

Retours d'expérience sur la mise en oeuvre de méthodes et outils d'IE basée sur des modèles

Christophe Ponsard
GRD-GPL – Paris, 30 mars 2017

Résumé

L'ingénierie dirigée par les modèles se développe depuis de nombreuses années pour la conception de logiciels et de systèmes. Elle peut également soutenir la phase d'ingénierie de exigences: un modèle d'exigence permettant de guider l'identification, la définition et la structuration des concepts clés d'un domaine, notamment en termes de buts, exigences, hypothèses, agents, obstacles, risques.

Notre exposé s'appuiera sur une série de mises en œuvre outillées d'une telle approche de l'IE que le CETIC a mené depuis une dizaine d'années auprès de différentes entreprises belges et internationales. Différentes dimensions seront abordées et discutées: la richesse des notations vs leur standardisation, l'intégration avec les autres phases du cycle de vie et au travers des chaînes d'outils et les liens avec une approche d'architecture d'entreprise.

Aperçu

- Acteurs: académique, R&D appliquée et exploitation
- KAOS: méthode/outil actuel
- Historique des « défis » lors des divers « âges » de KAOS
 - R&D
 - Missions
- Zoom sur quelques travaux représentatifs
 1. Raisonnement formel ? → FAUST
 2. Vue élargie (grande entreprise) → architecture d'entreprise
 3. Vue élargie (PME) → ISO 29110 → enquête
 4. Gestion des relations entre les artefacts d'IE → transformation, synchro
 5. Modèle « Saas » - Version Web

En collaboration avec...

UCL
Université
catholique
de Louvain


Respect-IT



Un partenariat de longue date



*Recherche
Fondamentale*



Respect-IT

Services

Editeur de logiciel

Recherche appliquée

Prototypes

Transfert de technologies

Consultance technologique

Business



Notre valeur ajoutée: une **méthode** et un **outil** support



Interviews



Systèmes
existants

Documents



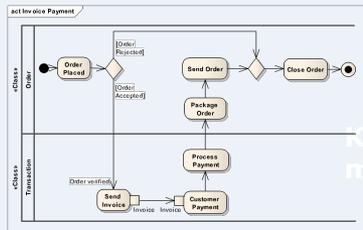
Validation



Modélisation



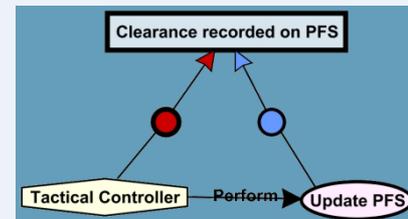
Métier



As is

To be

Exigences



GORE/KAOS

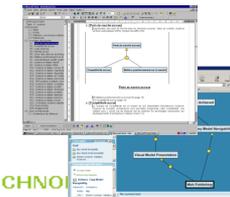
Vérification



UML, BPMN, SBE...

Dérivation

GORE: Goal-Oriented RE
KAOS: Keep All Objectives Satisfied

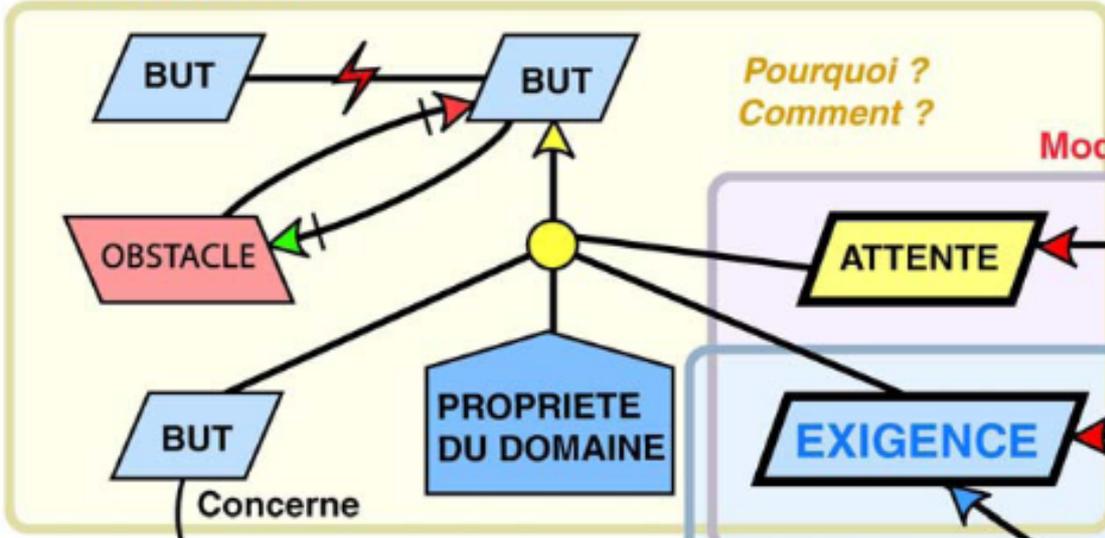


Rapports
(CSC, docs,...)

Méta-modèle KAOS (+/- stable depuis 2004)

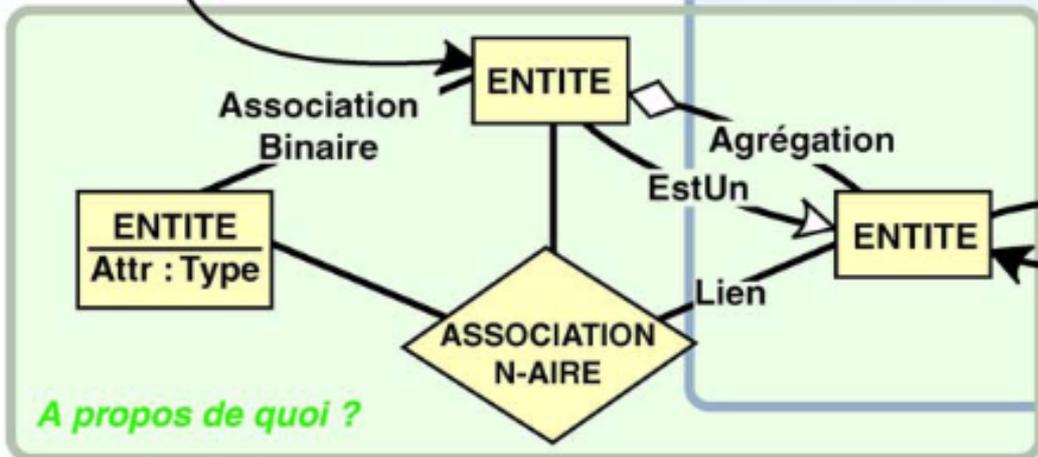
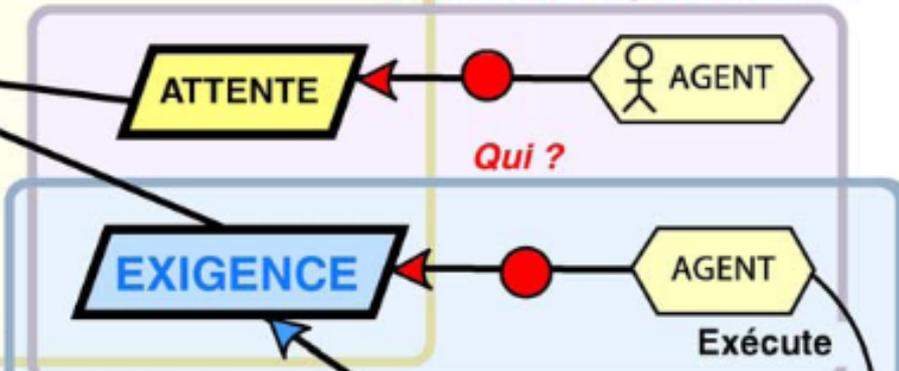


Modèle des buts



Objectiver®

Modèle des responsabilités

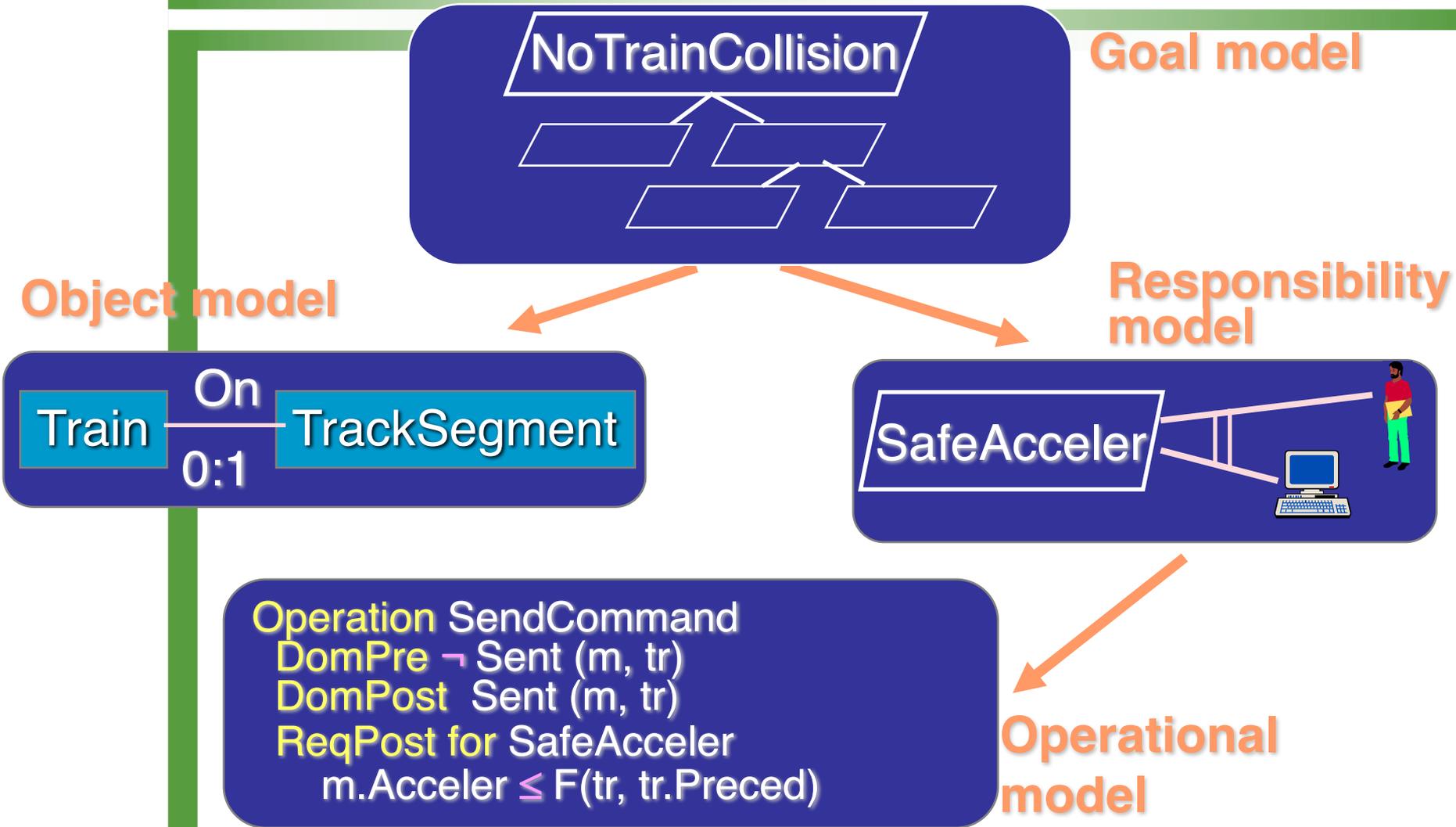


Modèle Objet

Modèle des opérations

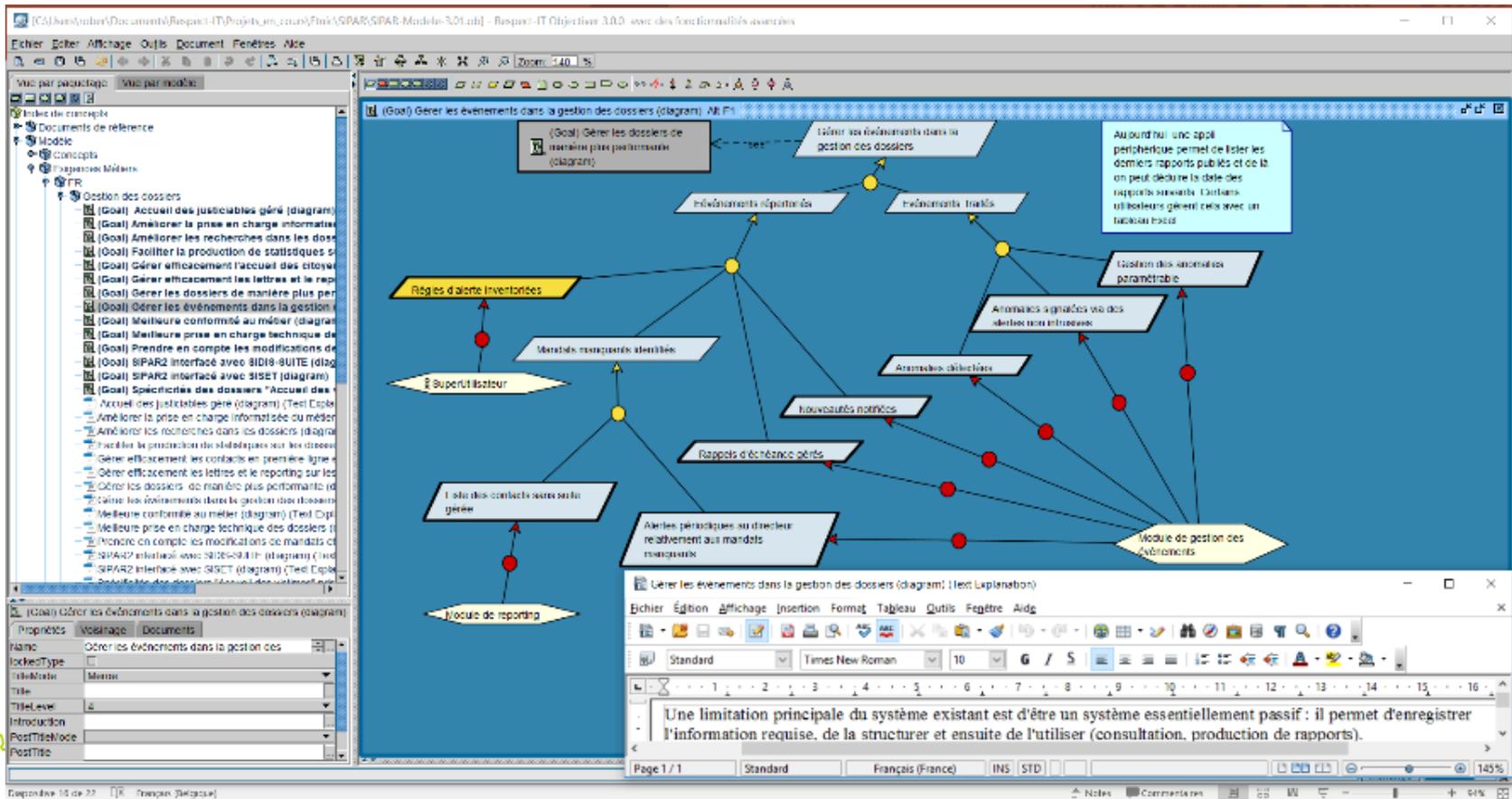


IE Orientée But



Outil

« Desktop » → « Web »



Outil

« Desktop » → « Web »

The screenshot displays the ReqDiscover web application interface. The browser address bar shows the URL: localhost:8000/objectOver/Client/editor.html?projectId=1244. The application header includes navigation links for Home, Tools, My Account, and Help, along with a user greeting 'Welcome, JohnDoe' and a Logout button. The project name is identified as 'O-Web-1462031800035'.

The main workspace is divided into several sections:

- Left Panel:** A tree view of project elements, including folders like 'Guidance system' and 'Help managed', and specific elements like 'Maintain[Zone: Status Indicated]'.
- Central Canvas:** A graphical model showing relationships between requirements. Nodes include 'Maintain[Space Availability Status Indicated]', 'Maintain[Zone status reported inside car park]', 'Full status reported', 'Cars entry/exit counted', 'Parking slot management and guidance system', and 'Diagnose Seeker'. A note 'Car driver not finding place of parking time' is also present.
- Right Panel (GWT Editor):** A text editor for writing GWT code. It shows a feature definition and two scenarios with associated conditions and actions.

The GWT editor content is as follows:

```
1 feature: zone status reported inside
2
3
4 As * <car_peak_owner>
5 I want that <car_drivers> are quickly directed to free place
6 In order to ensure smooth operation
7 and to maximize <car_drivers> satisfaction
8
9 Scenario: report specific zone full
10 Given park is divided in a set of <park_zone>
11 When there is no free space in zone <park_zone>
12 Then show message about full status and redirect to another <park_zone>
13
14 Scenario: report empty space in specific zone
15 Given park is divided in a set of <park_zone>
16 When there is free space in zone <park_zone>
17 Then message about number of free place is displayed in <park_zone>
```

Below the GWT editor, there are 'Refresh' and 'Submit' buttons.

At the bottom of the interface, there is a table with columns for 'View', 'User', and 'Message'.

View	User	Message
Libe time	Libe user	Libe message
2016-04-30 10:15	JohnDoe	Update Graphical representation of concept Display System (Agent) in Diagram Space Availability Status Indicated
2016-04-30 10:16	JohnDoe	Update Graphical representation of concept Maintain[Zone status reported inside car park] [Goal] in

Historique

	Recherche	Missions	Défis
<ul style="list-style-type: none"> 90's genèse KAOS – jeunes années <ul style="list-style-type: none"> Développement de la méthode (UCL) Premières études (CEDITI) Outillage préliminaire 	<ul style="list-style-type: none"> '91 Seminal paper (Dardenne, AvL) '98 Obstacles (AvL, Letier) '98 Formal patterns (Darimont, AvL) 	<ul style="list-style-type: none"> '95 Telecom Publishing Pharma ... 	<ul style="list-style-type: none"> Méthode: consolider Outil: modéliser
<ul style="list-style-type: none"> 00's – des outils <ul style="list-style-type: none"> Grail/Objectiver semi-formel (CEDITI/Respect-IT, commercial) Atelier formel FAUST (CETIC, R&D) 	<ul style="list-style-type: none"> '02-03 Opérations, Agent (Letier, AvL) '04 Atelier FAUST (Ponsard, Massonet, AvL) '04-05 Sécurité/Confid. AvL, RDL '08-11 Event-B (Ponsard, Massonet) 	<ul style="list-style-type: none"> '03 Eurocontrol '04 GAMAH '06 AssessGrid '08 Parlements '10 Banque 	<ul style="list-style-type: none"> modularité génération CDC formalisation et raisonnement formel Intégration model-based
<ul style="list-style-type: none"> 10's – maintenance et évolution <ul style="list-style-type: none"> Outil: OpenOffice Writer/Calc... Méthode: cible PME 29110 Version web « SaaS » Ingénierie Système 	<ul style="list-style-type: none"> '15 Models-Diag-Table (Ponsard, Darimont) '15-'16 risk-proba (Caillau, AvL) '16 ISO 29110 (Majchrowski, Deprez) '16 Objectiver-web (Ponsard, Darimont) '16 Spatio-temporel (Ponsard, Touzani) 	<ul style="list-style-type: none"> '11-'12 ONE '12 Paasage '13 EVS '13-14 DMI '16 Justice 	<ul style="list-style-type: none"> Outil: autres artefacts raisonnement Méthode: allégement Agilité Outil: version web M/O: patterns

Principales missions (→ 2004)

A. Van Lamsweerde, *Goal-Oriented Requirements Engineering: A Roundtrip from Research to Practice*, 12th IEEE Joint International Requirements Engineering Conference, Kyoto, Sept. 2004

Domain	System
Telecom	Phone service through TV cable
Air traffic control	Inter-controller communication support (preliminary study)
Air traffic control	Conflict handling between ground and on board collision avoidance systems (preliminary study)
Aerospace	Design of test suites for rocket launch
Steel industry	Integrated production management
Automotive industry	Production scheduling; inter-facility order processing
Publishing	Copyright tracking & management
Press	Newspaper back office system
Food industry	Supermarket discount management
Pharmaceutics	Drug dispatching & tracking
Pharmaceutics	E-learning service for salesmen
Health care	Patient clinical summary
Health care	Hospital emergency service support
Natural language processing	Web page translator

Principales missions (2004 → 2014)

Christophe Ponsard, Robert Darimont, Arnaud Michot: Combining Models, Diagrams and Tables for Efficient Requirements Engineering : Lessons Learned from the Industry. INFORSID 2015: 235-250

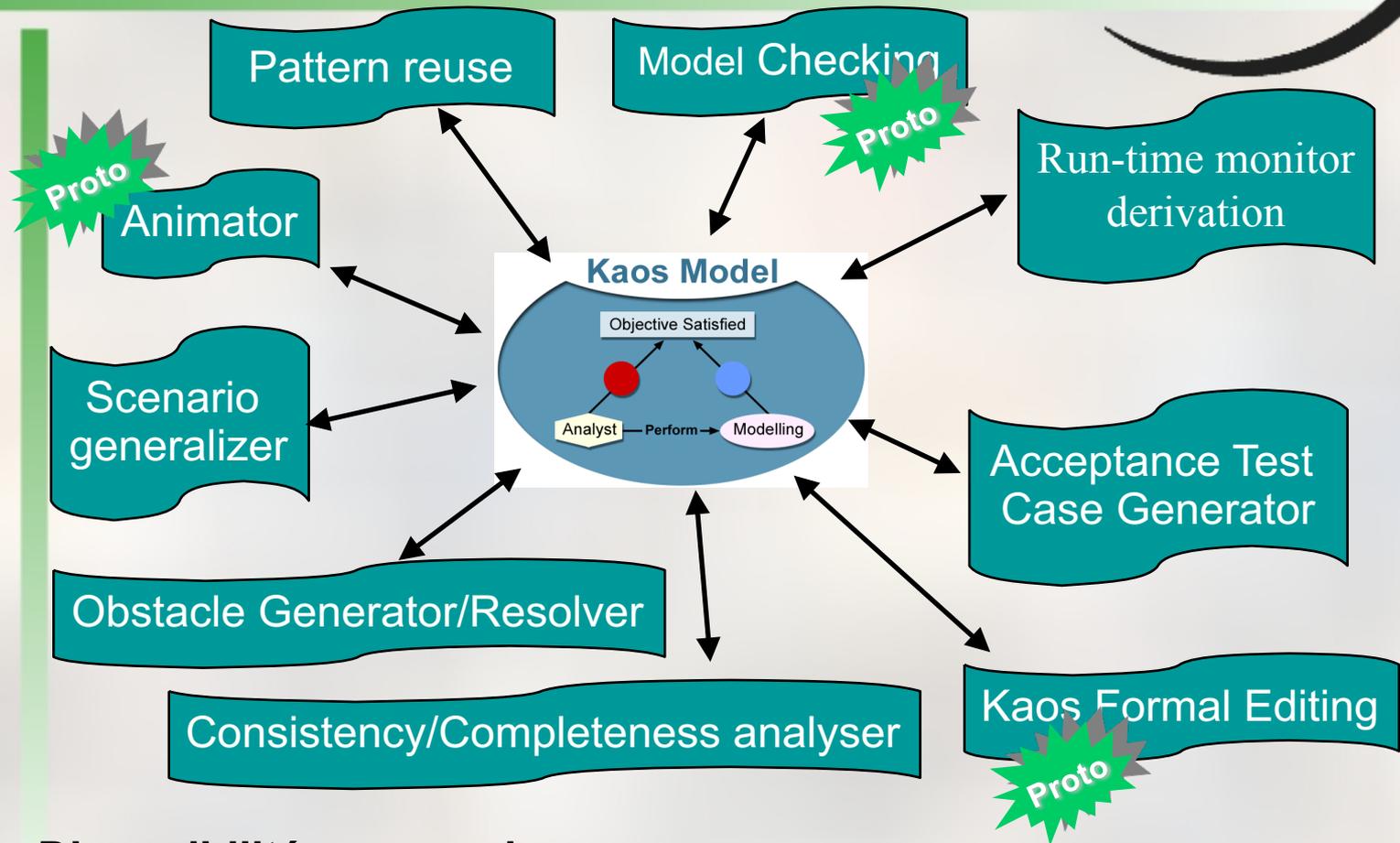
Year	Domain	Location	Purpose	#reqs	#pages	Notations used
2004	Accessibility	Belgium	Domain model	185	108	goal diagrams, structured text, ranking table
2006	Grid computing	Europe	SRS	52	137	Structured text, req. tables, sequence diagrams
2007	Child care	Brussels	As-Is	126	182	BPMN, statecharts, tables (high level goals)
2009	Parliaments	Belgium	Call for tender	187	127	Structured text, req. tables, goal diagrams (multilingual)
2010	Banking	Brussels	internal templates	N/A	N/A	Structured text, context/goal/BMPN/information diagrams
2011	Smart Cards	Brussels	test plan	N/A	230	Command tables, Finite State Machines
2012	Child care	Brussels	Call for tender	173	267	Structured text, Event Process Chains, Use cases, req tables
2013	Electronic Nurse record	Brussels	Call for tender	223	151	Structured text, process models, req tables and diagrams
2014	Cloud computing	Europe	SRS, arch.	200	187	Structured text, req. tables, sequence diagrams
2014	Accounting	Belgium	SRS	210	170	Structured text, req tables and diagrams



Quelques Références

Aéronautique	Industrie	Services
    	  	    
<h2>Santé</h2>		<h2>Edition</h2>           
  		

Topic 1 - atelier formel FAUST



Disponibilité progressive
Prochain Milestone en mai 2003

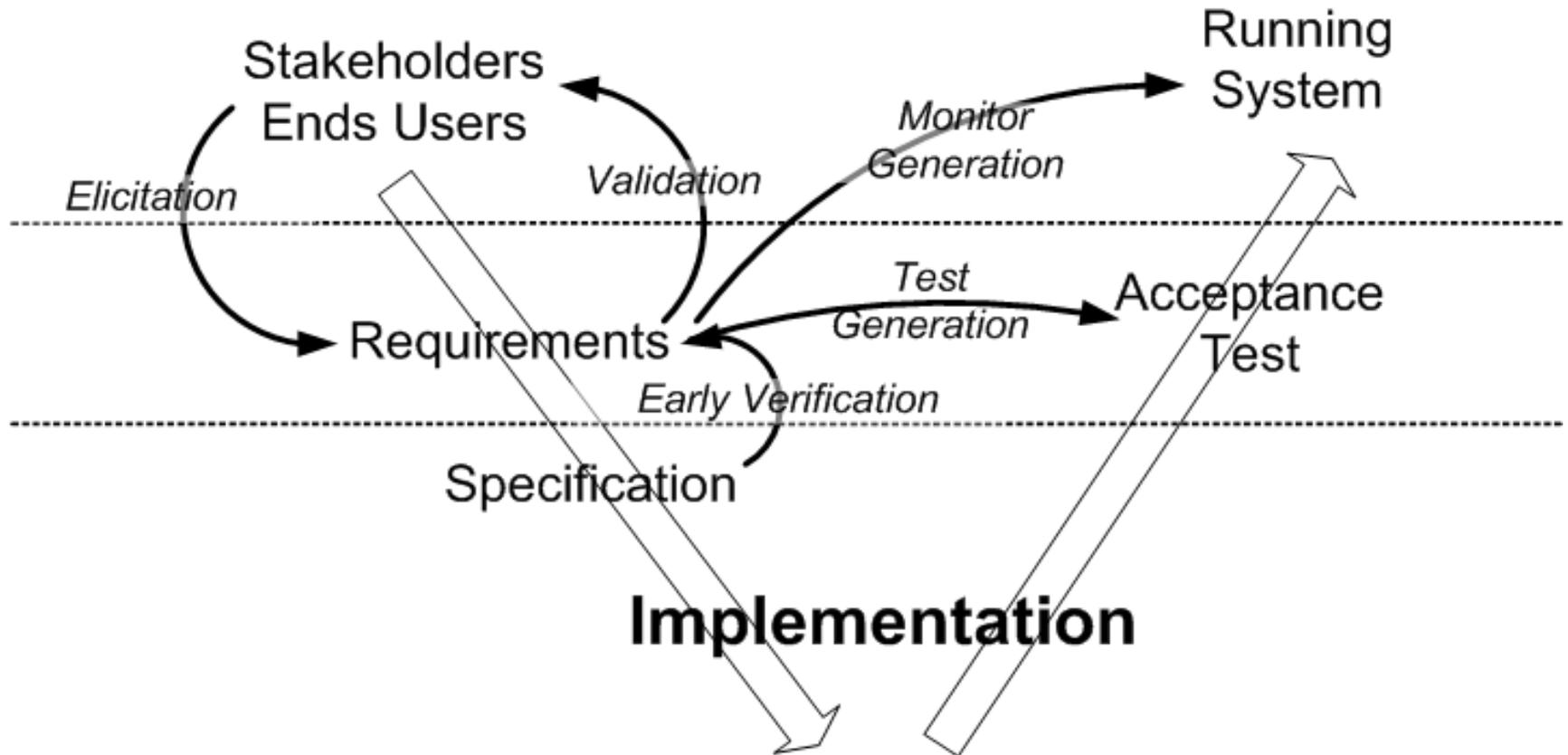
Outil KAOS : Objectiver (GrailLite)

The screenshot displays the Cediti Grail 0.3.1 software interface. The main window shows a KAOS diagram titled "PriseDeSang Alt-0" with a central goal "Réaliser[ExamenSanguin]" and three sub-goals: "Réaliser[DemandePSPourPatient]", "Réaliser[RésultatAnalyseTransmis]", and "Réaliser[AnalyseEchantillonPrélevé]". A "Docteur" actor is associated with the first sub-goal. The interface includes a menu bar (File, Edit, View, Tools, Document, Windows, Help), a toolbar, and several panels: "Specification" (Attributes, Concept Index), "Concerns" (Conflicts With, Operations, Documents, Properties), "Documents" (ContexteSU, ExamenSanguin, NFR), "Concept index" (Assurer[EtiquetageTubes], Assurer[EvaluationUrgence], Assurer[ReussitePrélevement]), "Concepts by type" (Docteur, Infirmier, Labo, S.I), and "Concept specification" (Infirmier, Domain, ResponsibleFor, Réaliser, [TransfertPrélevement]).

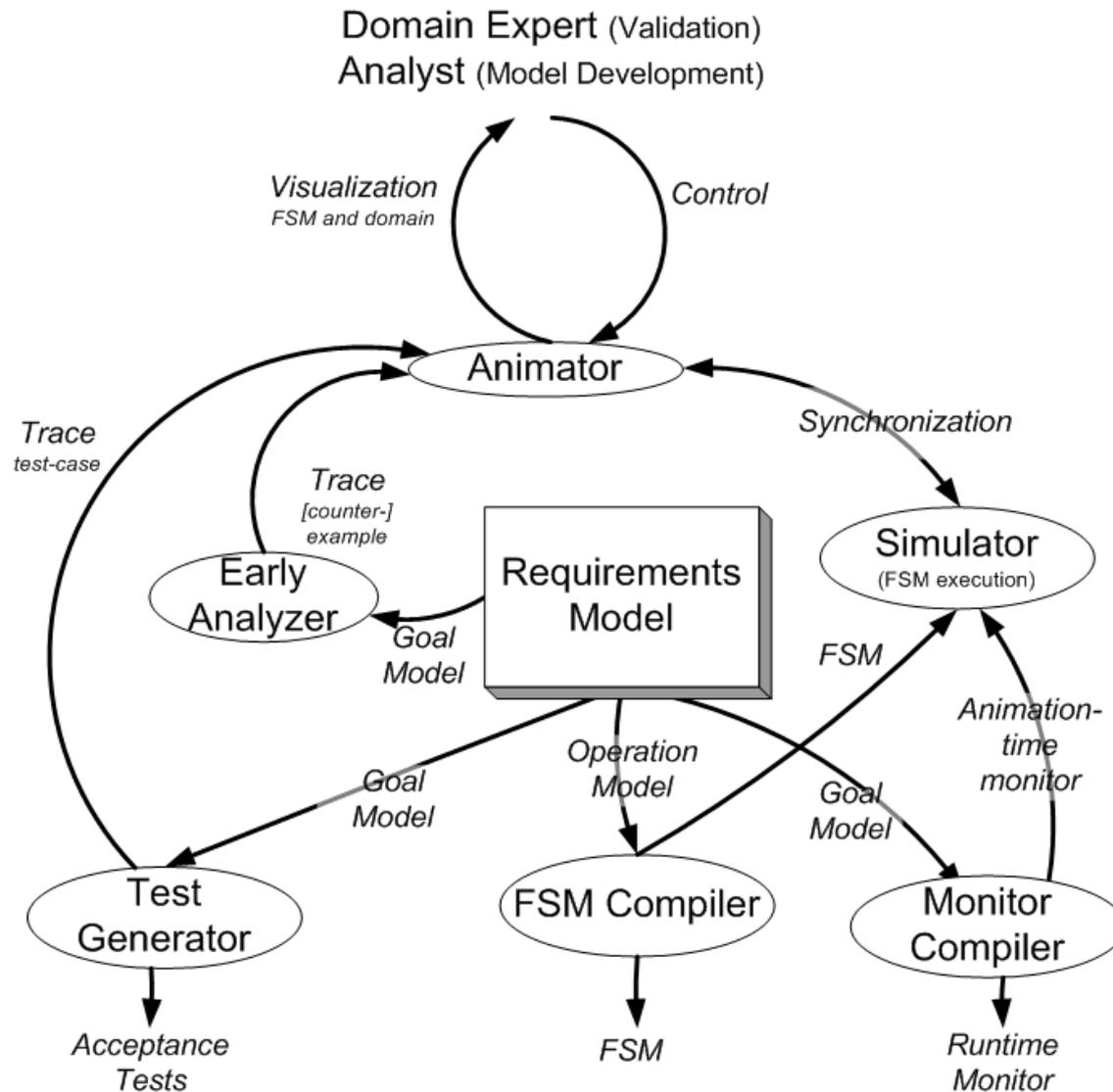
Overlaid on the bottom right is a Microsoft Internet Explorer window displaying the generated HTML report for "PriseDeSang". The report shows a more detailed KAOS diagram with actors "Docteur", "Infirmier", "Labo", and "S.I.", and goals "Réaliser[ExamenSanguin]", "Réaliser[DemandePSPourPatient]", "Réaliser[PrélevementChezPatient]", "Réaliser[AnalyseEchantillonPrélevé]", "Réaliser[TransfertPrélevement]", and "Réaliser[RésultatAnalyseTransmis]". Below the diagram, the text reads: "Toute demande d'examen sanguin d'un patient admis au service des urgences est traitée dans un délai raisonnable et le résultat de l'analyse du patient est".

- Java
- Générique
- Génération de rapports

Activités et contexte



Atelier FAUST – relations entre les principaux outils



Formal Level: Semantics of Goal Refinement

- **Formal definition of a refinement**

$G_1, \dots, G_n, \text{Dom} \models G$

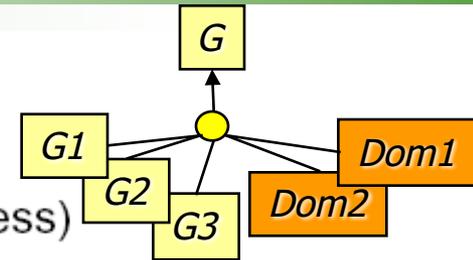
(completeness)

$\bigwedge_{j \neq i} G_j, \text{Dom} \not\models G$ for each $i \in [1..n]$

(minimality)

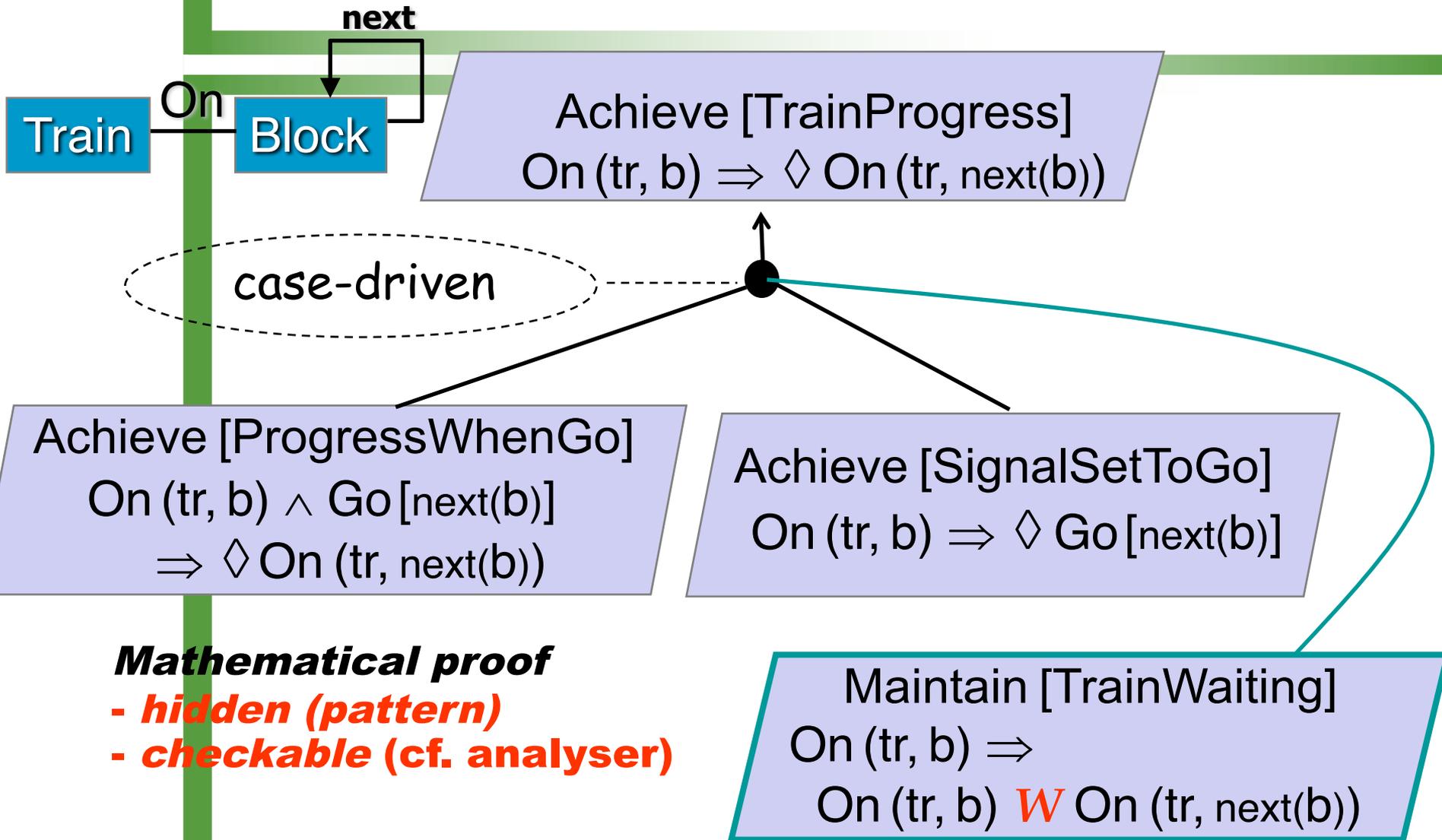
$G_1, \dots, G_n, \text{Dom} \not\models \text{false}$

(consistency)



- **Local/incremental nature:** each refinement can be analyzed independently from the others (not the case for conflicts !)
- **Propagation:** the global correctness comes from the correctness of each refinement
- Each refinement is more or less sensitive to **domain properties**

Pressing the “formal” button



Mathematical proof

- **hidden (pattern)**
- **checkable (cf. analyser)**

FAUST – Model-checker (nuSMV, plugin not maintained)

The screenshot displays the Cediti Objectiver 1.5.2 interface. The main window shows a diagram with nodes: "signal set to go (bounded)", "progress when go signal (bounded)", and "train progress (bounded)". A yellow circle is positioned between "signal set to go" and "train progress".

On the left, the Package View shows a tree structure under "Train progress", including "Instances", "Objects", and various goal and object definitions.

At the bottom left, the Documents panel shows a table with columns "Name" and "Value":

Name	Value
Pattern	...
AltName	...
Complete	<input type="checkbox"/>

Three FormalDef windows are open, showing the following code:

```
// FormalDef of signal set to go (bounded)  
All tr: Train, b : Block  
nextBlock( On( tr ) , b )  
==> <> [= < 2 steps] go signal ( b ) = green()
```

```
// FormalDef of progress when go signal (bounded)  
All tr: Train, b : Block  
nextBlock( On( tr ) , b )  $\wedge$  go signal ( b ) = green()  
==> <> [= < 2 steps] On( tr ) = b
```

```
// FormalDef of train progress (bounded)  
All tr: Train, b : Block  
nextBlock( On( tr ) , b )  
==> <> [= < 4 steps] On( tr ) = b
```

The rightmost window, "Attributes and Check of the refinement (depends values)", contains the following text:

```
// STATE 0 LOOP path : states repeating for ever in this order  
On( Train [1]() ) = Block [2]()  
go signal( Block [1]() ) = red()  
go signal( Block [3]() ) = red()  
go signal( Block [2]() ) = green()  
nextBlock( Block [1](), Block [2]() ) is True  
nextBlock( Block [3](), Block [1]() ) is True  
nextBlock( Block [2](), Block [3]() ) is True  
  
// STATE 1 (still within loop)  
On( Train [1]() ) = Block [1]()  
go signal( Block [3]() ) = green()  
go signal( Block [2]() ) = red()
```

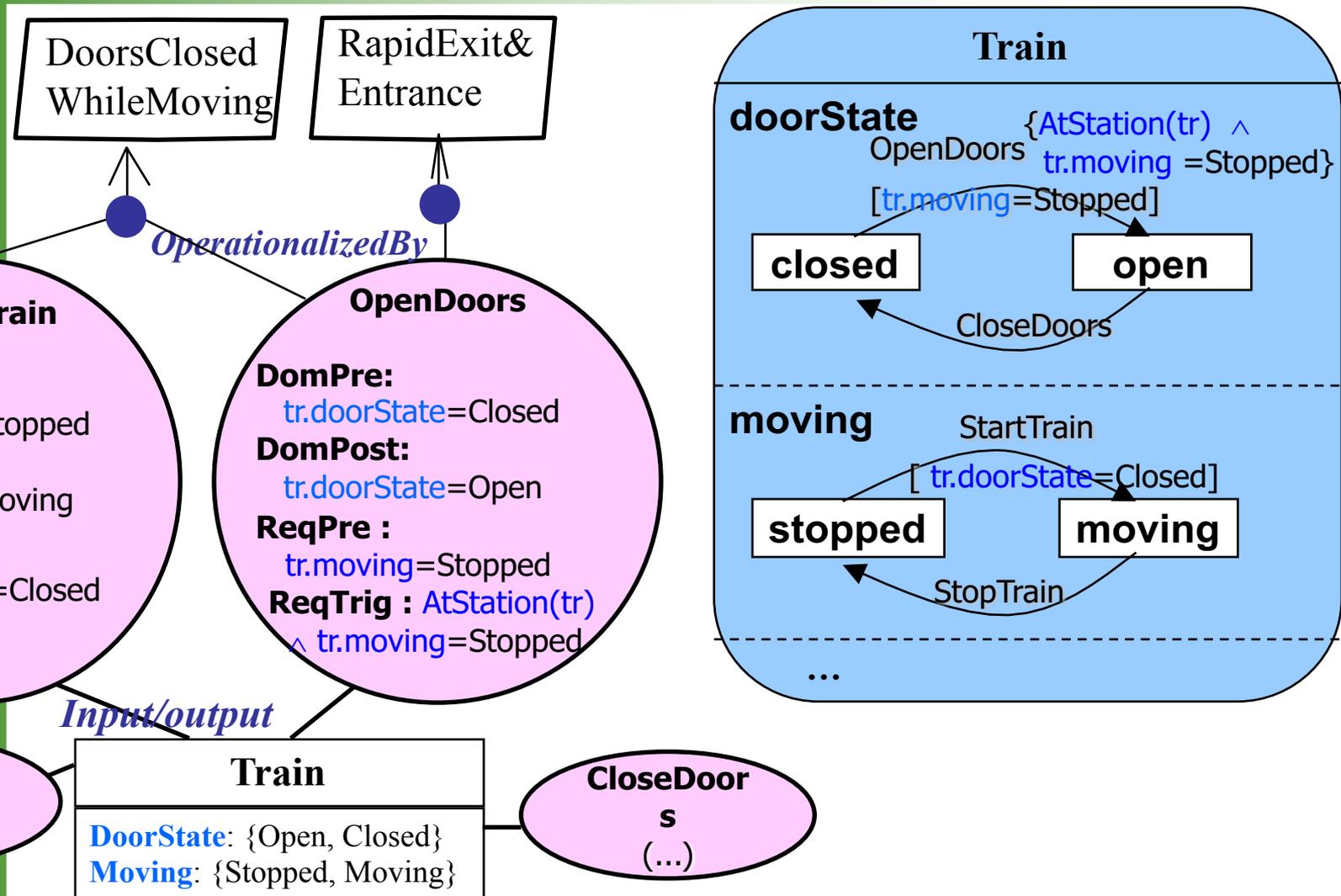
The status bar at the bottom shows the following log messages:

```
Sep 19, 2004 11:02:59 AM INFO: Scenario found.  
Sep 19, 2004 11:03:00 AM INFO: The check requested to the server at (GMT) Sep 19, 2004 9:02:55 AM  
has been answered by the server at (GMT) Sep 19, 2004 9:02:59 AM (laps is : 4s)  
Sep 19, 2004 11:03:00 AM INFO: Request FormalCheckAnalysisOfRefinement result has been received.
```

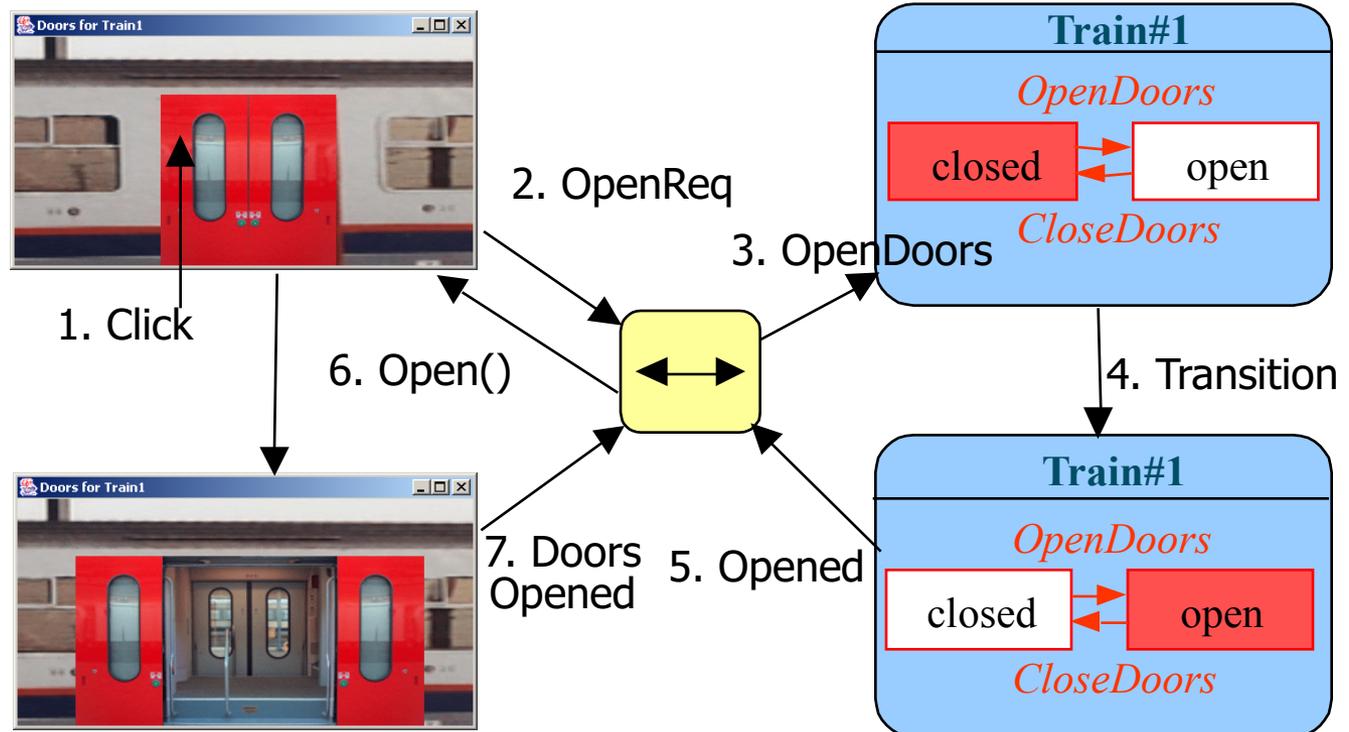
The bottom right corner of the interface shows "Modified", "42M of 93M", and a small icon.

GSM Generation in action

Scope: DoorCloseWhileMoving



Mapping GSM on domain-based visualizations



FAUST - Animateur

The screenshot displays the FAUST Animateur software interface for a train system simulation. The main window is titled "[specs/train/TrainSystem-RE04.ob] - Cediti Objectiver 1.5.2 with advanced features".

Simulation View: Shows a train on a track with various elements like doors and control panels.

Doors for Train1: A panel showing a close-up of train doors.

Train Controls: A panel with three indicators: "Moving" (a hand icon), a speedometer showing approximately 110 MPH, and "Opened" (a door icon).

Animator Actor (localhost: Baldus@1095585565605): A control panel with buttons for "Create instance" and "Show state".

Execution View: A text area showing the following commands:

```
[Stop(vh:=Train#1)]GO
[CloseDoors(tr:=Train#1)]GO
[Start(vh:=Train#1)]GO
[OpenDoors(tr:=Train#1)]GO
=>
```

FSM Visualizations: Two state machine diagrams for "Train#1". The left diagram shows a transition from "Closed" to "Opened" via "OpenDoors" and from "Opened" to "Closed" via "CloseDoors". The right diagram shows a transition from "Forward" to "Stopped" via "Stop" and from "Stopped" to "Forward" via "Start".

Available scenarios: A list of scenarios including "Crossing-FollowingTrains", "Crossing-Train1 CrossingOpened", "Doors-OpenDoorsWhileMoving" (highlighted), "Doors-StartWithDoorsOpened", "MiniDemo-Train-at-Station", "Various-Train1 GoesAround", and "Various-TrainsGoBetweenStations".

Debug View: A text area showing the following messages:

```
req. is disabled
OpenDoors executed
```

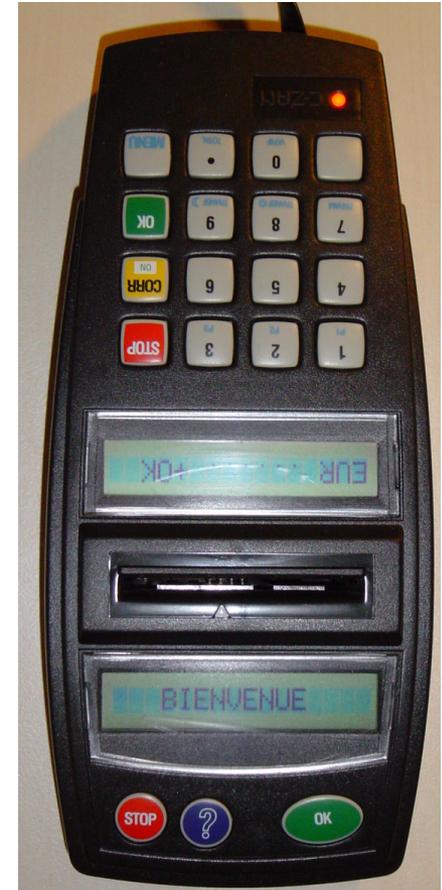
Security Goal Failure Report: A red-bordered box at the bottom left contains the following text:

```
SECURITY GOAL FAILURE : door not closed while moving
for Train#1
```

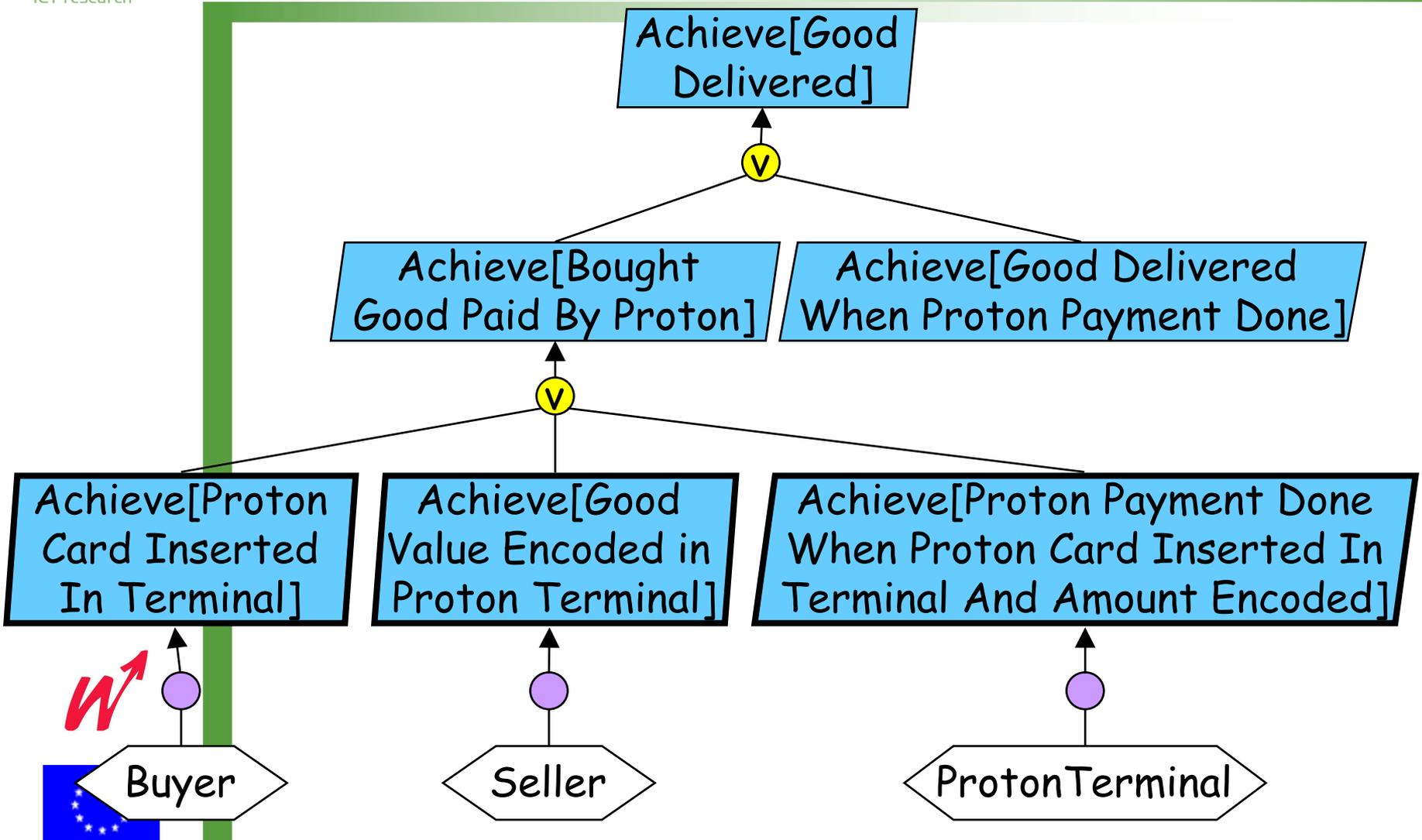
System Information: A box at the bottom right shows "Modified 43M of 93M".

Petite étude de cas dans la sécurité des informations : PROTON (RIP)

- Porte-monnaie électronique
- Rechargeable
 - aux ATM
 - téléphones publics (PIN requis)
- Paiement hors ligne au terminal du vendeur: le terminal collecte la monnaie "électronique"
- Mise en ligne du terminal pour alimenter le compte du vendeur



PROTON – aspects fonctionnels



PROTON: buts de l'acheteur

Avoid[Buyer Wealth Decreased
From Proton Card]



Avoid[Proton Card Balance
Decreased When No
Proton Payment Done]

Avoid[Amount Deduced From Proton
Card Bigger Than Bought Good Value]



Maintain[Proton Payment
Amount Lower Or Equal
To Bought Good Value]

Maintain[Amount Deduced From Proton
Card Balance When Proton Payment Done
Lower Or Equal To Payment Amount]



Maintain[Encoded
Amount Lower Or Equal
To Bought Good Value]

Maintain[Proton Payment
Amount Lower Or Equal
To Encoded Amount]

 Seller

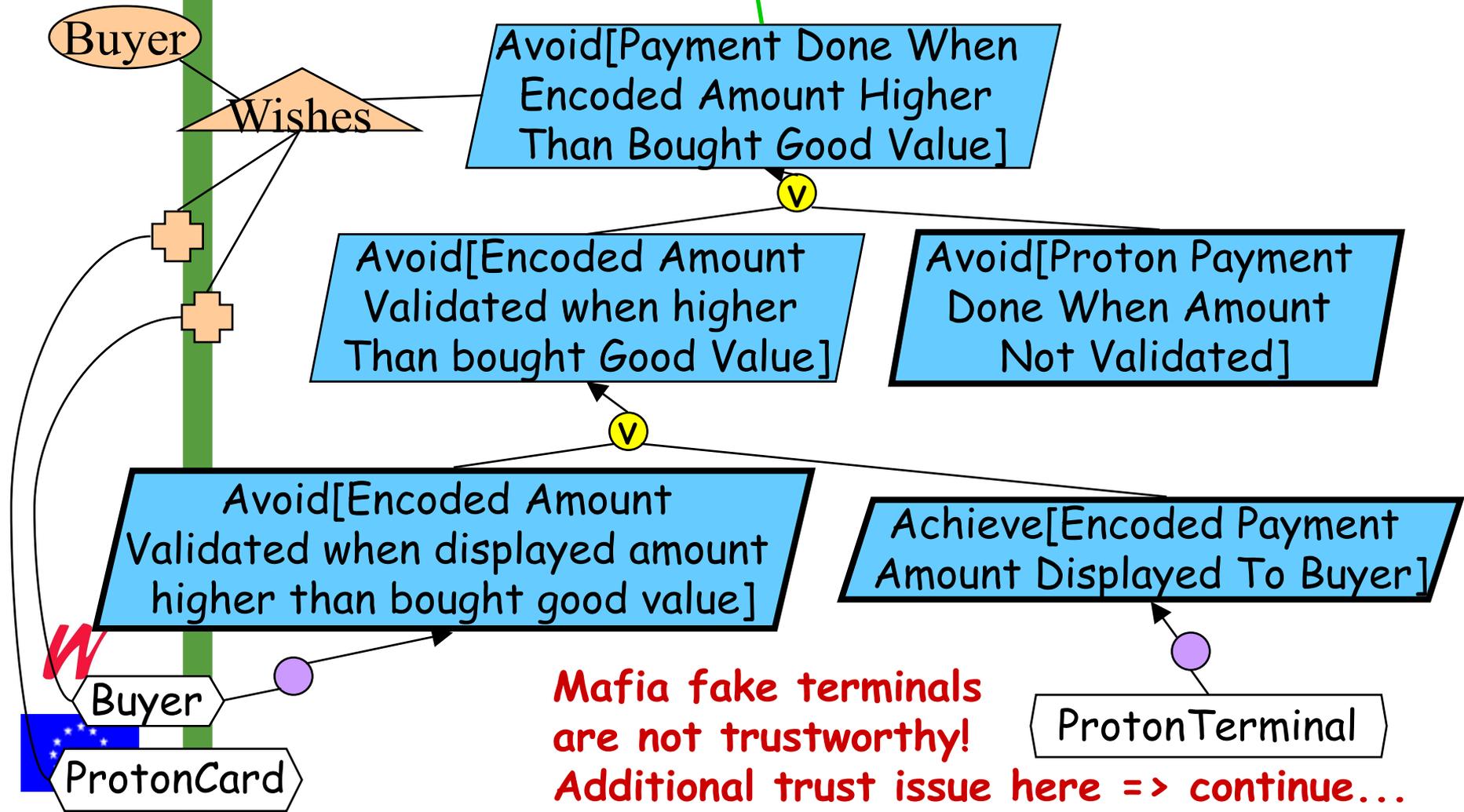
Encoded Amount Higher
Than Bought Good Value

Nothing will prevent the Seller
from entering a higher amount

PROTON – Résolution du problème de confiance [PhD R. de Landtsheer]

Encoded Amount Higher Than Bought Good Value

Obstacle mitigation



Mafia fake terminals are not trustworthy!
Additional trust issue here => continue...

FAUST - au final ?

- Gestion du niveau formel « en avance sur son temps »
 - D'abord avoir la maturité au niveau semi-formel, approche IDM,...
- Réaliser un animateur → lourd (maintenance...)
 - Apparition de bon animateurs sur la plateforme RODIN
- Cible réduite: systèmes critiques

- Piste privilégiée par la suite
 - Alignement avec une plateforme formelle (Event-B/RODIN)
 - Travaux de mapping avec Event-B
 - Intérêt récrudescent: montée en maturité, cyber-physical systems (co-design des problèmes de sécurité et de sûreté de fonctionnement)

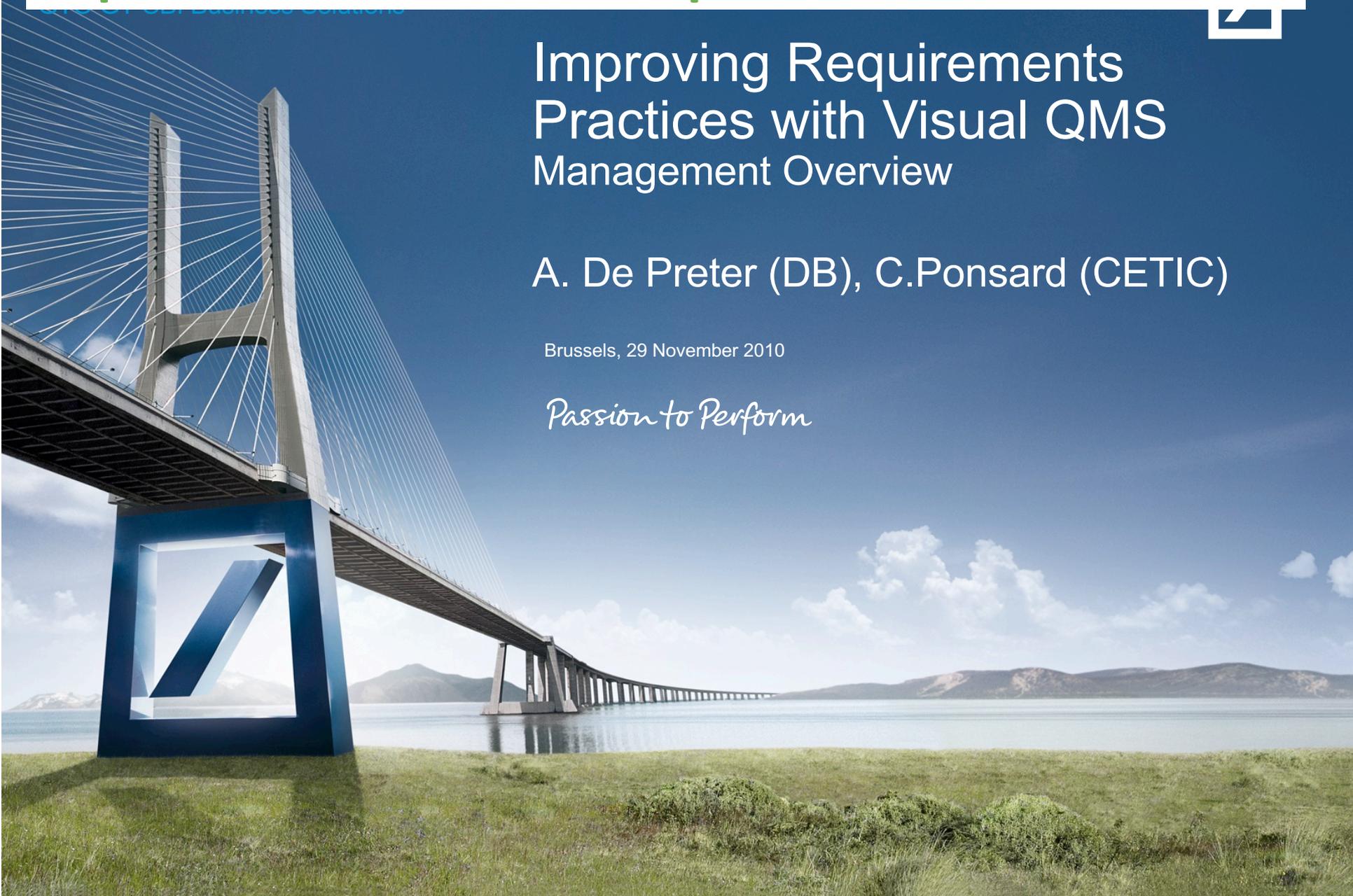
Topic 2 - Architecture d'entreprise (Deutsche Bank, A. De Preter)

Improving Requirements Practices with Visual QMS Management Overview

A. De Preter (DB), C.Ponsard (CETIC)

Brussels, 29 November 2010

Passion to Perform



Problem statement: QMS needs more support !



- QMS is difficult to learn and to use
 - even more for external consultants
 - several templates, limited hint about how to instantiate
- Little reuse of artefact across projects, lack of enterprise view
- Document oriented culture
 - little modelling practices
 - no sharing of experience
- No explanation of how models integrate with documents (nor why)
- Lack of Alignment
 - IT to the Business
 - Projects to the Enterprise

= main conclusions of the initial assessment mission

Proposed Solution: Visual QMS

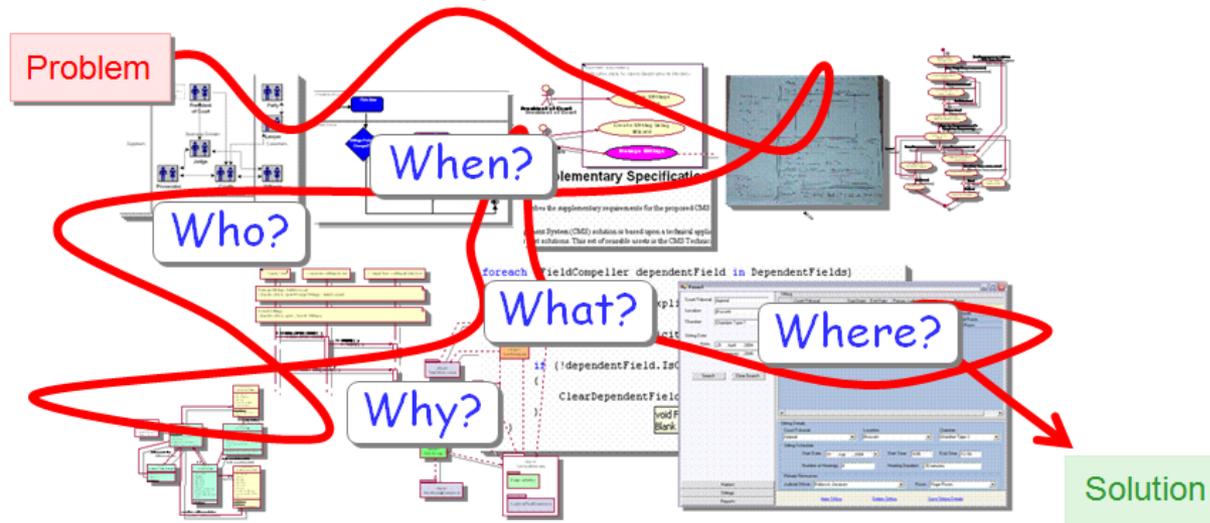


SCOPE

- Zoom into QMS **Requirements Analysis** phase
- For Business / Functional Analysts, Domain / Solution Architects

VISUAL QMS - DEFINITION

- Simple, visual and structured method for Project Delivery
- Synoptic and navigable guidance with practical examples
- Extends QMS with modelling techniques and contextual guidelines
- Enables Continuous Process Improvement



Main Benefits



- Simplifies the learning and usage of the standard QMS methodology
- Fills QMS gaps
 - Standardized modelling techniques
 - Alignment of IT to the Business
 - Projects alignment to the Enterprise
- Enables continuous process improvement (“CMM 5”)

Visual QMS Features – Tools



Process Guidance Website

DEFINITION

- Delivery Process Guidance
- Implemented as a dynamic and navigable Web site
- Provides links to specific Resources regarding roles, documents, models and tools.

For each role, organized answers are provided to pragmatic questions that are difficult to answer today:

- What deliverable do I need to produce right now ?
- How does this model integrates into a document (at section level) ?
- What input do I need from whom ?
- Who will use my work product ?
- How do I produce my deliverable: guidelines, video, template, concrete example. ?

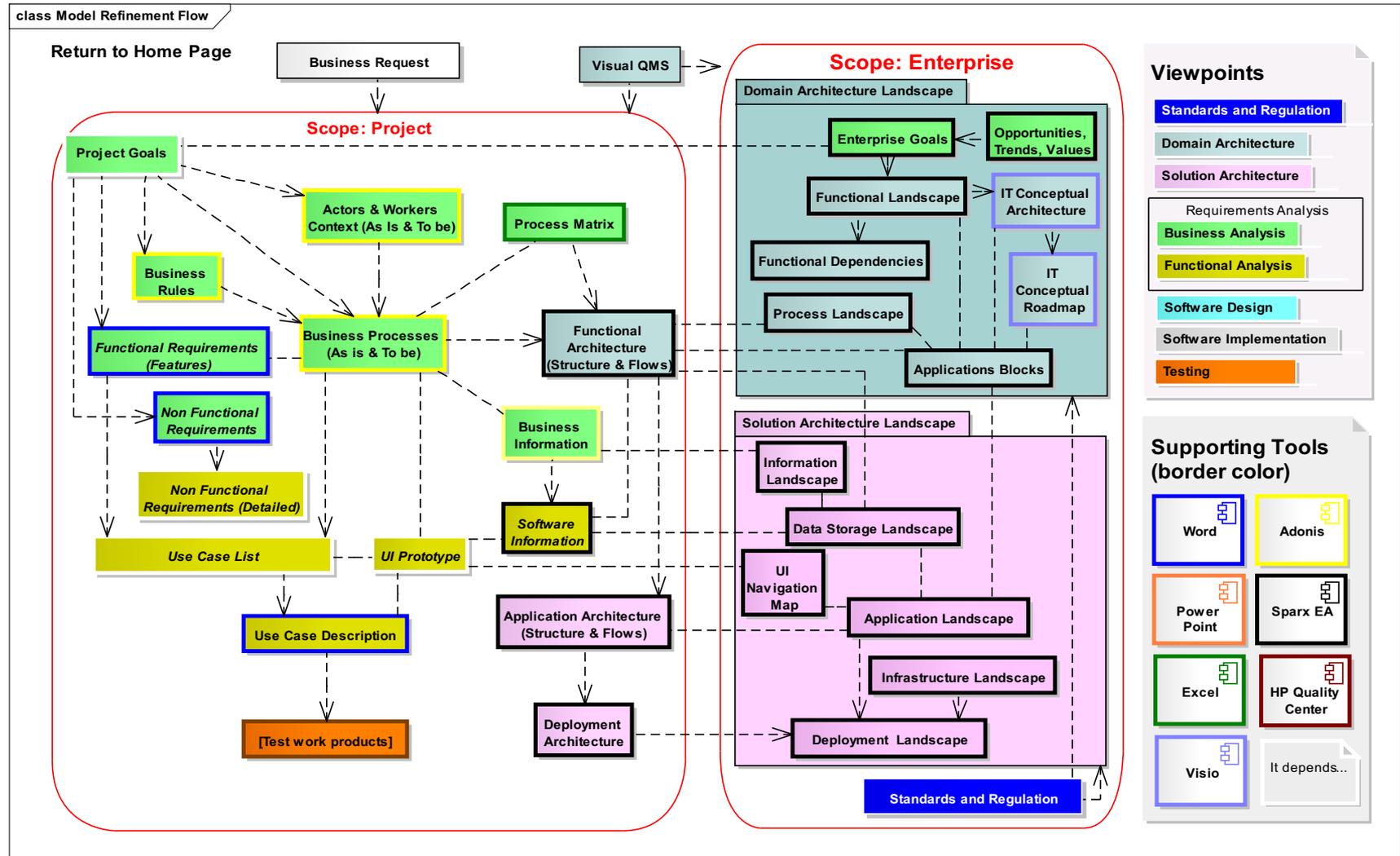
BENEFITS

- Minimized learning curve, including for new staff/external consultants
- Improved understanding of what is to be captured within each analysis activity
- Improved quality in terms of consistency and completeness
- Improved traceability between document artefacts
- Easy to maintain, adapt and extend

Visual QMS – Website



Models are used as input to create other models – Also shows who does it and with what tool

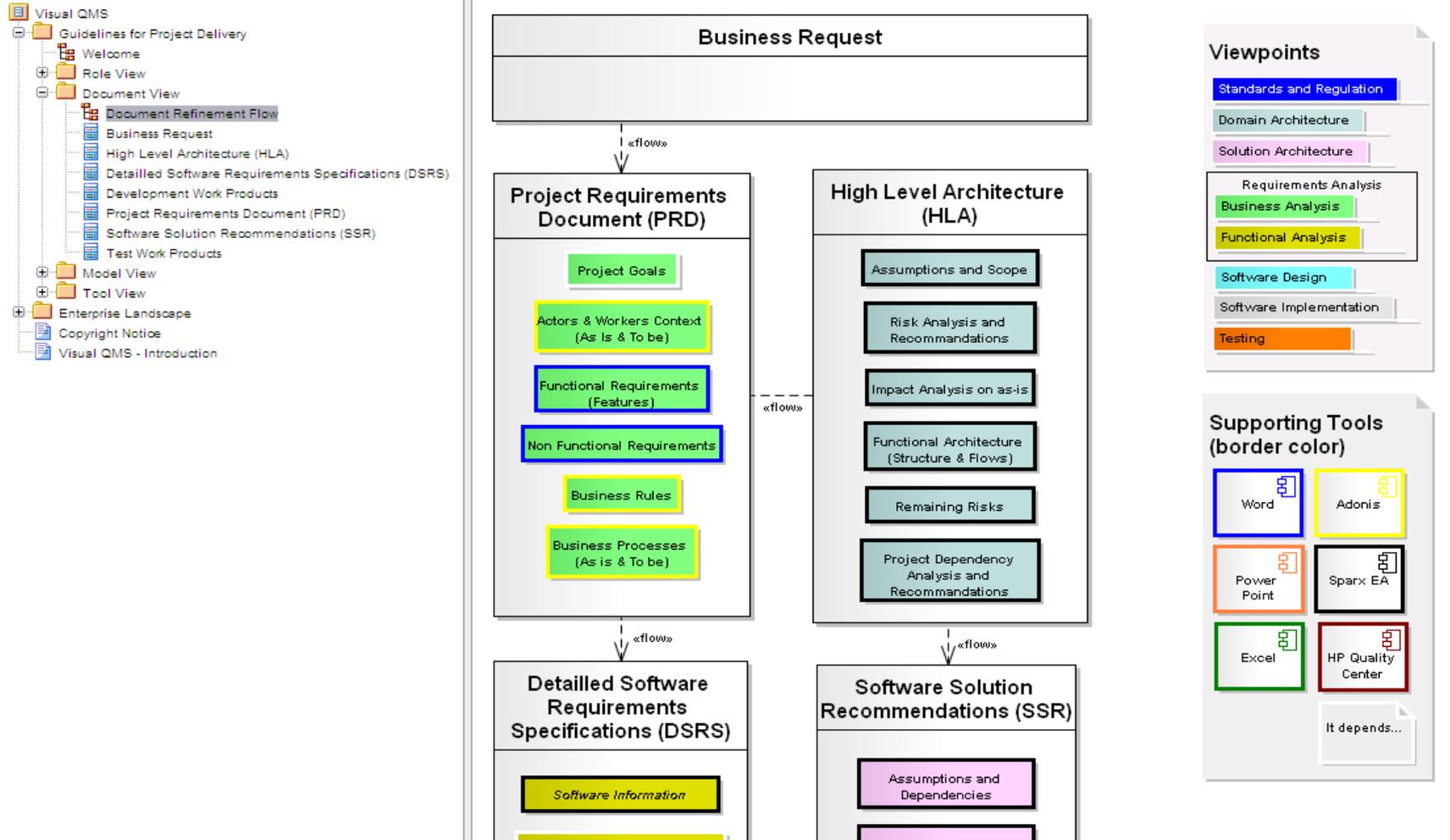


Visual QMS – Website con't



Models integrate in documents. Documents are used as input to create other documents

Visual QMS

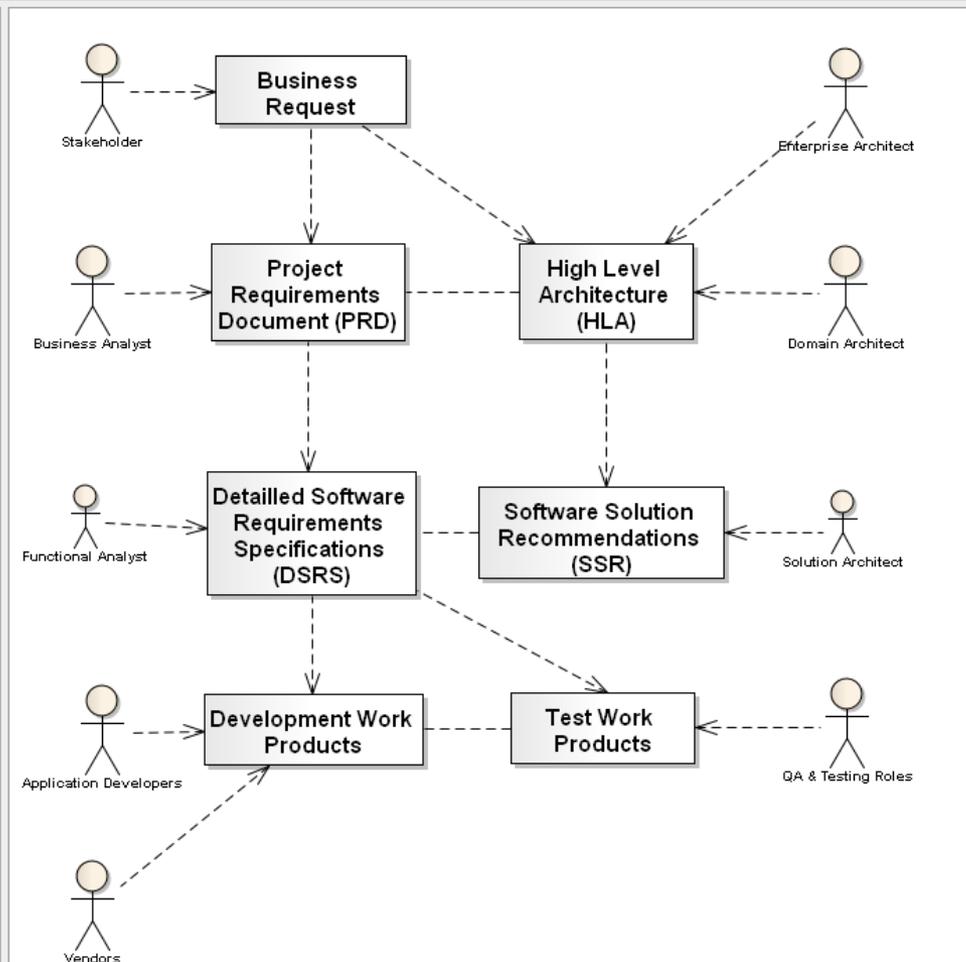
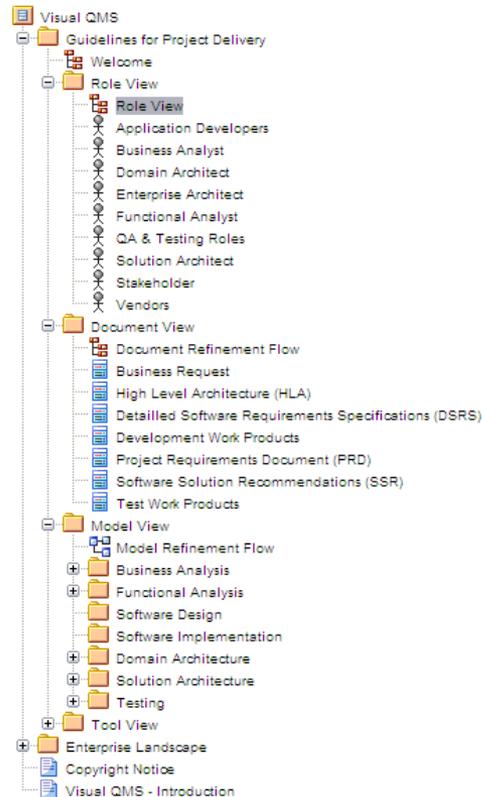


Visual QMS – Website con't



Roles produce documents

Visual QMS



Visual QMS – Website con't



Guidelines, Templates & Examples are available for producing Documents and Models using Tools



Visual QMS

Use Case Description : public class
Created: 06-Oct-09 12:49:34
Modified: 19-Nov-10 05:39:36

Project:
Advanced:

A use case yields an observable result of value to an actor.
A **use case description** illustrates

- system behavior, in terms of sequences of actions.
- flows of events related to producing the "observable result of value", including alternate and exception flows.

File	Type
C:\DB\Guidance\Resources\Guidelines, Templates and Examples\Models\UseCases	Local File

Details:
Guidelines for Use Cases and Use Case descriptions

File Size:
Time Stamp:

Rechercher : brun Suivant Précédent Surligner tout Respecter la casse

Short description

Links to resources (guidelines, templates, howtos...)

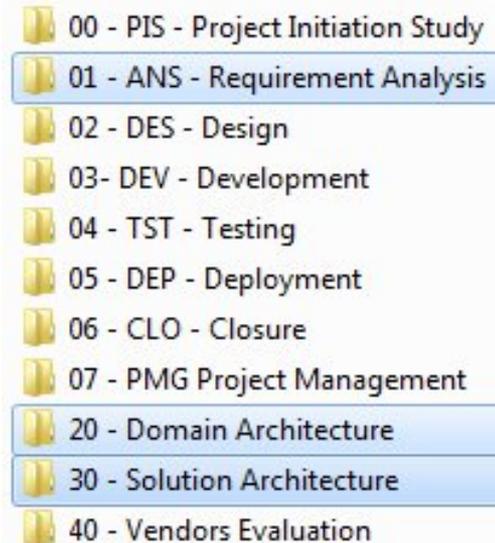
Visual QMS Features – Tools



Canonical Folder Structure

DEFINITION

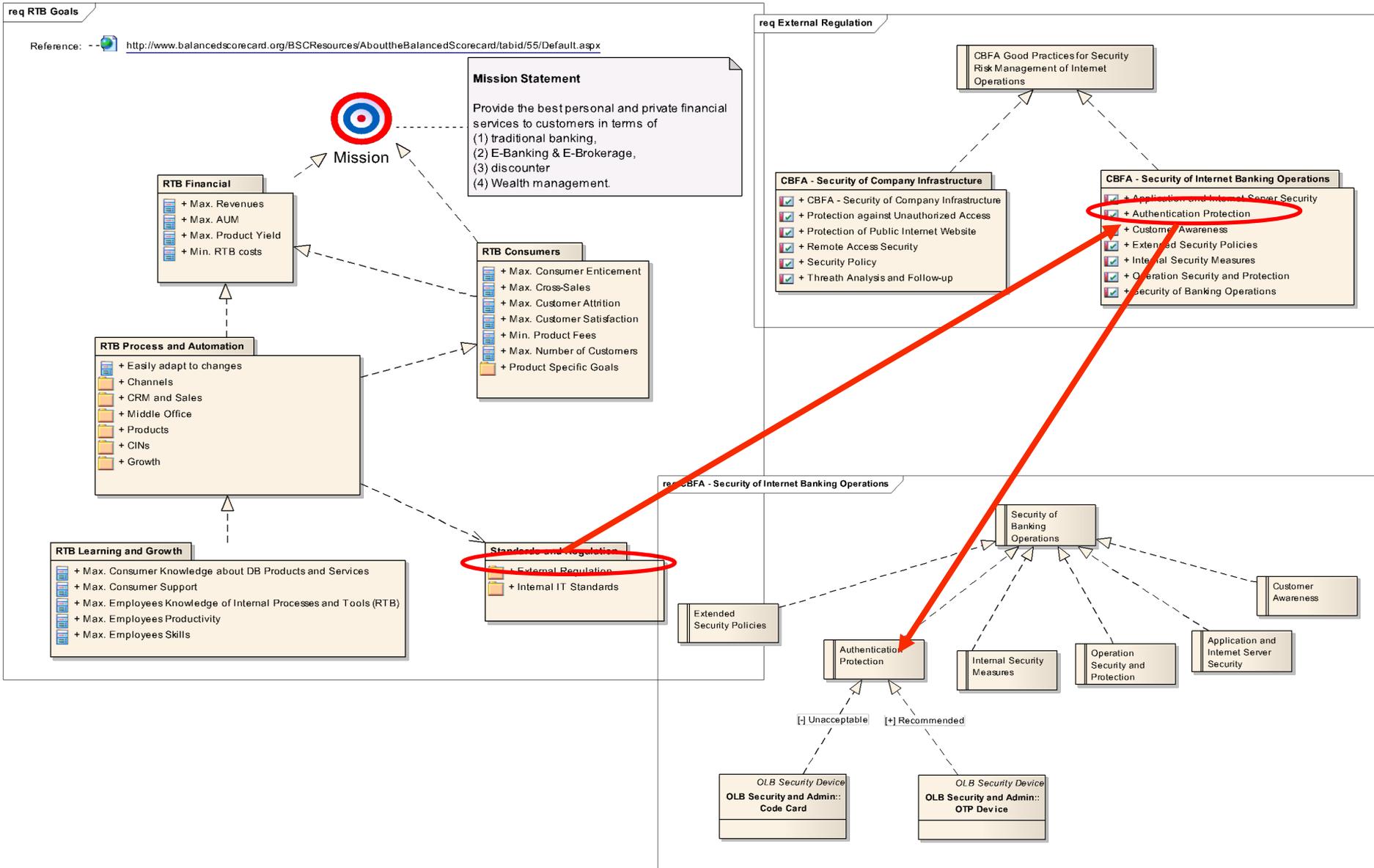
- Complete structure of project folders
- Structured based on the project development lifecycle
- Includes all relevant QMS templates augmented with reference to guidelines (for relevant folders)



BENEFITS

- Easy to instantiate at project start-up
- Ensure homogeneity across all projects
- Build-in guidance

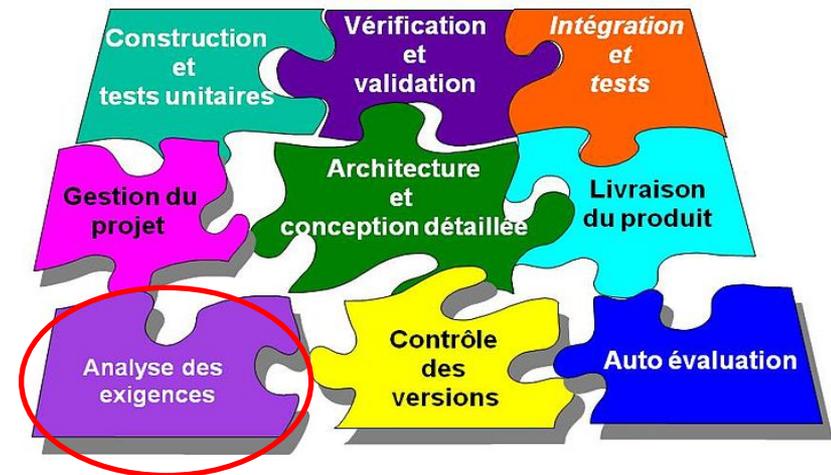
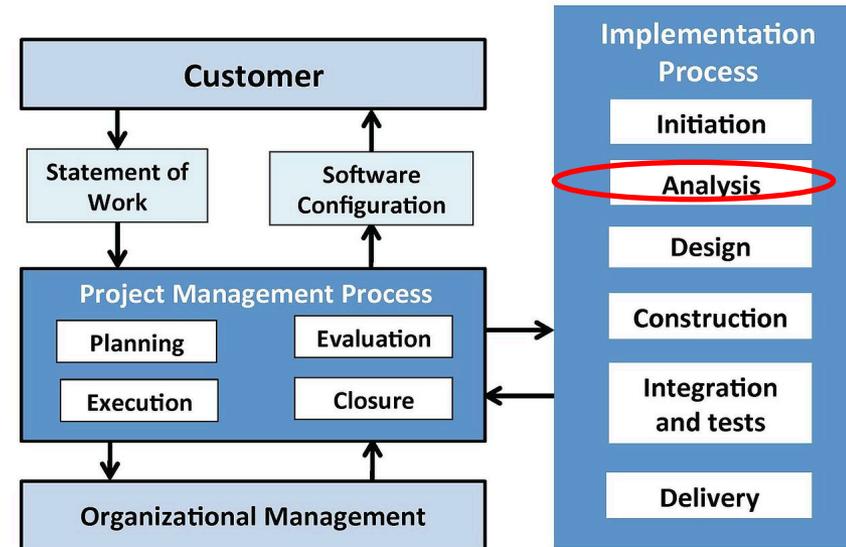
Buts et exigences (Enterprise Architect)



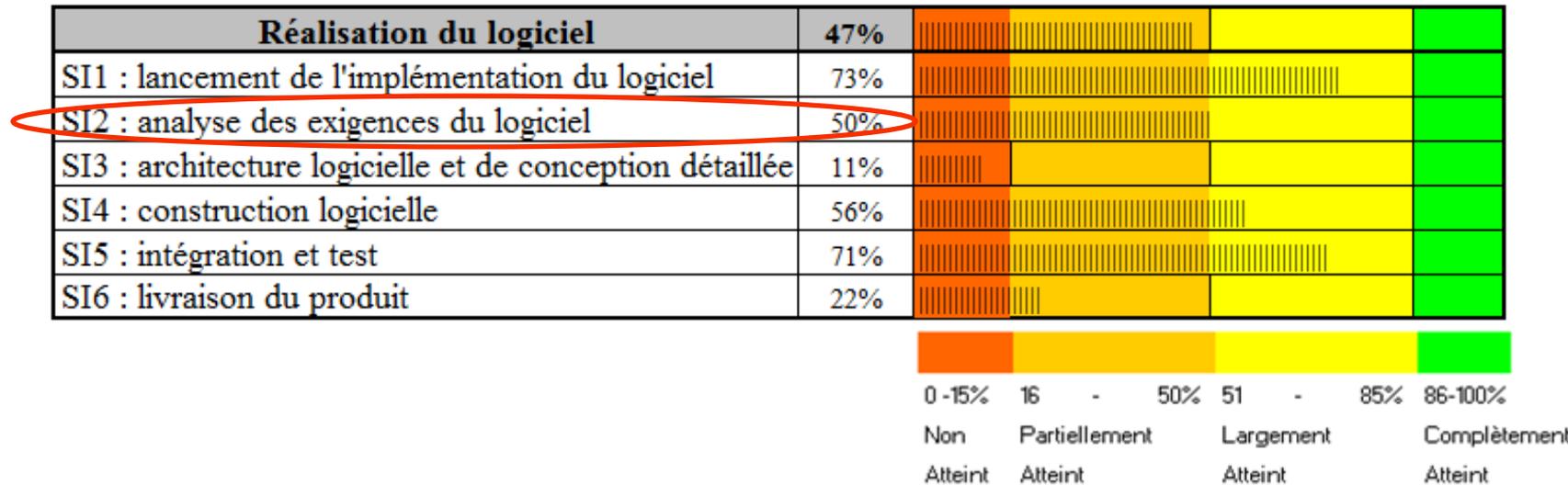
Topic 3 - ISO 29110 (Laporte)

→ Cible PME

- Etablir un bilan de l'approche méthodologique employée par une entité de développement logiciel en évaluant les pratiques et les documents
- Entités de 25 personnes maximum
- Supporte 4 profils selon la maturité de l'organisation
 - Entry level / Basic Level / Intermediate Level / Advanced Level
- S'appuie sur des trousse de déploiement
- Audit via questionnaires et analyse des documents
- Réponses quantifiées (1-4) et résultats pondérés
- Vision synthétique par tableaux du niveau c conformité par rapport à la norme



Synthèse des pratiques d'implémentation du logiciel



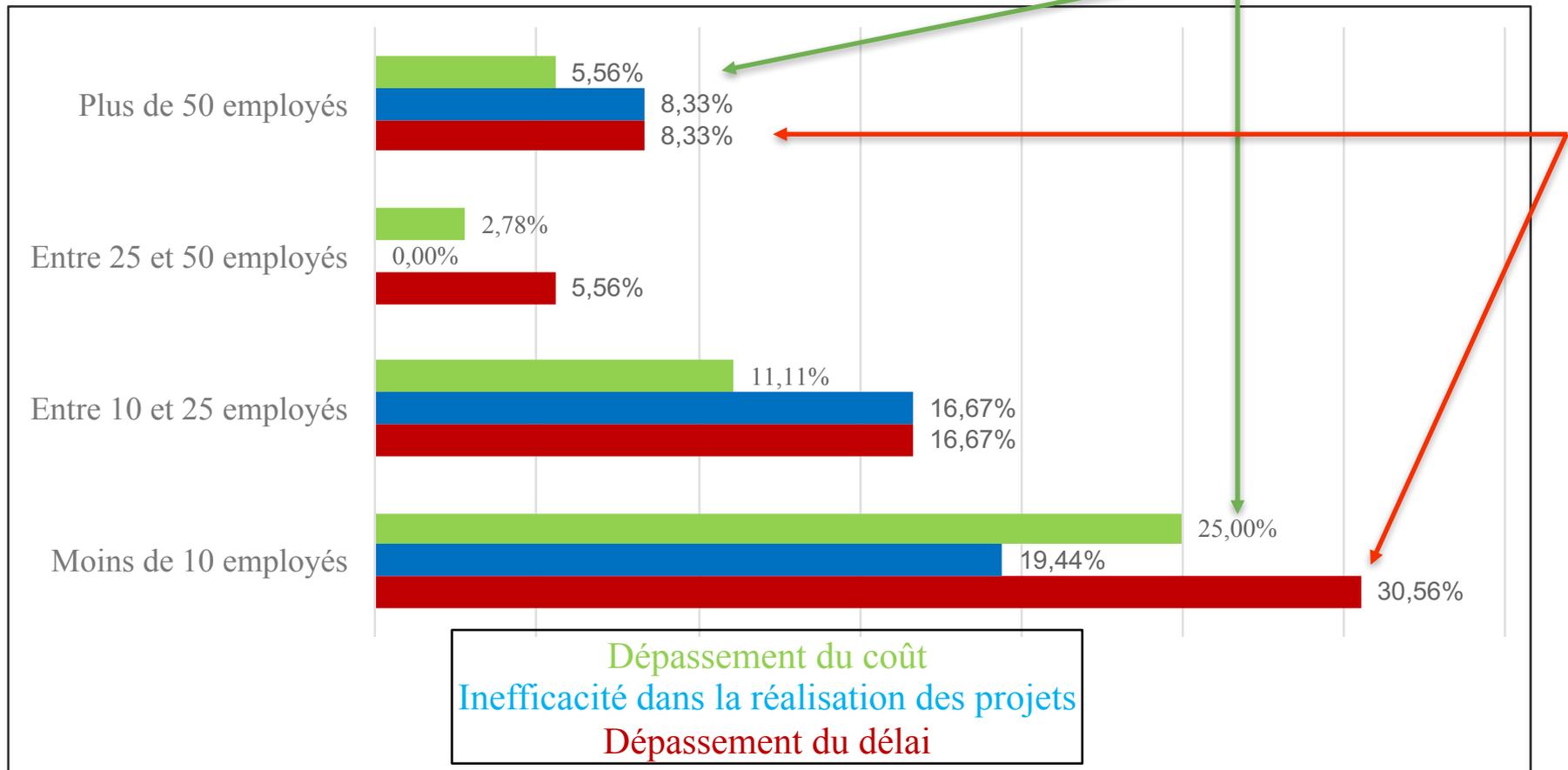
- (+) Plan projet (PP) réalisé en concertation avec l'équipe mais le PP final pas revu
- (+) Tests réalisés selon plan de tests et résultats des tests enregistrés
- (+) Tous les defects corrigés et traçabilité du code dans Subversion
- (+) Interfaces bien identifiées
- (-) Processus de revue interne et de validation des documents non formalisé
- (-) Absence d'un document (et une vision globale) de l'architecture du produit
- (-) Notion de composants logiciels pas assez exploitée
- (-) Phase de livraison pas formellement préparée
- Rem : Dépendance entre les processus SW et HW non reflétée par ces cotes

Les causes de la non réussite des projets IT

Causes des problèmes rapportés	Type	Toujours	Souvent	Parfois	Jamais	Sévérité
dépassement délai prévu (>5%)	Client	14%	47%	31%	8%	3,0
inefficacité des tâches	Equipe	11%	33%	56%	0%	2,6
dépassement budget prévu (>5%)	Client	14%	31%	39%	17%	2,4
satisfaction documentation reçue (ex : guide utilisateur)	Client	25%	42%	28%	6%	1,9
satisfaction informations reçues au cours du projet (ex : planning)	Client	11%	58%	28%	3%	1,9
taux élevé d'erreurs rapportés par le client	Client	3%	17%	58%	22%	1,4
communication et discussion sur problèmes sévères	Client	44%	31%	22%	3%	1,4
mauvaise compréhension par l'équipe des tâches assignées	Equipe	3%	14%	61%	22%	1,3
bon niveau de maintenabilité des logiciels (dette technique)	Equipe	39%	42%	19%	0%	1,2
satisfaction caractéristiques non fonctionnelles (ex : performance)	Client	17%	72%	11%	0%	1,2
l'environnement de développement disponible pour l'équipe	Equipe	33%	58%	8%	0%	0,9
satisfaction fonctionnalité offerte	Client	33%	61%	6%	0%	0,8

Relation de la taille des PME avec les causes de non succès

- PME de moins de 10 employés majoritairement impactées par le top 3
- Jusqu'à 5 fois plus de PME de petite taille que de PME de grande taille qui ont un dépassement de budget



Top des pratiques les plus recommandées

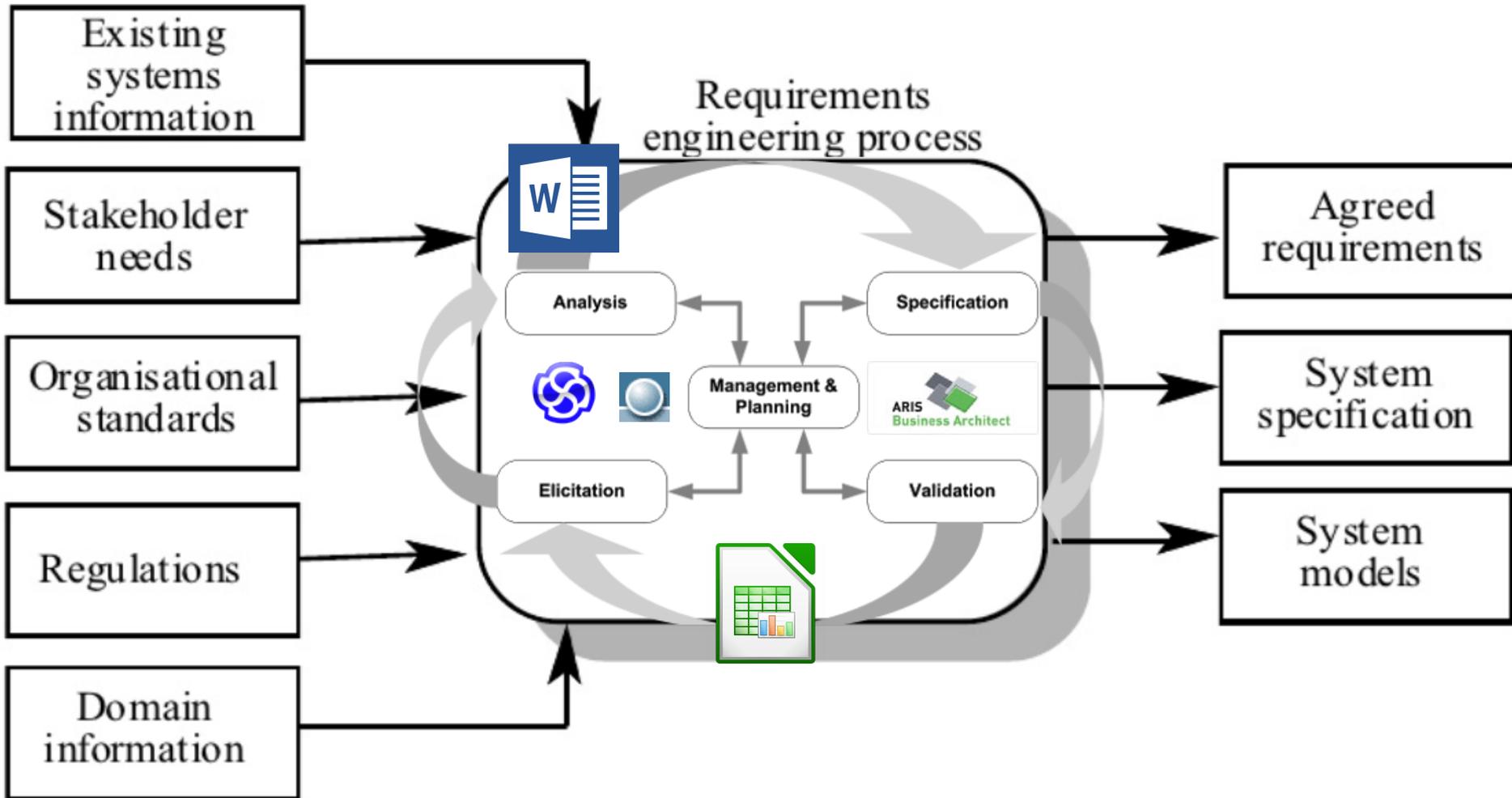
#	Pratique	Recommandée	Réalisée
1	Etablir une description des exigences du client	97%	77%
2	Documenter l'état d'avancement du projet au cours de son exécution	92%	67%
3	Contrôler régulièrement l'évolution du projet par rapport au planning	92%	82%
4	Etablir un plan de projet	81%	69%
5	Organiser le kick-off du projet	64%	87%
		
10	Décrire la manière dont vous testez vos logiciels	3%	100%
11	Réaliser les tests	3%	100%

- La pratique la plus recommandée reste la description des exigences du client mais elle est déjà réalisée par plus de 75% des PME
- Les pratiques concernant la gestion de projet sont largement recommandées et pertinentes car pas encore réalisées par 20 à 30% des PME
- Les pratiques de tests ne sont vraiment pas problématiques

Comparaison avec d'autres enquêtes à large échelle

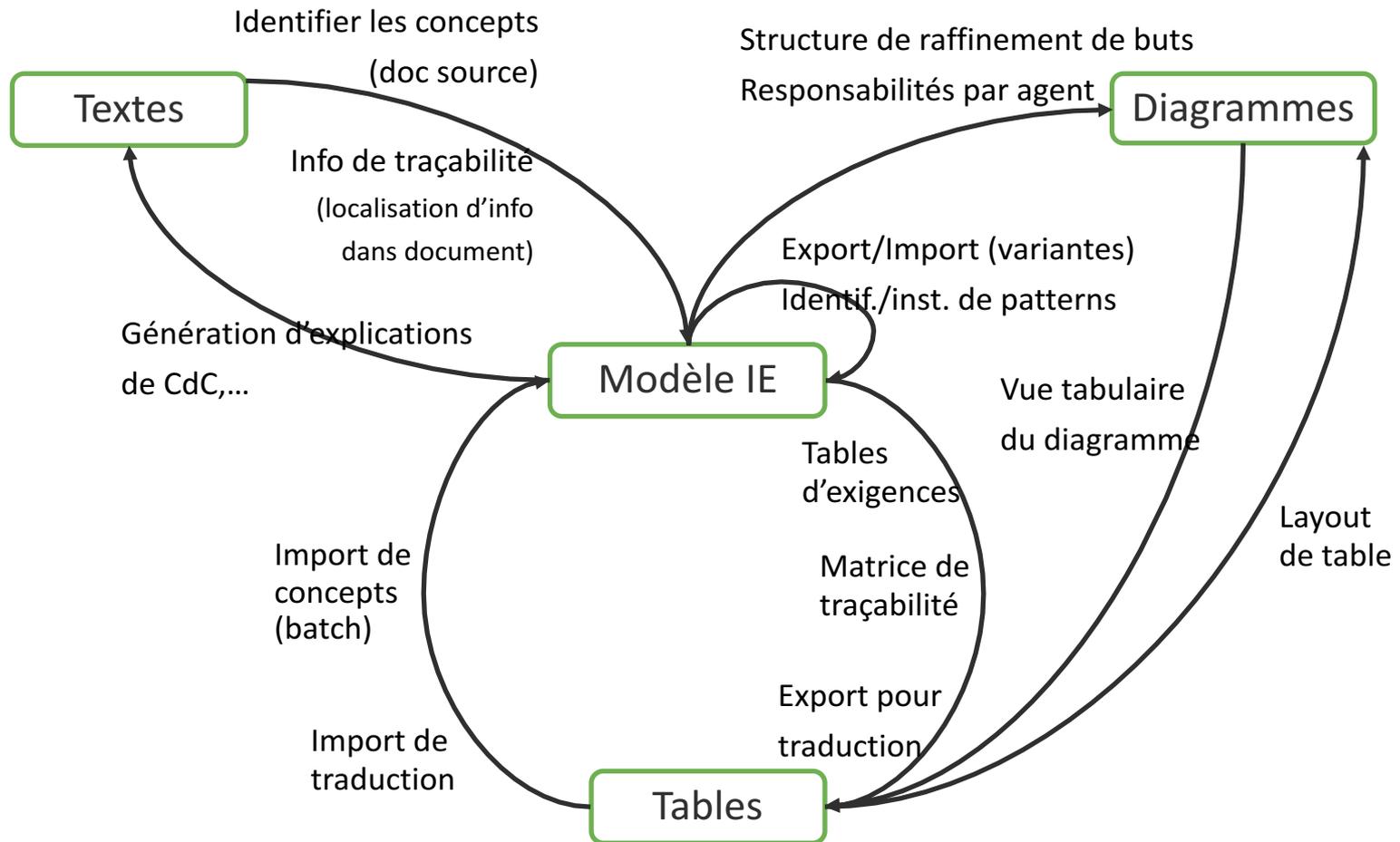
	CHAOS report (2012)	GARTNER report (2011)	SAUER study (2003)	CETIC survey (2015)
Project outcome				
Successful	39%	25%	16%	20%
Failed	18%	25%	31%	10%
Challenged	43%	50%	53%	70%
Key dimensions				
Time overruns	74%	44%	45%	92%
Cost overruns	59%	42%	49%	83%
Features coverage	69%	57%	41%	100%

Topic 3 – Relation entre les artefacts en IE



(Sommerville)

Modèle-Textes-Tables-Diagrammes



Feuille de calcul (Calc)

The screenshot shows the OpenOffice Calc application window titled "test-121231-3.ods - OpenOffice.org Calc". The spreadsheet contains the following data:

	A	B	C	D	E
1	Date	Heure	Hauteur	Coeff.	
2	Lun.31	00h34	1,70m		
3		06h32	6,75m	80	
4		12h57	1,6m		
5		18h52	6,55m	79	
6	Mar.01	01h09	1,70m		
7		07h06	6,70m	78	
8		13h32	1,70m		
9		19h28	6,54m	76	
10	Mer.02	01h45	1,80m		
11		07h42	6,55m	74	
12		14h09	1,85m		
13		20h06	6,30m	71	
14					
15					

The spreadsheet also shows a formula bar with "Date" and a status bar at the bottom indicating "Feuille 1 / 6", "Standard", and "STD".

Scénario : génération d'une grille d'évaluation

- Modèle => Document (numérotation, pages)
=> requête éléments de la grille => table (références)

	ABCD	E	F	G	H	I	J	K	L	M	N	
	Reference			Name	Page	Module	Coverage	Parametrization	Standard development	Specific development	Availability	Comments
1												
2						NWLT	-/1	-/1	-/1	Qi-YY		
49	2.1.4	Absences and overtime managed			36							
50	2.1.4.1	Absences managed			37							
51	G8.	Global administration of the absence management system supported			41							
52	R49.	Typology of absence types and status managed			42	Absence-Overtime Module	N					
53	R50.	Absences visualizable			42	Absence-Overtime Module	N					
54	R51.	Absence status overwritten by HR officers			42	Absence-Overtime Module	N					
55	R52.	Public holidays calendar managed			42	Absence-Overtime Module	N					

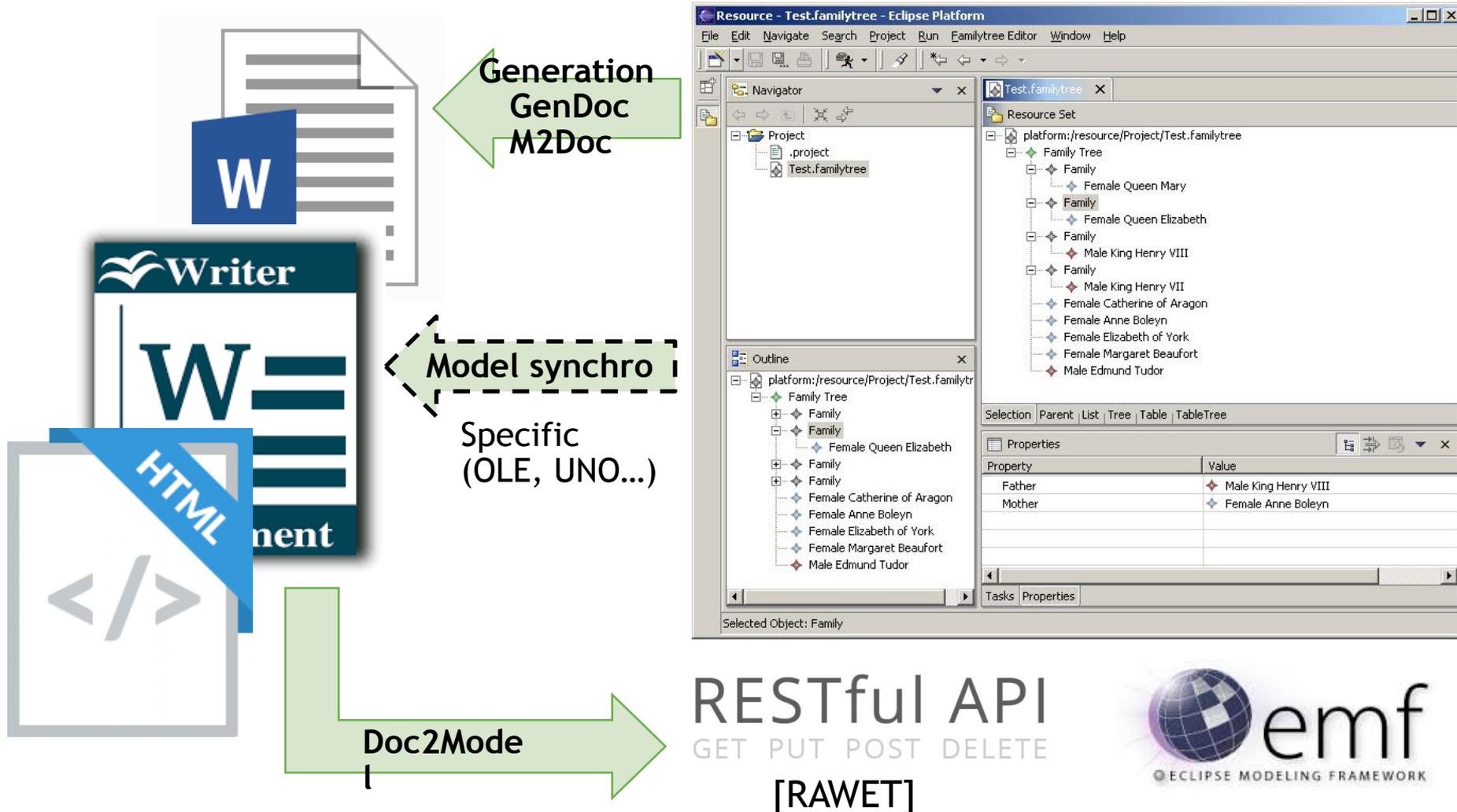
Scénario : Estimation d'effort

- Modèle => Modèle (sélection de variante) => tables
=> feuille de calcul (avec comparaison de variantes)

Req \ Module	Agent5	Agent3	Agent1
Requirement1	0	10	0
Requirement2	0	0	20
Requirement3	35	0	0
Requirement4	0	40	0
Requirement5	50	0	0
Requirement6	0	0	75
Requirement7	0	0	70
Requirement8	80	0	0
COST	165	50	165
TOTAL COST	380		

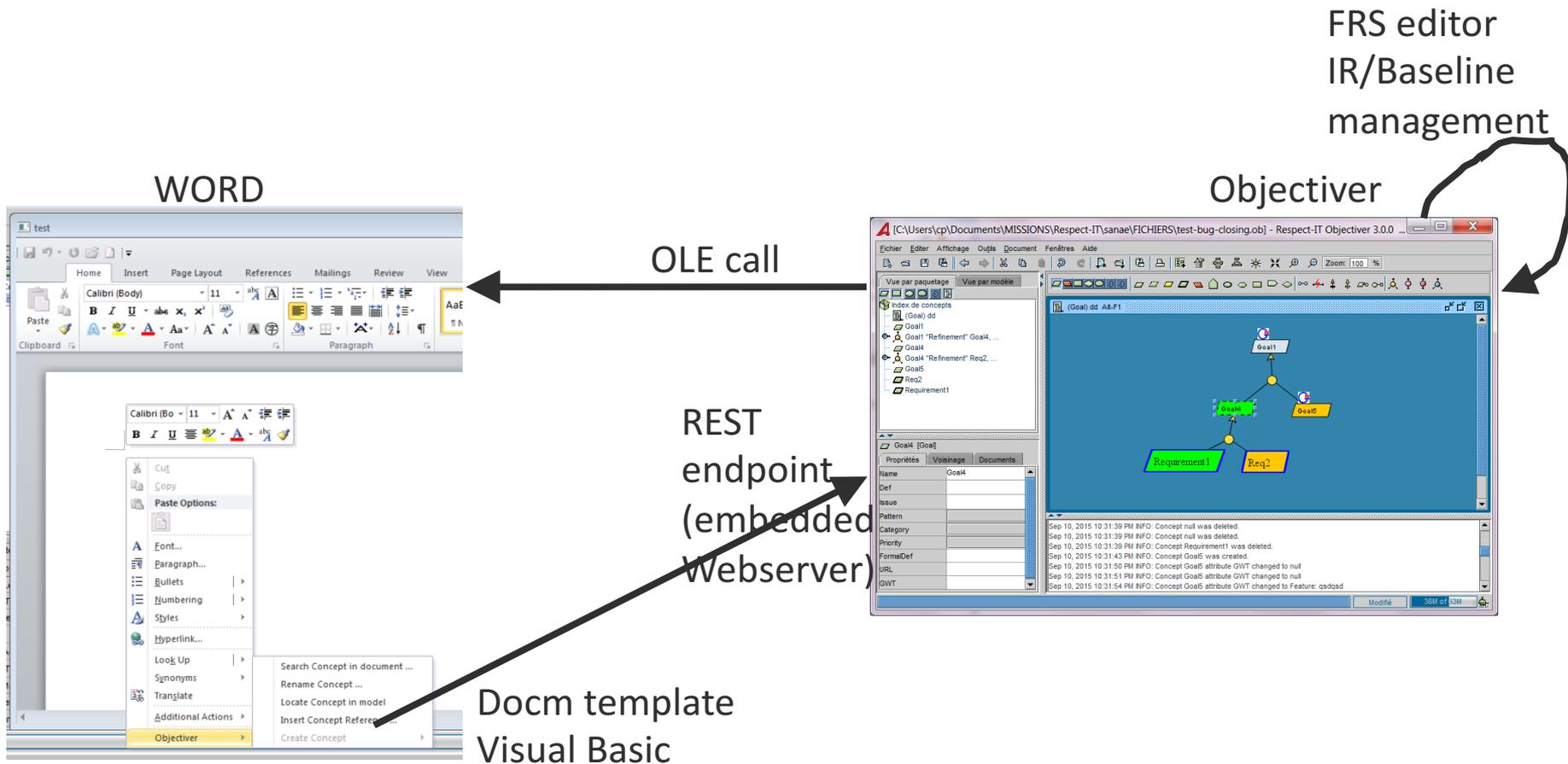
Req \ Module	Agent5	Agent3	Agent1
Requirement1	0	10	0
Requirement2	0	0	20
Requirement3	35	0	0
Requirement4	0	40	0
Requirement5	50	0	0
Requirement6	0	0	75
Requirement9	100	0	0
COST	185	50	95
TOTAL COST	330		

Problème de la mise à jour des artefacts vs modèle

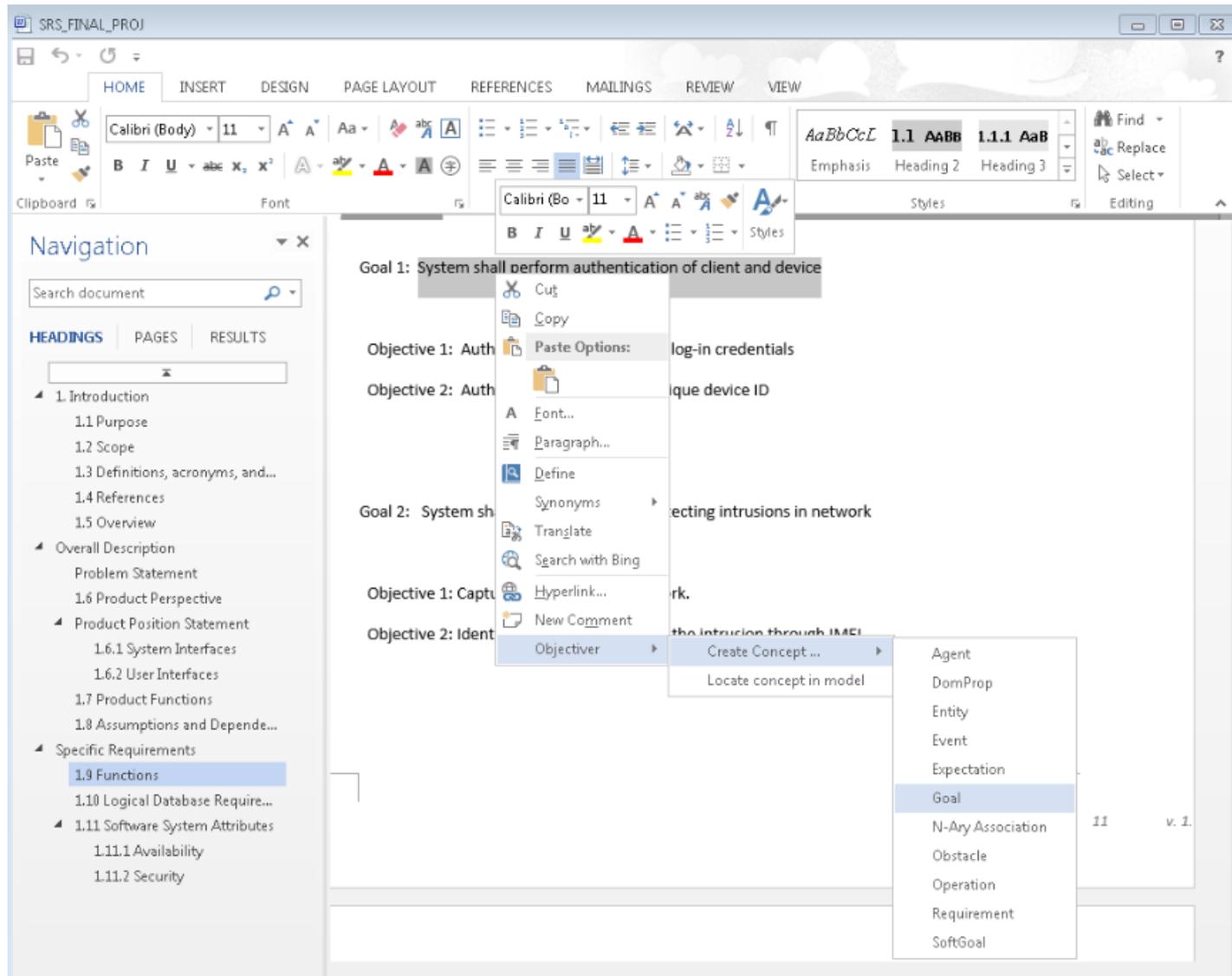


Instanciation au cas d'Objectiver

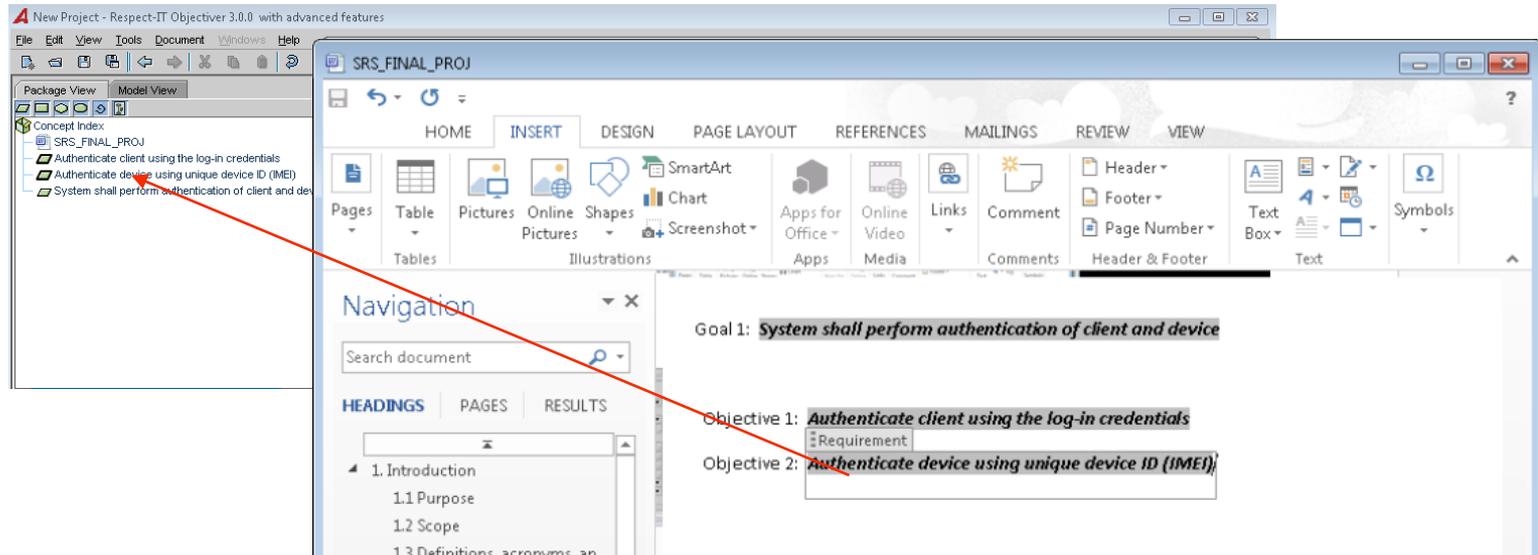
- Modèle → Document
- Doc → Modèle



Créer un concept depuis un document : taggage



Renommer un concept depuis un document



Aussi dans Eclipse/Capella – Localisation depuis un HTML

The image shows two windows side-by-side. The left window is the Eclipse IDE, displaying a project named 'My1.simplekaos'. The project structure includes a 'Resource Set' with various elements like 'Agent Agent 1', 'Goal Goal 1', 'Goal Expectation 1', 'Goal Requirement 1', 'Obstacle Obstacle 1', 'Obstacle Obstacle 2', 'Goal Goal 2 Editing in line', 'Agent Create new Agent', and 'Agent DEMO'. The 'Agent DEMO' element is circled in red. A red arrow points from this element to the 'DEMO' link in the browser window on the right. The browser window shows a page titled 'Doc2M : Sample Example' with a 'Model' section containing several links: 'Agent 1', 'Goal 1', 'Expectation 1', 'Requirement 1', 'Obstacle 1', 'Obstacle 2', 'Goal 2 Editing in line', 'Create new Agent', and 'DEMO'. The 'DEMO' link is also circled in red. Below the links is a 'Create new concept' section with a 'Concept name' input field, a dropdown menu set to 'Agent', and a 'Create' button.

Resource - Demo/sample/My1.simplekaos - Eclipse Platform

File Edit Navigate Search Project Simplekaos Editor Run Window Help

Quick Access Resource

Projec... My1.simplekaos index.html Network.js

Resource Set

- platform:/resource/Demo/sample/My1.simplekaos
 - Agent Agent 1
 - Goal Goal 1
 - Goal Expectation 1
 - Goal Requirement 1
 - Obstacle Obstacle 1
 - Obstacle Obstacle 2
 - Goal Goal 2 Editing in line
 - Agent Create new Agent
 - Agent DEMO

Selection Parent List Tree Table Tree with Columns

Tasks Properties

index.html - Demo/sample/html

Resource	Property	Value
	Info	
	derived	false
	editable	true
	last modified	March 28, 2017 at 5:32:03 PM
	linked	false

index.html - Demo/sample/html

DOC2M: HTML SAMPLE

file:///E:/runtime-EclipseApplication/ Rechercher

Doc2M : Sample Example

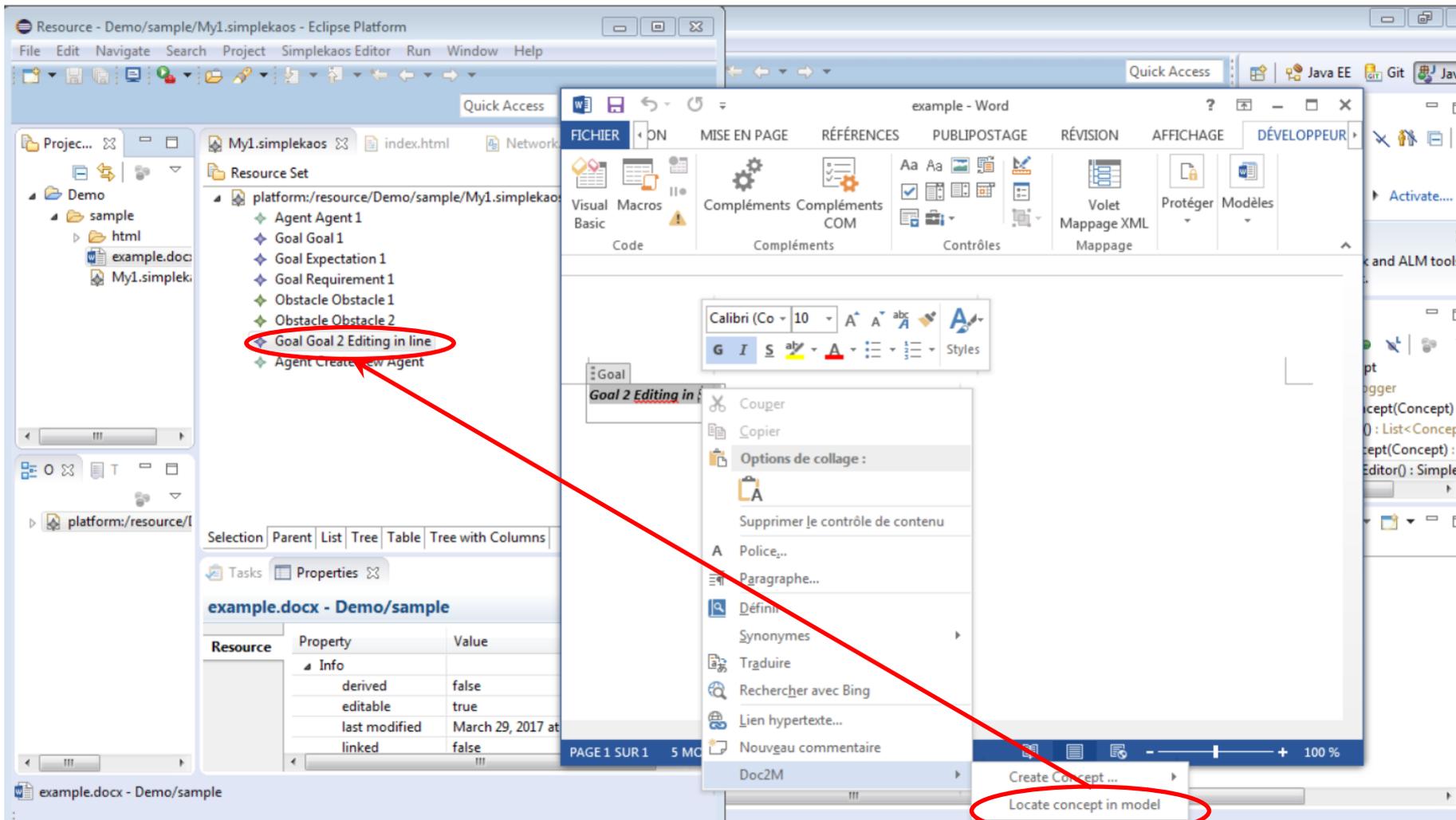
Model

- [Agent 1](#)
- [Goal 1](#)
- [Expectation 1](#)
- [Requirement 1](#)
- [Obstacle 1](#)
- [Obstacle 2](#)
- [Goal 2 Editing in line](#)
- [Create new Agent](#)
- [DEMO](#)

Create new concept

Concept name Agent

Dans Eclipse/Capella – localisation depuis Word



Dans Eclipse/Capella – édition en place (1/2)

The screenshot displays the Eclipse IDE interface with a Microsoft Word document open in an in-place editing mode. The document content is visible, including a section titled "Your Connection to ICT Research" and another titled "2013 at a glance". A red circle highlights a specific text element within the document: "Agent RENAMED INSIDE WORD DOCUMENT". A red arrow points from the text "Edit concept inside Word document" to this highlighted text. The Eclipse IDE's Project Explorer on the left shows a project structure with "My.simplekaos" and "Agent Agent". The bottom status bar of the IDE indicates "Selected Object: Agent Agent".

TEST - Word

FICHIER ACCUEIL INSERTION CRÉATION MISE EN PAGE RÉFÉRENCES PUBLIPOSTAGE RÉVISION

Calibri (Corps) 11

Coller

Presses-papiers

Police

Paragraphe

Style

Modification

Your Connection to ICT Research

As an applied research centre in the field of ICT, CETIC's mission is to support economic development by transferring the results of the most innovative research in ICT to companies, particularly SMEs. CETIC helps companies integrate these technological breakthroughs into their products, processes and services, enabling them to innovate faster, save time and money and develop new markets. CETIC develops its expertise in key technologies, including Big Data, Cloud Computing, the Internet of Things, software quality, and trust and security of IT systems. These innovations are applied in domains of primary importance to society, such as health, smart mobility, energy and industry. This expertise is continuously supplemented through CETIC's active involvement in European and regional projects. CETIC is located on the Aéropole of Charleroi, in the Walloon region, Belgium.

Agent RENAMED INSIDE WORD DOCUMENT

2013 at a glance

Change was a major keyword of 2013 for CETIC, with a change of director, which saw Simon Alexandre handing on the baton after successfully leading the development of CETIC over the last 5 years. A new president of the board of directors was also appointed at the end of the year: Bruno Schröder is already well known in the Walloon ICT ecosystem. As Technology Officer for Microsoft, he brings a strong worldwide vision on the future of ICT.

2013 was also the year in which two technology trends have reached the masses: Big Data and the Internet of Things. Beyond the buzz, what matters is the value these technologies will bring to end users and businesses, and CETIC has worked hard in collaboration with numerous actors in order to make things concrete and identify the opportunities these trends will present for local ICT companies. The first results were made visible in December with a Big Data summit (Assises du Big Data) co-organised with the competitiveness clusters, INFOPOLE Cluster TIC and AWT.

CETIC is a major Walloon actor in the European research landscape, which is highly competitive, especially in ICT. CETIC was very successful in the last FP7 calls with 2 new projects starting in 2013: ASCETIC, in the field of GreenIT, and POLCA, on efficient use of computing systems, and two more starting in 2014. A new European framework program for research is being launched - H2020 - and our goal is to further develop the role of CETIC as a bridge between the R&D activities of major European players and local companies.

PAGE 1 SUR 9 2587 MOTS ANGLAIS (ROYAUME-UNI) 100 %

Selected Object: Agent Agent

Edit concept inside Word document

Dans Eclipse/Capella – édition en place (2/2)

The screenshot displays the Eclipse IDE interface. On the left, the Project Explorer shows a project named 'My.simplekaos' with a 'Resource Set' containing a 'Goal Goal' and an 'Agent Agent RENAMED INSIDE WORD DOCUMENT'. The central editor shows a Word document titled 'TEST - Word' with a red circle highlighting the text 'Agent RENAMED INSIDE WORD DOCUMENT'. The bottom left shows the Properties view for the selected object 'Agent Agent'. The bottom right shows the status bar with page and word counts.

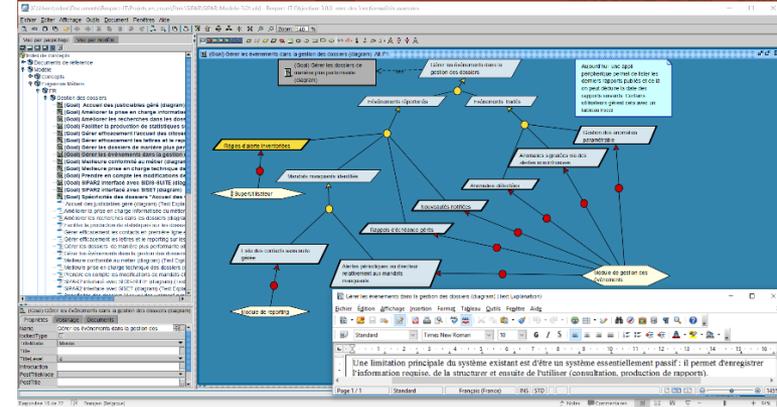
Concept renamed in EMF Model

Selected Object: Agent Agent



Topic 5 - Besoin d'une version Web/SaaS

- Objectiver DE: outil « stand alone » (conçu > 15 ans)
- De plus en plus: plateforme web
- Besoins de certains gros clients
 - Développement en équipes
 - Déployer et intégrer sur le cloud d'entreprise
 - Passage à l'échelle (#utilisateurs, #projets, taille projet...)
 - Gestion de versions
 - Disponibilité
 - Sécurité/contrôle accès
- Opportunité:
 - Facturation à l'utilisation
 - « Marketplace » d'extension



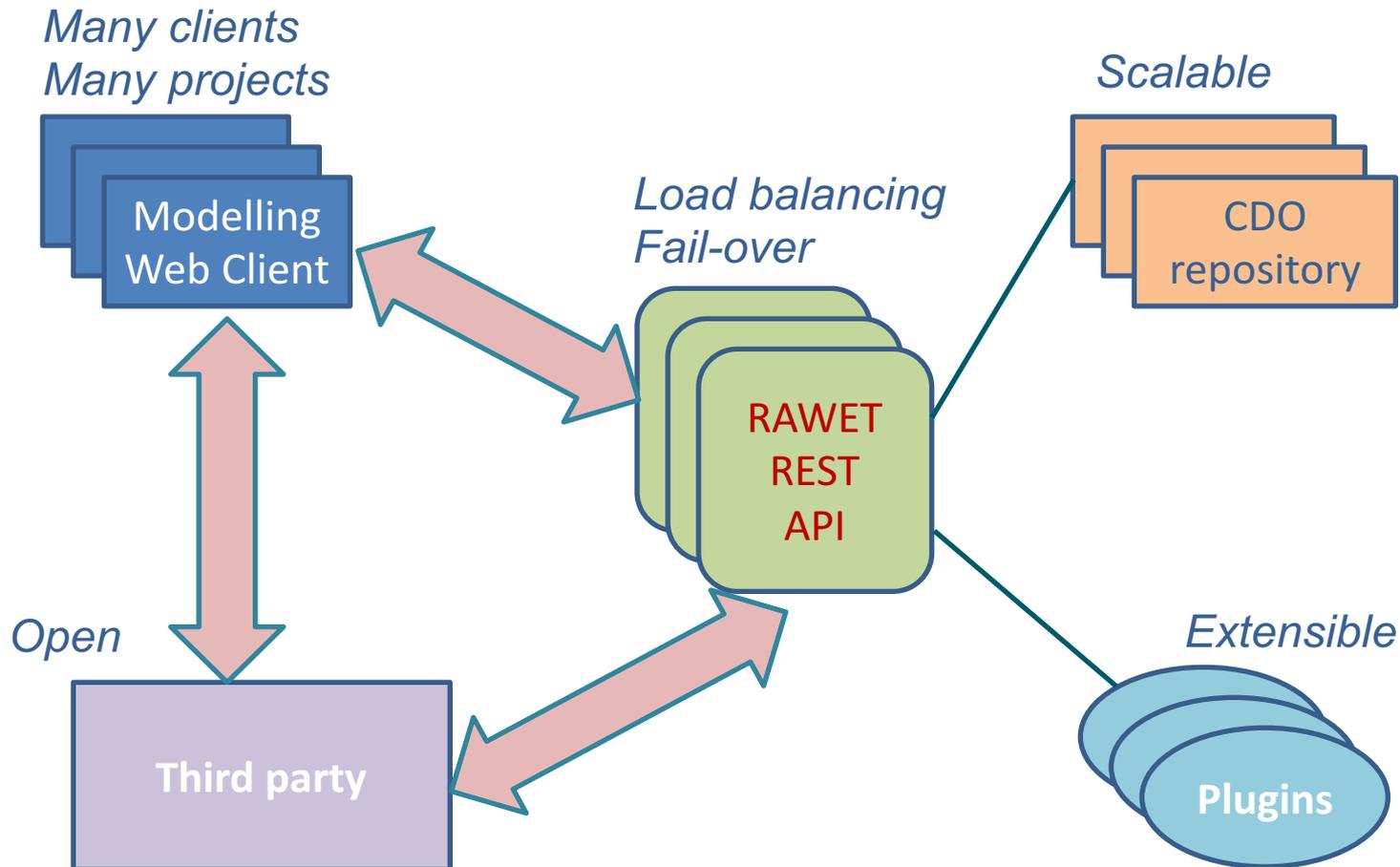
Problèmes sous-jacents

- Nécessite une refonte complète de l'architecture de l'outil:
 - Modélisation desktop → modélisation Web
 - Stand alone → Coopératif
 - Fiabilité « on the Cloud »
- Enjeux internes
 - Choix stratégique d'investissement pour Respect-IT
 - Garder le contrôle
 - Incertitude technologique / risque d'échec





La solution technique : architecture ouverte, robuste et évolutive

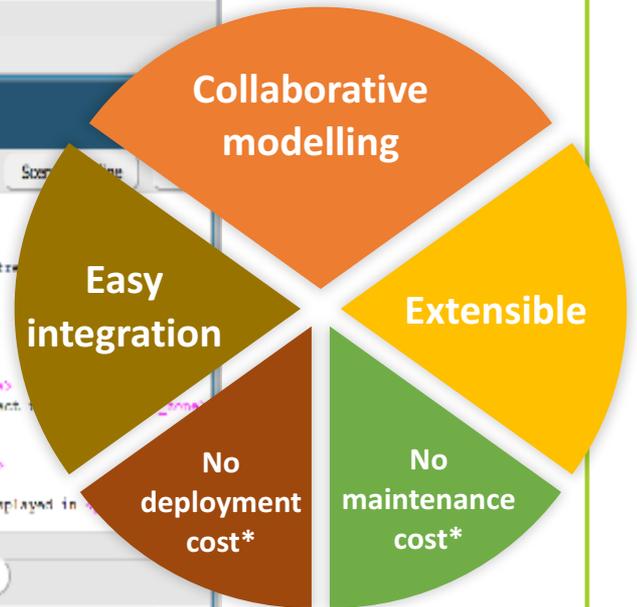




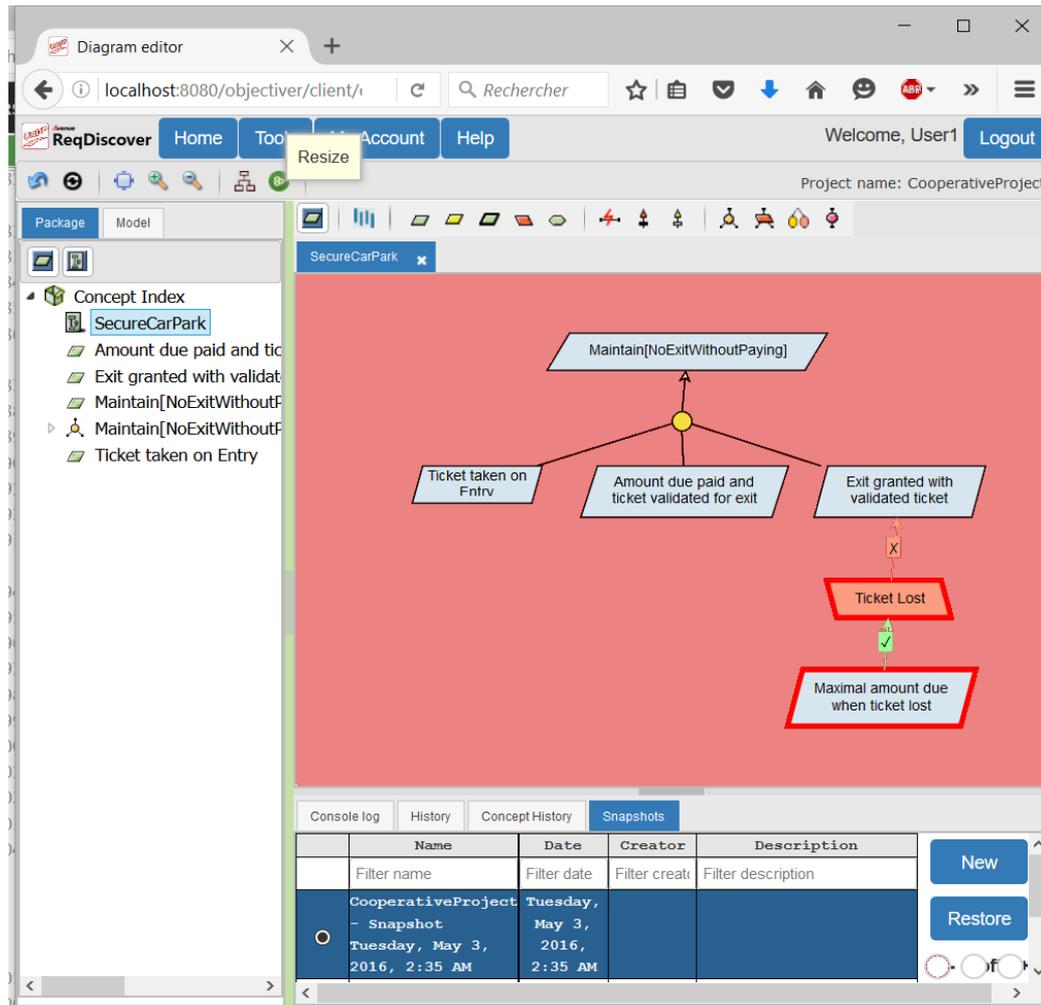
La solution : Edition web en mode « SaaS »

The screenshot displays the ReqDiscover web application. The interface includes a navigation menu with 'Home', 'Tools', 'My Account', and 'Help'. The main workspace is divided into several sections:

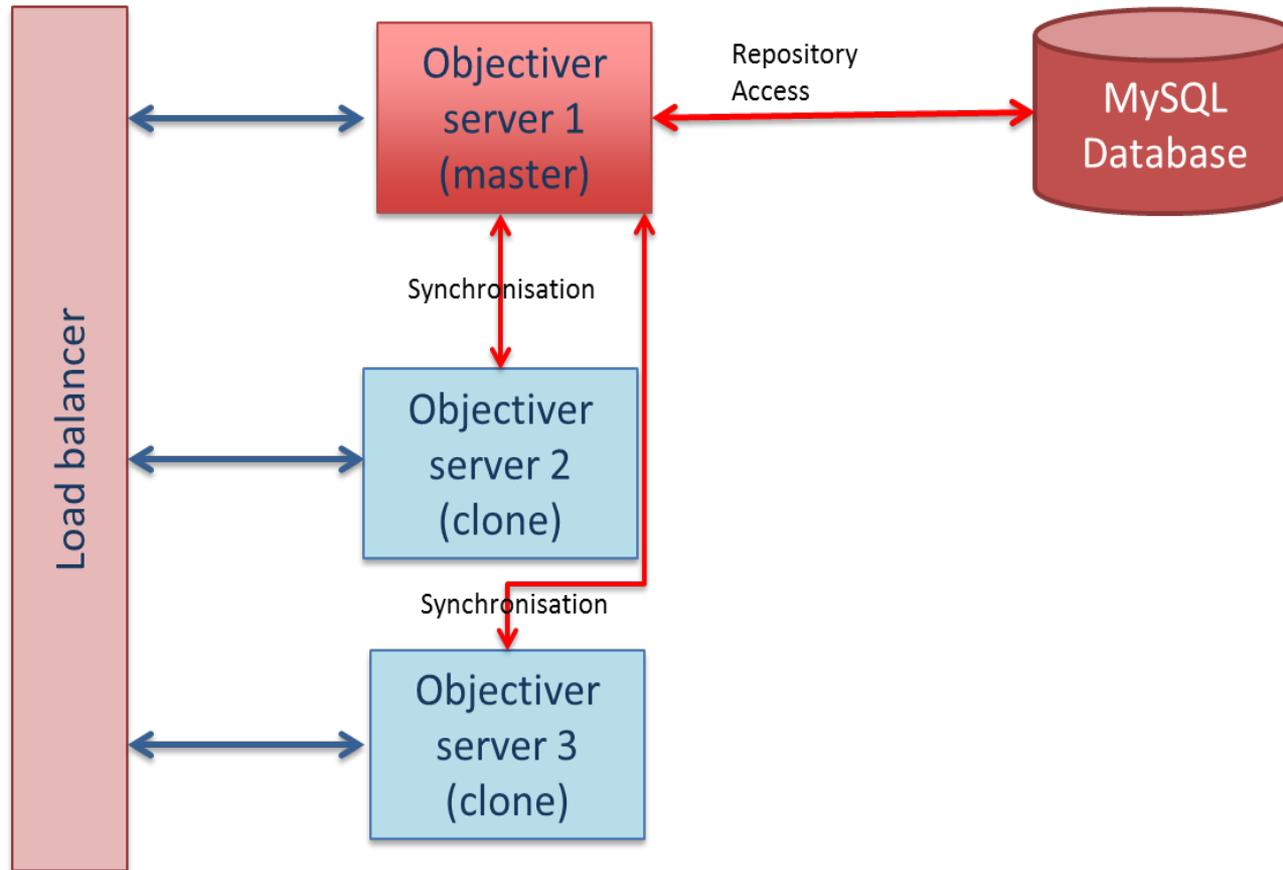
- Left Panel:** A tree view of project elements, including 'Goals', 'Guidance system', 'Help managed', 'Image recognit', 'Images from al', 'Insertion probl', 'Instructions dis', 'Jammed tickets', 'Last payment li', 'Laws and regul', 'Laws and regul', 'Lighted infrastr', 'Lighted infrastr', 'Machine status', 'Maintain[Perkin]', 'Maintain[Perkin]', 'Maintain[Spce]', 'Maintain[Spce]', 'Maintain[Spce]', 'Maintain[Spce]', 'Maintain[Zone]', and 'Maintain[Zone]'. The 'Maintain[Zone]' element is selected.
- Central Canvas:** A graphical model showing relationships between elements. A central yellow diamond labeled 'Parking slot management and audience system' is connected to several other elements: 'Full status reported', 'Cars entered counted', 'Maintain[Zone status reported inside car park]', and 'Maintain[Space Availability Status Indicated]'. A red box highlights 'Car driver not finding space of parking time'.
- Right Panel:** A code editor showing GWT (Google Web Toolkit) code. The code includes a feature definition and two scenarios. The feature is: 'Feature: zone status reported inside'. The scenarios are: 'Scenario: report specific zone full' and 'Scenario: report empty space in specific zone'. The code uses GWT tags like <<car_park_owner>>, <<car_driver>>, <<park_zone>>, and <<park_zones>>.
- Bottom Panel:** A table with columns 'Time', 'User', and 'Message'. It contains two rows of data: one for 'JohnDoe' at '2016-04-30 10:10' and another for 'JohnDoe' at '2016-04-30 10:10'.



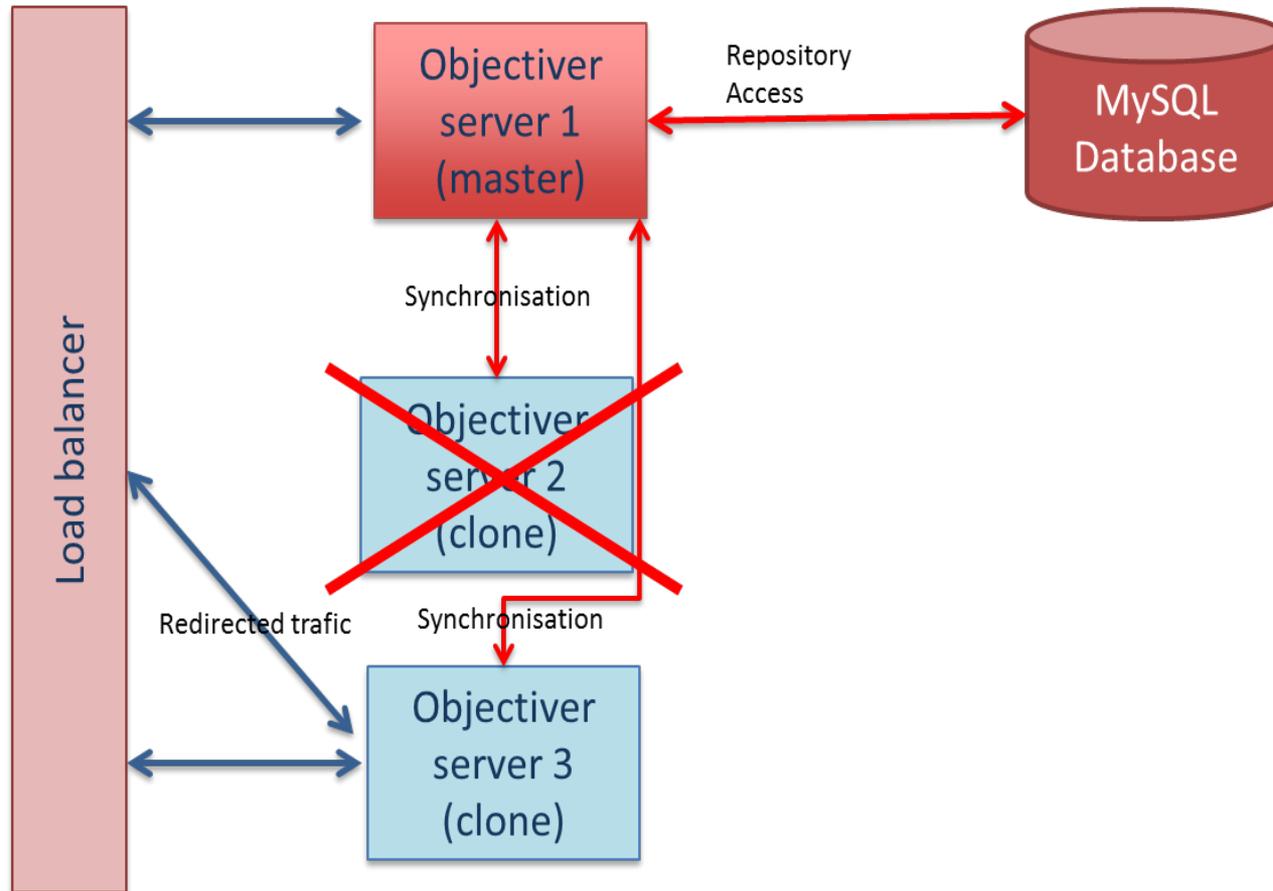
Gestion de version et différence entre modèles (CDO)



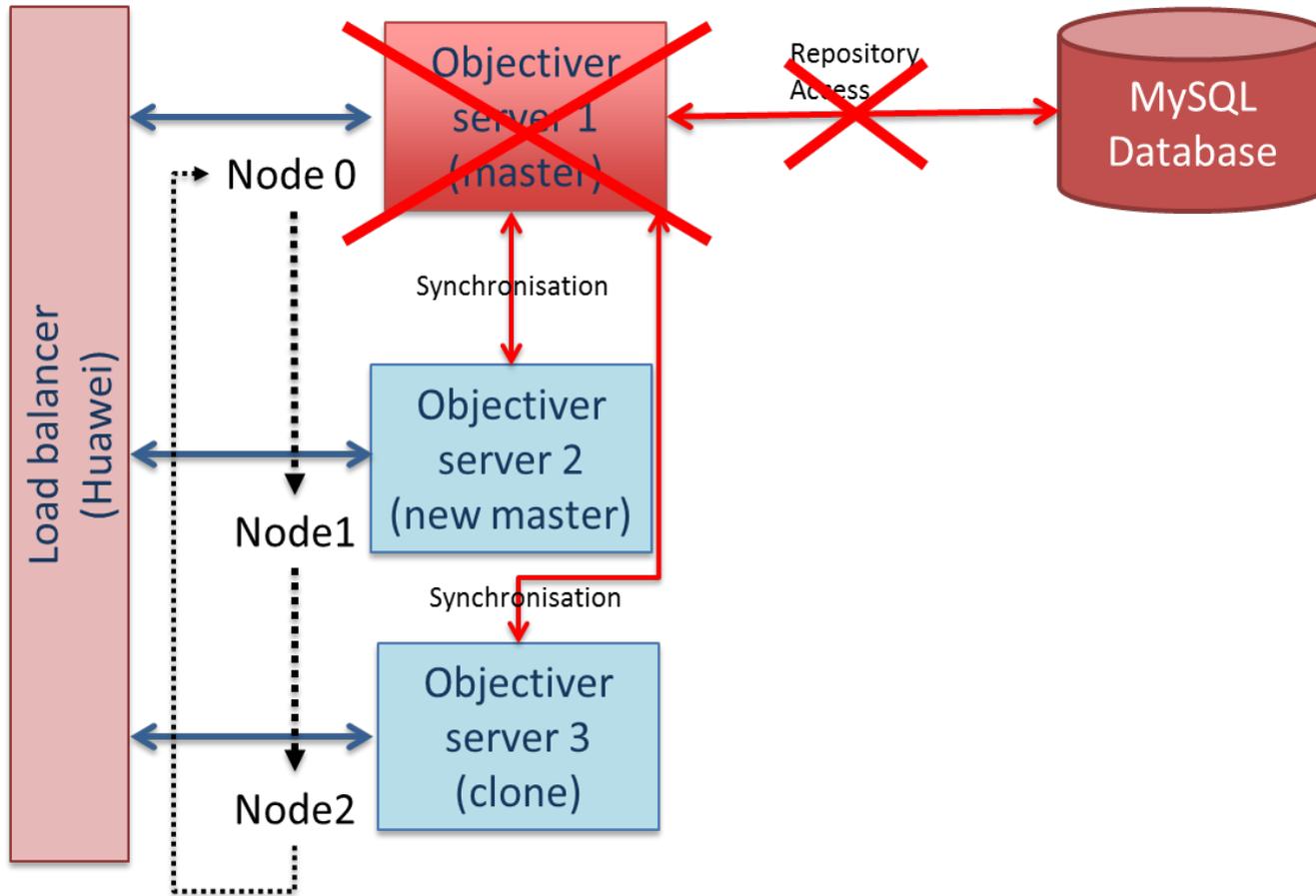
Haute disponibilité



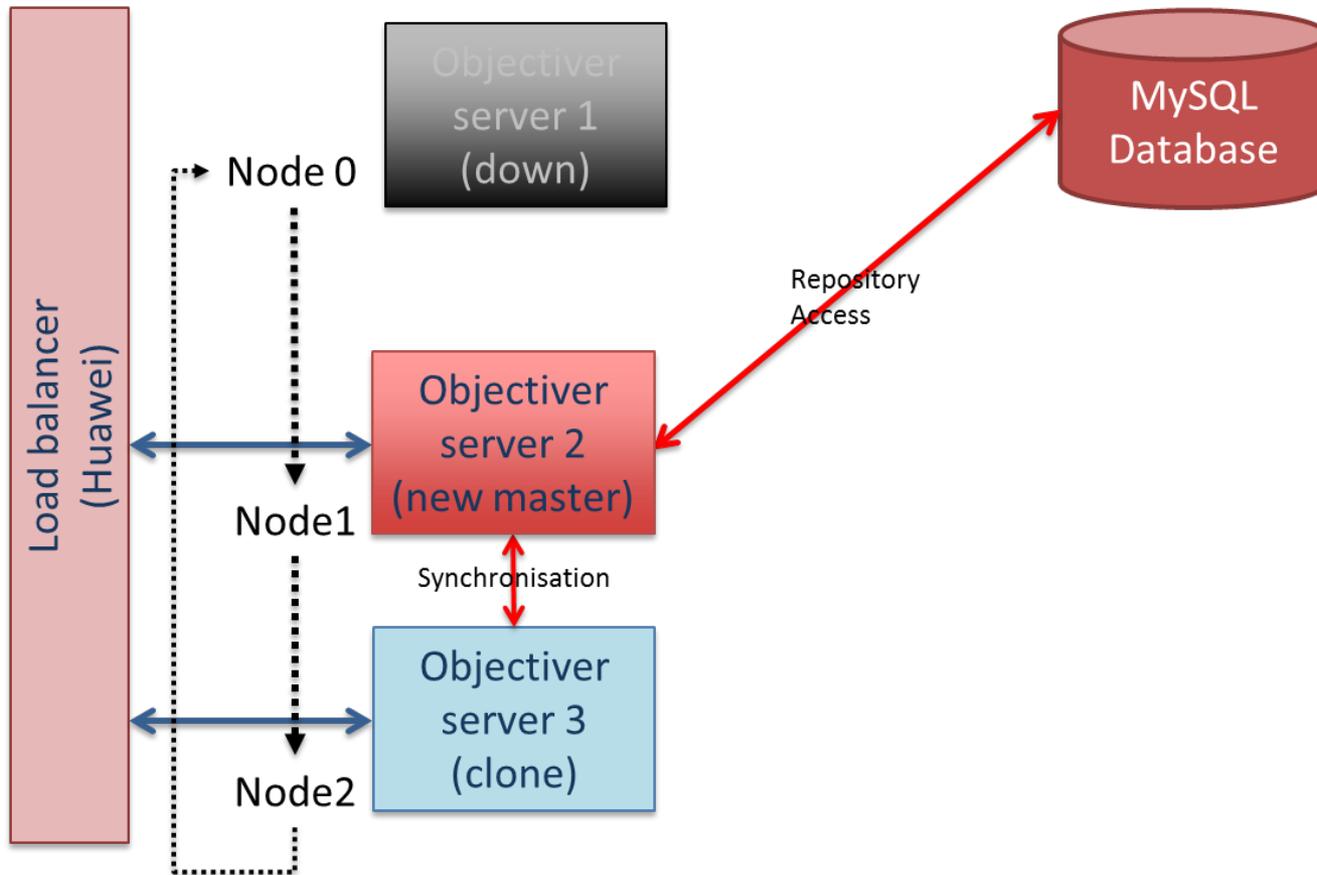
Haute disponibilité



Haute disponibilité



Haute disponibilité



Travaux Actuels

- Outils
 - Roundtrip engineering (doc => modèle) et impact sur model => doc
 - Patterns
- Méthodes
 - Spatio-temporel – extension des notations, études de cas
 - Gestion de projet Big Data (InforSID 2016) – dont IE
- Défis
 - GORE et Agilité (récits utilisateurs, GWT, SBE)
 - Estimation d'effort (proto de plugin, tool demo RE'15)