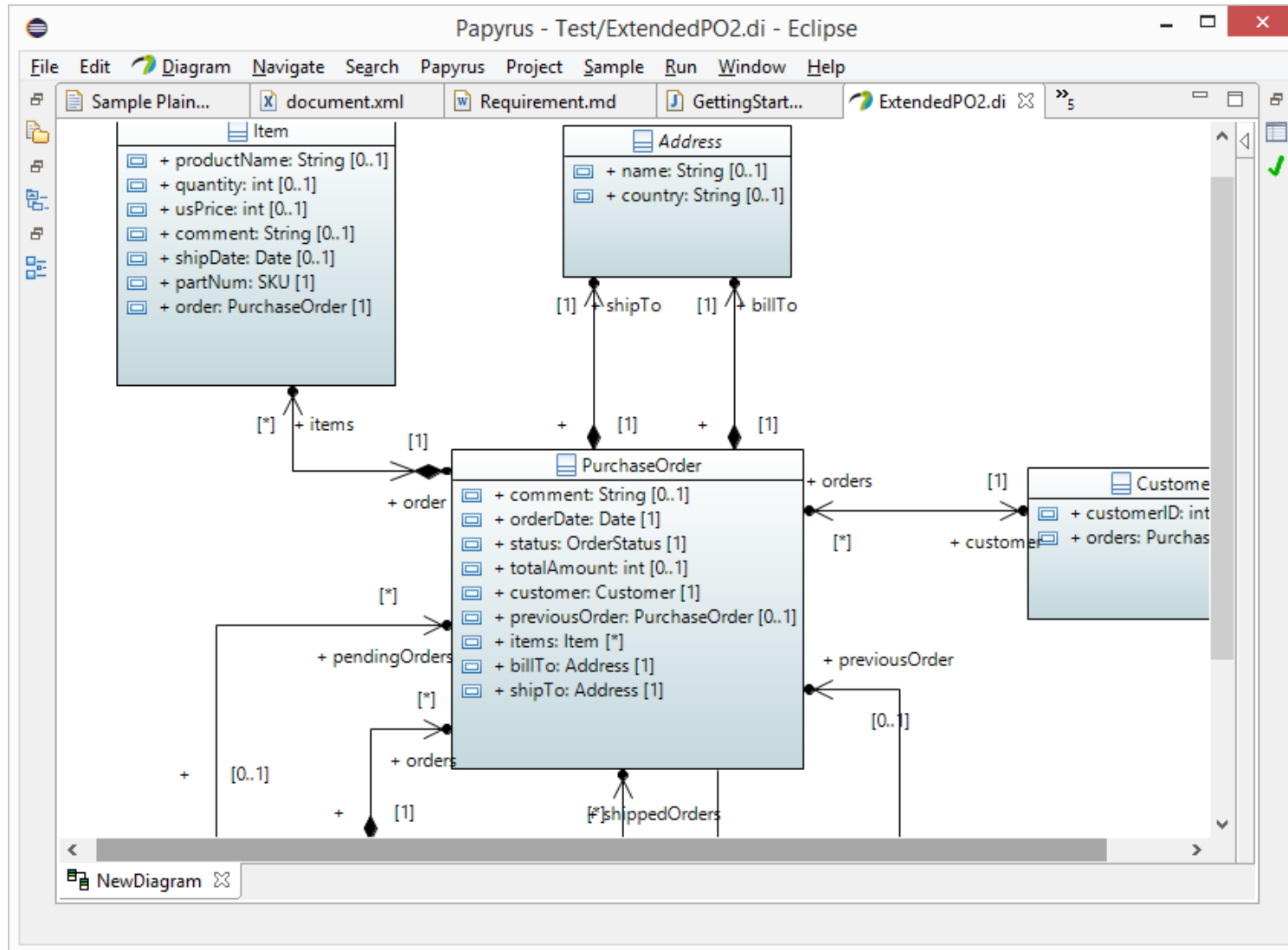
Everything is a model! (BPMN Standard)

Business Process Model & Notation



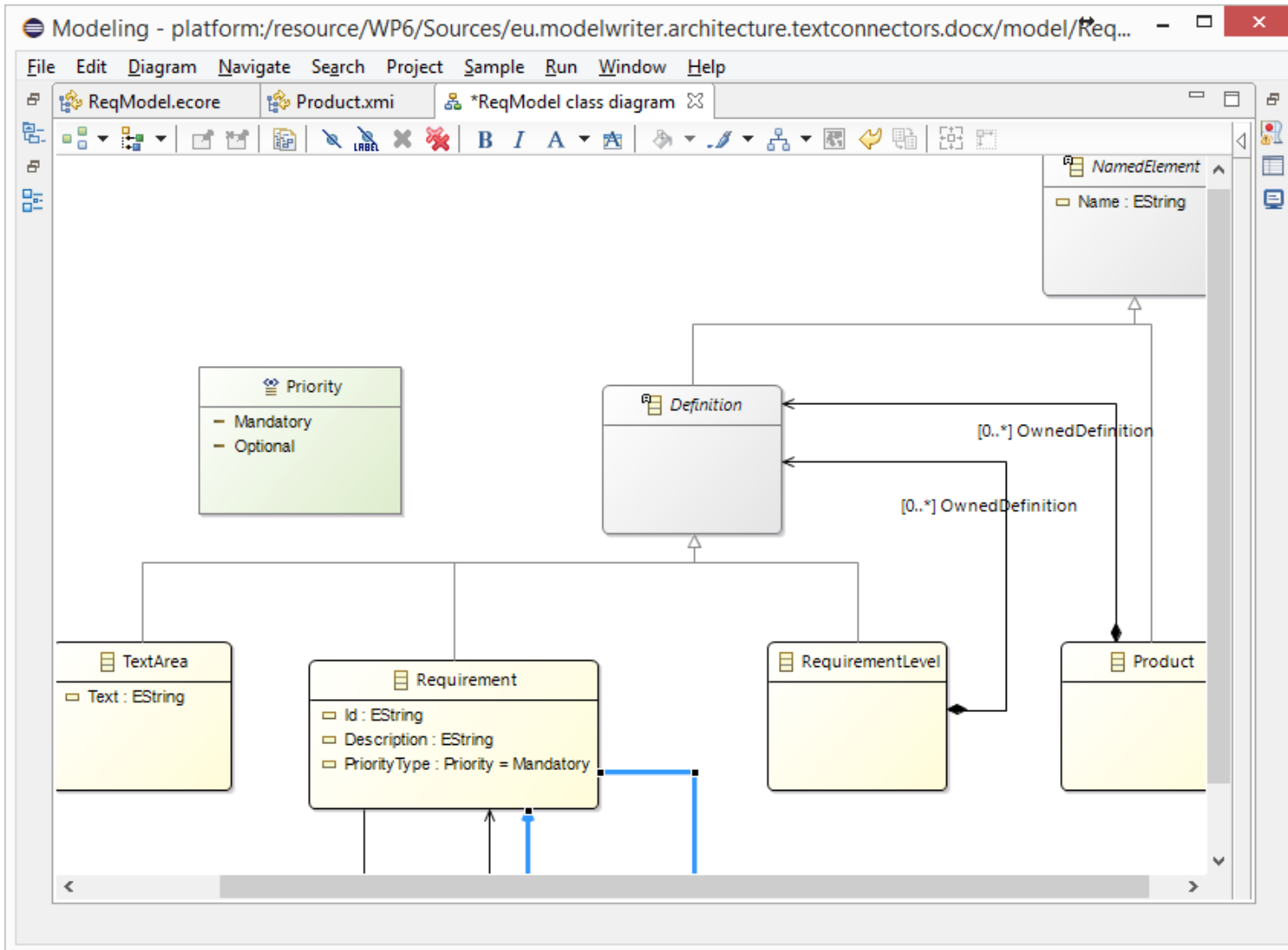
Everything is a model! (UML Standard)

UML Modeling Languages



Everything is a model!

Eclipse Modeling Framework (EMF)



Everything is a model!

Tree-based or Tabular Representations

Modeling - platform:/resource/WP6/Sources/eu.modelwriter.architecture.textconnectors.docx/model/Req...

File Edit Navigate Search Project DTable Sample Run Window Help

ReqModel.ecore Product.xmi *ReqModel class table

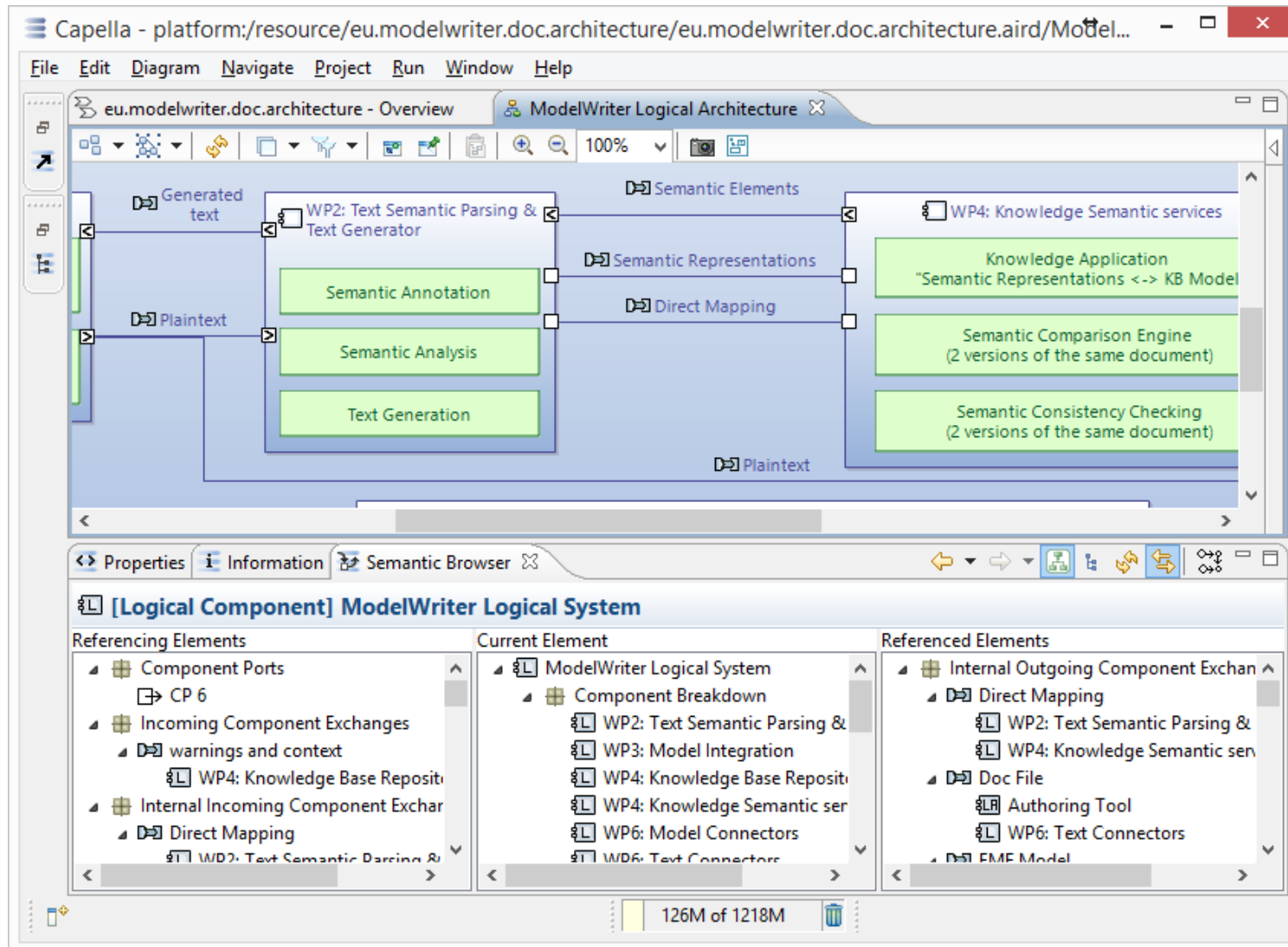
Name
NamedElement
Name : EString
Product -> NamedElement
OwnedDefinition : Definition
Definition -> NamedElement
RequirementLevel -> Definition
OwnedDefinition : Definition
Requirement -> Definition
Id : EString
Description : EString
Refine : Requirement
DependencyTo : Requirement
PriorityType : Priority
TextArea -> Definition
Text : EString

NamedElement

Property	Value
NamedElement	
Abstract	true
Default Value	
ESuper Types	
Instance Type Name	

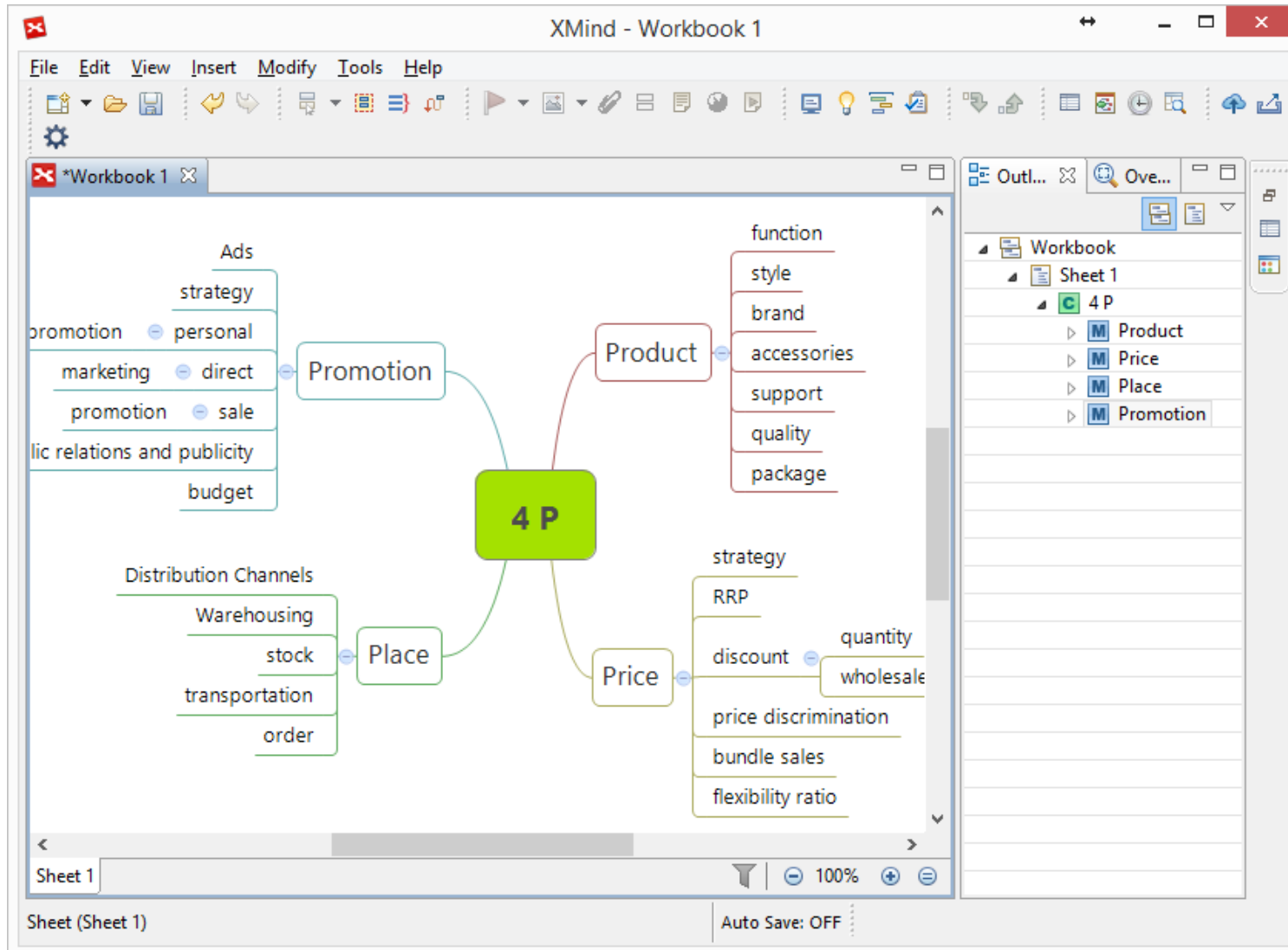
Everything is a model!

Software/System Architecture Design



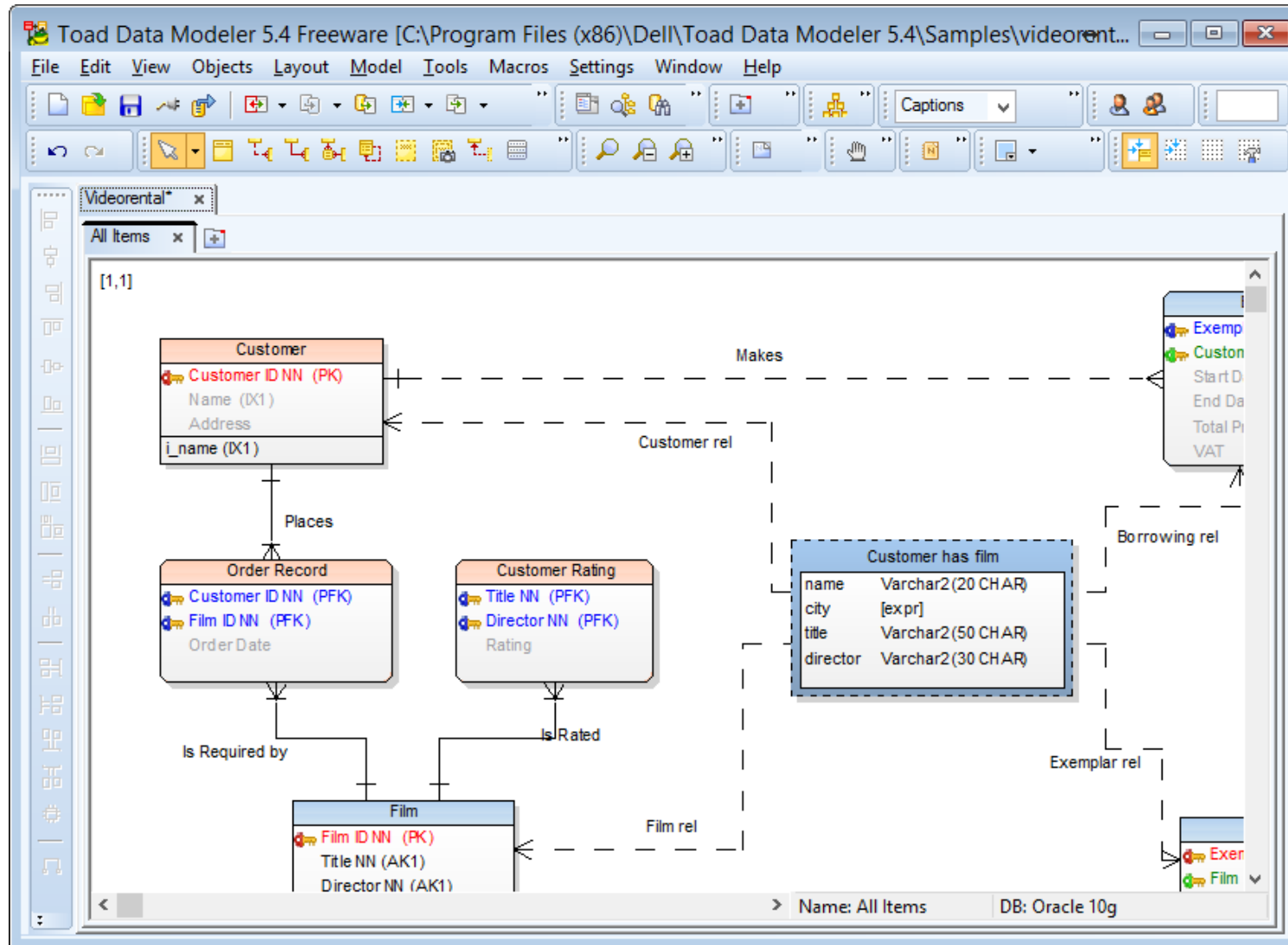
Everything is a model!

Topic Maps, Mind Maps, Vocabularies ...



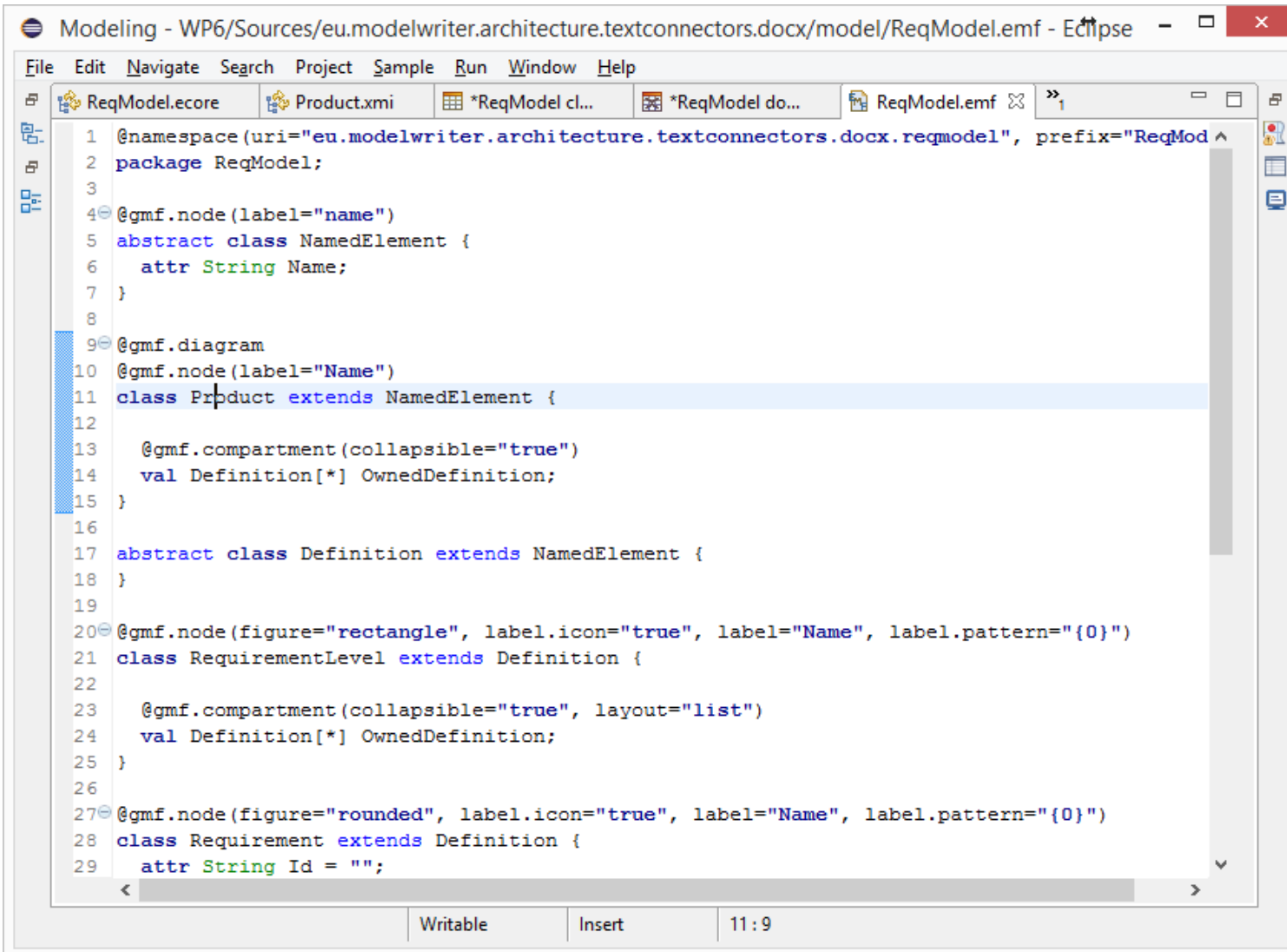
Everything is a model!

Databases (ER, IDEF1.x)



Everything is a model! (Textual Lang.)

Domain Specific Languages

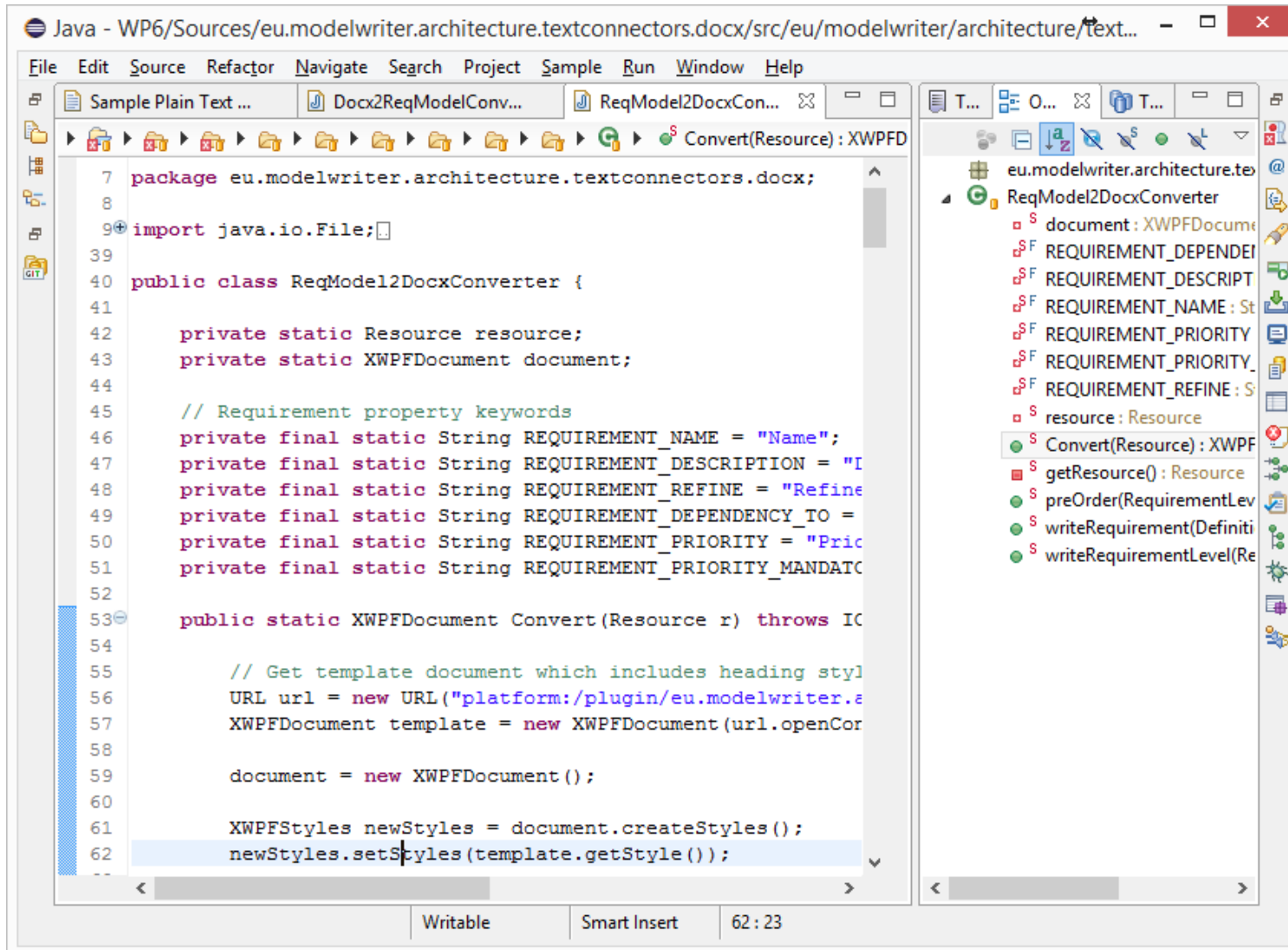


```
Modeling - WP6/Sources/eu.modelwriter.architecture.textconnectors.docx/model/ReqModel.emf - Eclipse
File Edit Navigate Search Project Sample Run Window Help
ReqModel.ecore Product.xml *ReqModel cl... *ReqModel do... ReqModel.emf »1
1 @namespace(uri="eu.modelwriter.architecture.textconnectors.docx.reqmodel", prefix="ReqMod
2 package ReqModel;
3
4 @gmf.node(label="name")
5 abstract class NamedElement {
6   attr String Name;
7 }
8
9 @gmf.diagram
10 @gmf.node(label="Name")
11 class Product extends NamedElement {
12
13   @gmf.compartment(collapsible="true")
14   val Definition[*] OwnedDefinition;
15 }
16
17 abstract class Definition extends NamedElement {
18 }
19
20 @gmf.node(figure="rectangle", label.icon="true", label="Name", label.pattern="{0}")
21 class RequirementLevel extends Definition {
22
23   @gmf.compartment(collapsible="true", layout="list")
24   val Definition[*] OwnedDefinition;
25 }
26
27 @gmf.node(figure="rounded", label.icon="true", label="Name", label.pattern="{0}")
28 class Requirement extends Definition {
29   attr String Id = "";
```

Writable Insert 11:9

Everything is a model! (Java, C++, etc.)

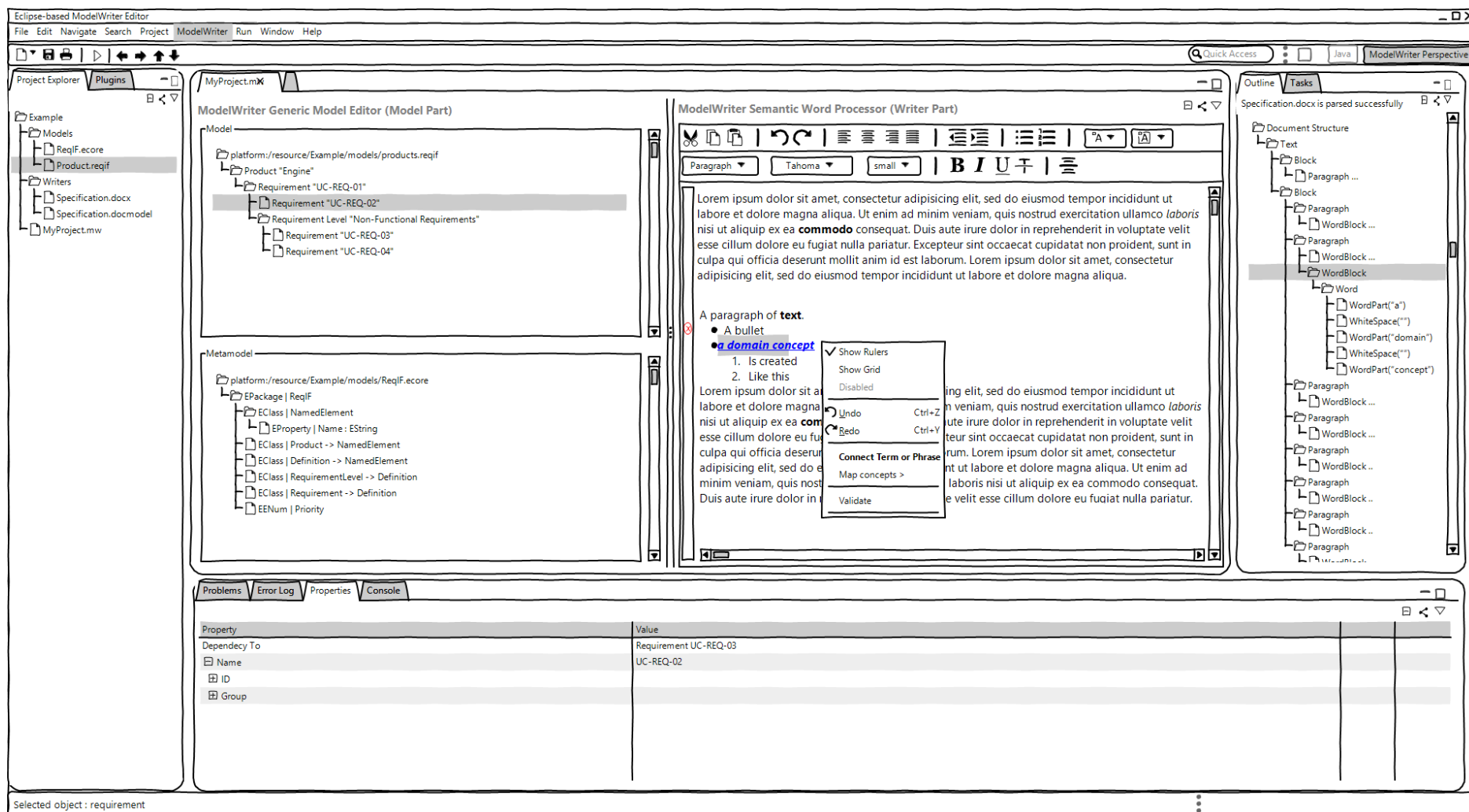
Even Programming Languages



```
Java - WP6/Sources/eu.modelwriter.architecture.textconnectors.docx/src/eu/modelwriter/architecture/text...  
File Edit Source Refactor Navigate Search Project Sample Run Window Help  
Sample Plain Text ... Docx2ReqModelConv... ReqModel2DocxCon...  
Convert(Resource): XWPFD  
7 package eu.modelwriter.architecture.textconnectors.docx;  
8  
9 import java.io.File;  
39  
40 public class ReqModel2DocxConverter {  
41  
42     private static Resource resource;  
43     private static XWPFDocument document;  
44  
45     // Requirement property keywords  
46     private final static String REQUIREMENT_NAME = "Name";  
47     private final static String REQUIREMENT_DESCRIPTION = "I  
48     private final static String REQUIREMENT_REFINE = "Refine  
49     private final static String REQUIREMENT_DEPENDENCY_TO =  
50     private final static String REQUIREMENT_PRIORITY = "Pri  
51     private final static String REQUIREMENT_PRIORITY_MANDATC  
52  
53     public static XWPFDocument Convert(Resource r) throws IC  
54  
55     // Get template document which includes heading styl  
56     URL url = new URL("platform:/plugin/eu.modelwriter.a  
57     XWPFDocument template = new XWPFDocument(url.openCor  
58  
59     document = new XWPFDocument();  
60  
61     XWPFDStyles newStyles = document.createStyles();  
62     newStyles.setStyles(template.getStyle());  
63  
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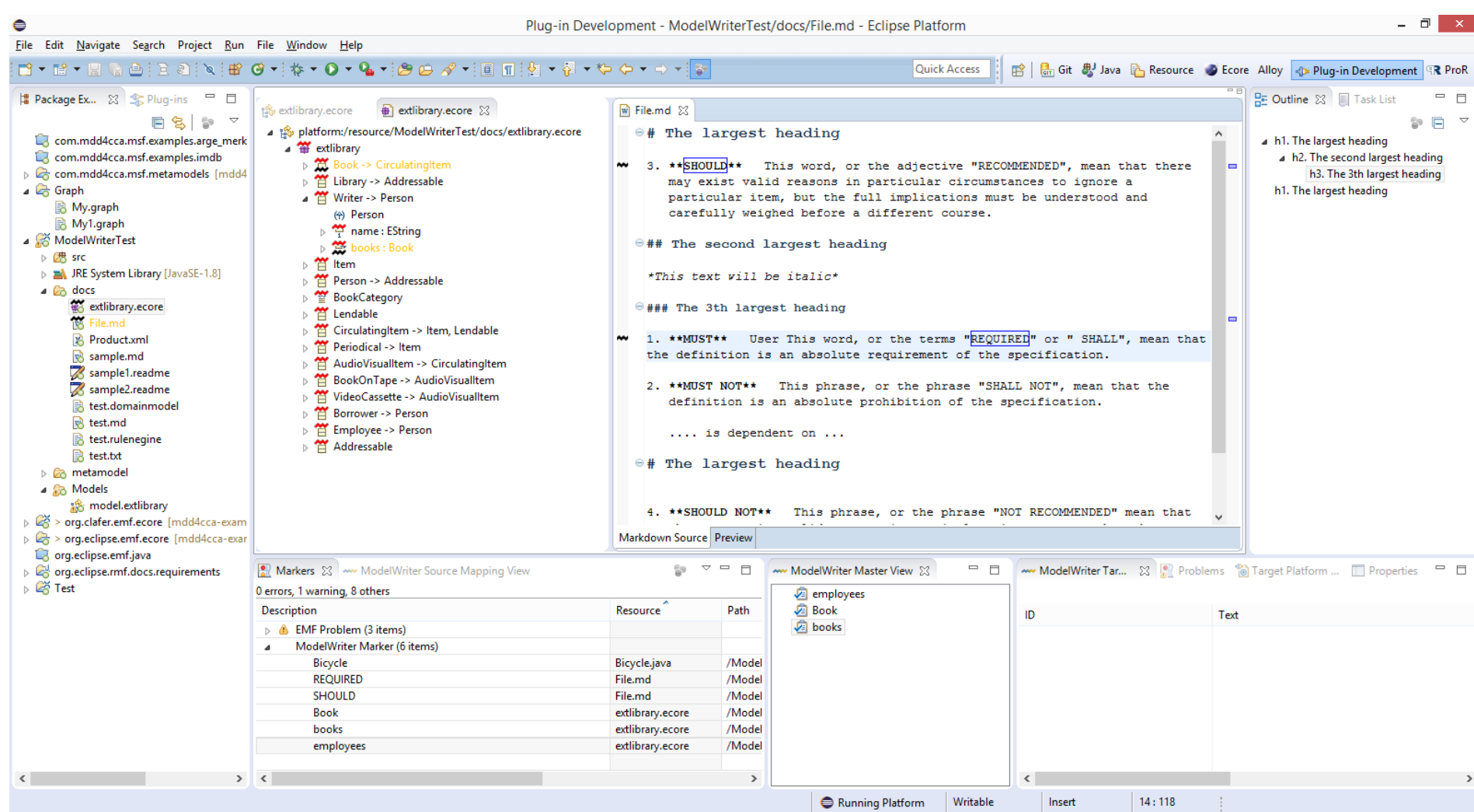

**Is it possible to connect and
keep arbitrary software/system
engineering artifacts
synchronized ?**

ModelWriter – The Solution



Text & Model-Synchronized Document Engineering Platform

ModelWriter – The Solution



Text & Model-Synchronized Document Engineering Platform

ModelWriter – The Solution

Plug-in Development - ModelWriterTest/src/ModelWriter/Bicycle.java - Eclipse Platform

File Edit Source Refactor Navigate Search Project Run File Window Help

Quick Access

Package Explorer

extlibrary.ecore

platform:/resource/ModelWriterTest/docs/extlibrary.ecore

- extlibrary
 - Book -> CirculatingItem
 - Library -> Addressable
 - Writer -> Person
 - Person
 - name: EString
 - books: Book
 - Item
 - Person -> Addressable
 - BookCategory
 - Lendable
 - CirculatingItem -> Item, Lendable
 - Periodical -> Item
 - AudioVisualItem -> CirculatingItem
 - BookOnTape -> AudioVisualItem
 - VideoCassette -> AudioVisualItem
 - Borrower -> Person
 - Employee -> Person
 - Addressable

File.md

Bicycle.java

```
1 package ModelWriter;
2
3 public class Bicycle {
4
5     // the Bicycle class has
6     // three fields
7     public int cadence;
8     public int gear;
9     public int speed;
10
11     // the Bicycle class has
12     // one constructor
13     public Bicycle(int startCadence, int startSpeed, int startGear) {
14         gear = startGear;
15         cadence = startCadence;
16         speed = startSpeed;
17     }
18
19     // the Bicycle class has
20     // four methods
21     public void setCadence(int newValue) {
22         cadence = (int)newValue;
23     }
24
25     public void setGear(int newValue) {
26         gear = newValue;
27     }
28 }
```

Outline

ModelWriter

- Bicycle
 - cadence: int
 - gear: int
 - speed: int
 - Bicycle(int, int, int)
 - setCadence(int): void
 - setGear(int): void
 - applyBrake(int): void
 - speedUp(int): void
 - preferences(): void

Markers

ModelWriter Source Mapping View

0 errors, 1 warning, 11 others

Description	Resource	Path
Bicycle	Bicycle.java	/Mc
cadence	Bicycle.java	/Mc
gear	Bicycle.java	/Mc
speed	Bicycle.java	/Mc
REQUIRED	File.md	/Mc
SHOULD	File.md	/Mc
Book	extlibrary.ecore	/Mc
books	extlibrary.ecore	/Mc
employees	extlibrary.ecore	/Mc

ModelWriter Master View

- employees
- Book
- books

ModelWriter Target Platform View

ID	Text
----	------

Running Platform Writable Smart Insert 19:29

Text & Model-Synchronized Document Engineering Platform

ModelWriter – The Solution

The screenshot displays the Eclipse IDE interface for the ModelWriter plugin. The main editor shows the XML file `extlibrary.ecore` with the following content:

```
<?xml version="1.0" encoding="UTF-8"?>
<ecore:EPackage xmi:version="2.0" xmlns:xmi="http://www.omg.org/XMI" xmlns:xs="http://www.eclipse.org/emf/2002/Ecore" name="extlibrary" nsU
nsPrefix="extlib">
  <eClassifiers xsi:type="ecore:EClass" name="Book" eSuperTypes="#//Circulati
  <eStructuralFeatures xsi:type="ecore:EAttribute" name="title" eType="ecor
  <eStructuralFeatures xsi:type="ecore:EAttribute" name="pages" eType="ecor
    defaultLiteral="100"/>
  <eStructuralFeatures xsi:type="ecore:EAttribute" name="category" eType="#
    unsettable="true"/>
  <eStructuralFeatures xsi:type="ecore:EReference" name="author" lowerBound
    eType="#//Writer" eOpposite="#//Writer/books"/>
</eClassifiers>
<eClassifiers xsi:type="ecore:EClass" name="Library" eSuperTypes="#//Addres
  <eStructuralFeatures xsi:type="ecore:EAttribute" name="name" eType="ecore
  <eStructuralFeatures xsi:type="ecore:EReference" name="writers" upperBound
    eType="#//Writer" volatile="true" transient="true" derived="true" con
    resolveProxies="false">
    <eAnnotations source="http://org.eclipse/emf/ecore/util/ExtendedMetaDa
      <details key="group" value="#people"/>
    </eAnnotations>
  </eStructuralFeatures>
  <eStructuralFeatures xsi:type="ecore:EReference" name="employees" upperBo
    eType="#//Employee" volatile="true" transient="true" derived="true" c
    resolveProxies="false">
```

The left sidebar shows the project structure, including the `ModelWriterTest` directory. The bottom panels show the `ModelWriter Source Mapping View`, `ModelWriter Master View`, and `ModelWriter Target Platform View`.

The `ModelWriter Source Mapping View` shows the following table:

Description	Resource	Path
EMF Problem (3 items)		
ModelWriter Marker (9 items)		
Bicycle	Bicycle.java	/Mc
cadence	Bicycle.java	/Mc
gear	Bicycle.java	/Mc
speed	Bicycle.java	/Mc
REQUIRED	File.md	/Mc
SHOULD	File.md	/Mc
Book	extlibrary.ecore	/Mc

The `ModelWriter Master View` shows the following table:

ID	Text
employees	
Book	
books	

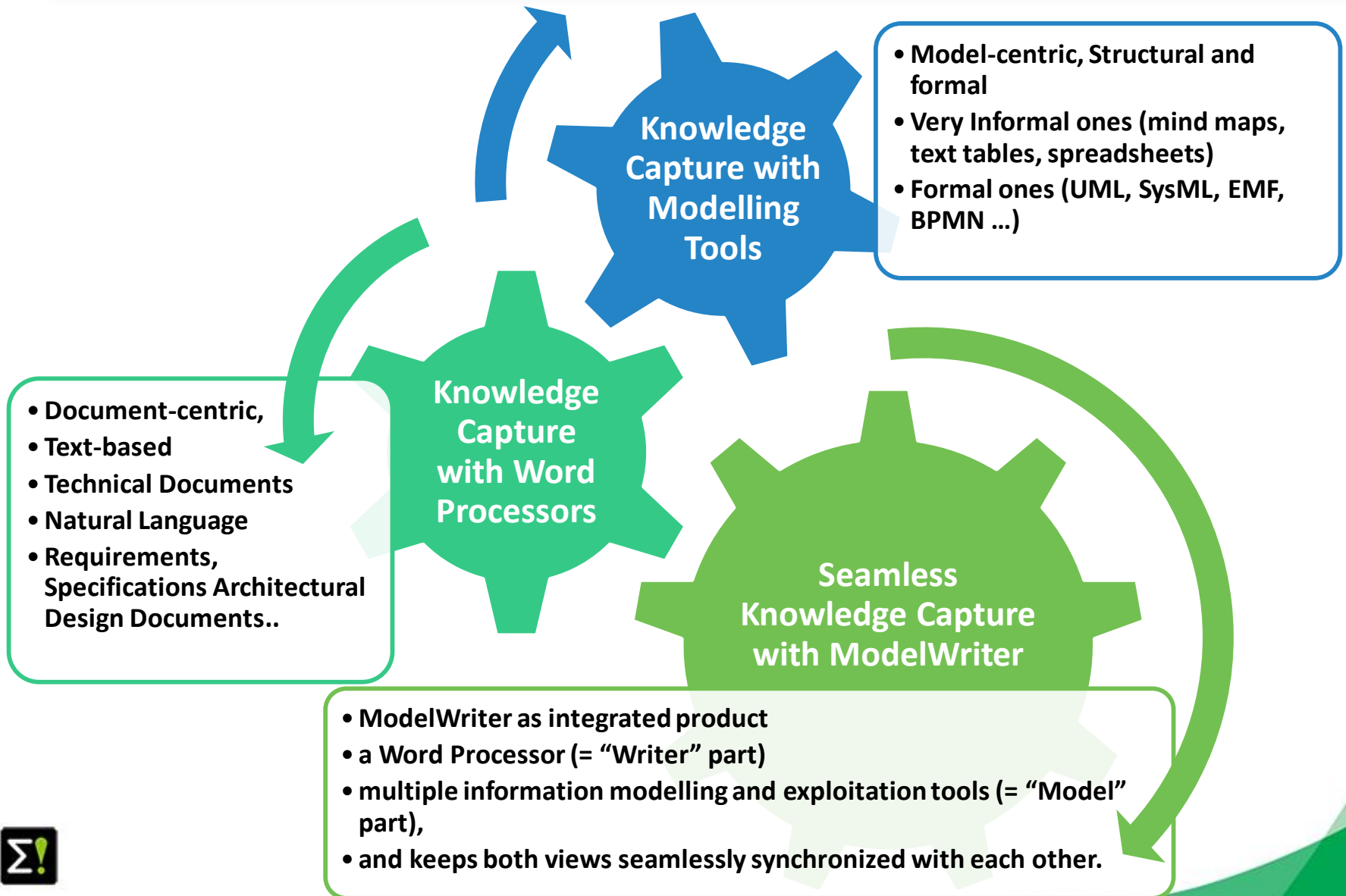
The `ModelWriter Target Platform View` shows the following table:

ID	Text
----	------

Text & Model-Synchronized Document Engineering Platform



Synchronization is maintained!



Semantic Word Processor
(Text-Based Knowledge Extractor)

Understands the various textual parts of a document expressed in Natural Language

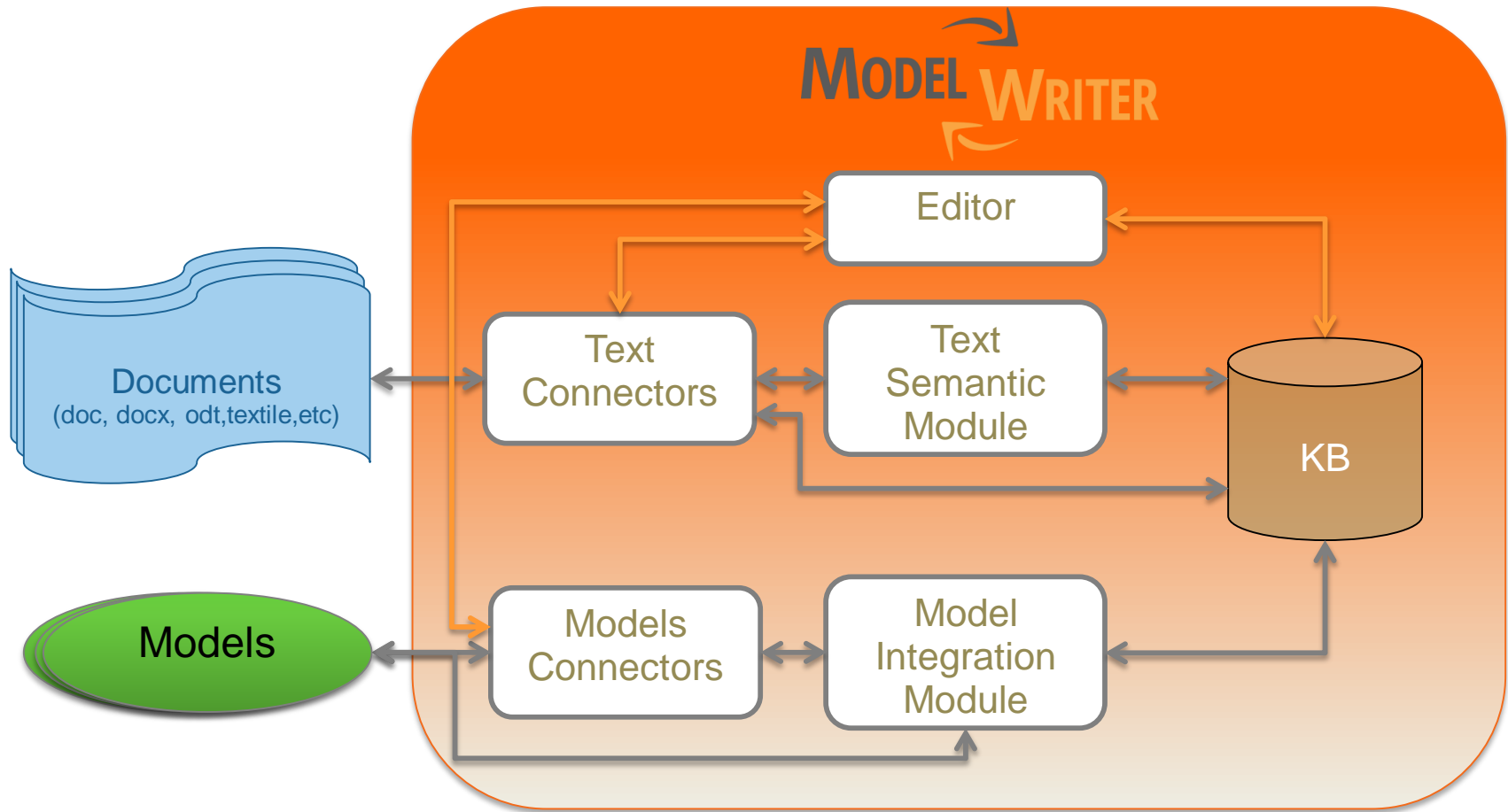
Reveals concepts and relationships between them (“Model”-part)

Consistency & Completeness Checking

Quantification of the expected benefits

- Improvement in quality and productivity of technical documentation.
- Quality increase of the product with consistent requirements and designs.
 - For instance, according to AIRBUS's claims in their use cases, the global saving would be 5 M€ to 7 M€ (A350 Recurring Cost)
- 50% reduction of costs for keeping the documentation up-to-date with the developed software

ModelWriter Architecture



ModelWriter: Work packages & Concrete Results

WP1 Industrial Use Cases and Requirements (AIRBUS)

WP2 (LORIA)

- Semantic Word Processor
- bi-directional transformation between text and formal knowledge representation

WP3 (UNIT)

- An extensible model-model transformation framework
- Model checker plug-in for consistency

WP4 (MANTIS)

- A federated Knowledge Base and its API
- Bi-directional sync. mechanism between texts and models

WP6 (OBEO)

- A complete “ModelWriter” tool integrating of all these in a consistent

WP5 Project Management (UNIT)

WP7 Standardization, Dissemination and Exploitation (OBEO)

UC-FR-02

Help determining the impacts of a change in the Enterprise Architecture

Enterprise Architecture

[CEISAR - Center of Excellence in Enterprise Architecture](#)

**OBEO, TOTAL,
AIR France, AXA**

UC-FR-03

This use case will explore the use of ModelWriter concept to structure and manage a repository of system installation rules.

Synchronization of regulation documentation with a design rule repository

**OBEO, AIRBUS,
LORIA**

UC-FR-04

Focus on building synchronized links between regulation documents in natural language and rules (as models).

Production of a context specific design document

**OBEO, AIRBUS,
LORIA**

UC-TR-03

IBM Rational Doors Plug-in and Eclipse Requirement Frameworks Sub-component which supports OMG's ReqIF Standard.

Sync between Requirement Documentation and Feature Models

KoçSistem, UNIT

UC-TR-04 (UC-FR-01)

Demonstrate that the ModelWriter concept can be usefully applied on System design / Requirement generation activities.

Requirements Engineering with SysML Designer (requirement-model consistency)

UNIT, HAVELSAN

UC-TR-05

Synchronous Business Process Design with Use Cases

UNIT, KoçSistem

BPMN and Use Case Documentation

ModelWriter Business Strategy

Open Source Campaign


Open Call for Industrial User Stories

- *Shape the future ModelWriter*
- *Early adaptation of the technology*
- *Long Term Support*


ModelWriter Open Source Campaign


<https://github.com/modelwriter>





[Pull requests](#) [Issues](#) [Gist](#)





ITEA2-ModelWriter Project

Text & Model-Synchronized Document Engineering Platform

Europa <http://www.modelwriter.eu> project@modelwriter.eu

Filters

+ New repository

Workshops

Repository dedicated to workshops

Updated 9 minutes ago

★ 0 📄 0

WP7

Work Package 7 - Standardization, Dissemination and Exploitation (Obeo)

Updated 15 hours ago

★ 0 📄 0

Deliverables

Project Monitoring, Tracking, Communication Management and Infrastructure

Updated 2 days ago

★ 1 📄 0

Source


Federated Source Code Repository of ModelWriter project

Updated 25 days ago

★ 0 📄 0

People

22 >



Invite someone

Teams

25 >

Owners

1 member · 22 repositories

AIRBUS

2 members · 0 repositories

Consortium

19 members · 22 repositories

Create new team



ModelWriter Requirements & User Stories

<https://waffle.io/modelwriter/requirements>



The screenshot displays a Kanban board for the project 'modelwriter/requirements'. The board is organized into four columns: 'User Stories' (13 items), 'Confirmed' (3 items), 'In Progress' (0 items), and 'Done' (2 items). A sidebar on the left contains navigation icons and a user profile. The 'User Stories' column lists items 10 through 14, each with a description, a 'Software Requirements Document (SRD)' tag, and a 'WP3 - Model to/from Knowledge Base' tag. The 'Confirmed' column lists items 15 through 17, each with a description, a 'UC-TR-03 Generation and management of feature models' tag, and a 'User Requirements Document (URD)' tag. The 'In Progress' column is currently empty and contains a message: 'Let others know you're working on an issue by dragging it to In Progress.' The 'Done' column lists items 18 and 19, with descriptions 'readme folder added' and 'Fe' respectively. A 'Filter Board' search bar is located at the top right of the board area.

modelwriter/requirements

+ Add Issue

Filter Board

User Stories 13

Confirmed 3

In Progress 0

Done 2

14

The TRAM will be able to compose transformations.

Software Requirements Document (SRD)

WP3 - Model to/from Knowledge Base

13

The TRAM validates such parameters and also the input models before a transformation takes place.

Software Requirements Document (SRD)

WP3 - Model to/from Knowledge Base

12

A mechanism is needed to register the available transformations in ModelWriter

Software Requirements Document (SRD)

WP3 - Model to/from Knowledge Base

11

M2M Transformation Framework must synchronize the output models after its input models or configurations have been modified.

Software Requirements Document (SRD)

WP3 - Model to/from Knowledge Base

10

M2M Transformation Framework must keep traces between transformed models and its source models.

17

The system must support an open requirement authoring tools (such as RMF)

UC-TR-03 Generation and management of feature models

User Requirements Document (URD)

16

The system should support ReqIF standard.

UC-TR-03 Generation and management of feature models

User Requirements Document (URD)

15

BPMN 2.X shall be supported as the Business Process Modeling Language in the tool.

UC-TR-05 Synchronous Business Process Design with Use Cases

User Requirements Document (URD)

In Progress

Let others know you're working on an issue by dragging it to In Progress.

19

Fe

18

readme folder added

ModelWriter Open Workshops in 2015

<https://github.com/modelwriter/workshops>



The 1st International ModelWriter Workshop in Izmir, Turkey (Jan 15-17, 2015)



The 1st International Euraka Project Exhibition in Berlin, Germany (Mar 10-11, 2015)



The 2nd International ModelWriter Workshop in Brussels, Belgium (Apr 30, 2015)



The 3rd International ModelWriter Workshop in Toulouse, France (Jun 22-23, 2015)



The 4th International ModelWriter Workshop in Brussels, Belgium (Sep 23-24, 2015)

**Thank you for your attention
We value your opinion and
questions.**