



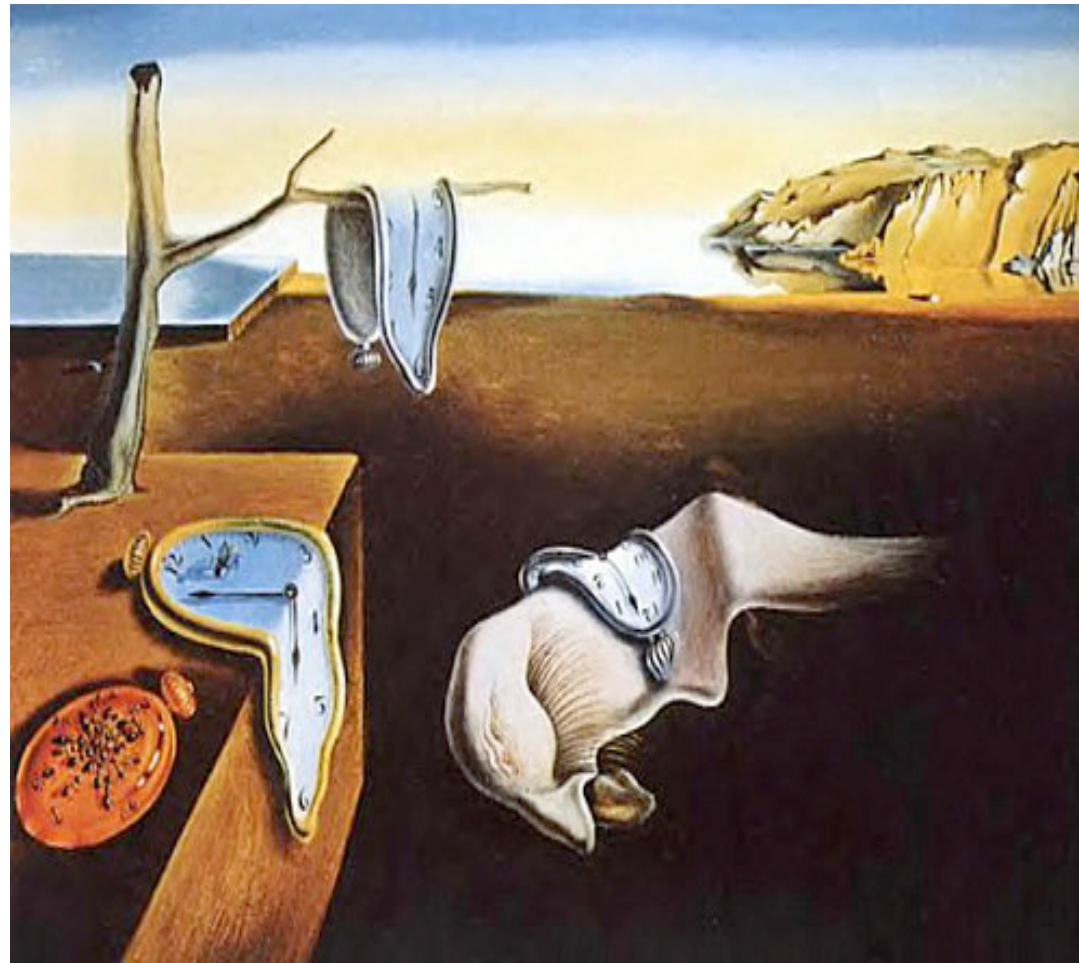
Plasticité des Interfaces Homme-Machine : Rétrospective et Perspectives

Gaëlle Calvary
Grenoble INP
Laboratoire d'Informatique de Grenoble (LIG)

Plasticité ?

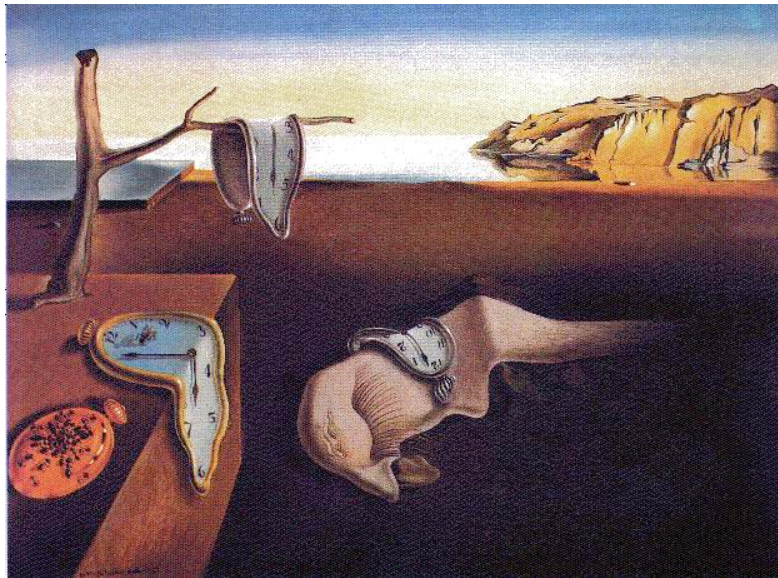


Plasticité ?



Plasticité : définition

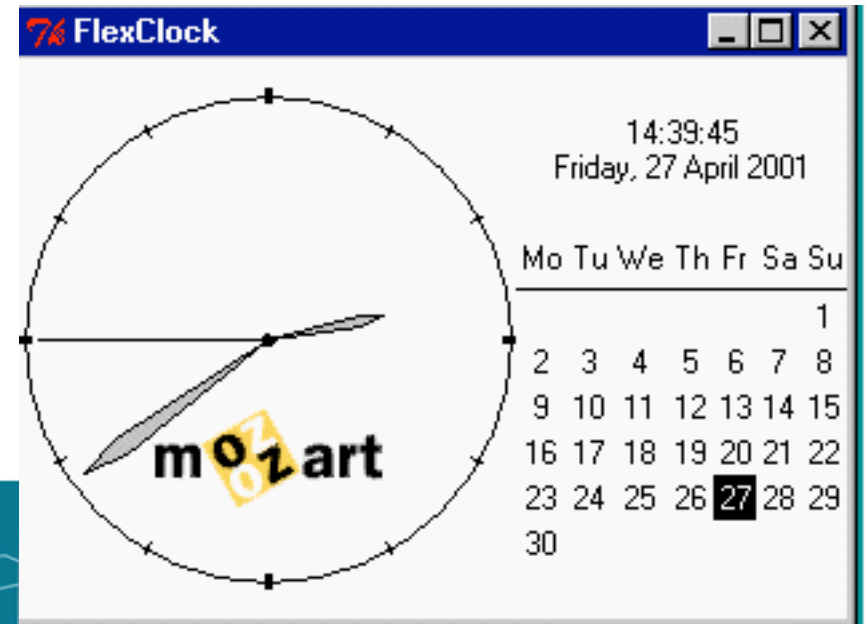
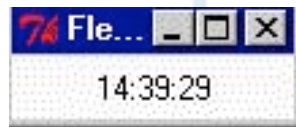
- Capacité d'une Interface Homme-Machine (IHM)
 - À s'adapter
 - À son contexte d'usage
 - Dans le respect des bonnes propriétés pour l'utilisateur



[Thevenin 99]
[Daassi 07]

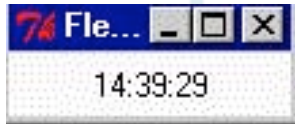
Plasticité : définition

- FlexClock [Grolaux 01]



Plasticité : définition

- FlexClock [5]



La plasticité
n'est pas
une propriété
absolue !

Plasticité : définition

- Contexte d'usage

- Absence de définition générale

« There is no context without context » P. Brézillon

- En plasticité

« Any information that may inform the adaptation process »

- User
 - Platform
 - Environment

Plasticité : définition

■ Adaptation

Style



CSSZENGÂRDEN

THE BEAUTY OF CSS DESIGN

A demonstration of what can be accomplished visually through CSS-based design. Select any style sheet from the list to load it into this page.

Téléchargez les fichiers d'exemple html et css

THE ROAD TO ENLIGHTENMENT

Les reliques passées des sélecteurs spécifique aux navigateurs, des DOMs incompatibles, et du manque de support des CSS encomrent un long chemin sombre et morne.

Aujourd'hui, nous devons nous clarifier l'esprit et nous débarassés des pratiques passées. La révélation de la véritable nature du Web est maintenant possible, grâce aux efforts infatigables des gens du W3C, du WaSP et des créateurs des principaux navigateurs.

Le Jardin Zen css vous invite à vous relaxer et à méditer sur les leçons importantes des maîtres. Commencez à voir clairement. Apprenez à utiliser ces techniques (bientôt consacrées par l'usage) de manière neuve et revigorante. Ne faites qu'Un avec le Web.

SO WHAT IS THIS ABOUT ?

Il y a clairement un besoin pour les graphistes de prendre les CSS au sérieux. Le Jardin

SELECT A DESIGN



The Road to Enlightenment

Les reliques passées des sélecteurs spécifique aux navigateurs, des DOMs incompatibles, et du manque de support des CSS encomrent un long chemin sombre et morne.

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SELECT A DESIGN

Retro Theater

by Eric Rogé

Lily Pond

by Rose Thorogood

Isle Outback

by Timo Vatanen

Zen Army

by Carl Desmond

The Original

by Joachim Shottar

Floral Touch

by Jadae Jimmy

Elegance in Simplicity

Plasticité : définition

- Adaptation

Style

Modalité d'interaction

Psycho : sens humain : du graphique au vocal



Plasticité : définition

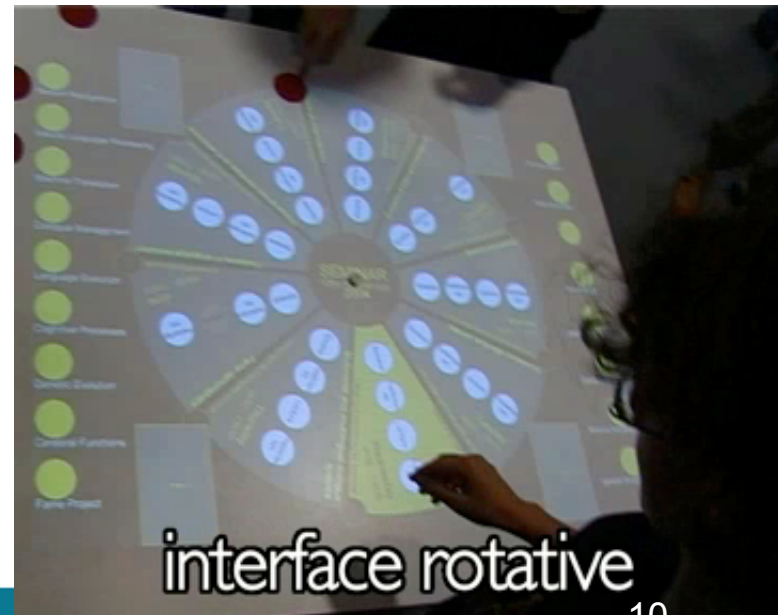
■ Adaptation

Style

Modalité d'interaction

→ Psycho : sens humain : du graphique au vocal

→ Info : < dispositif, langage > d'interaction



Plasticité : définition

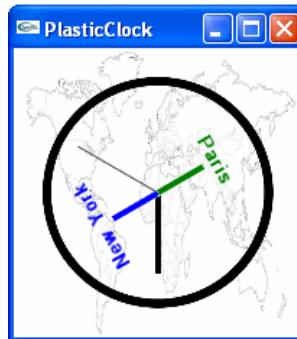
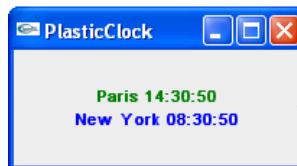
■ Adaptation

Style

Modalité d'interaction

Psycho : sens humain : du graphique au vocal

Info : < dispositif, langage > d'interaction



Changement d'interacteur

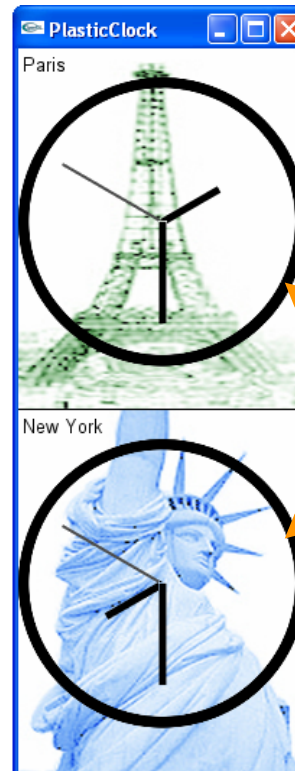
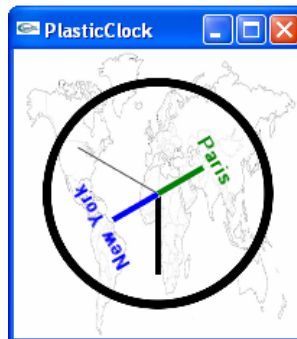
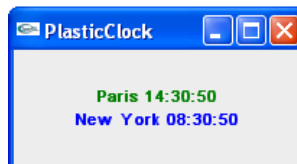
Plasticité : définition

- Adaptation

Style

Modalité d'interaction

Structure



2 espaces de travail

Plasticité : définition

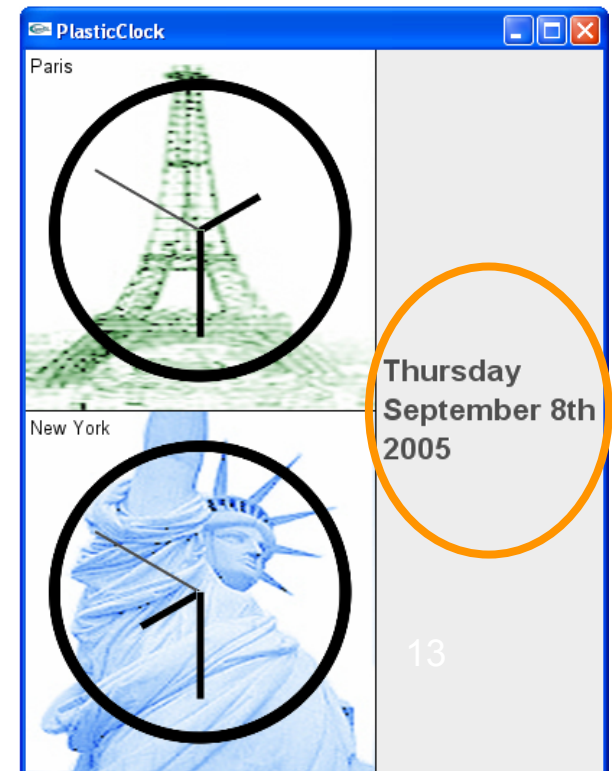
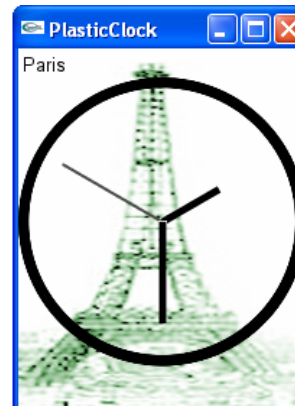
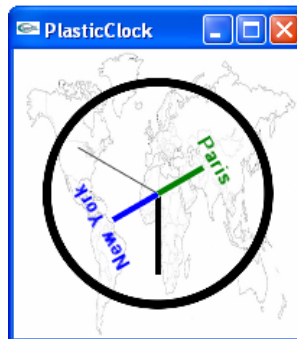
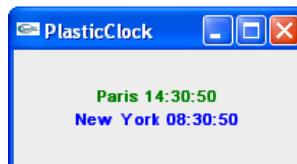
- Adaptation

Style

Modalité d'interaction

Structure

Tâche



Plasticité : définition

- Adaptation

Remodelage

Style

Modalité d'interaction

Structure

Tâche

Plasticité : définition

■ Adaptation

Remodelage

Style

Modalité d'interaction

Structure

Tâche

Redistribution

Migration partielle / totale



Plasticité : définition

- Adaptation

Sty

Remodelage

Redistribution

La plasticité :
c'est bien plus
compliqué
qu'un problème
de couleur !

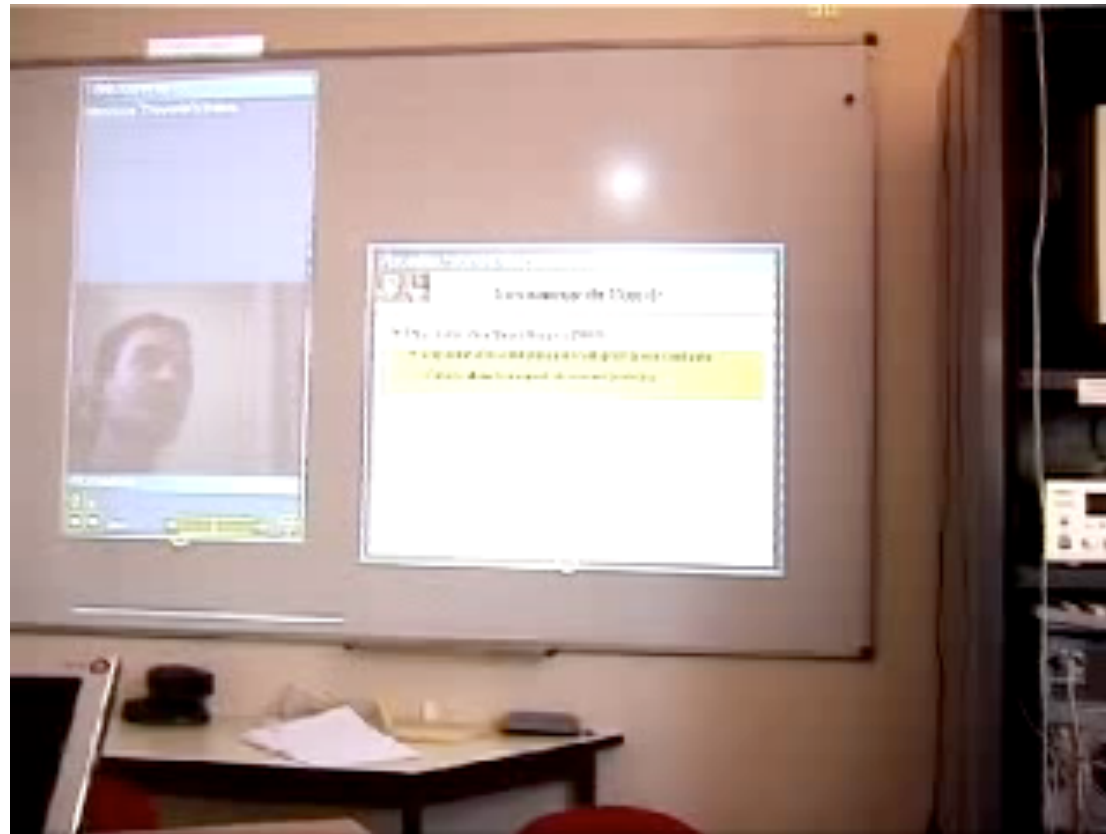
Plasticité : définition

- Bonnes propriétés pour l'utilisateur

- Utilité
 - Utilisabilité
 - + Inter utilisabilité [Karsenty 05]
- Valeur [Cockton 04]

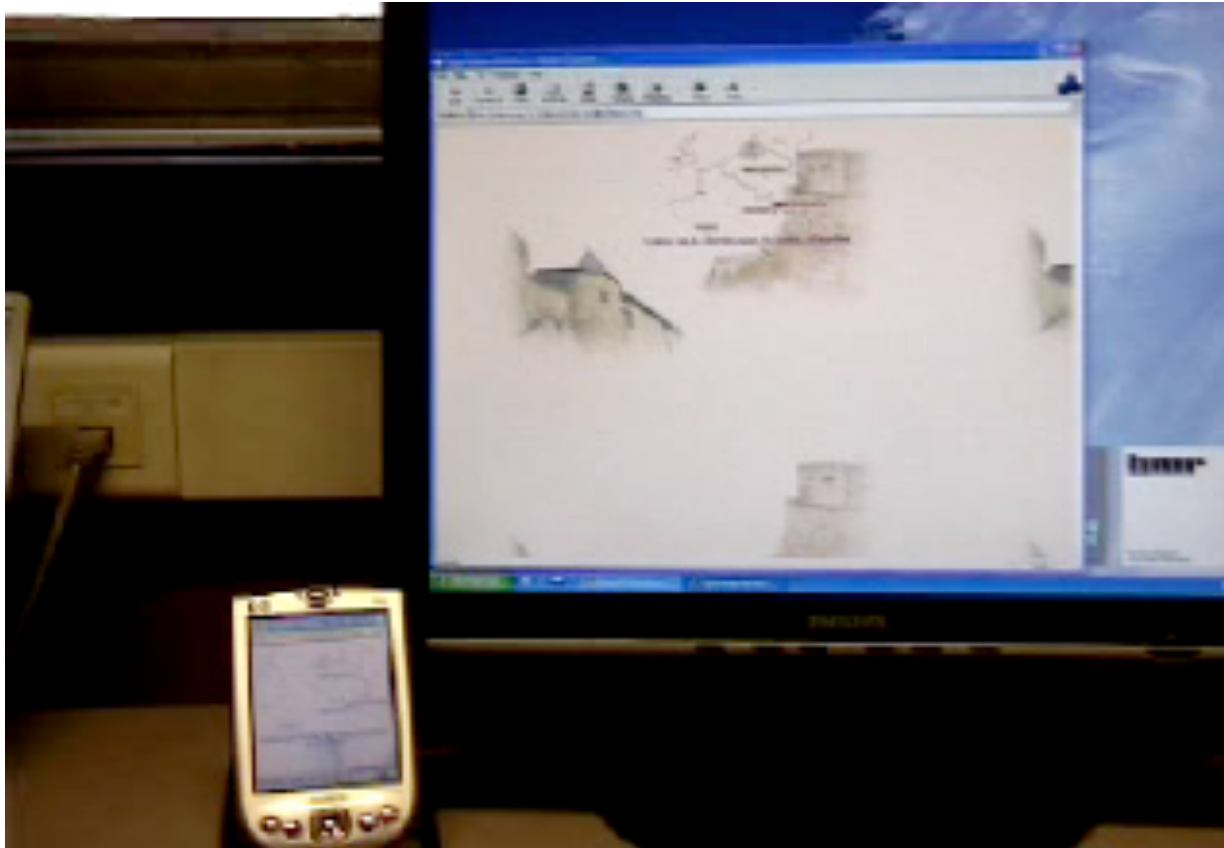


Plasticité : définition



CamNote
[Demeure 05]

Plasticité : définition



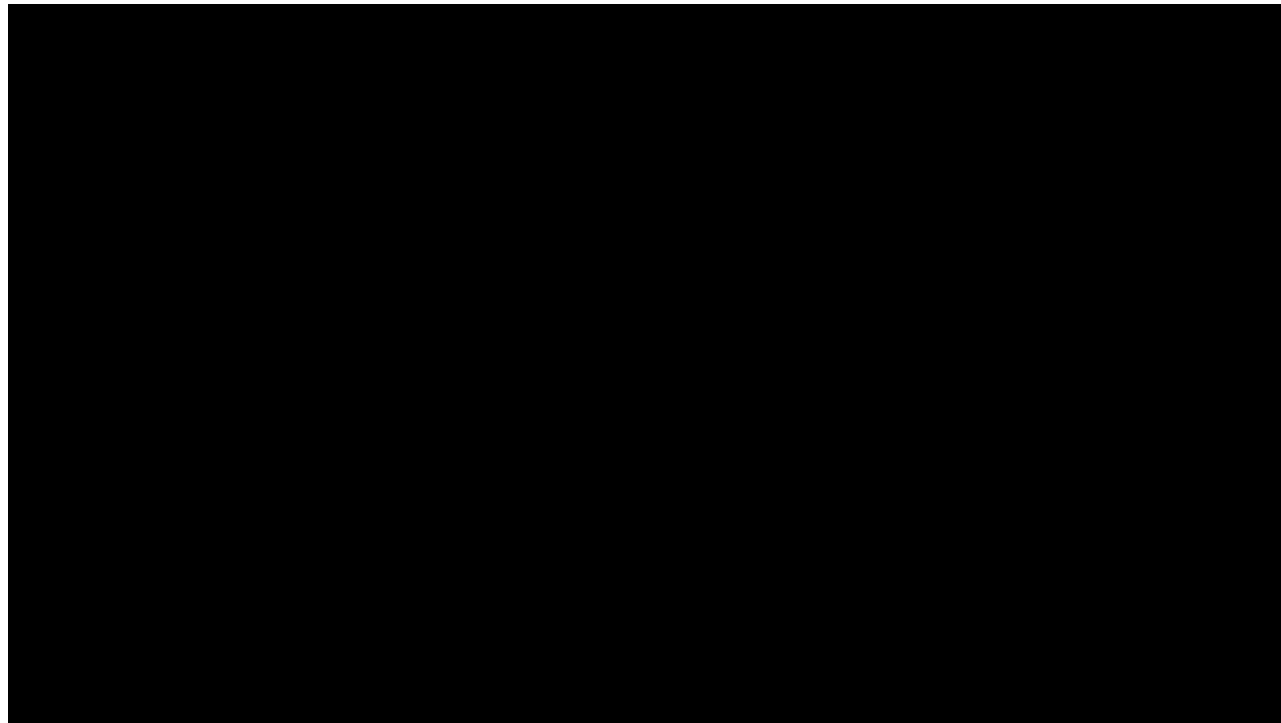
Sedan-Bouillon
[Balme 05]



20

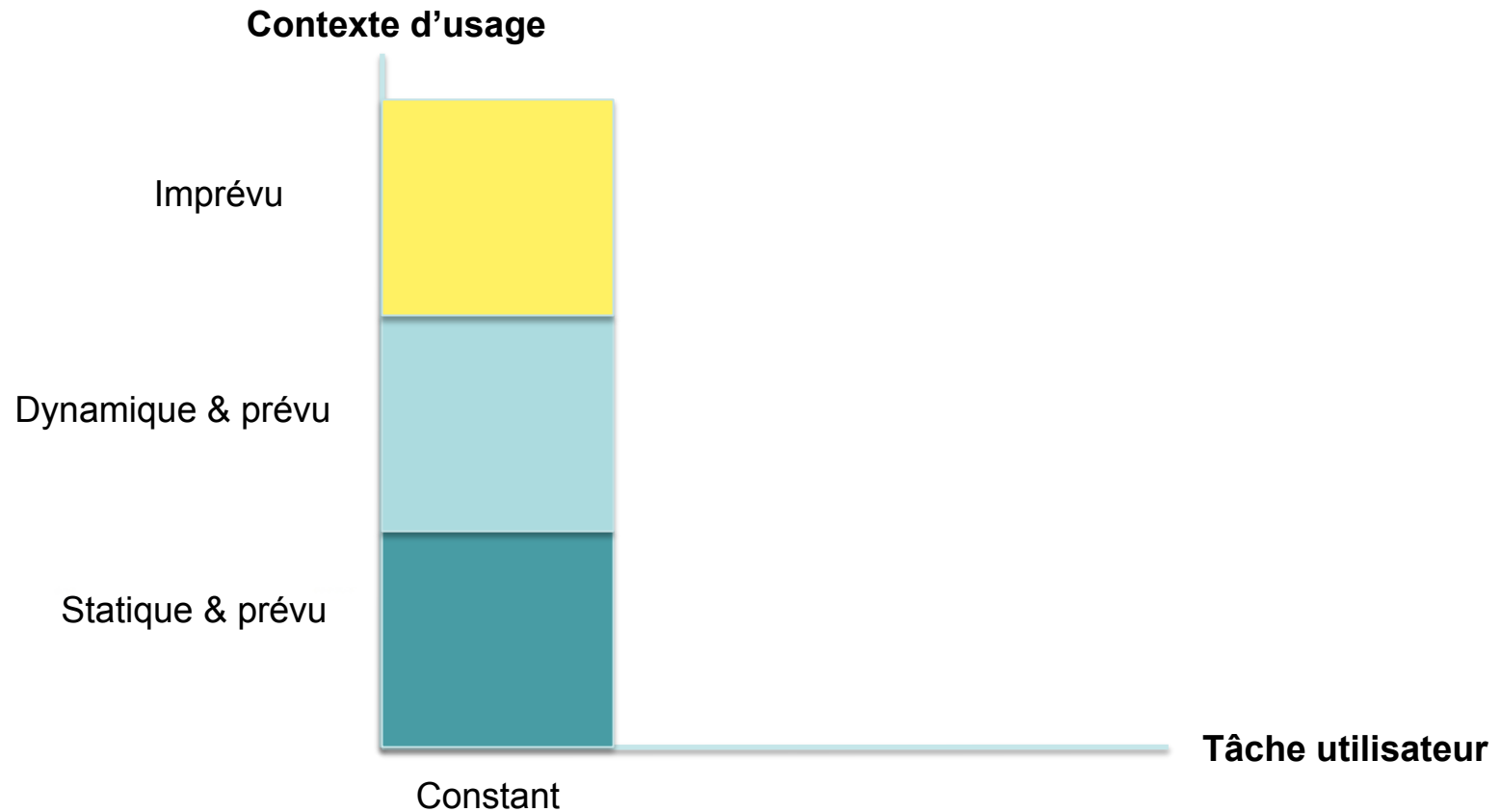
Plasticité : définition

- 1er transfert industriel : UbiLoop
MyCitizSpace (ANR, 2007-2011)

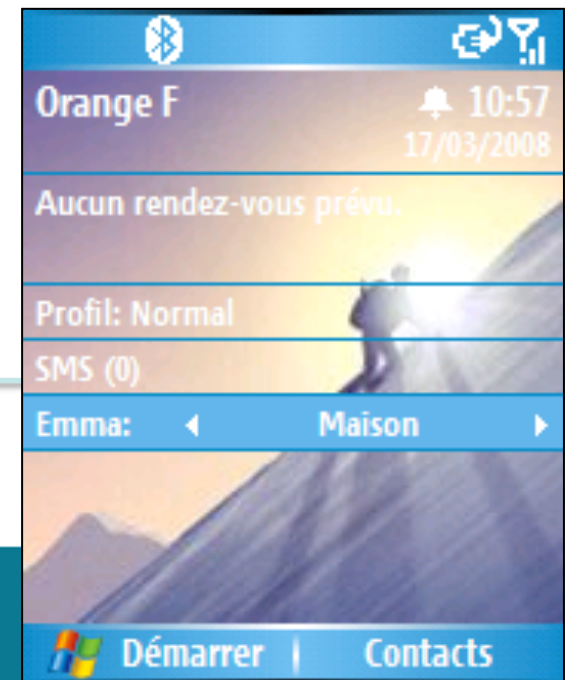
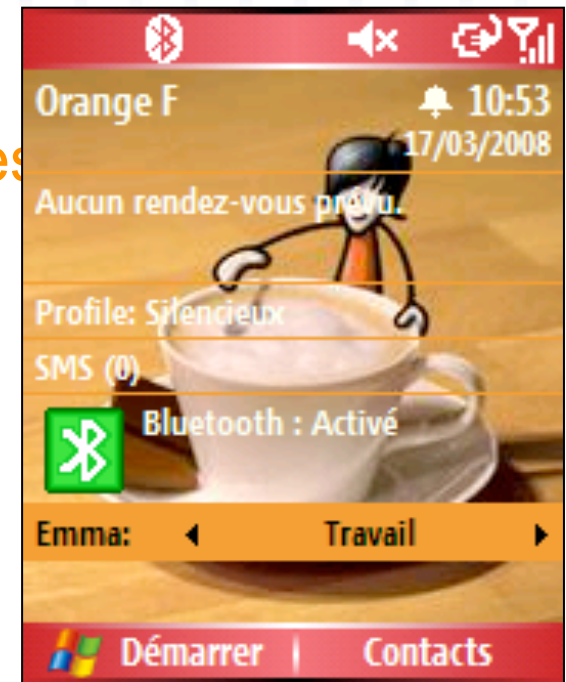
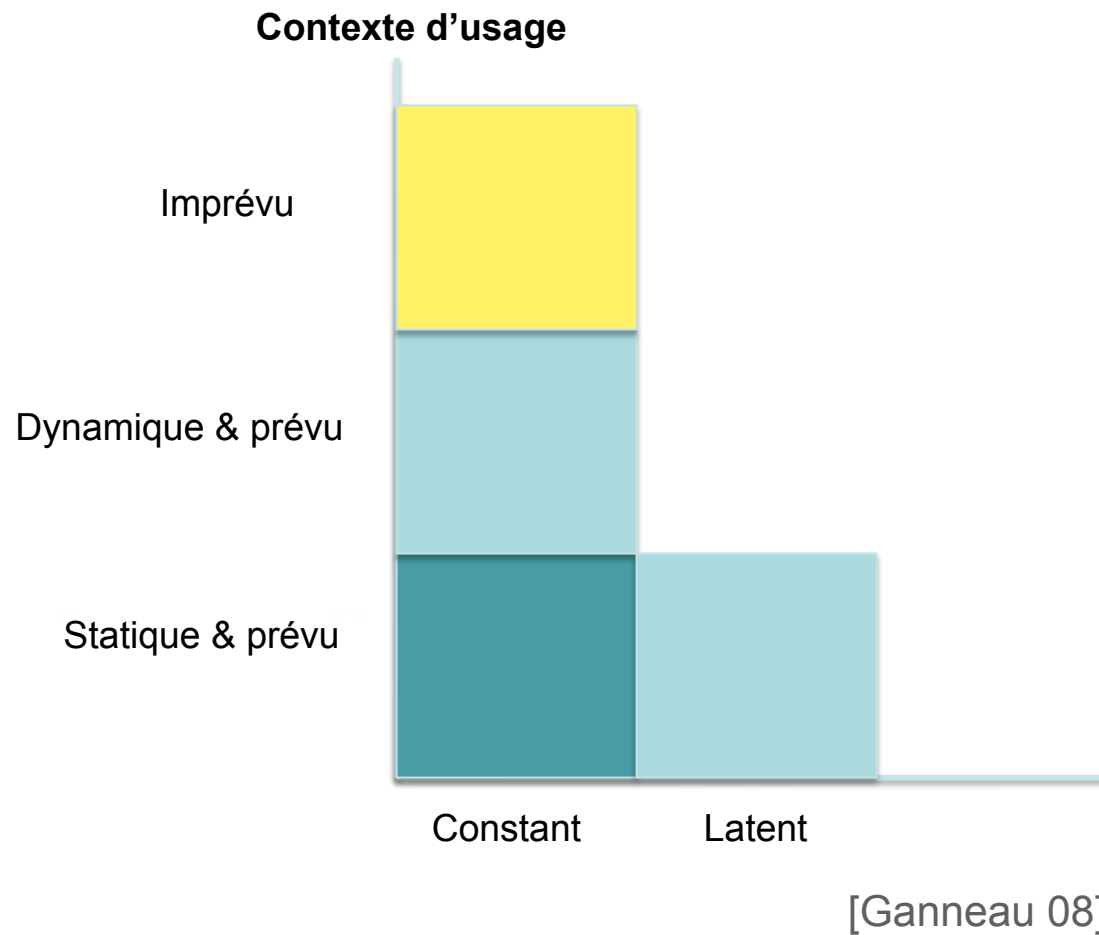


[Serna 09]

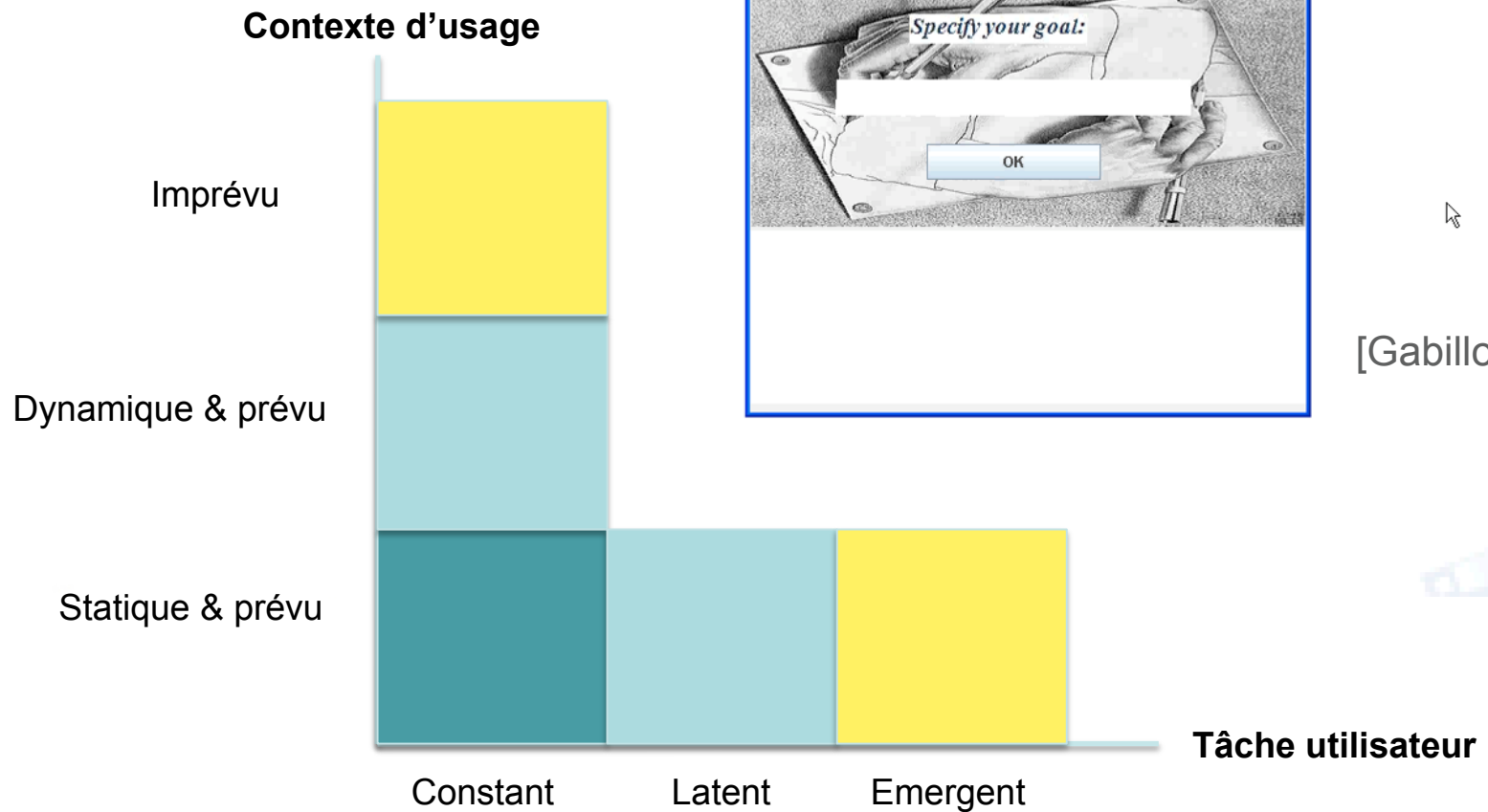
Plasticité : rétrospective et perspectives



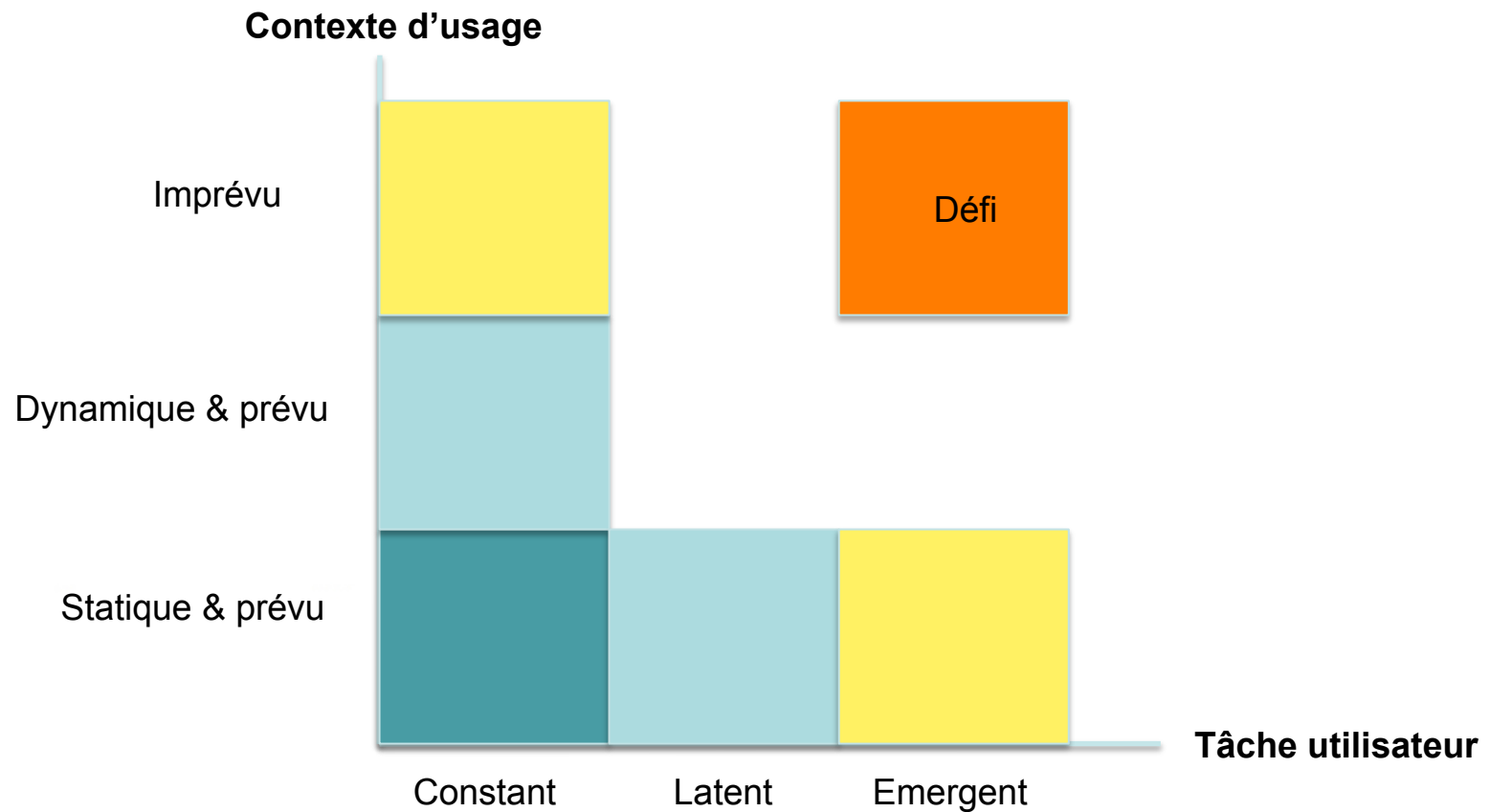
Plasticité : rétrospective et perspectives



Plasticité : rétrospective et perspectives



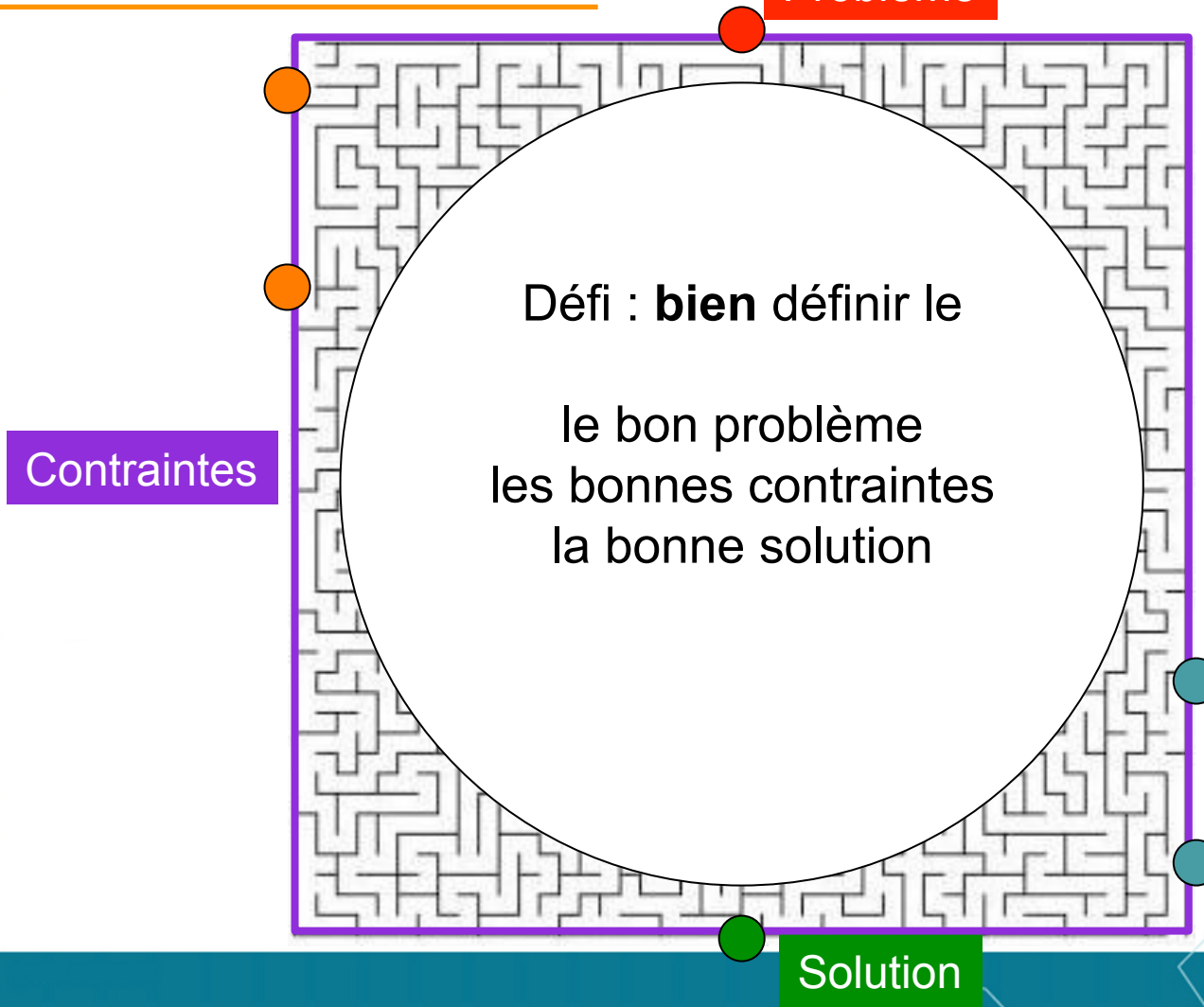
Plasticité : rétrospective et perspectives



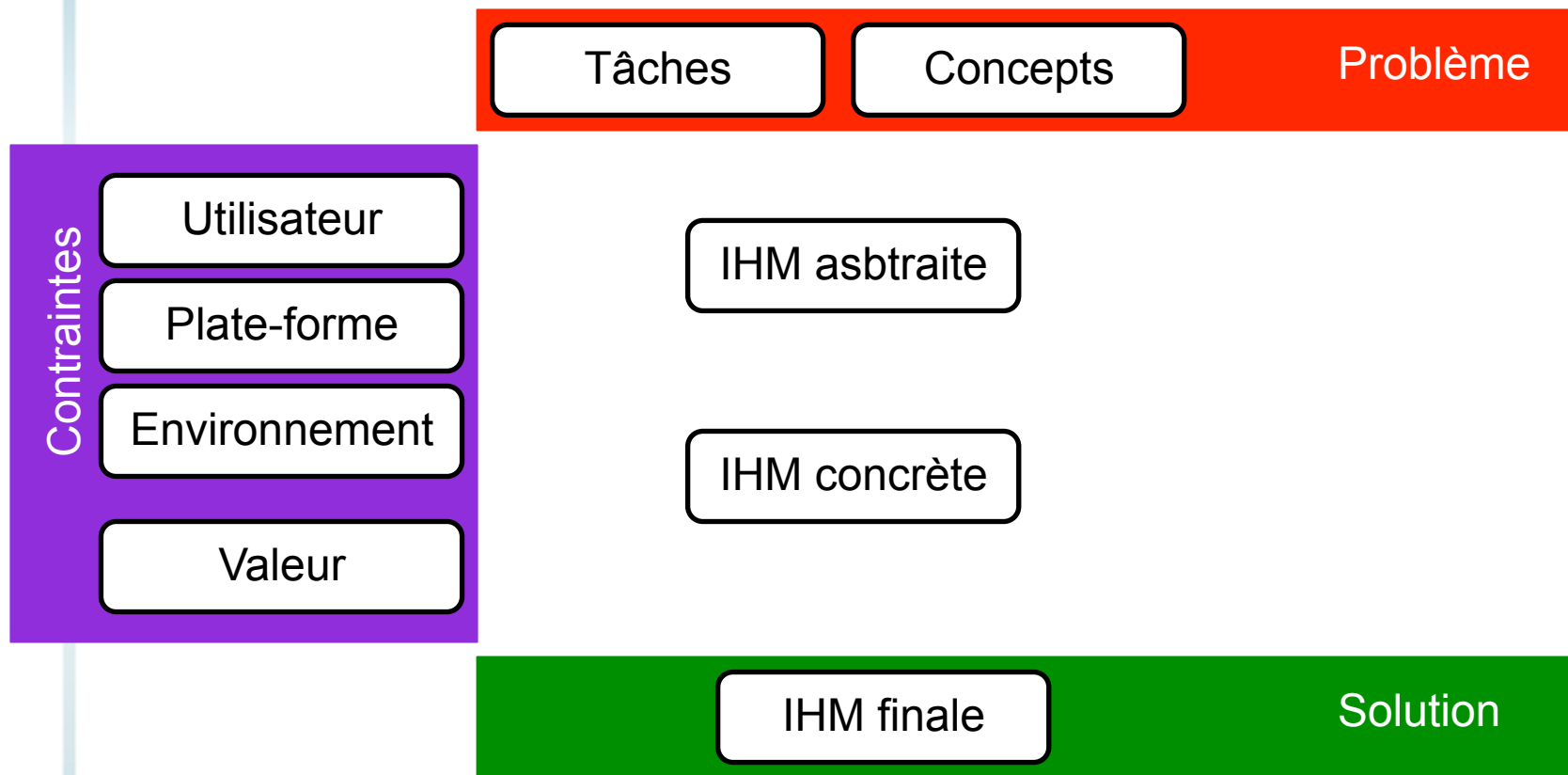
Plan de l'exposé

- Description
- Généralisation
- Abstraction
- Perspectives

Analyse d'impact en ingénierie et la plasticité

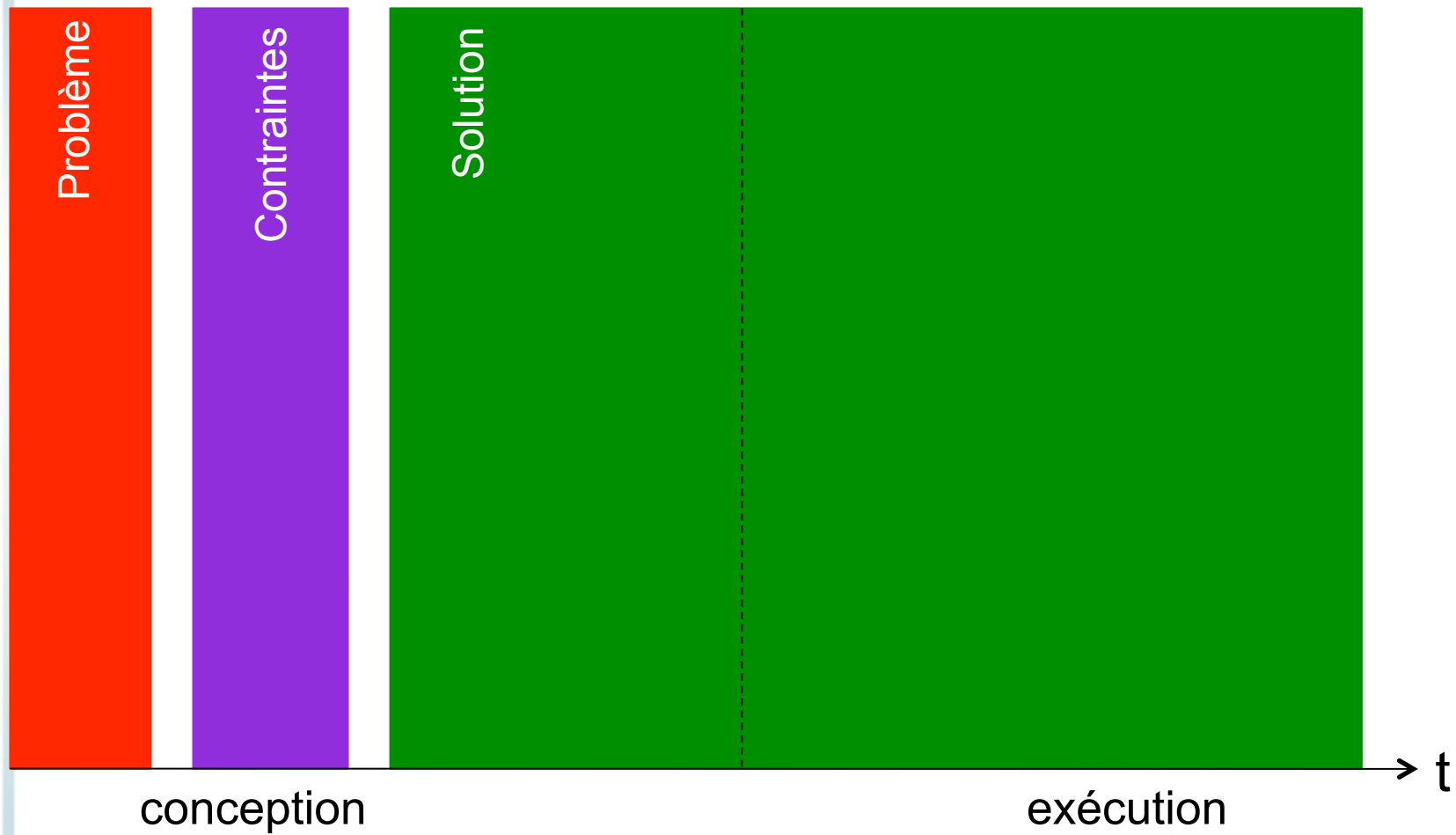


Ingénierie d'IHM

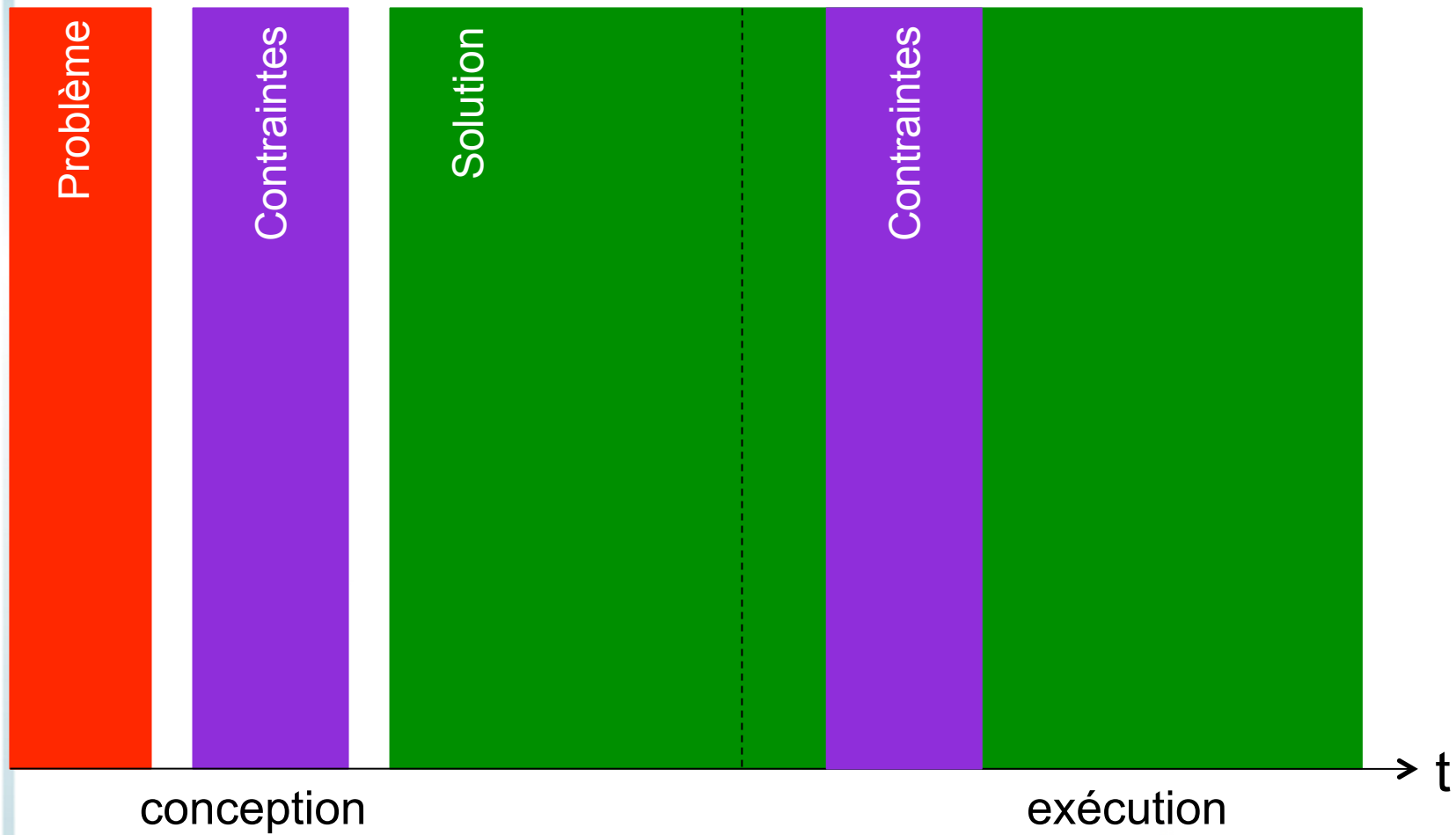


[Calvary 03]

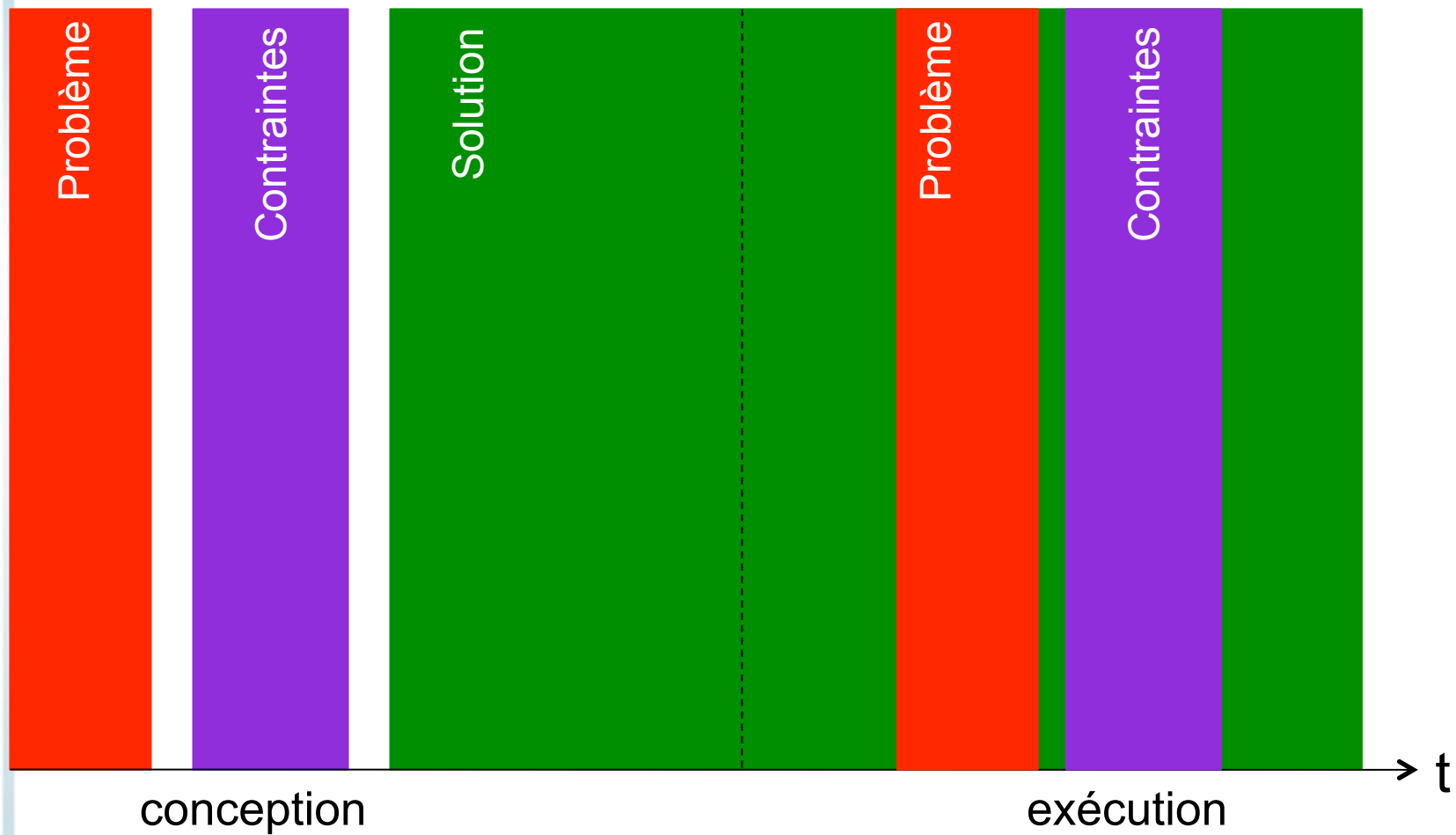
Ingénierie d'IHM traditionnelles



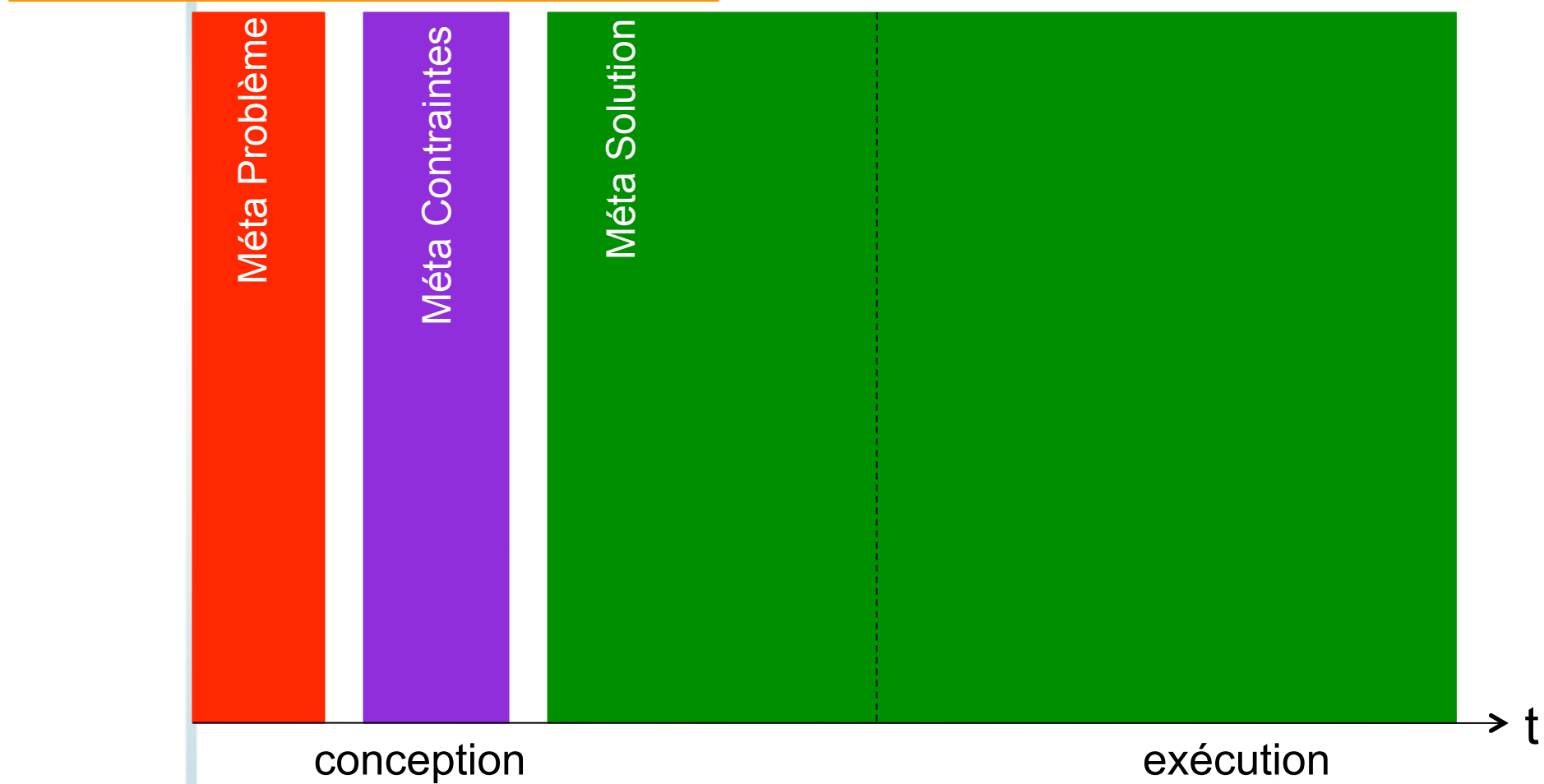
Ingénierie d'IHM ubiquitaires



Ingénierie d'IHM pleinement plastiques



Approche : changement de système d'étude



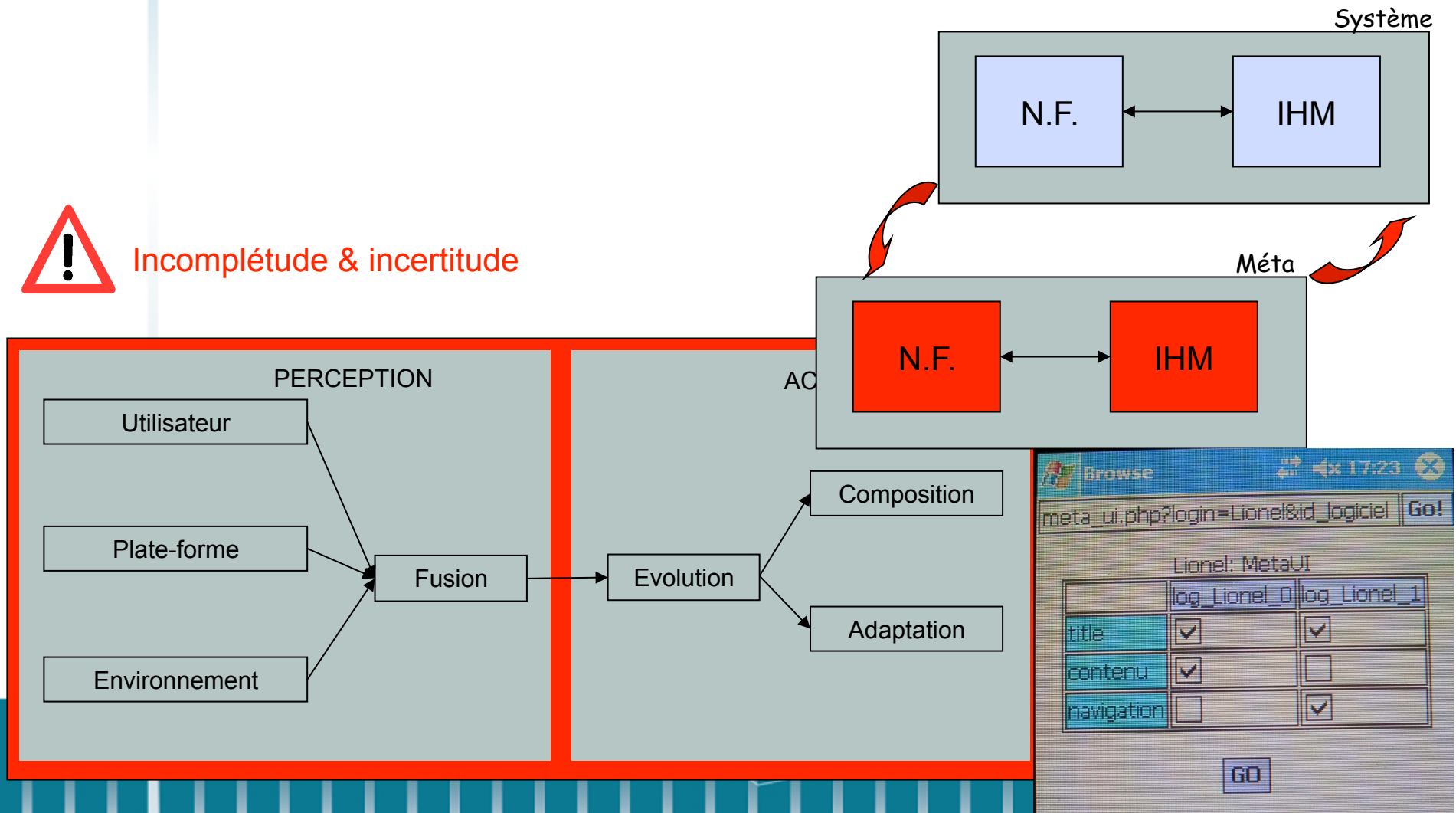
Approche : changement de système d'étude



Description, transformation, combinatoire



Incomplétude & incertitude



Plan de l'exposé

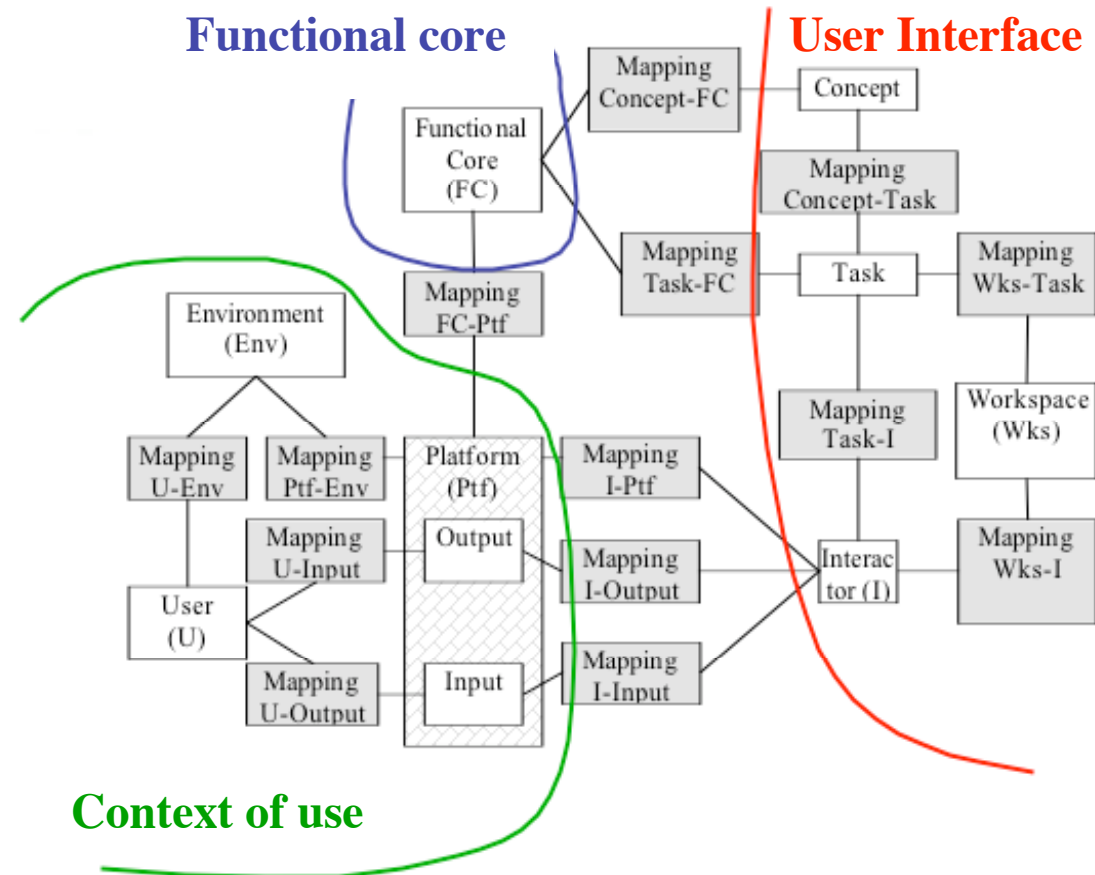
- Description
- Généralisation
- Abstraction
- Perspectives

Approche : 5 grands principes

- #1: Modèles de conception présents à l'exécution
- #2: Transformations et *mappings* : des modèles
- #3: Interpréteurs de modèles : des services
- #4: L'humain dans la boucle
- #5: Adaptation interne et externe



Approche : 5 grands principes



Approche : 5 grands principes

- #1: Design-time models are alive at runtime
- #2: Transformations and mappings are models
- #3: Design-time interpreters are runtime services
- #4: Humans are kept in the loop
- #5: Close adaptiveness and open adaptiveness cooperate

Approche : 5 grands principes ...

... fondés sur l'Ingénierie Dirigée par les Modèles (IDM)

IDM

```
DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//
EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html> <head> <meta http-equiv="Content-Type"
content="text/html; charset=UTF-8"/>
<title id="title">" type="text/css" href="http://data.hordes.fr/
css/ie.css.gz?v=86"/>
<![endif--> <!--[if IE 6]> <link rel="stylesheet" type="text/
css" href="http://data.hordes.fr/css/ie6.css.gz?v=86"/> <![
endif-->
<script type="text/javascript" src="/js/horde.js.gz?v=28"></
script> </head>

</div> <div c

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ou d'<a href
a>
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<div id="content"> <div id="notification"> <div
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/div> <div class="box"> <div id="notificationText"><
/div> <a href="#" class="button"
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d
ocument.getElementById('notification').className=";
js.Tutorial.showTutorialStep(); return false">Fermer</a> <
/div> </div> <div id="banner" onclick="js.Js.reboot(); return
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<div id="content"> <div id="notification"> <div class="black"></div>
<div class="box"> <div id="notificationText"><
```

SVG, CSS, XUL, HTML, PHP, Sql, Osgi, Corba, Java, Servlet, Ajax

```
family/ie/default.msp" target="_blank">mettre a jour</a>
ou d'<a href="http://www.getfirefox.com">installer Firefox</
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```

```
<div id="tooltipContent"></div> </div> </div>
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<div id="tooltipContent"></div> </div> </div>
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IDM

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</div> <!-- JS TOOLTIP --> <div id="tooltip"
class="dynamicTipCategoryHere">
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IDM

Générer

```
DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//
EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
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css" href="http://data.hordes.fr/css/ie6.css.gz?v=86"/> <![
endif-->
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script> </head> <body id="body"> <div id="cache">

</div> <div class="ieWarning">

" target="_blank">mettre à jour</a>
ou d'<a href="http://www.getfirefox.com">installer Firefox</
a>
.</div> <div id="main"> <div id="contentBg">
<div id="content"> <div id="notification"> <div
class="black"><
</div> <div class="box"> <div id="notificationText"><
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onClick="document.getElementById('body').className=";
document.getElementById('notification').className=";
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</div> </div> <div id="banner" onclick="js.Js.reboot(); return
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<script type="text/javascript" src="/js/horde.js.gz?v=28"></
script> </head> <body id="body"> <div id="cache">

</div> <div class="ieWarning">

Vous utilisez une version ancienne d'Internet Explorer. Nous
vous recommandons fortement de le
<a href="http://www.microsoft.com/france/windows/products/
winfamily/ie/default.msp" target="_blank">mettre à jour</a>
ou d'<a href="http://www.getfirefox.com">installer Firefox</
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```

IDM

- Trois principes essentiels
 - Explicitation
 - Capitalisation
 - Opérationnalisation
- Concepts de base
 - Système
 - Modèle
 - Métamodèle
 - Acteur
- Relations de base
 - Représente
 - Est conforme

Système

➤ Tout est « **système** »



Un système

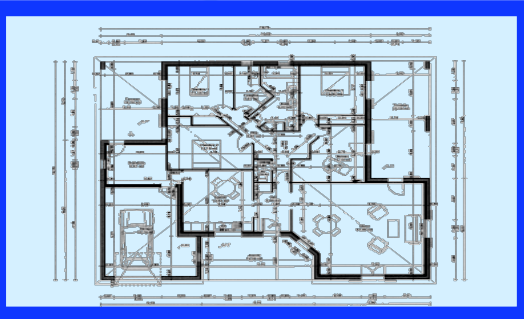
Système et Modèles

- Un modèle **représente** un **système**

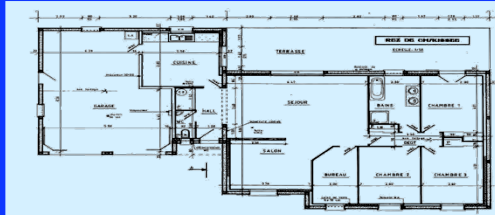


Un modèle

μ



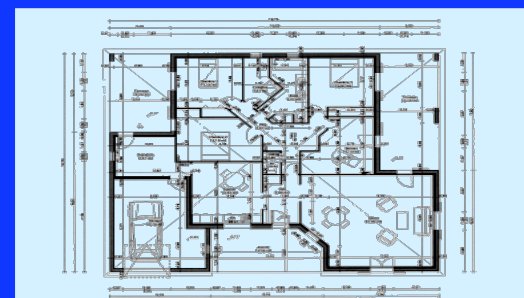
Système et Modèles



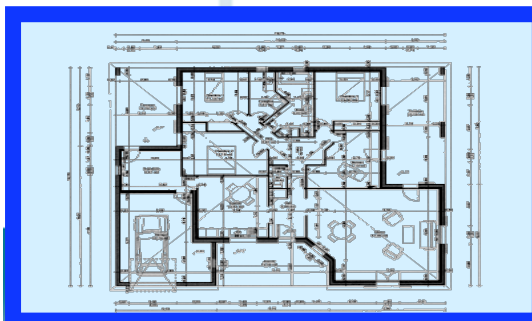
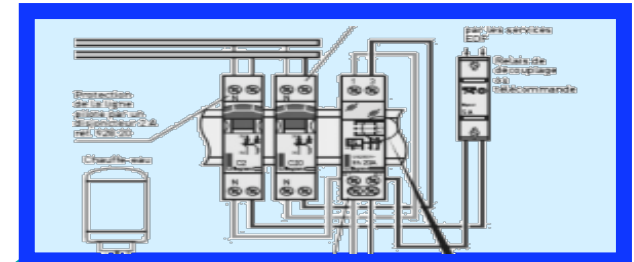
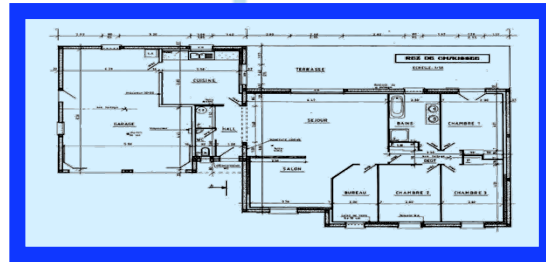
μ



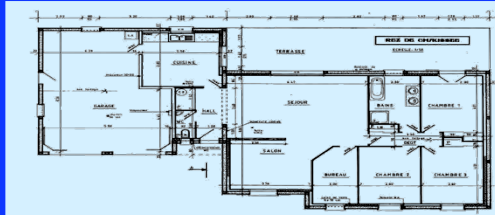
μ



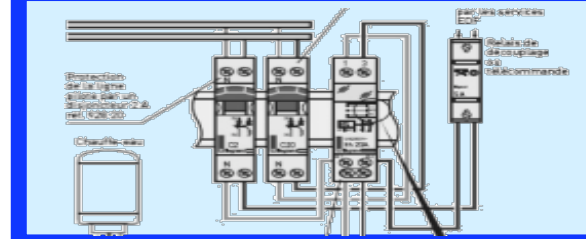
Systeme et Modèles



Système et Modèles



μ

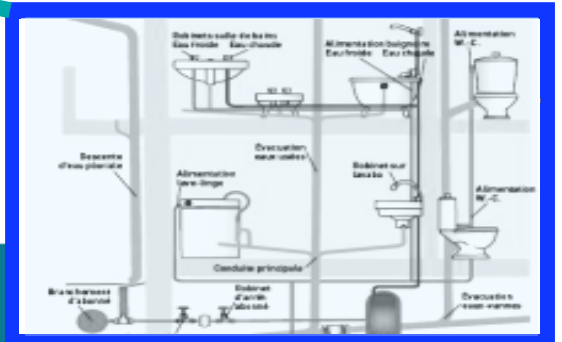
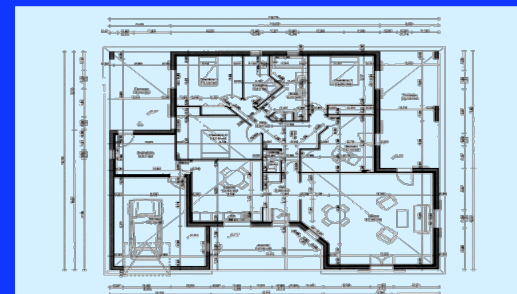


μ

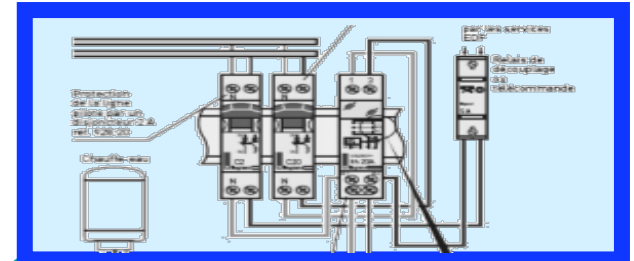
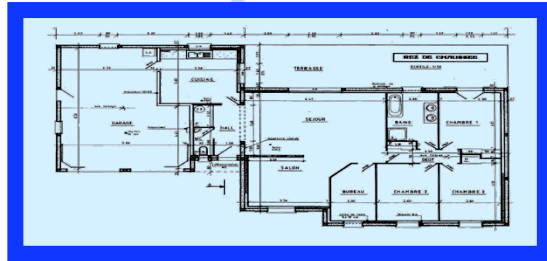


μ

μ



Modèles et Acteurs



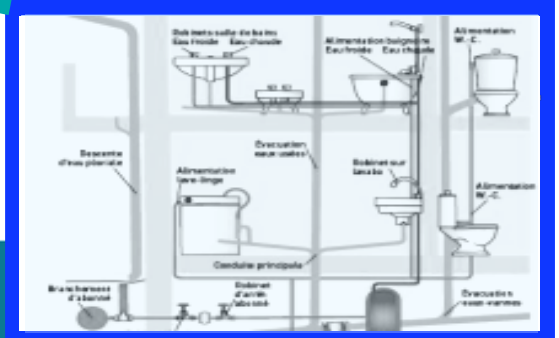
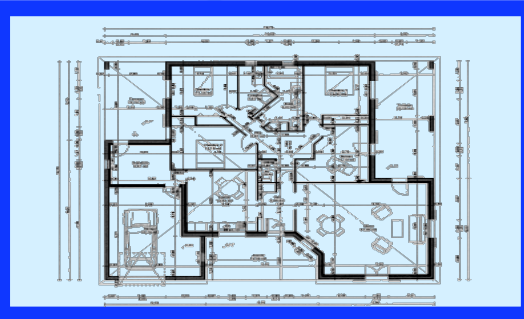
μ

μ

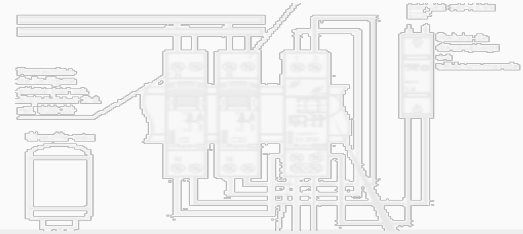
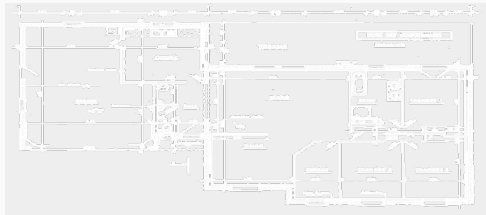
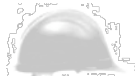


μ

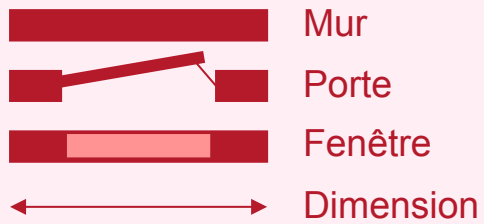
μ



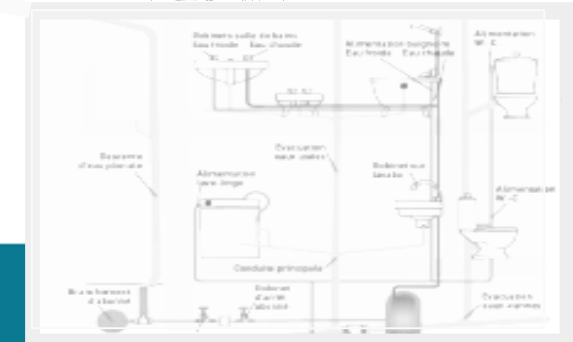
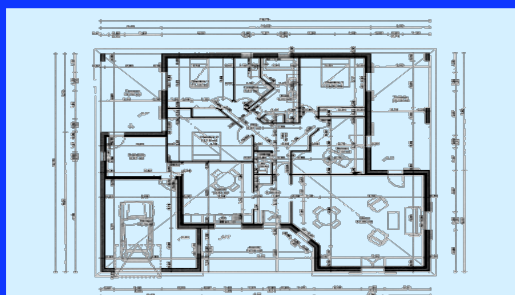
Modèles et Métamodèles



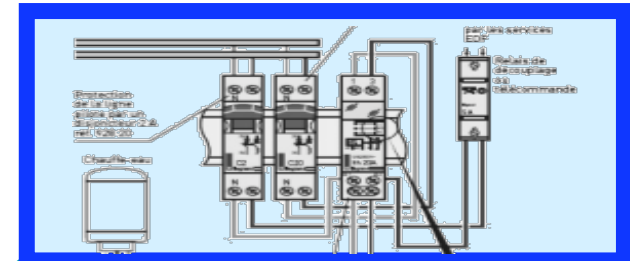
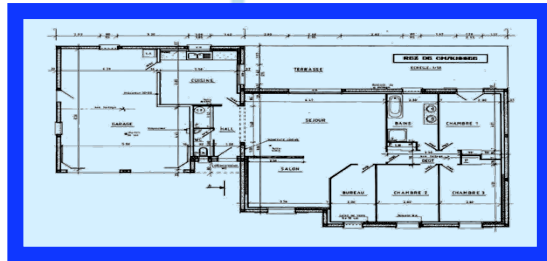
Un metamodelle



X

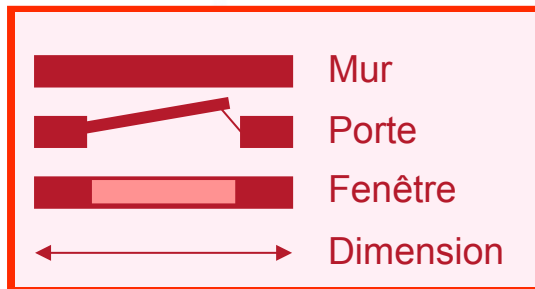


Modèles et Métamodèles



μ

μ

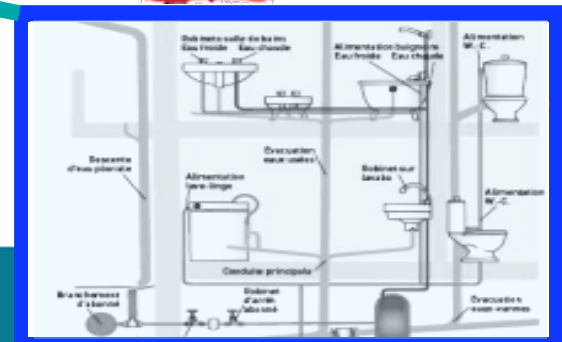
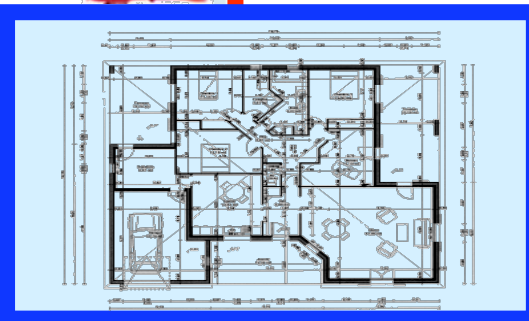


χ

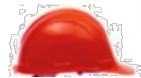
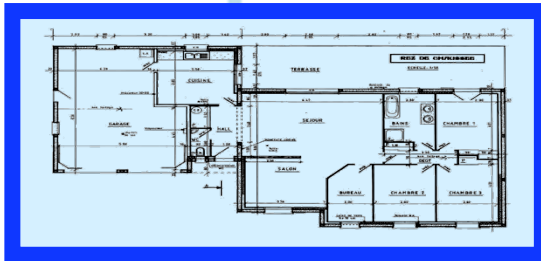


μ

μ

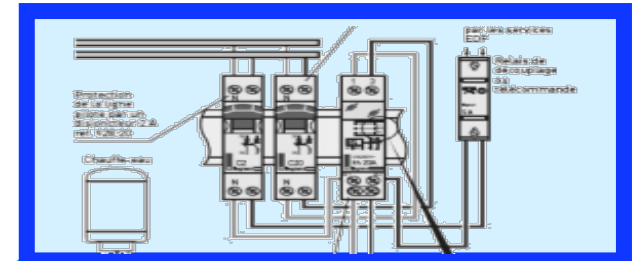


Modèles et Métamodèles

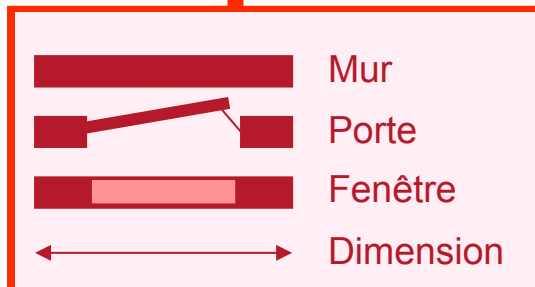


×

μ



μ

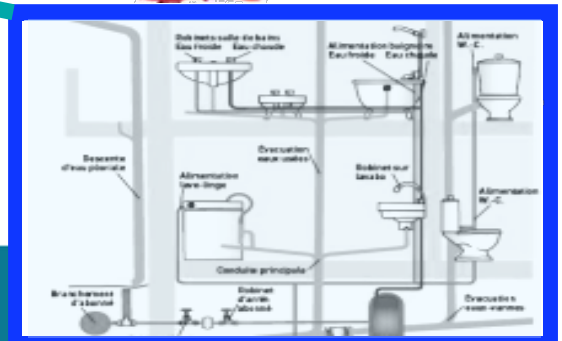


×

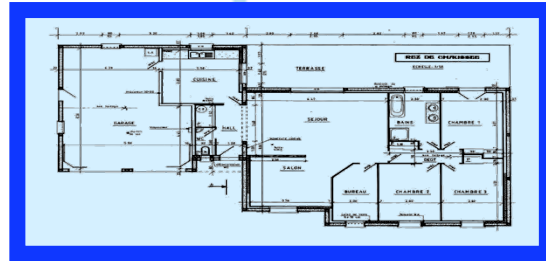
μ



μ

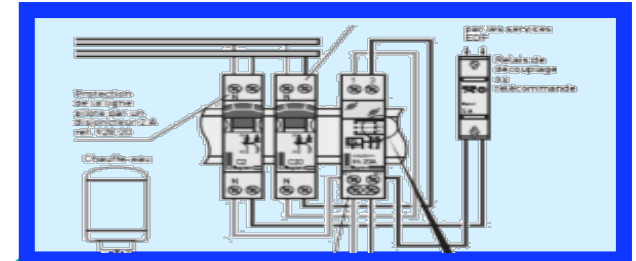


Modèles et Métamodèles

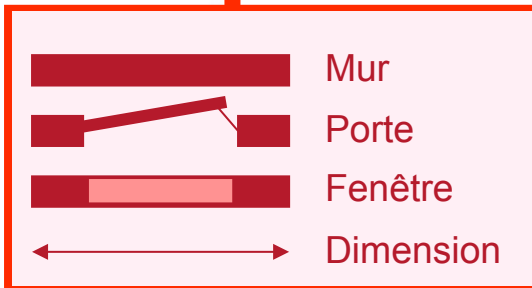


✗

μ



μ

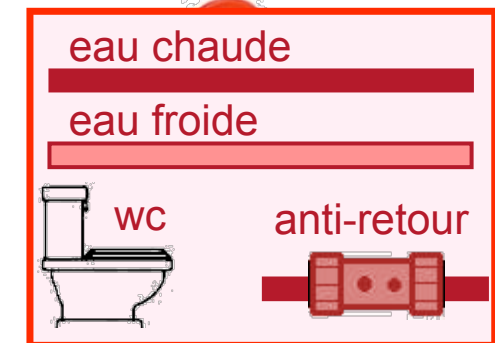


✗

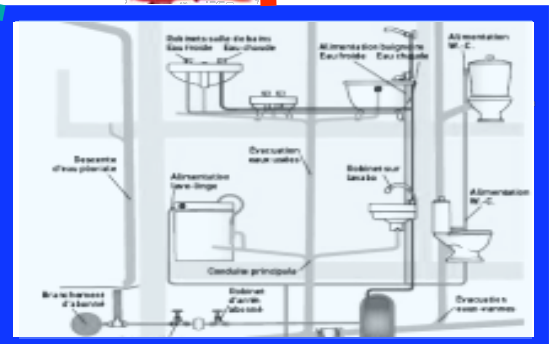
μ



μ



✗

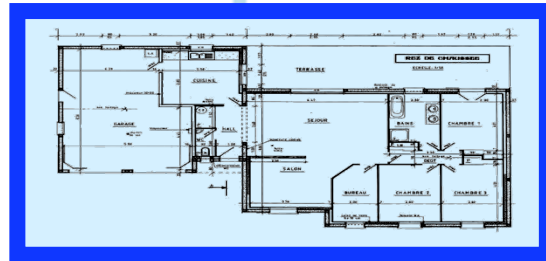


Modèles et Métamodèles

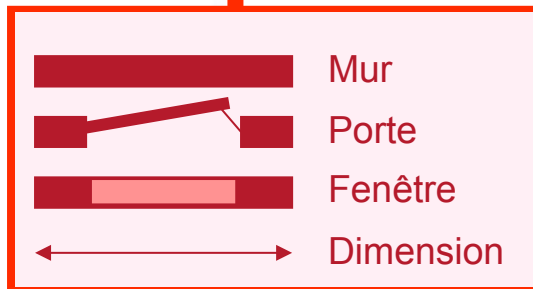
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27	38	47	56	la ligne
28	39	48	57	pour un
29	40	49	58	dispositif de
30			59	relais
			60	de commande
			61	et de
			62	service
			63	eau
			64	chaude
			65	et froide
			66	WC
			67	anti-retour
			68	
			69	
			70	
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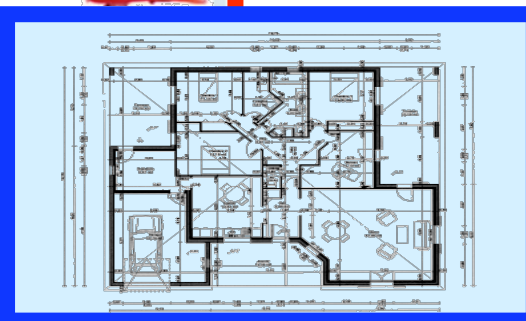
X



X



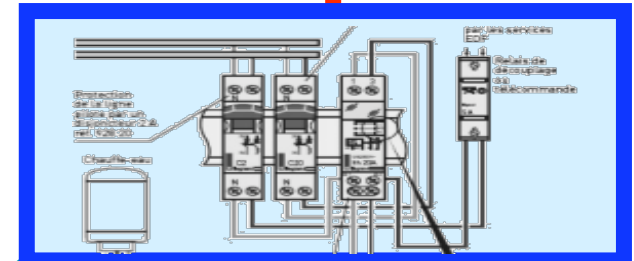
X



μ



μ



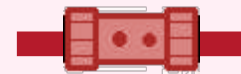
eau chaude

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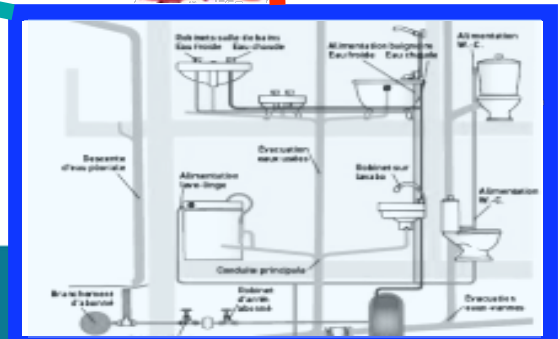


WC

anti-retour

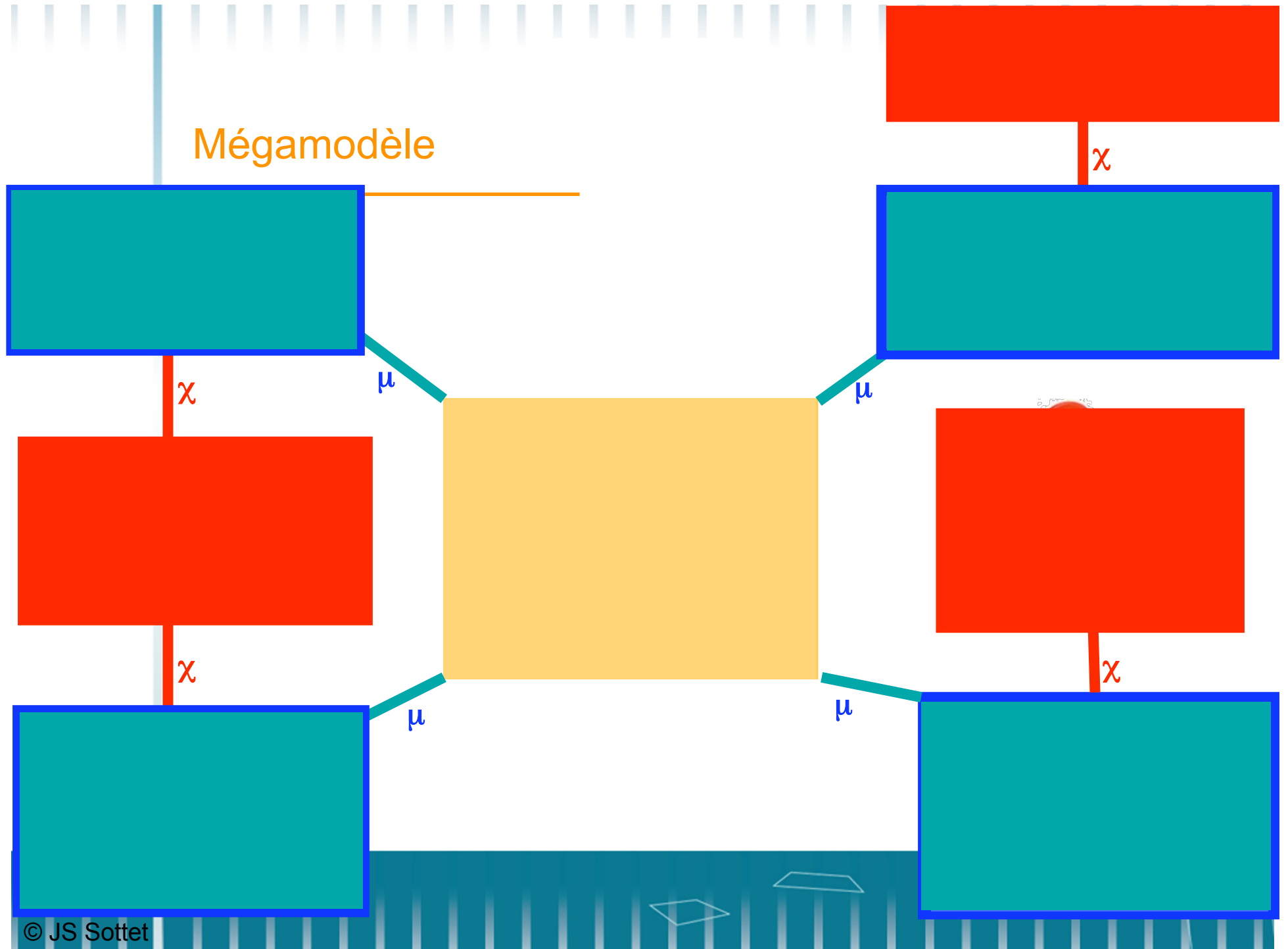


μ

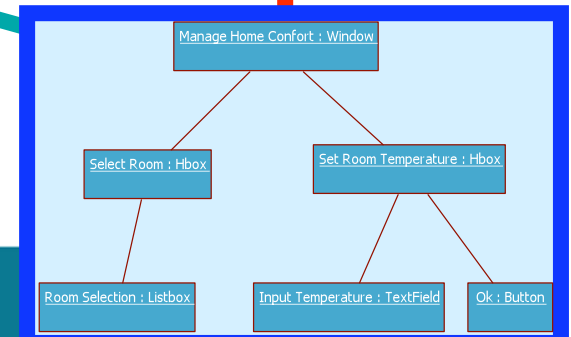
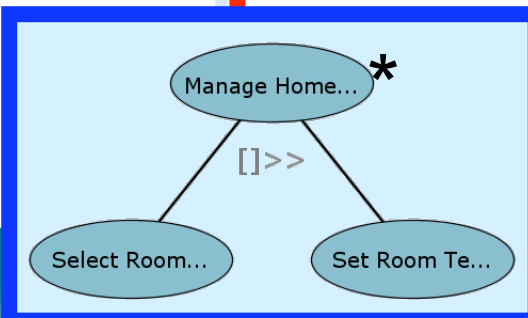
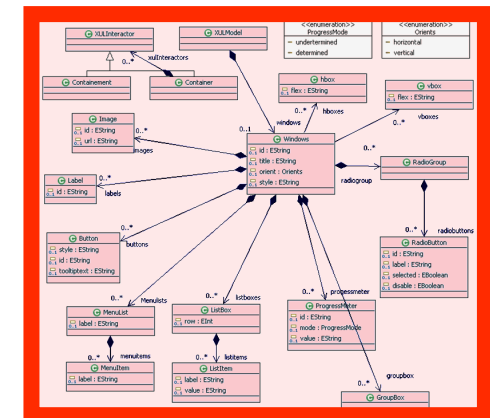
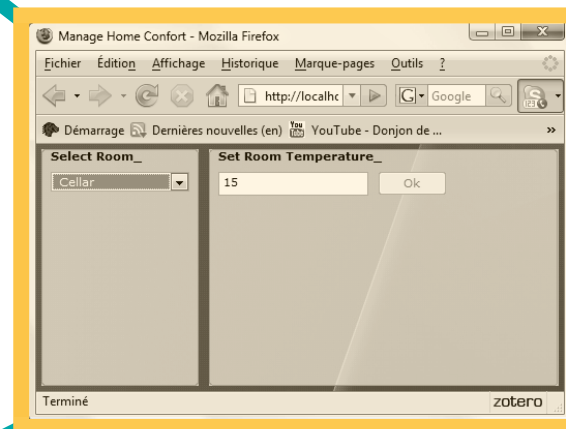
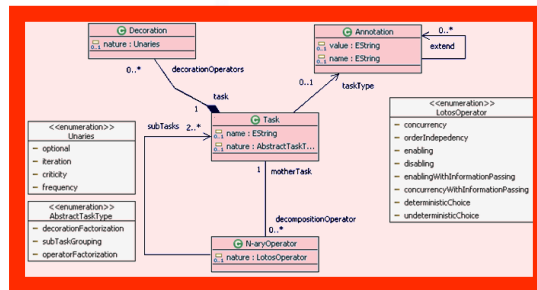
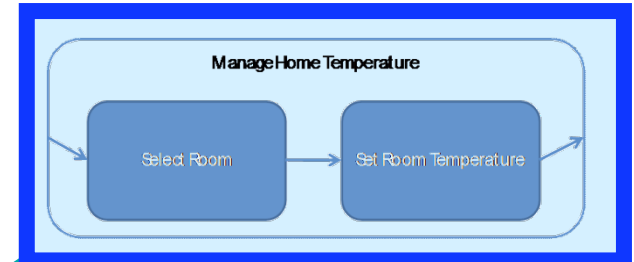
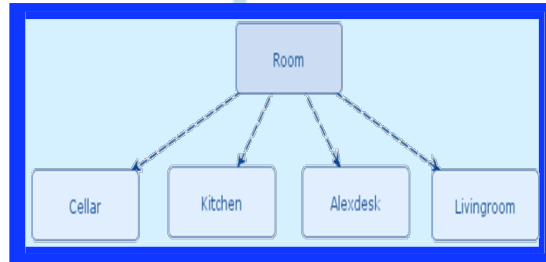


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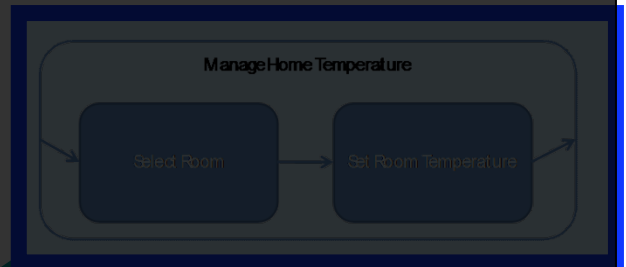
Mégamodèle



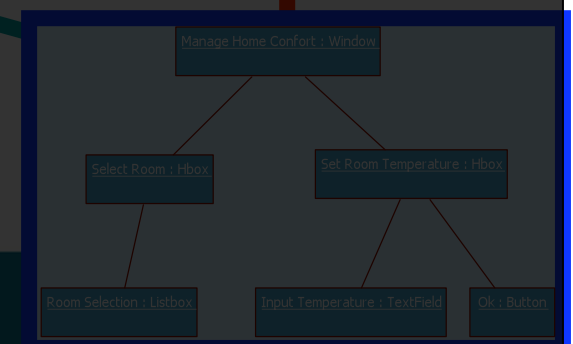
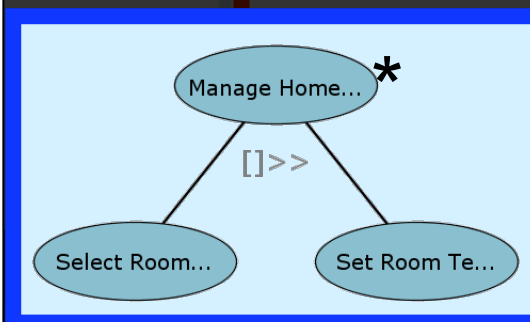
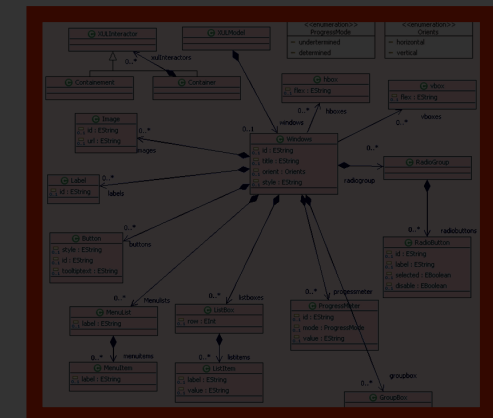
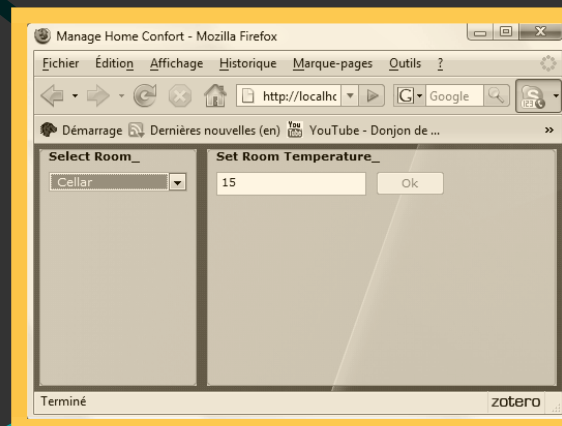
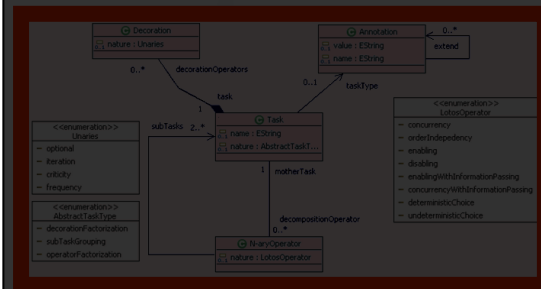
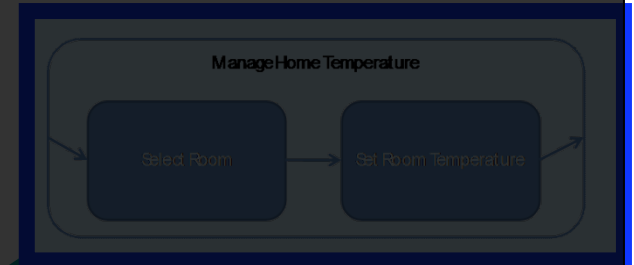
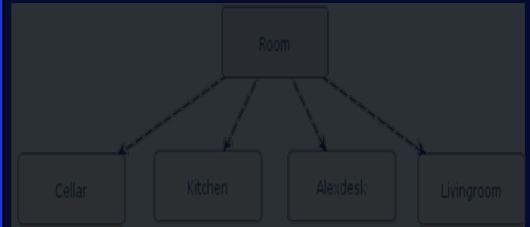
Mégamodèle d'IHM



Une IHM

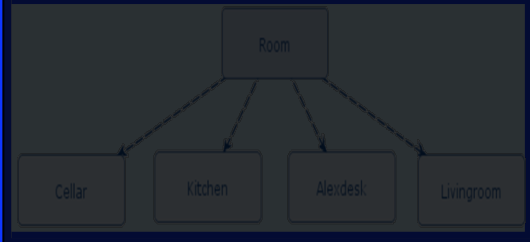


Mégamodèle d'IHM

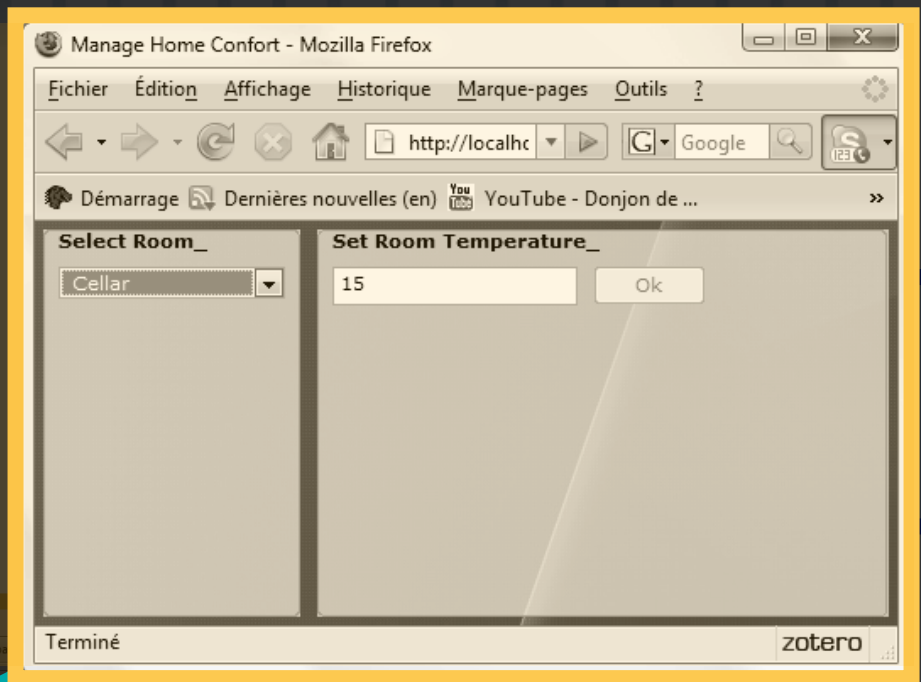


Une IHM

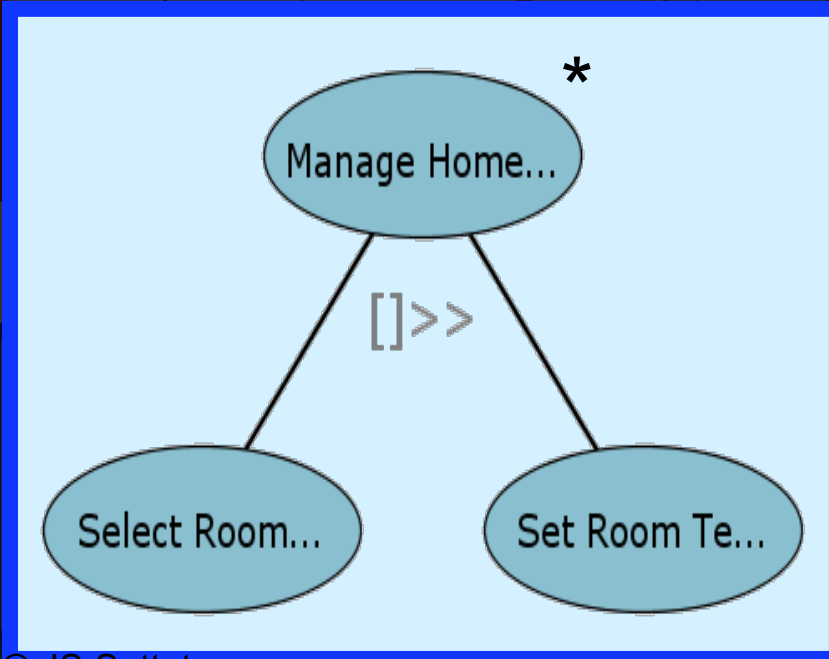
Mégamodèle d'IHM



μ

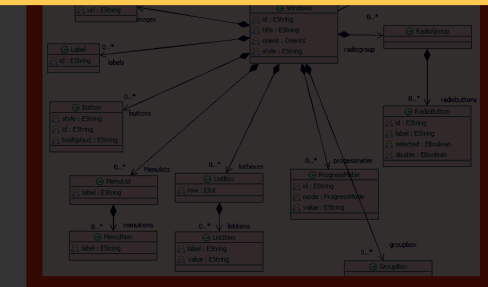


μ

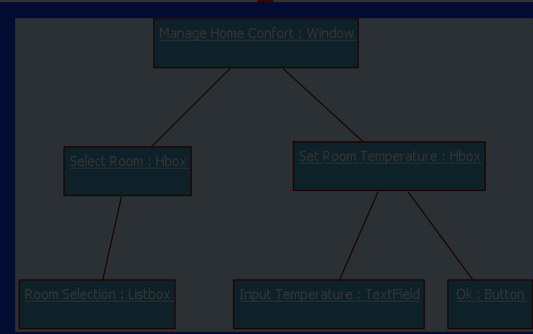


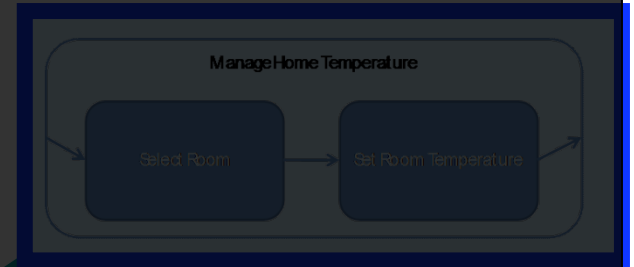
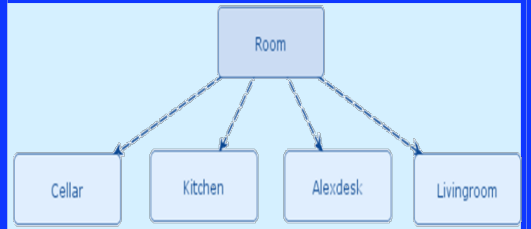
Une IHM

μ



χ





Manage Home Confort - Mozilla Firefox

Fichier Édition Affichage Historique Marque-pages Outils ?

http://localhost Google

Démarrage Dernières nouvelles (en) YouTube - Donjon de ...

Select Room_

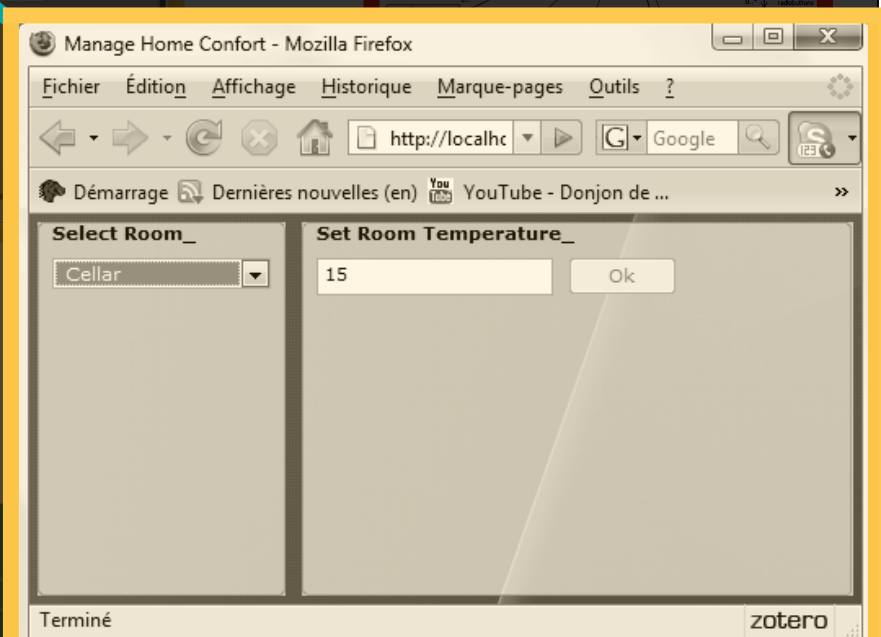
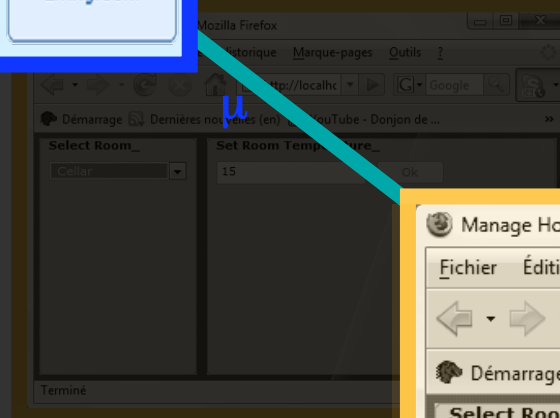
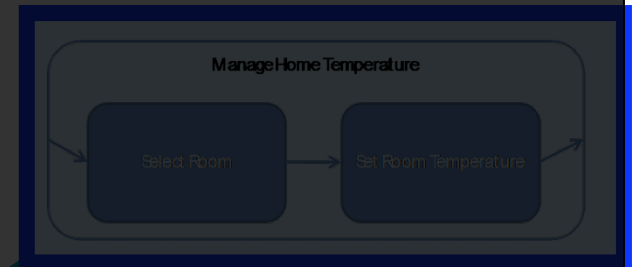
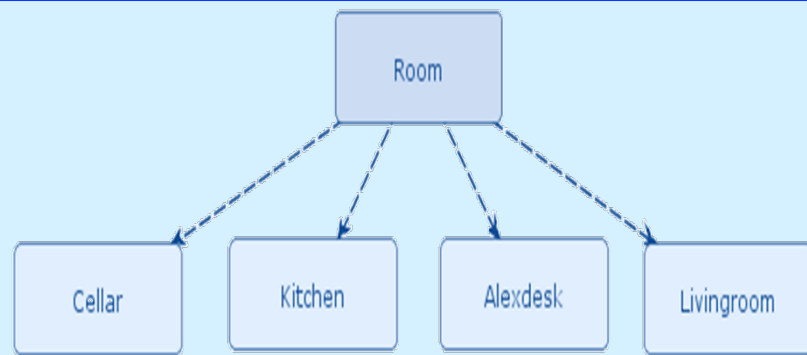
Cellar

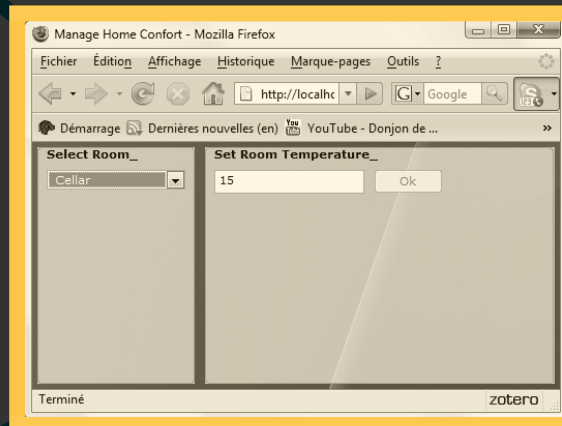
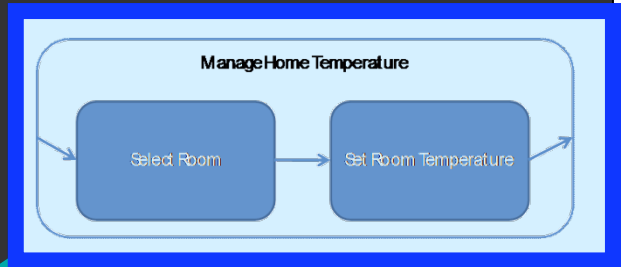
Set Room Temperature_

15 Ok

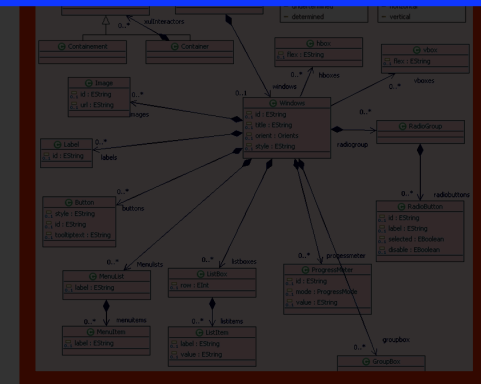
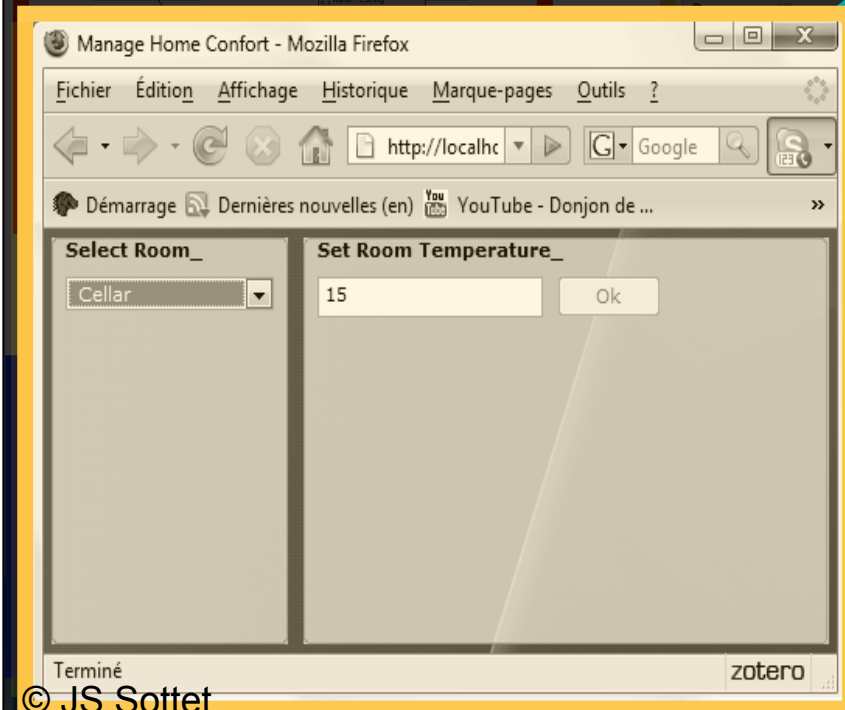
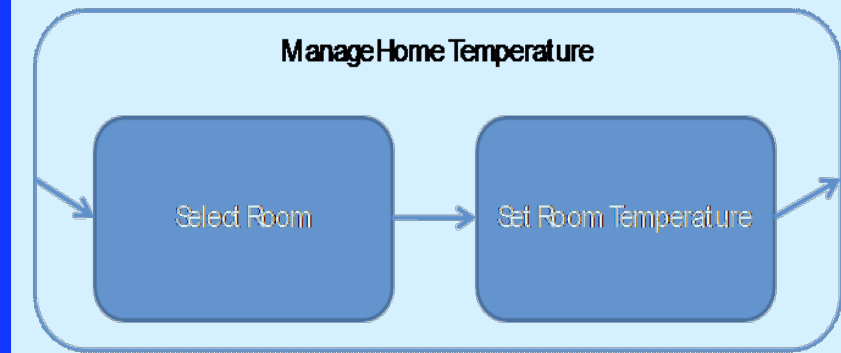
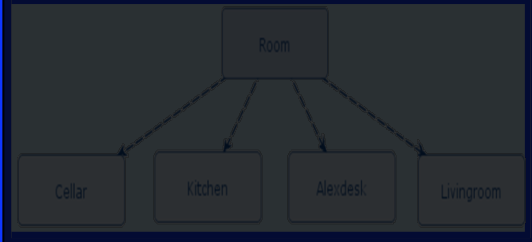
Terminé zotero



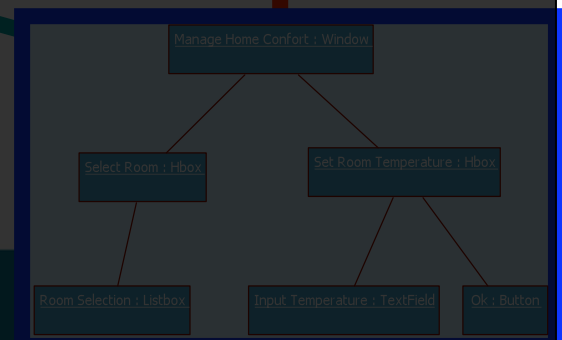




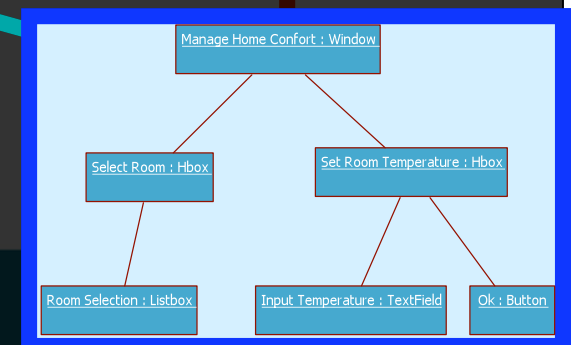
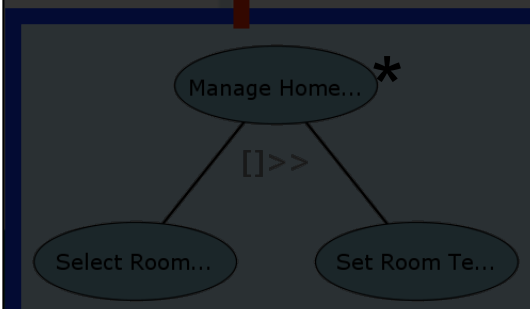
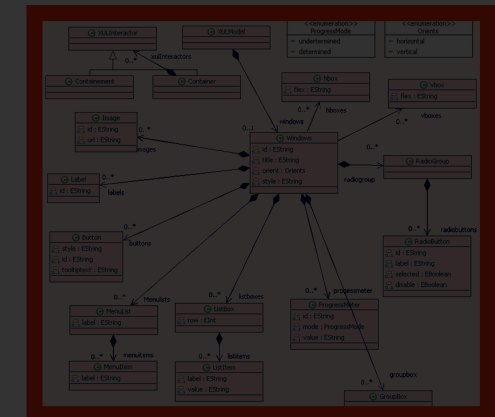
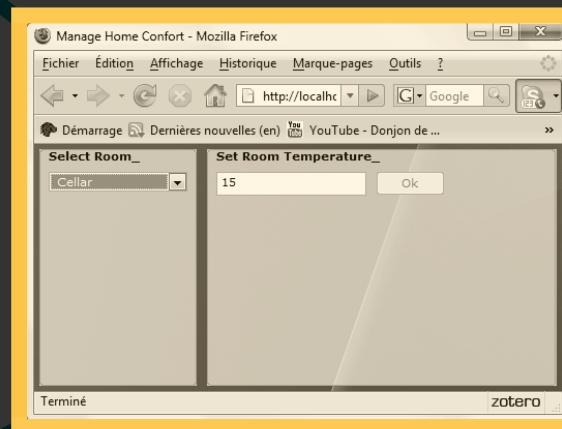
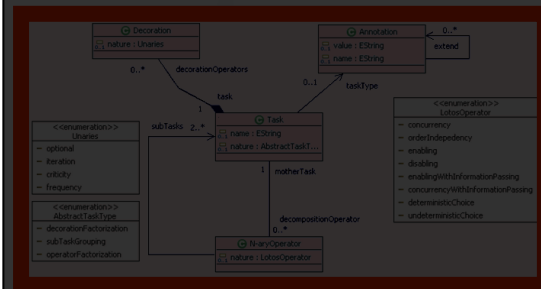
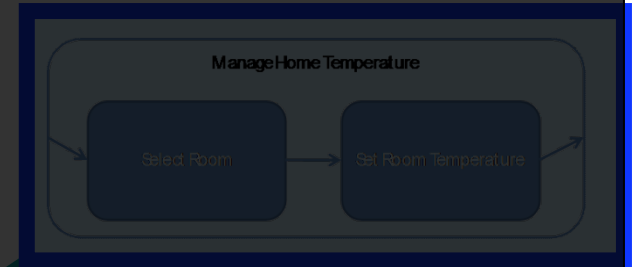
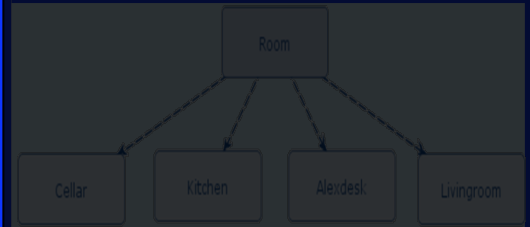
Mégamodèle d'IHM



Une IHM

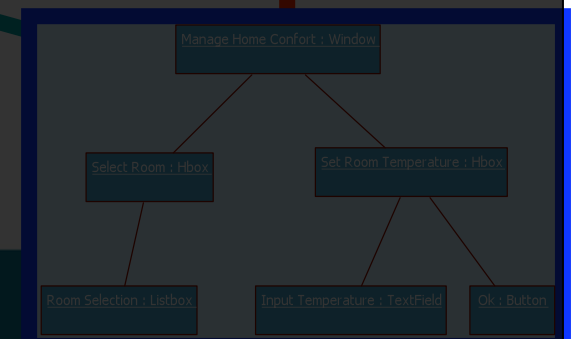
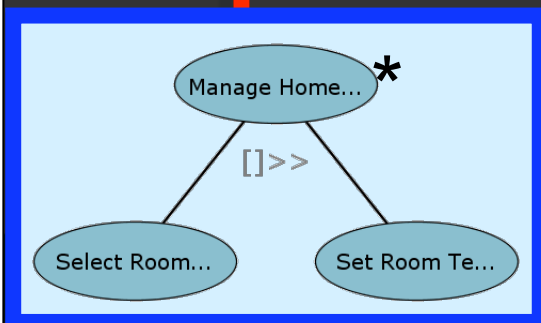
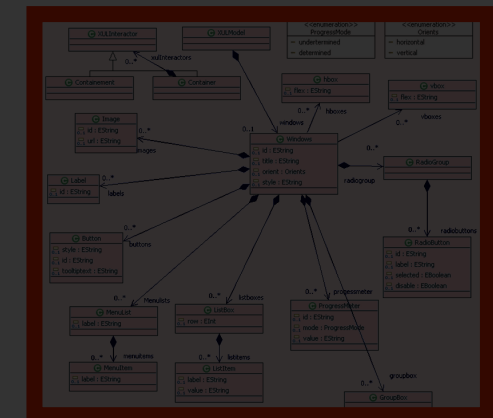
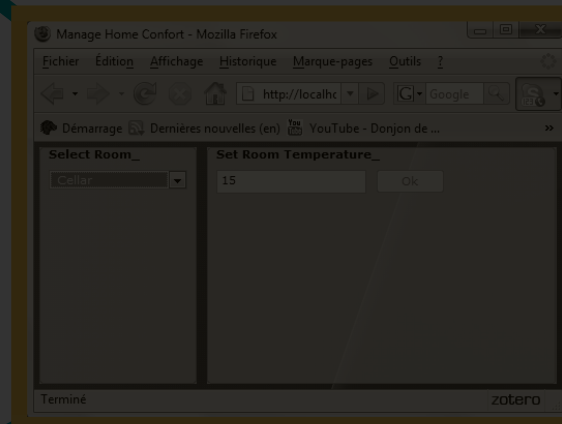
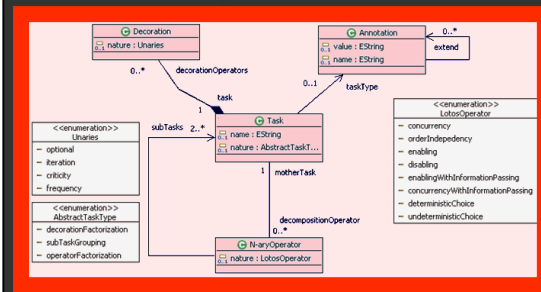
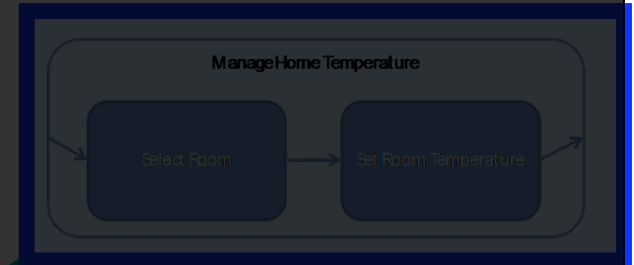
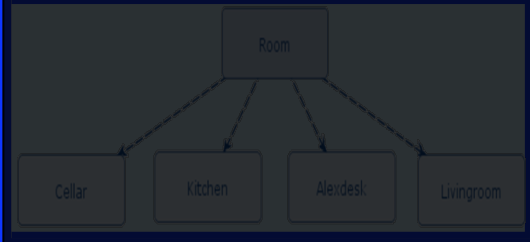


Mégamodèle d'IHM



Une IHM

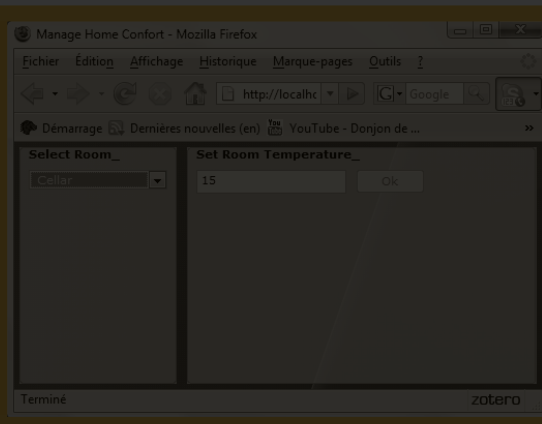
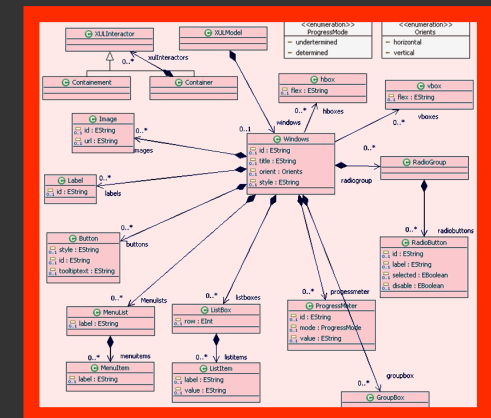
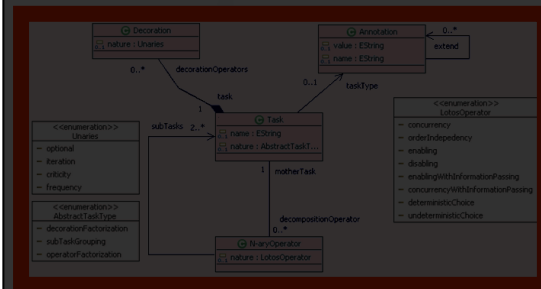
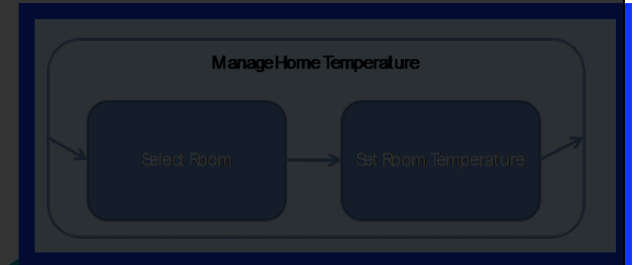
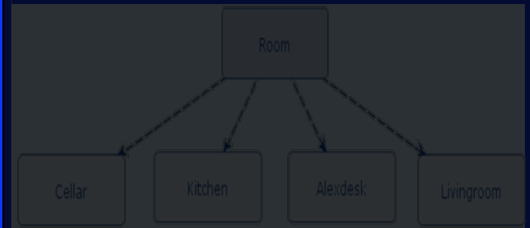
Mégamodèle d'IHM



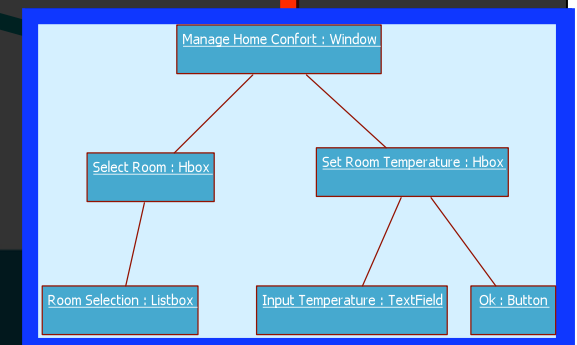
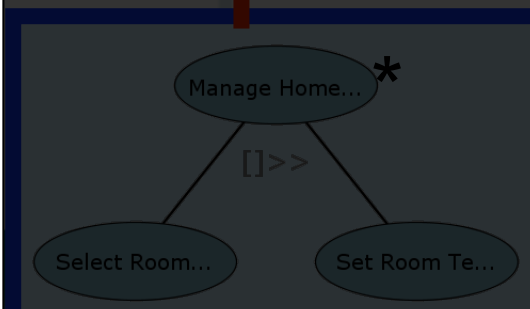
Une IHM



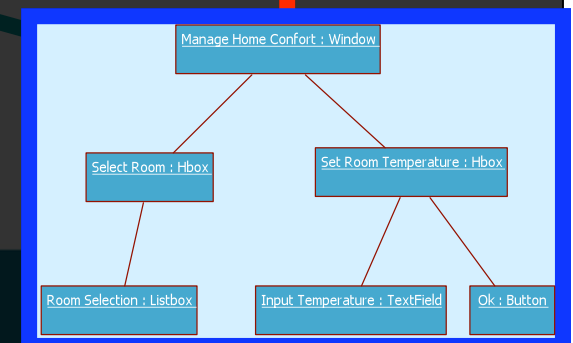
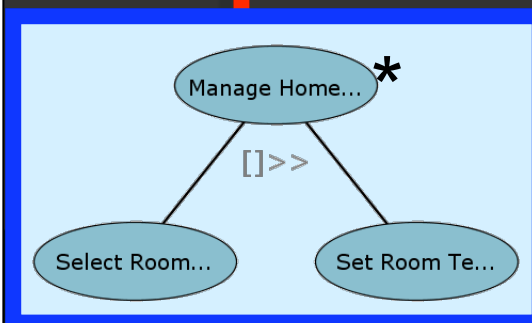
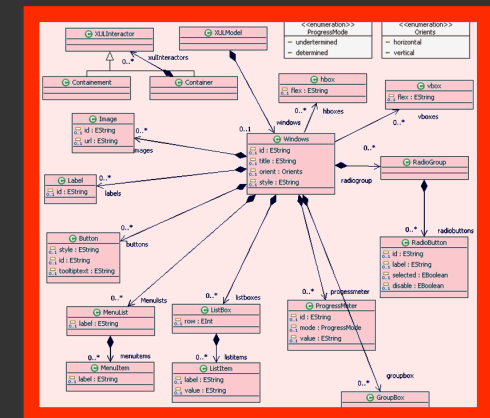
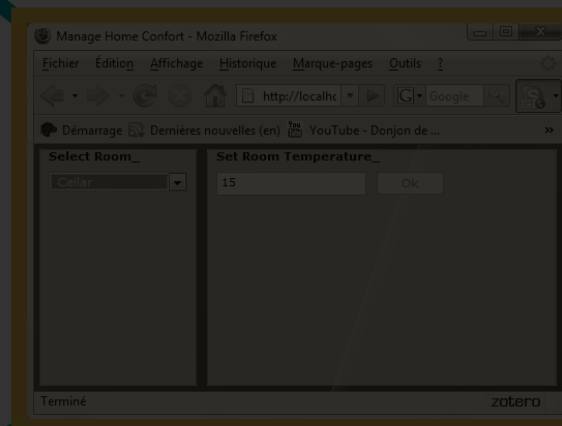
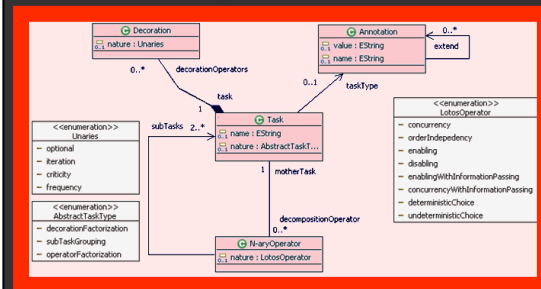
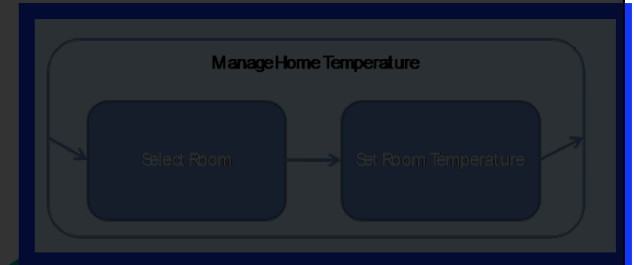
Mégamodèle d'IHM



Une IHM



Mégamodèle d'IHM



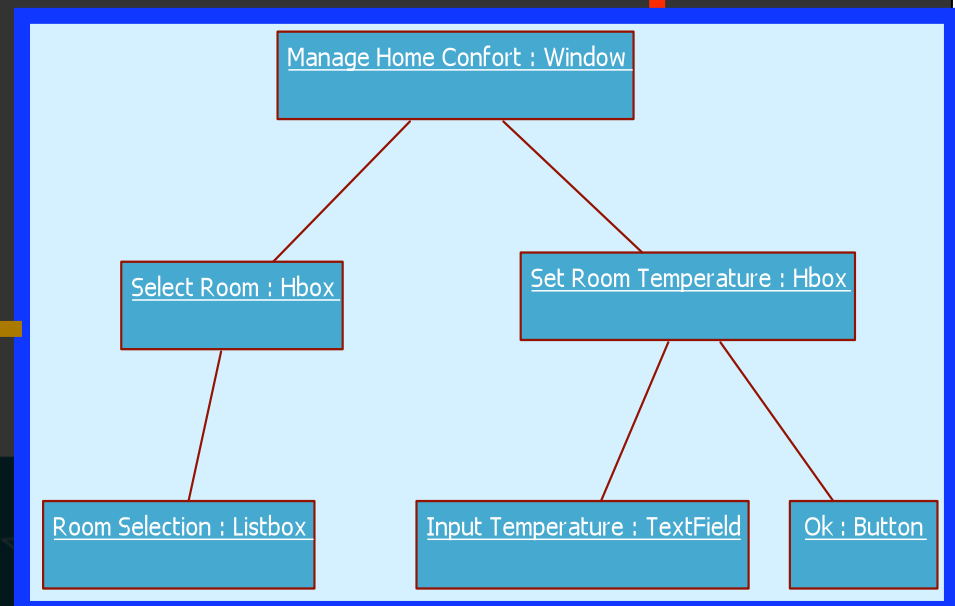
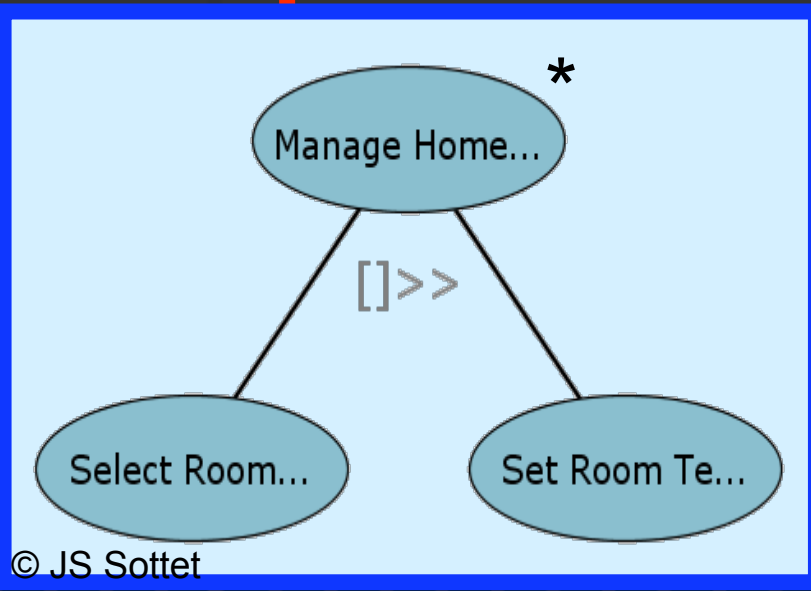
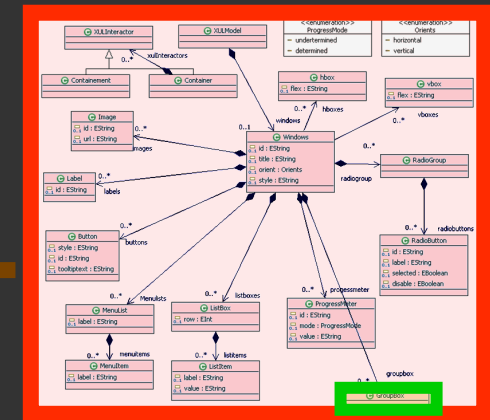
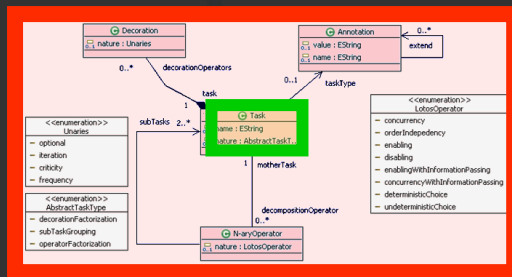
```

rule TaskChoiceToGroupBox {

  from tsk : MMEcosystem!Task (tsk.taskType.name='Choice1/n'
  and tsk.manipulatedConcepts->size()>=1 --la tâche manipule au moins 1 concept
  and tsk.manipulatedConcepts->collect(e | e.conceptInstances->flatten()->size()) <= 6
  and tsk.taskPlatforms->select( e | e.active=true)->size() >= 1
  and tsk.performingComponentInstances->size() =0
  )

  to gp_box : XULMetaModel!GroupBox (id <- 'group'+ tsk.name,
  flex <- 1,
  xulInteractors <- Sequence {capt,vbx}),

```



rule TaskChoiceToGroupBox {

```

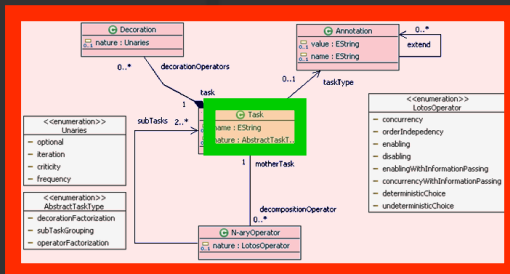
from tsk : MMEcosystem Task (tsk.taskType.name='Choice 1/n'
and tsk.manipulatedConcepts->size()>=1 --la tâche manipule au moins 1 concept
and tsk.manipulatedConcepts->collect(e | e.conceptInstances)->flatten()->size() <= 6
and tsk.taskPlatforms->select( e | e.active=true)->size() >= 1
and tsk.performingComponentInstances->size() = 0
)

```

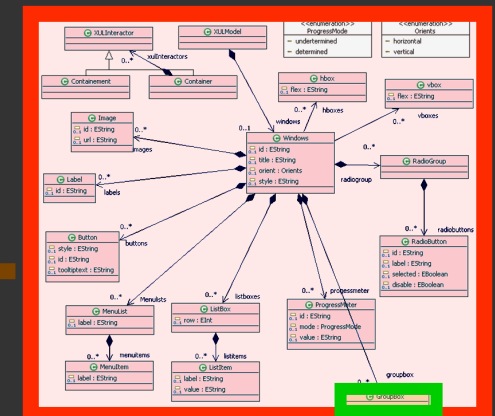
```

to gp_box : XULMetaModel GroupBox (id <- 'group'+ tsk.name,
flex <- 1,
xulInteractors <- Sequence {capt,vbx}},

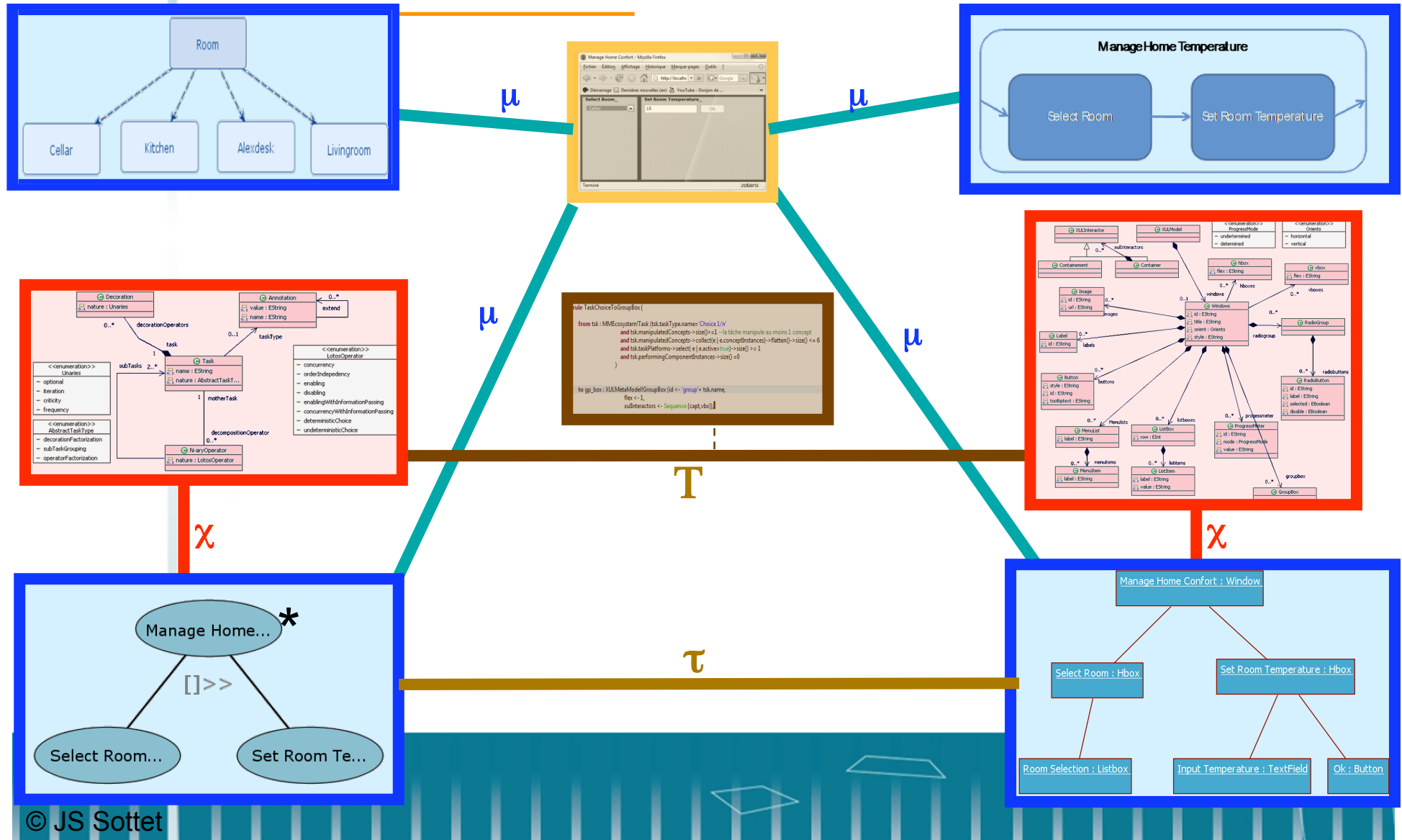
```



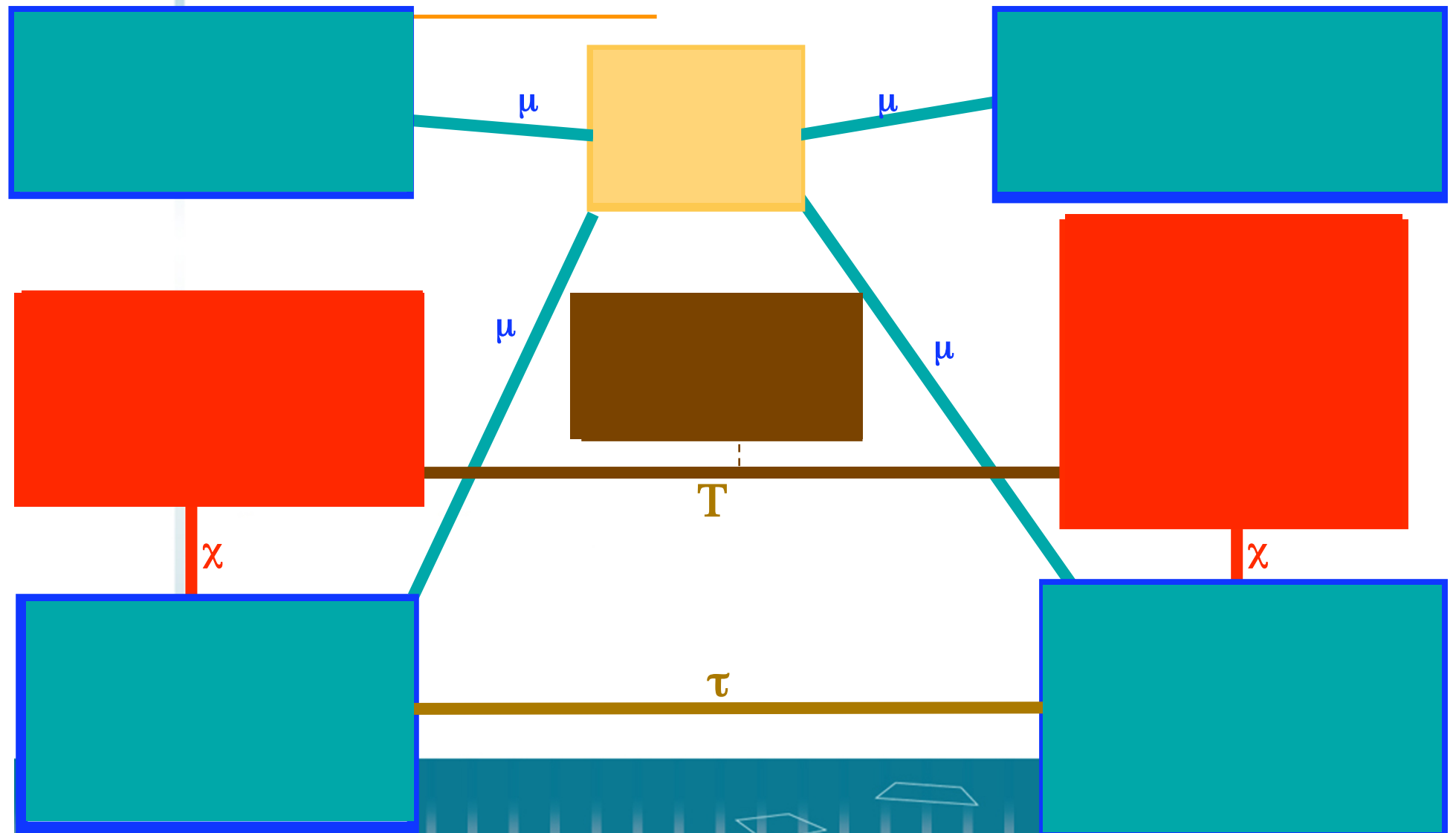
T



Mégamodèle d'IHM

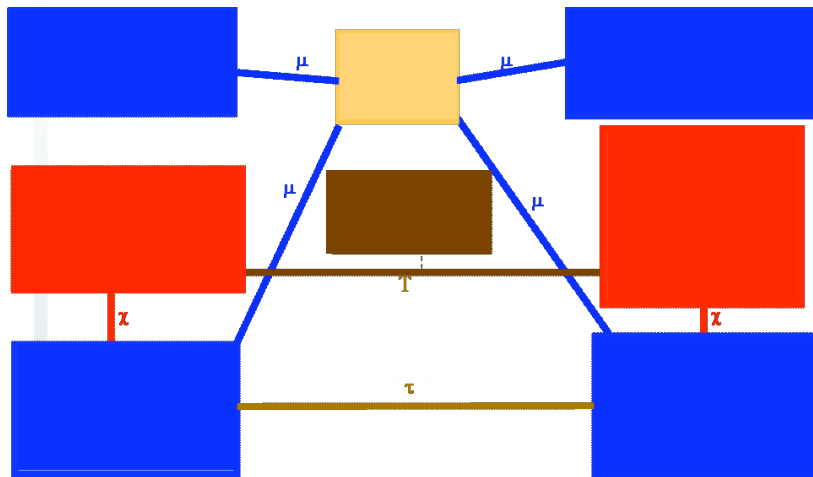


Mégamodèle d'IHM



Mégamodèle d'IHM

- Un megamodèle est un graphe d'artefacts d'IDM

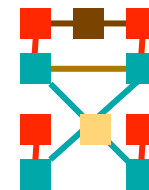


Mégamodèle d'IHM

- Un megamodèle est un graphe d'artefacts d'IDM

- **nœuds**

- systèmes
- modèles
- metamodèles
- transformations



- **arcs**

- μ : système-modèle:
- χ : modèle-metamodèle
- τ : (trace de) transformations entre modèles
- T : transformations entre metamodèles

Mégamodèle d'IHM

- IHM du mégamodèle ? Mega-UI alias end-user programming
 - Modèles ? : extra-UI
 - Métamodèles ? : meta-UI
- A ne pas confondre avec l'IHM de l'adaptation !

Approche : analyse critique

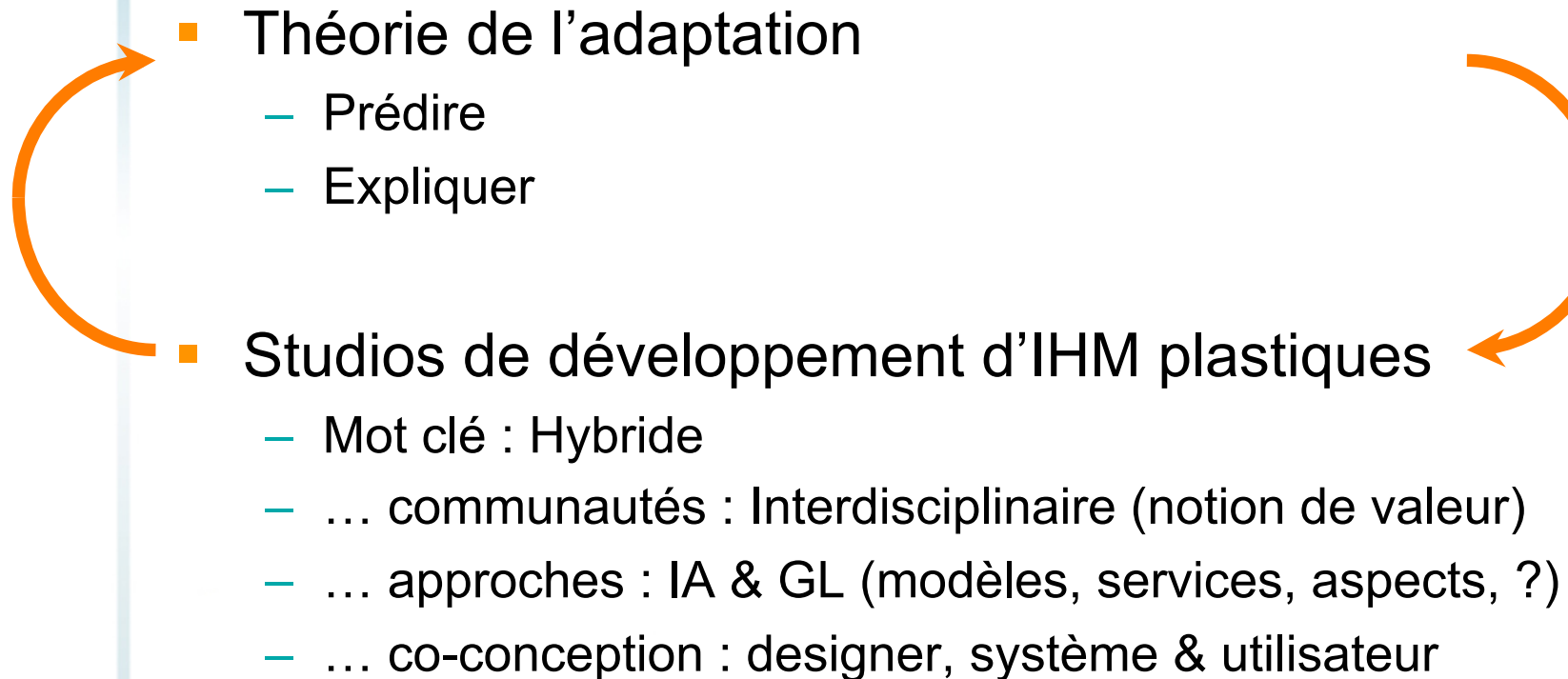
- « Low ceiling » [Myers 01]
 - IHM basiques
 - Modèle de tâches supposé connu
 - Noyau fonctionnel supposé stable
- « High threshold »
 - Gestion de modèles délicate
 - Peu de standards

Approche : analyse critique

- **MAIS**
 - Effort porté sur les modèles, peu sur les transformations !
 - Unification élégante des phases
 - Explicitation et réutilisation du savoir-faire
 - Amélioration du savoir-faire : pensez plasticité ! [Serna 10]

- 
- Description
 - Generalization
 - Abstraction
 - Perspectives

Mes grands défis

- 
- Théorie de l'adaptation
 - Prédire
 - Expliquer
 - Studios de développement d'IHM plastiques
 - Mot clé : Hybride
 - ... communautés : Interdisciplinaire (notion de valeur)
 - ... approches : IA & GL (modèles, services, aspects, ?)
 - ... co-conception : designer, système & utilisateur

Court terme

- (Théorie) Qualité d'usage
 - Par construction : créativité [Masson 11]
Génération de transformations par algorithmes génétiques
 - Par explication [Garcia 10]
Vues sur les transformations
 - Par programmation par l'utilisateur
Vues interactives

Court terme

- (Studio) Paradigmes de développement logiciel
 - Modèles (E. Céret, PhD)
Flexibilité : graphe partiel de modèles
 - Aspects
 - Planification [Gabillon 11]

Conclusion

- La route est encore longue (☺)
- Des avancées partielles à **réconcilier**
- Bénéfices mutuels : (x for IHM) et (IHM for x)
- Urgent de considérer de **vraies applications**
- A minima, un bon moyen
 - **D'améliorer le savoir-faire** en IHM
 - Unifier les **communautés**