

Centre d'Excellence en Technologies de l'Information et de la Communication (CETIC)

PER - Christophe Ponsard, Philippe Massonet

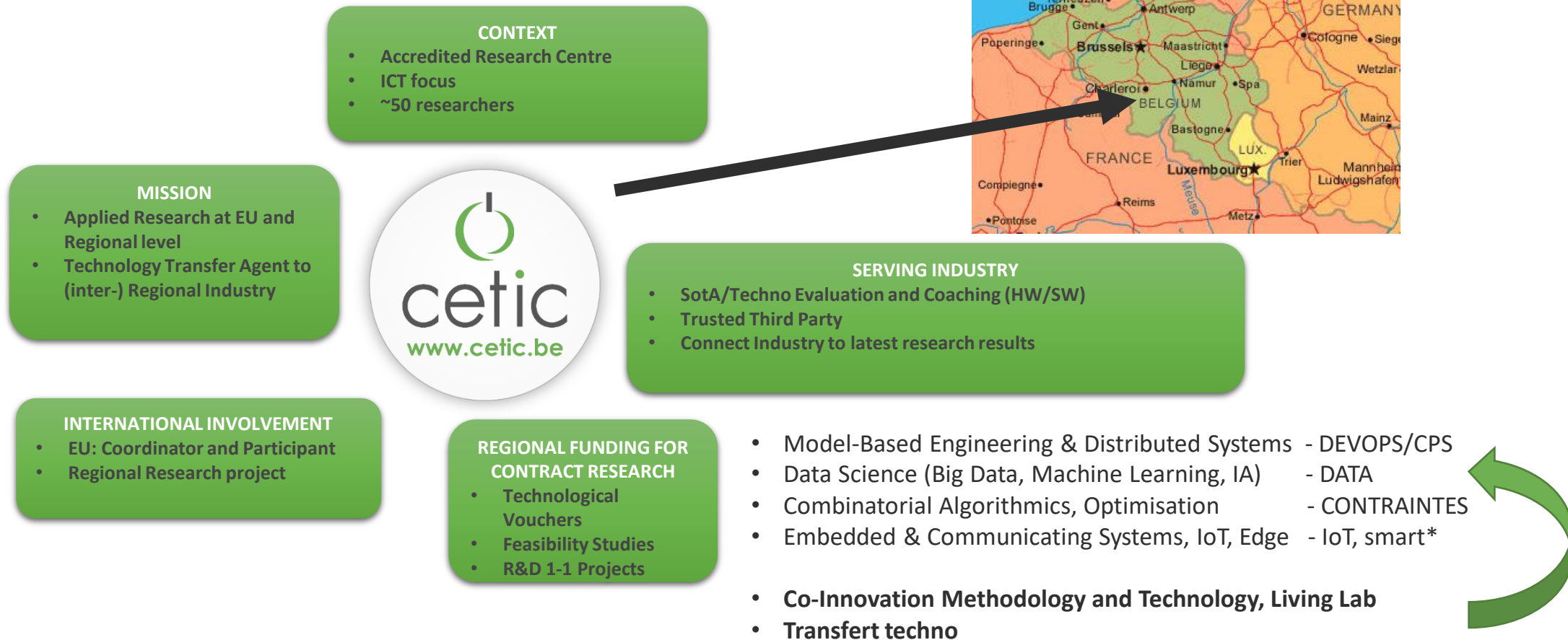
COMET - Bérengère Nihoul, Laurie Ceccotti, Lucrezia Dibattista

MBEDIS – Valery Ramon, Denis Darquennes

GT IE, 28 mai 2021

CETIC en bref – centre R&D appliquée

Fondé en 2001 par UCLouvain, UNamur, UMONS



Domaine: santé, logistique (ferroviaire/automotive), industrie 4.0, numérique
Thématiques: safety, cybersecurity, privacy, sustainability,...

Origines et collaborations

*Recherche
Fondamentale*



*Services
Editeur de logiciel*

Recherche appliquée

Prototypes

Transfert de technologies

Consultance technologique

Business

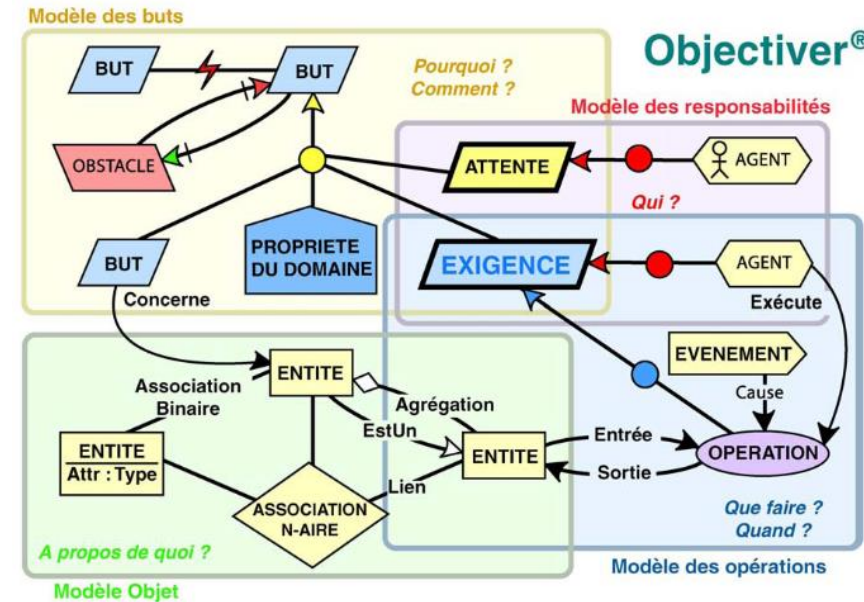


Ingénierie des Exigences au CETIC – origines « GORE-KAOS »

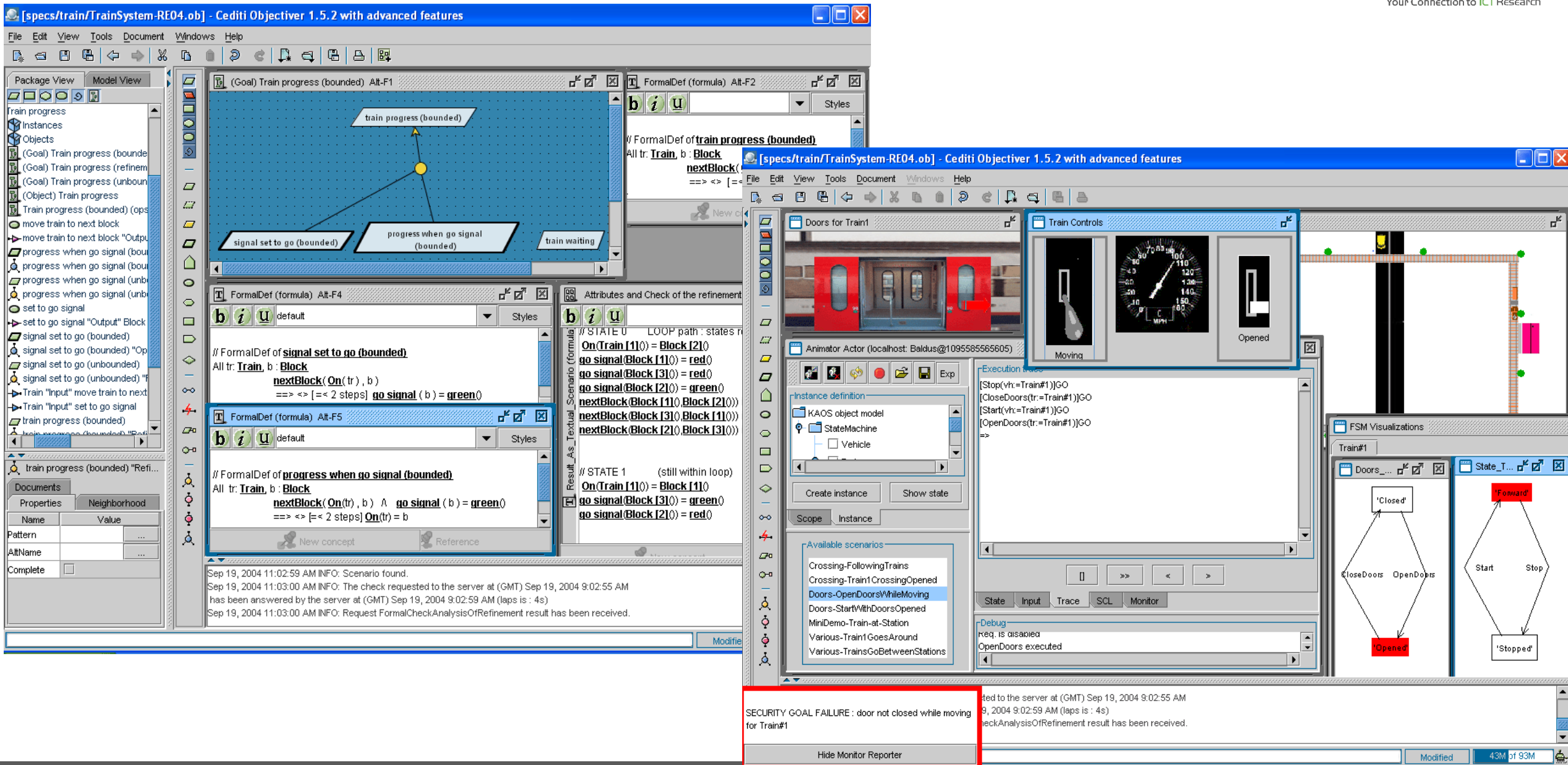
- « GORE » = Goal-Oriented Requirements Engineering
- Méthode KAOS issue de l'UCLouvain
- Outil Objectiver commercialisé et opéré par Respect-IT
- Focus CETIC: R&D et tech transfert

• R&D

- IE formel (FAUST) pour systèmes mission critical, lien Event-B, USE
 - extensions: spatio-temporel, safety/security/CPS, optimisation sur designs alternatifs (SBSE) (prototypé sur objectiver)
-
- **Transfert (templates structurés → modèles semi-formel → formel)**
 - évolution Objectiver vers une version web collaborative (Huawei)
 - application spécifiques à des domaines: cadastre, accessibilité, soutenabilité...
 - accompagnement, réalisation de CDC: en soutien de Respect-IT (parlements, hôpitaux,...)
 - modernisation d'applications (approche model-based, y compris GORE)



Atelier FAUST (formel) – model-checking et animation (2002-2010)



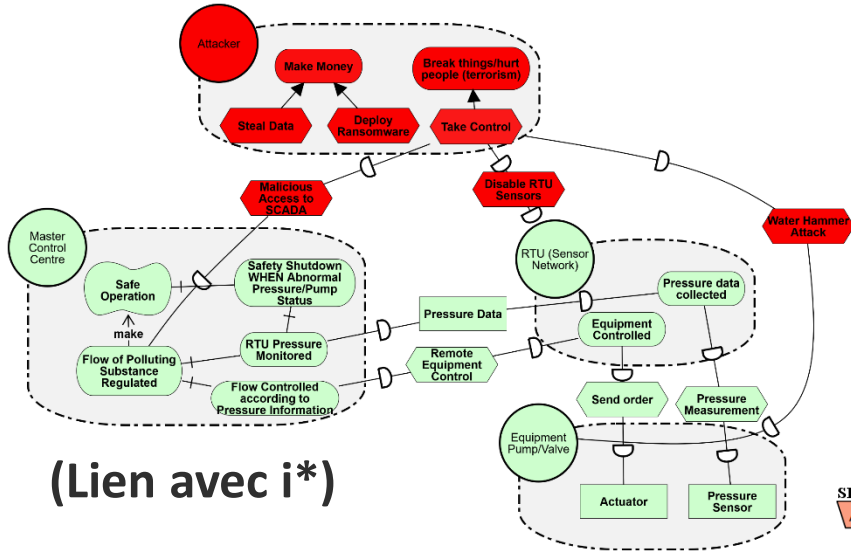
The screenshot displays the Cediti Objectiver 1.5.2 interface for a train system model. The main window shows a goal graph with nodes like "train progress (bounded)", "signal set to go (bounded)", "progress when go signal (bounded)", and "train waiting". A formal definition window shows the following code:

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

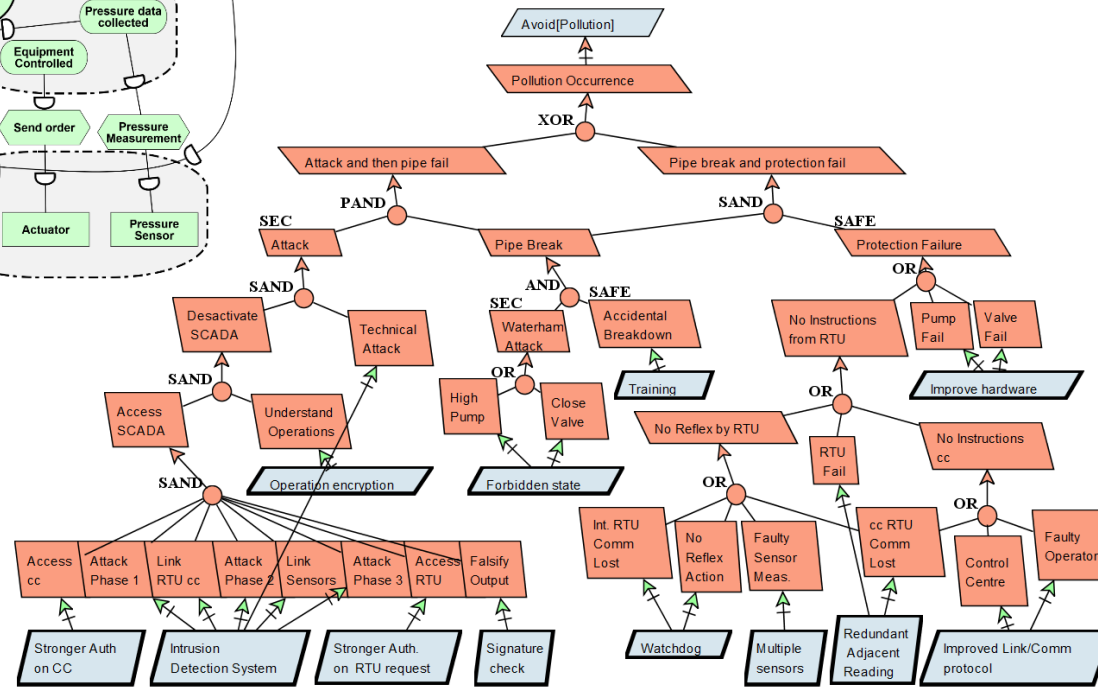
```
// FormalDef of progress when go signal (bounded)  
All tr: Train, b: Block  
nextBlock( On( tr ), b )  $\wedge$  go signal ( b ) = green()  
==> <> [= < 2 steps] On( tr ) = b
```

The interface also includes a "Doors for Train1" window with a speedometer and door status indicators, an "Execution tree" window showing state transitions like "Start", "OpenDoors", and "Closed", and an "FSM Visualizations" window with state transition diagrams. A red box highlights a "SECURITY GOAL FAILURE: door not closed while moving for Train#1" message in the bottom status bar.

Optimisation sur des espaces d'alternatives/obstacles (SBSE)



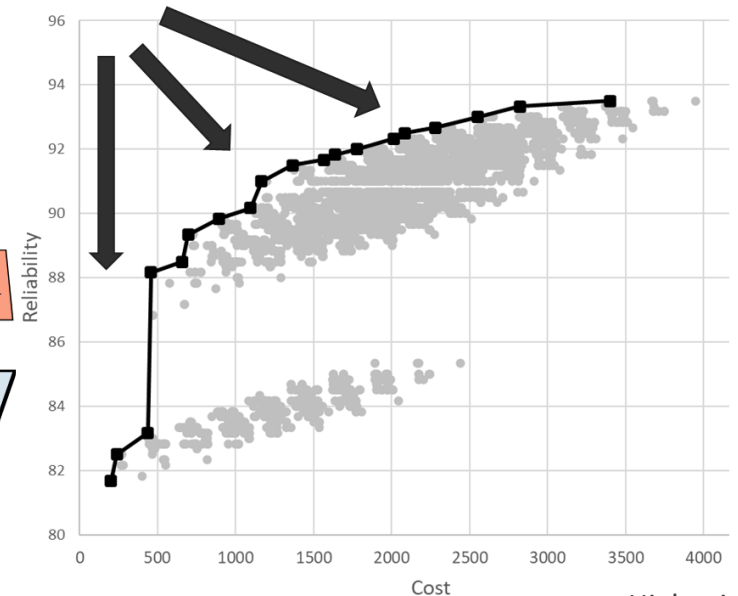
(Lien avec i*)



Extension safety/security



Pareto front

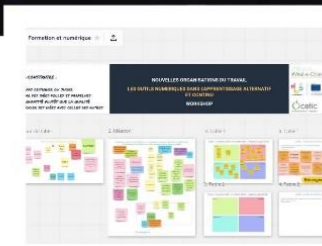
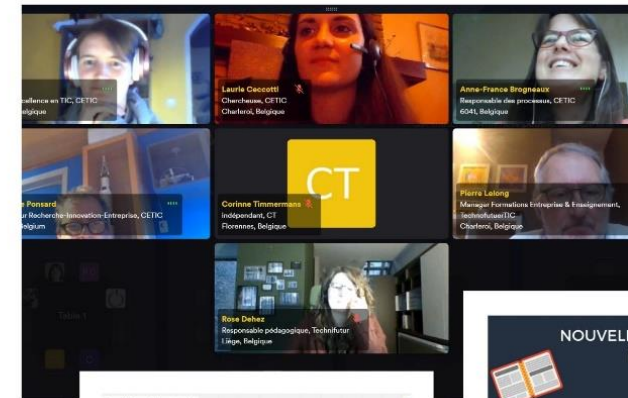
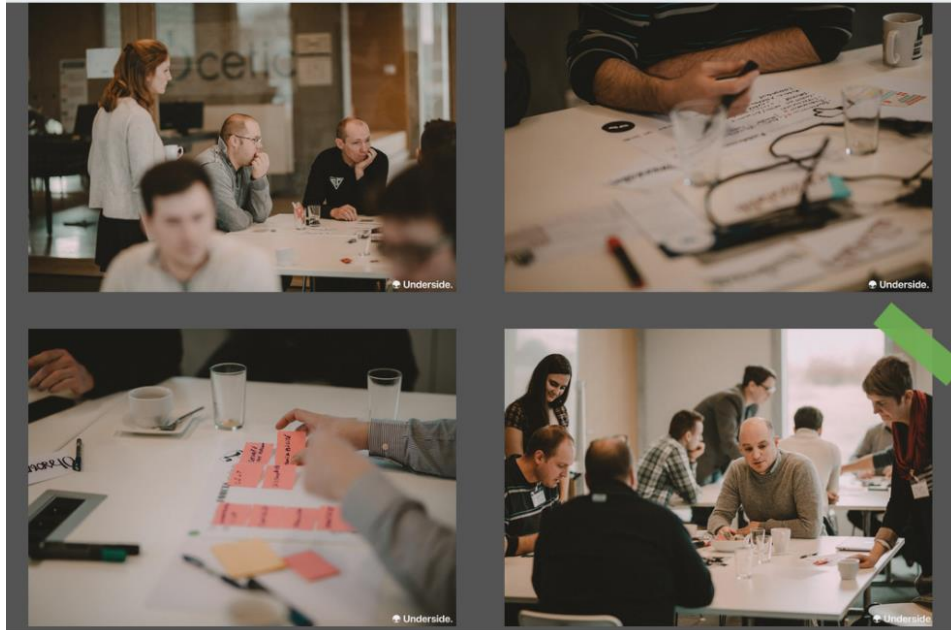
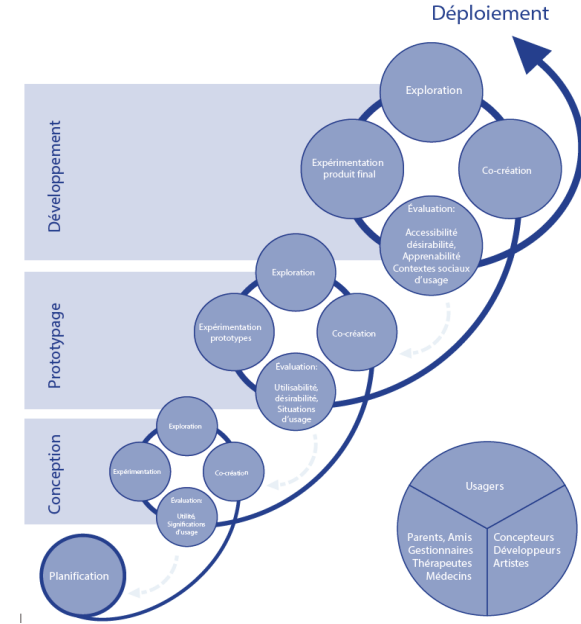


Low mitigation Budget

High mitigation budget

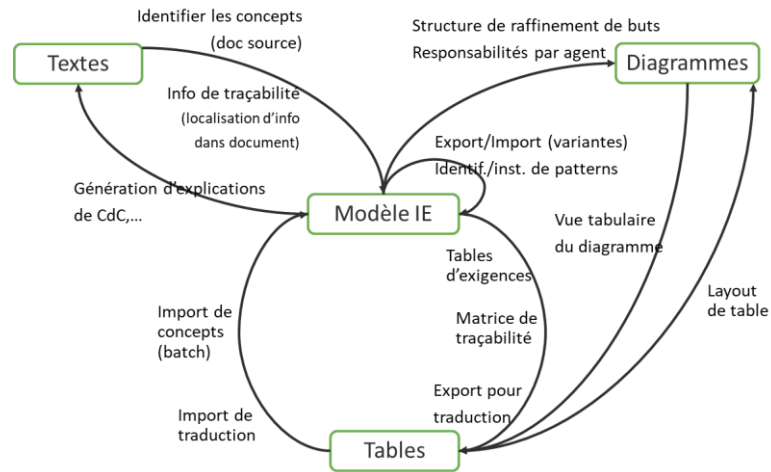
Evolution plus récente: méthodes participatives

- Appréhender la dimension pluridisciplinaire (expertises, 3-4 hélice,...)
- Appropriation de nouveaux instruments, espaces: coworking, incubateur, hub créatifs, living labs, fab labs,...
- Problématiques de sélection des parties prenantes, techniques d'élicitation,...
 - Groupes d'émergence, démarche par objectifs, personas, SWOT,...
- COVID → modalité distancielle (outils de vidéos, collaboration pour idéation,...)



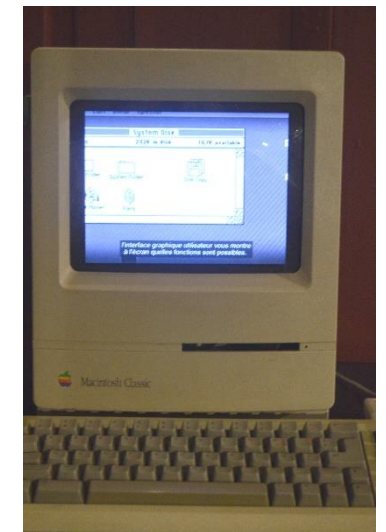
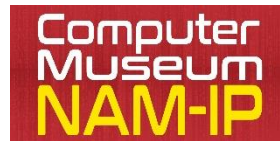
Multitude de collaborations

- Pratiquer pour maîtriser → analyser → améliorer
ex. extension pour intégrer texte-tables-diagrammes (InforSID 2015)



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/BPMN/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

- Collaboration muséale
 - exigences UX
 - préservation digitale





Your Connection to ICT Research

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Questions?

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