

Validation continue des exigences et de l'implémentation

méthode et techniques

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Material

<http://mathieuacher.com/teaching/PDL/>

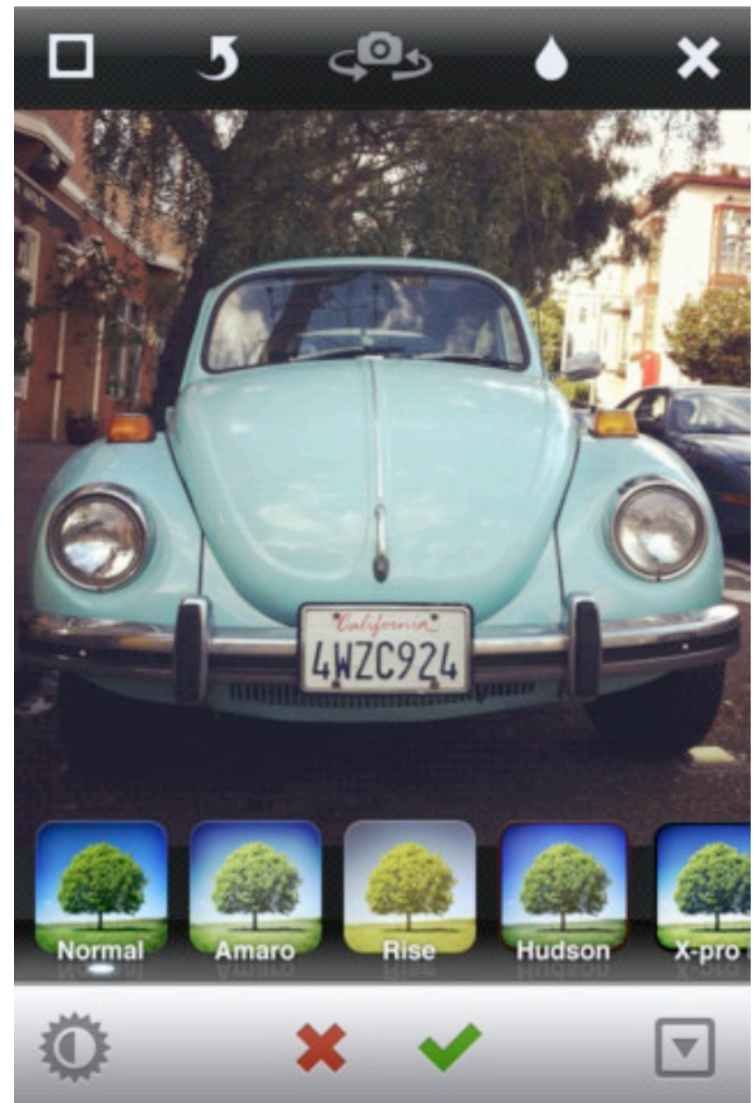
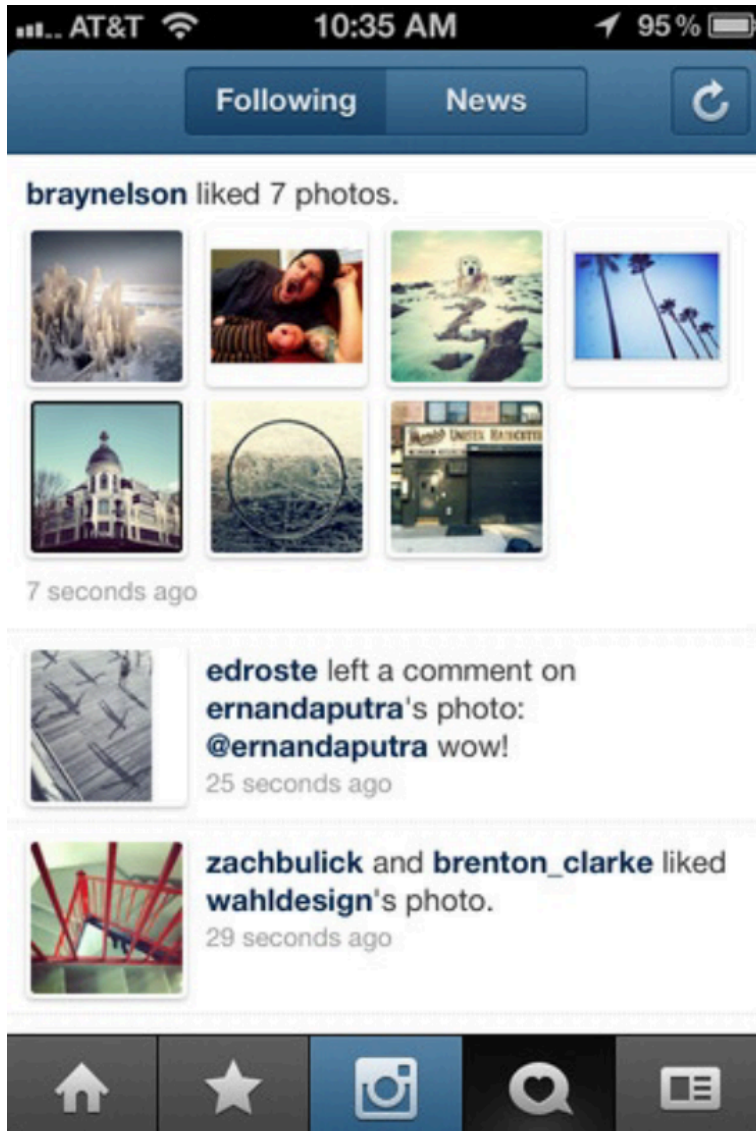
Deux projets:

Un succès

Un échec

Des défis

Instagram Story



Instagram Story

« Instagram is an app that **only took 8 weeks** to build and ship, but was a product of over a year of work. »

Instagram Story

« While I was there working in marketing, I started doing more and more engineering at night on simple ideas that helped me learn how to program (**I don't have any formal CS degree or training**) »

Instagram Story

« We spent 1 week prototyping a version that focused solely on photos.

It was pretty awful. So we went back to creating a native version of Burbn. We actually got an entire version of Burbn done as an iPhone app, but it felt cluttered, and overrun with features. It was really difficult to decide to start from scratch, but we went out on a limb, and basically cut everything in the Burbn app except for its photo, comment, and like capabilities. What remained was Instagram. »

Instagram Story

« So 8 weeks later, we gave it to our friends, beta tested, bug fixed, etc. and this Monday we decided it was ready to ship. »

Instagram Story

« Who is responsible for Instagram's UI design?

For better or for worse, I've done most of the pixel pushing in our app. ;) »

Instagram Story

- 30+ millions d'utilisateur en 2 ans
- 25k inscriptions le premier jour
 - « best & worst day of our lives so far »
 - « favicon » cause des milliers d'erreurs 404
 - « 404-ing on Django, causing tons of errors »
- Un seul serveur au lancement
 - Moins puissant qu'un MacBook Pro
- La suite: passage à l'échelle, cloud (EC2) et ingénierie du logiciel

<https://speakerdeck.com/mikeyk/scaling-instagram>

<http://zoompf.com/blog/2012/04/instagram-and-optimizing-favicons>

Instagram Story

- Sur la trentaine de composants, 4 seulement ont été écrits à partir de zéro
 - App iOS, App Android, Android Push Notification Service et Redis Query analyzer



node2dm



Fabric

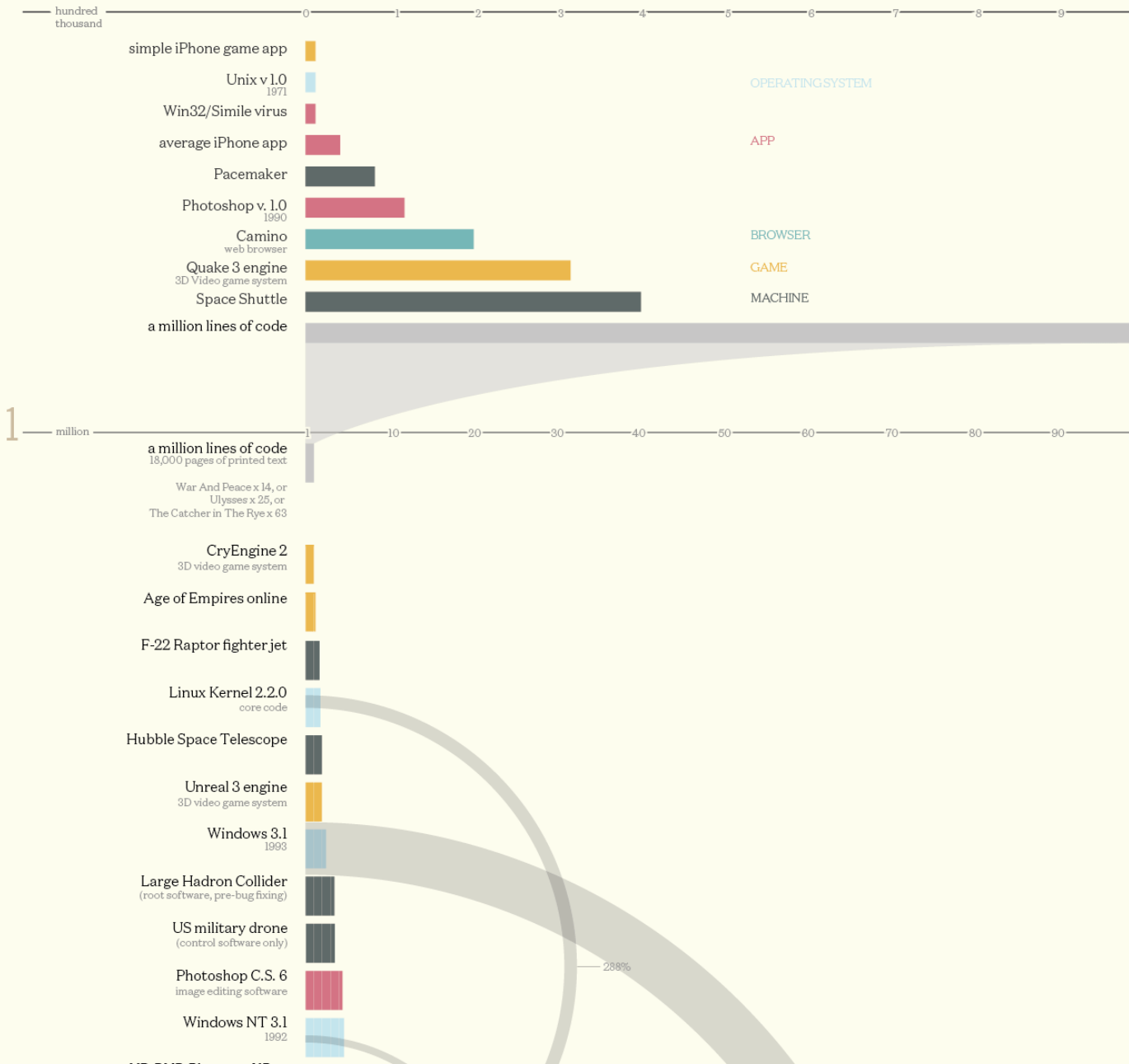


Instagram Story (key lessons)

- Sélection et intégration de multiples bibliothèques
- Open source community
 - Apprendre, partager, demander, répondre, etc.
- Auto-apprentissage
 - « Product guys » sont maintenant à même de rivaliser...
- Agilité, développement incrémental

Codebases

Millions of lines of code



5

needed to repair HealthCare.gov
apparently

Mars Curiosity Rover
Martian ground vehicle probe

Linux kernel 2.6.0
2003

Google Chrome
latest

World of WarCraft
server only

Boeing 787
avionics & online support systems only

Windows NT 3.5
1993

Firefox
latest version

10

Chevy Volt
electric car

Intuit Quickbooks
accounting software

Windows NT 4.0
1996

Android
mobile device operating system

Mozilla Core
core code at heart of all Mozilla's software

MySQL
database language

Boeing 787
total flight software

Linux 3.1
latest version

Apache Open Office
open-source office software

F-35 Fighter jet
2013

25

Microsoft Office 2001

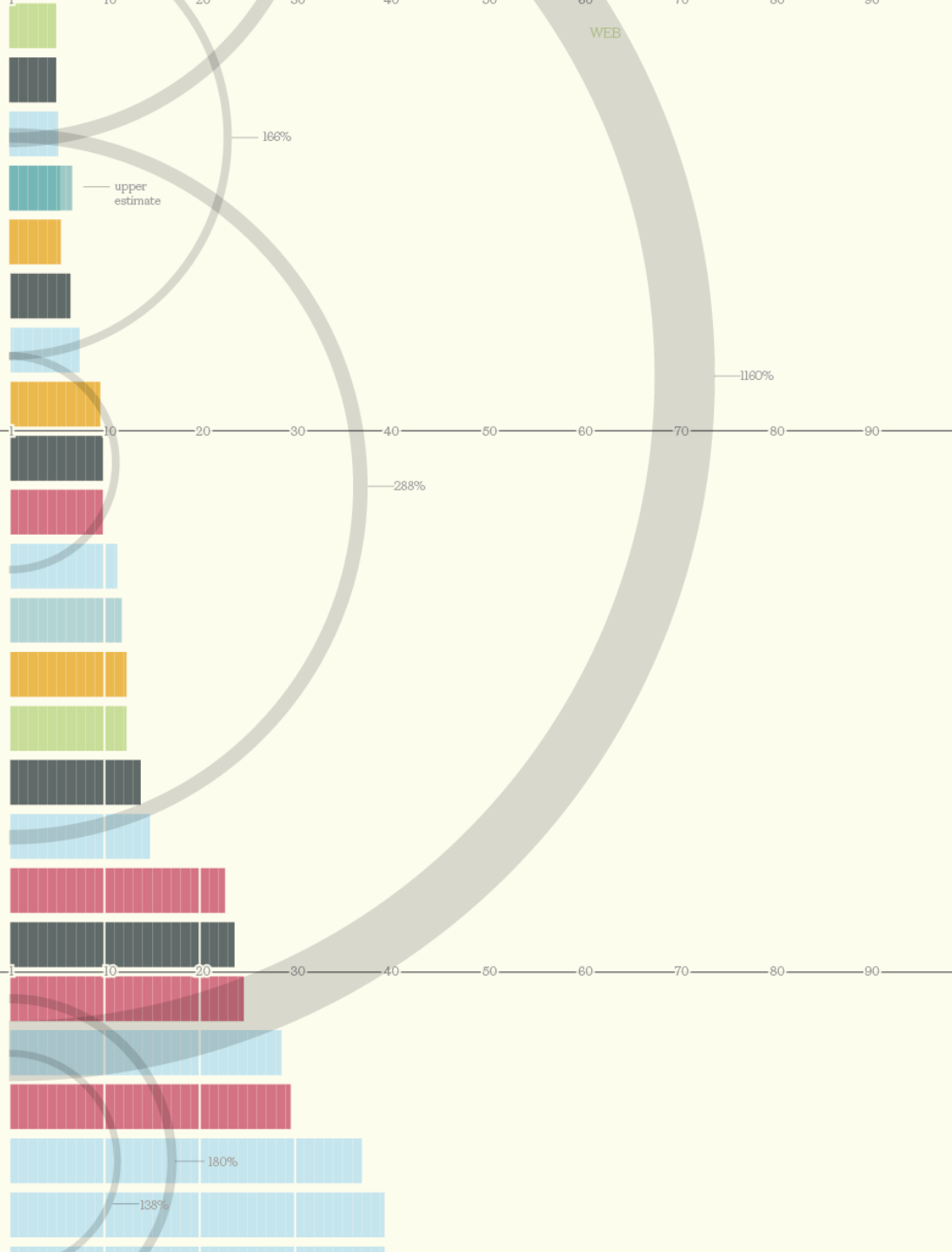
Windows 2000

Microsoft Office for Mac
2006

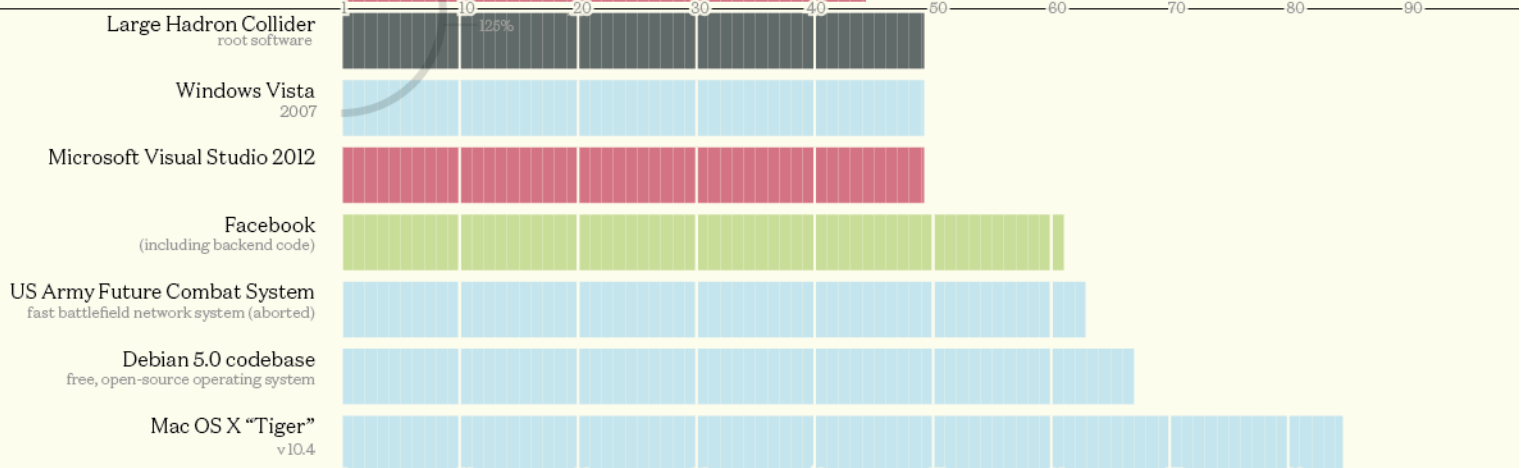
Symbian
mobile operating system

Windows 7
2009

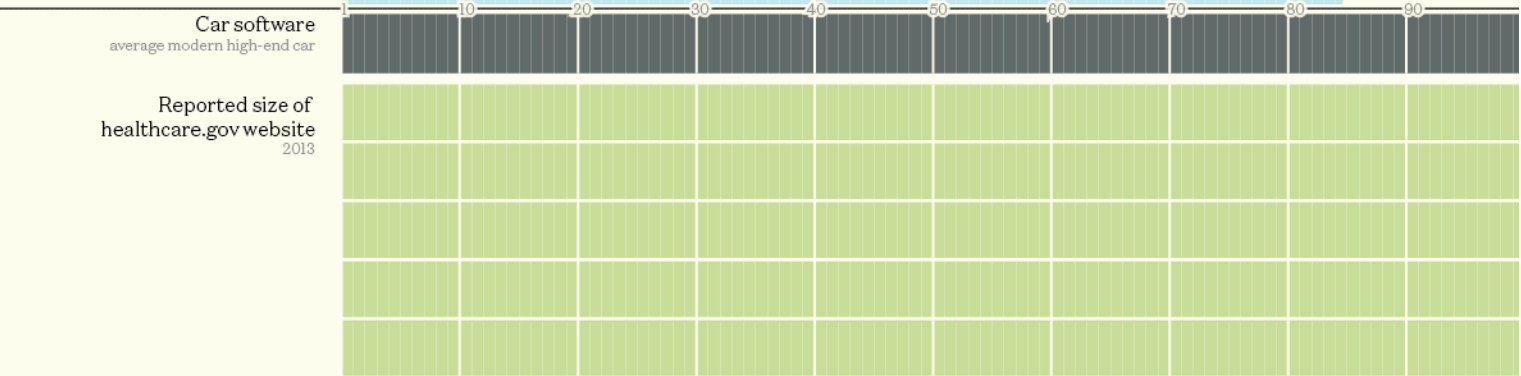
Windows XP



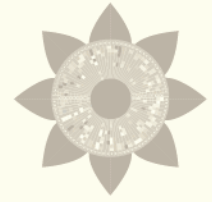
50



100



concept & design: David McCandless
informationisbeautiful.net
 research: Pearl Doughty-White, Miriam Quick



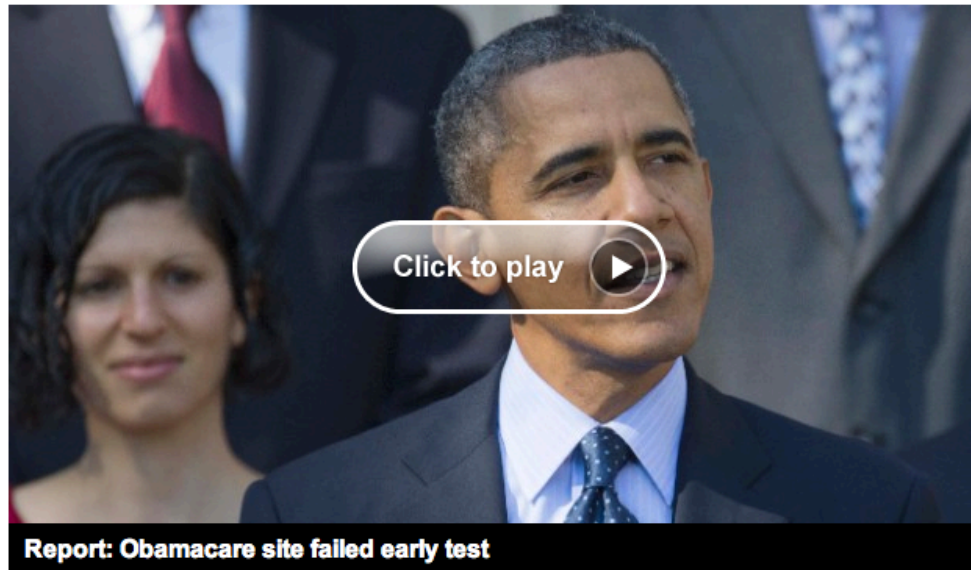
work in progress
 v0.62 // Oct 2013

sources NASA, Quora, Ohloh, Wired & press reports
 note some guess work, rumours & estimates
 data bit.ly/KIB_linescode

Report: Healthcare website failed test ahead of rollout

By **Ed Payne**, **Matt Smith** and **Tom Cohen**, CNN

October 23, 2013 -- Updated 0103 GMT (0903 HKT)



Report: Obamacare site failed early test

STORY HIGHLIGHTS

- **NEW:** Top White House official part of "tech surge" on Obamacare
- Obamacare "is not failing" despite website woes, White House spokesman says
- Obama says HealthCare.gov problems are "going to get fixed"
- Secretary Sebelius expected to testify at a congressional hearing next week

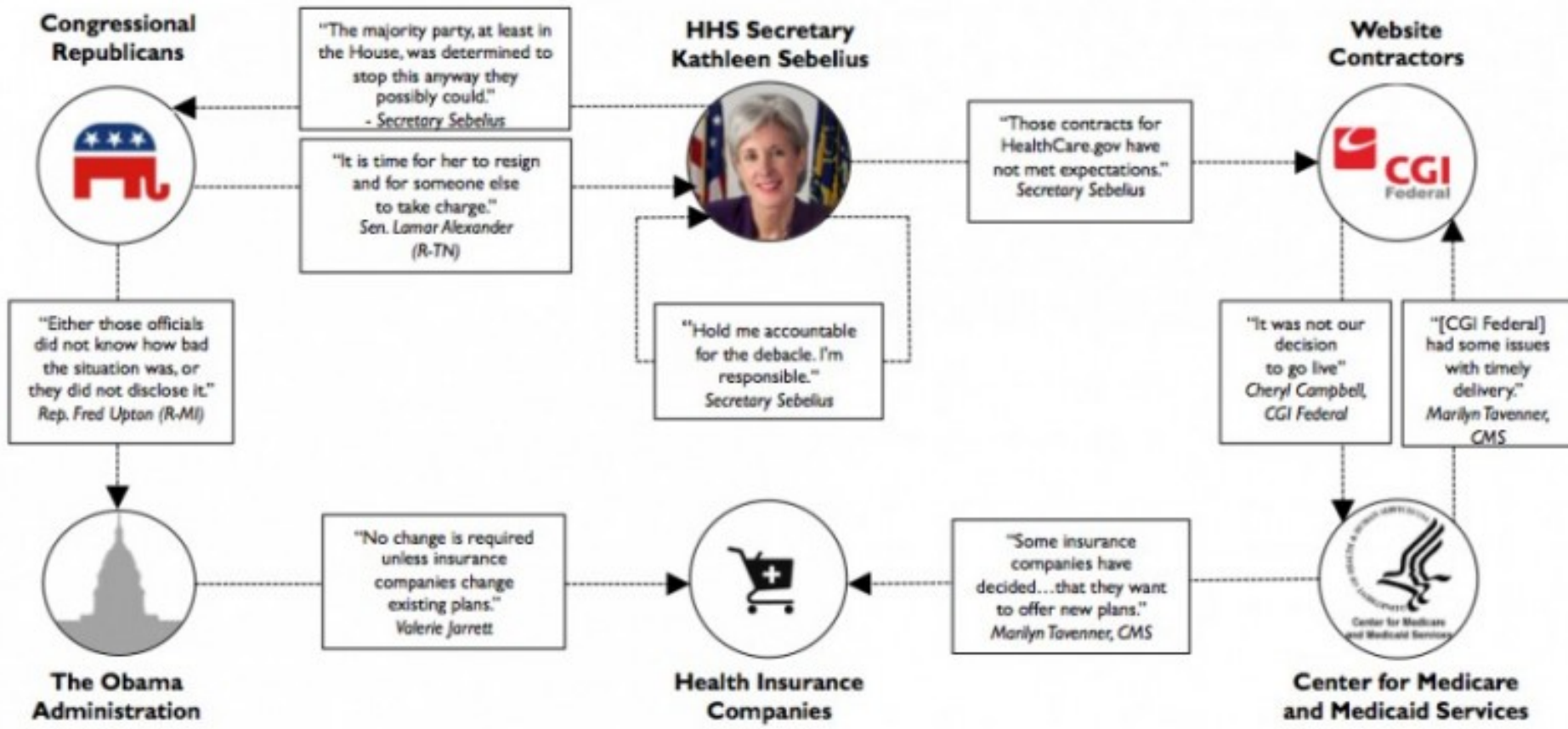
Washington (CNN) -- The President's healthcare sign-up web page was supposed to handle tens of thousands of people at once. But in a trial run days before its launch, just a few hundred users flatlined the site.

Despite the problems, federal health officials pushed aside the crash cart and rolled out [HealthCare.gov](#) on October 1 as planned, [The Washington Post](#) reported.

The result? The website crashed shortly after midnight as a couple thousand people tried to start the process, two people familiar with the project told the Post.

Requirements engineering/ Management problem

ACA Finger-Pointing Flowchart



<http://www.washingtonpost.com/blogs/wonkblog/wp/2013/11/01/thirty-one-things-we-learned-in-healthcare-govs-first-31-days/>

Thirty-one things we learned in HealthCare.gov's first 31 days

Scalability problem

Technical problems (e.g., inaccurate data, cancellation failures)

Testing issues

<http://www.washingtonpost.com/blogs/wonkblog/wp/2013/11/01/thirty-one-things-we-learned-in-healthcare-govs-first-31-days/>

10. HealthCare.gov didn't have enough testing before going live.

This became clear in a series of Congressional hearings, where federal contractors testified that end-to-end testing only began in the final weeks of September, right before the Oct. 1 launch. When pressed on how much time would have been ideal for testing, one contractor told lawmakers that “months would have been nice.”

<http://www.washingtonpost.com/blogs/wonkblog/wp/2013/11/01/thirty-one-things-we-learned-in-healthcare-govs-first-31-days/>

1 succès, 1 échecs

- 1 succès:
 - réutilisation: sélection et intégration de multiples bibliothèques
 - agilité, développement incrémental: les exigences ne sont pas fixes; sorties d'un produit qui correspond aux attentes des utilisateurs
- 1 échecs:
 - problème dans la communication et l'élicitation des exigences
 - pas de test

Votre projet = succès + !échecs

Votre projet

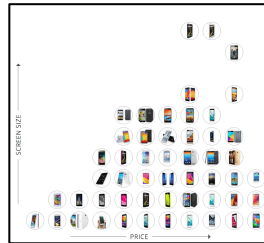
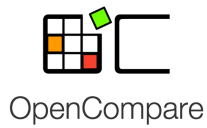
- Réutilisation: sélection et intégration de multiples librairies
- Agilité, développement incrémental: les exigences ne sont pas fixes; sorties d'un produit qui correspond aux attentes des utilisateurs
- Communication et élicitation des exigences avec le client; modélisation
- Test

Votre projet

Projet #1

opencompare et productcharts

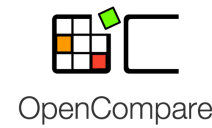
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0002		1280x800	LCD	1280x800	1280x800	100%	100%	100%
0003		1440x900	LCD	1440x900	1440x900	100%	100%	100%
0004		1600x1000	LCD	1600x1000	1600x1000	100%	100%	100%
0005		1920x1200	LCD	1920x1200	1920x1200	100%	100%	100%
0006		2560x1600	LCD	2560x1600	2560x1600	100%	100%	100%
0007		3840x2400	LCD	3840x2400	3840x2400	100%	100%	100%
0008		5120x3200	LCD	5120x3200	5120x3200	100%	100%	100%
0009		7680x4800	LCD	7680x4800	7680x4800	100%	100%	100%
0010		11520x7200	LCD	11520x7200	11520x7200	100%	100%	100%



Projet #2

export HTML configurable

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0003		1440x900	LCD	1440x900	1440x900	100%	100%	100%
0004		1600x1000	LCD	1600x1000	1600x1000	100%	100%	100%
0005		1920x1200	LCD	1920x1200	1920x1200	100%	100%	100%
0006		2560x1600	LCD	2560x1600	2560x1600	100%	100%	100%
0007		3840x2400	LCD	3840x2400	3840x2400	100%	100%	100%
0008		5120x3200	LCD	5120x3200	5120x3200	100%	100%	100%
0009		7680x4800	LCD	7680x4800	7680x4800	100%	100%	100%
0010		11520x7200	LCD	11520x7200	11520x7200	100%	100%	100%





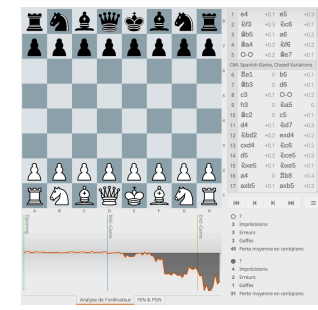
Projet #3

échecs

[Event "World Chess Championship (under 18)"]
 [Site "Heraklio GRE"]
 [Round "2"]
 [Date "2002.11.16"]
 [White "Zhigalko, Andrey"]
 [Black "Acher, Mathieu"]
 [Result "0-1"]
 [ECO "C84"]
 [Opening "Spanish Game, Closed Variations"]

8.Bb5 a6 4... Nf6 5.O-O Rf7 6.Re1 b5
 7.Nc3 Na5 10... Nc6 11.Nb3 Nxb3
 12.Nce5 15.Nb5 Nf5 16.Nc3 Naxb5
 17.Ra4 20.Rf1 Bg5 21.Ng5 22.Ra3
 23.Bb4 26.Nf3 Ra8 27.Nf5 Nf5 28.
 29.Nxh6 31.fxg7 Kxg7 32.Rxg7+ Kg5
 33.Rf1 34.Nxh6 36.Qxh6+ Kg8 37.Bb1 Qn4 38.e5
 39.Nxh2 Qxe5+ 40.Kxh3 f5 41.Bd2 Qxb2 42.Bxf5 Rxf5
 43.Qg6+ Qg7 44.Qxf5 Rf8 45.Qe4 Qf7 0-1



3 Projets et des risques

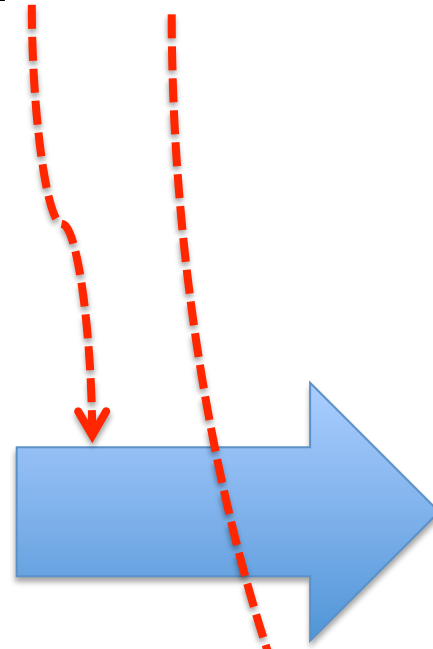
- Activités similaires:
 1. Eliciter et valider des exigences
 2. Développement Java pour traiter des données
 3. Génération de HTML/CSS/JavaScript
 4. Travail collaboratif
- **Risques** similaires. Exemples:
 1. Implémenter des fonctionnalités inutiles ou qui ne correspondent pas aux besoins du client
 2. Le programme Java est incapable de traiter certains types de données
 3. Le HTML généré ne permet pas à la feuille de style CSS de s'appliquer
 4. Une modification dans 1, 2, et 3 ne permet pas à un membre du groupe de correctement contribuer

Implémenter des fonctionnalités inutiles ou qui ne correspondent pas aux besoins du client

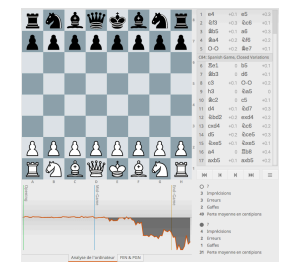
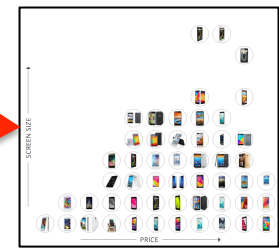
Code (paramétrisation, complétude du traitement)

Choix technologique (framework)

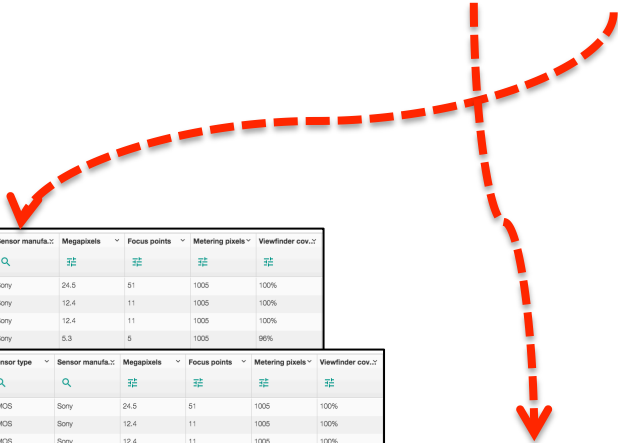
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D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%
D4S	EXPED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
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D80	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D700	-	APS-C	CCD	Sony	2.7	5	1005	96%
D70	EXPED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D60	EXPED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D7000	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D70	EXPED 4	Full-frame	CMOS	Nikon(Station ne...	24.9	51	91000	100%
D610	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%
D800	-	-	-	-	-	-	-	-



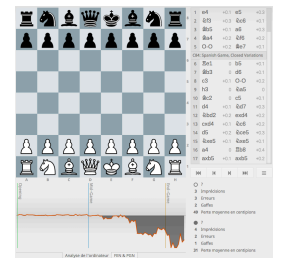
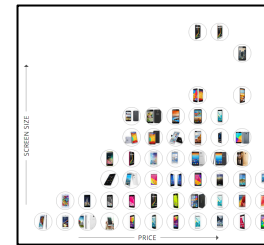
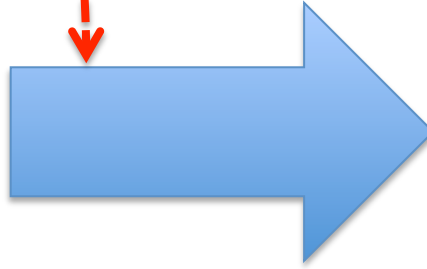
Interface-homme machine (disposition, interactions)



Le programme Java est incapable de traiter certains types de données

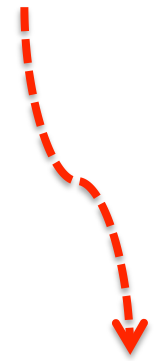
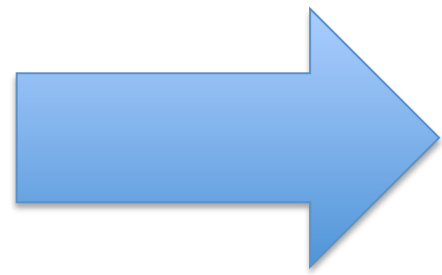


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D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%
D2Xa	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%
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D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
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D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D810	EXPED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D800	EXPED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D750	EXPED 4	Full-frame	CMOS	Nikon(station ne...	24.9	51	91000	100%
D610	EXPED 4	Full-frame	CMOS	Nikon	16.2	39	2016	100%
D600	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



Le HTML généré ne permet pas à la feuille de style CSS de s'appliquer

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D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%



```
<div class="featur">
F1
</div>
```

```
.feature {
  font-color: red;
}
```

Travail collaboratif et itératif: difficile! (multi-persons, multi-versions)

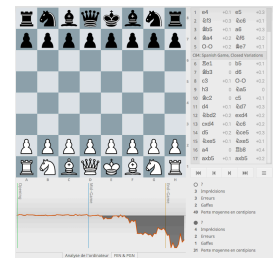
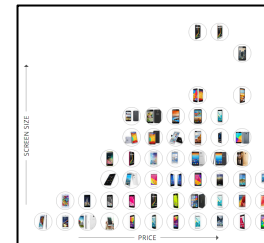


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D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%

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D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
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D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
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D790	EXPED 4	Full-frame	CMOS	Nikon station ne...	24.9	51	91000	100%
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D600	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



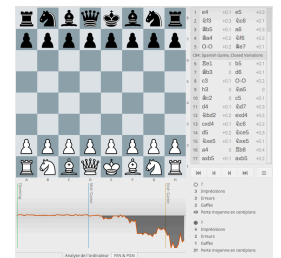
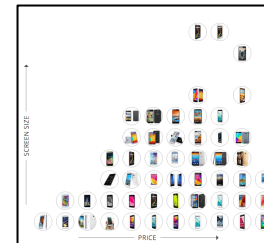
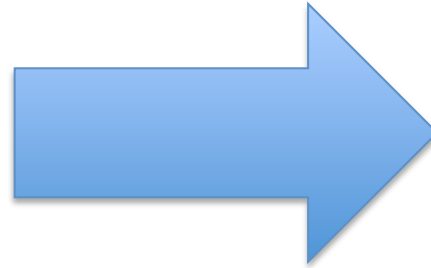
Imaginons: une erreur concernant les hypothèses sur les données en entrée? Une erreur dans le code Java?



Comment fait-on ?

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
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D2x	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...	
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D2x	-	APS-C	CMOS	Sony	12.4	11	1005	100%	
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%	
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%	
D20x	D4S	EXPED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%	
D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%	
D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%	
D90s	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%	
D4	D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%	
D610	EXPED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%	
D600	EXPED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%	
D700	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%	
D750	EXPED 4	Full-frame	CMOS	Nikon(station ne...	24.9	51	91000	100%	
D610	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%	
D800									



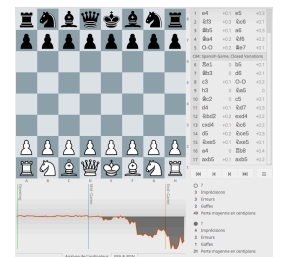
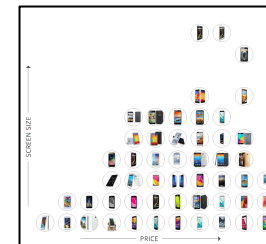
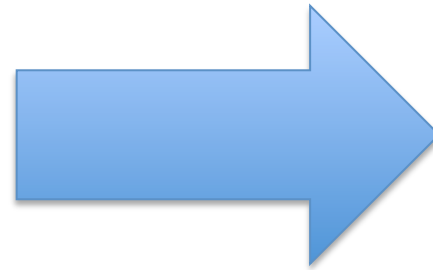
Réponses

- Eliciter et modéliser les exigences/besoins avec le client
- Valider l'implémentation (tester)
- Valider les exigences et l'implémentation à chaque itération
 - Sortie de “release” avec procédure de tests automatisée (git + Jenkins + Junit + PhantomJS)
 - Validation de chaque release avec le client

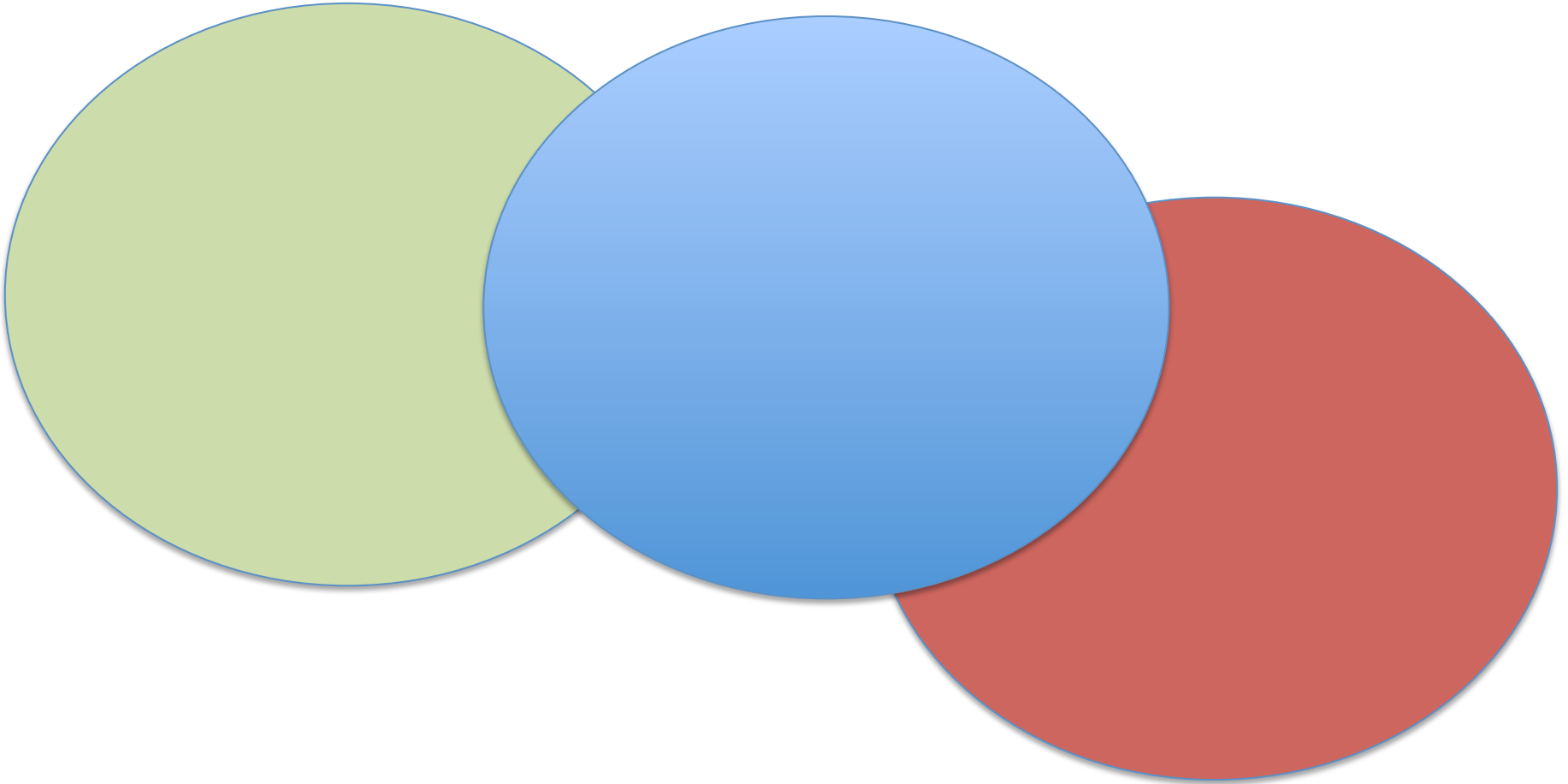
Modéliser les exigences

Modéliser les exigences

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
Find	Q	Q	Q	Q	☞	☞	☞	☞
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xa	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2x	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	-	-	-	-	-	-	-
D2Xa	-	-	-	-	-	-	-	-
D4S	-	-	-	-	-	-	-	-
D4	-	-	-	-	-	-	-	-
D1X	-	-	-	-	-	-	-	-
D1	-	-	-	-	-	-	-	-
D4S	-	-	-	-	-	-	-	-
D4	-	-	-	-	-	-	-	-
D3S	-	-	-	-	-	-	-	-
D3	-	-	-	-	-	-	-	-
D2Hs	-	-	-	-	-	-	-	-
D2H	-	-	-	-	-	-	-	-
D1H	-	-	-	-	-	-	-	-
D810	-	-	-	-	-	-	-	-
D4	-	-	-	-	-	-	-	-
D800	-	-	-	-	-	-	-	-
D700	-	-	-	-	-	-	-	-
D750	-	-	-	-	-	-	-	-
D3	-	-	-	-	-	-	-	-
D2Hs	-	-	-	-	-	-	-	-
D2H	-	-	-	-	-	-	-	-
D1H	-	-	-	-	-	-	-	-
D810	-	-	-	-	-	-	-	-
D800	-	-	-	-	-	-	-	-
D700	-	-	-	-	-	-	-	-
D750	-	-	-	-	-	-	-	-
Df	-	-	-	-	-	-	-	-
D790	-	-	-	-	-	-	-	-
Df	-	-	-	-	-	-	-	-
43 / 43								



Implémenter des fonctionnalités inutiles ou qui ne correspondent pas aux besoins du client => **Modéliser les exigences**

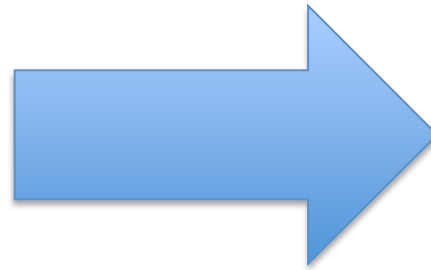


(à côté de la plaque?)

Modéliser les exigences

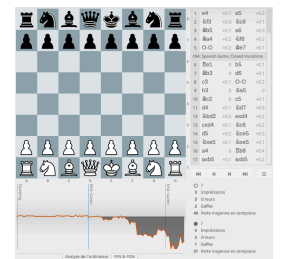
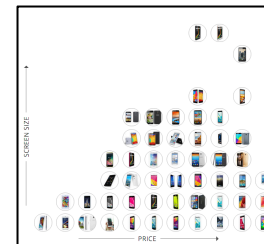
Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
Find	Q	Q	Q	Q	☞	☞	☞	☞
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2x	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...	
Find	Q	Q	Q	Q	☞	☞	☞	☞	
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%	
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%	
D2x	-	APS-C	CMOS	Sony	12.4	11	1005	100%	
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%	
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%	
D4S	EXPED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%	
D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%	
D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%	
D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%	
D90s	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%	
D4S	D90s	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D4	D90s	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%	
D810	D790	EXPED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D800	D790	EXPED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	D790	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D3H	D790	EXPED 4	Full-frame	CMOS	Nikon(station ne...	24.9	51	91000	100%
D610	D790	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%
D800	D790	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



Expliciter
Documenter

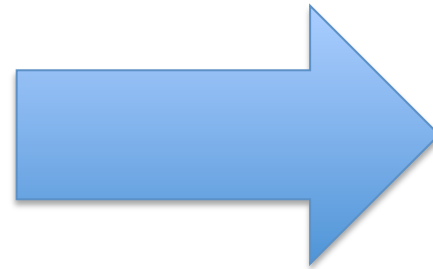
Communiquer avec le client



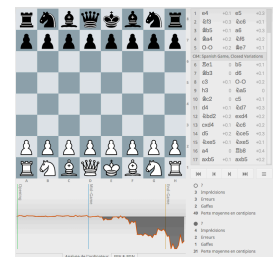
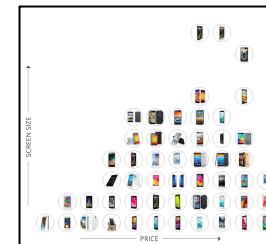
Modéliser les exigences

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
Find	Q	Q	Q	Q	☞	☞	☞	☞
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
Find	Q	Q	Q	Q	☞	☞	☞	☞
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%
D4S	EXPED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D90s	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D90	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D610	EXPED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D600	EXPED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D750	EXPED 4	Full-frame	CMOS	Nikon(Station ne...	24.9	51	91000	100%
D610	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%
D800	EXPED 4	Full-frame	CMOS	Nikon(Station ne...	24.9	51	91000	100%
D800	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



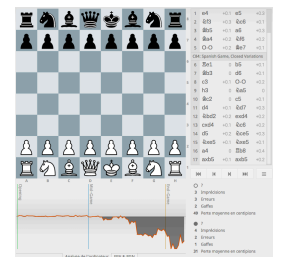
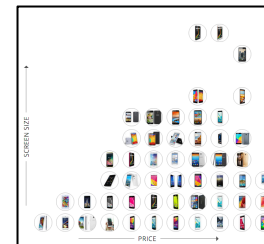
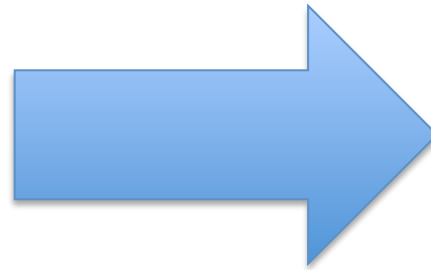
Délimiter
Approche défensive
“Contrat”



Comment modéliser les exigences?

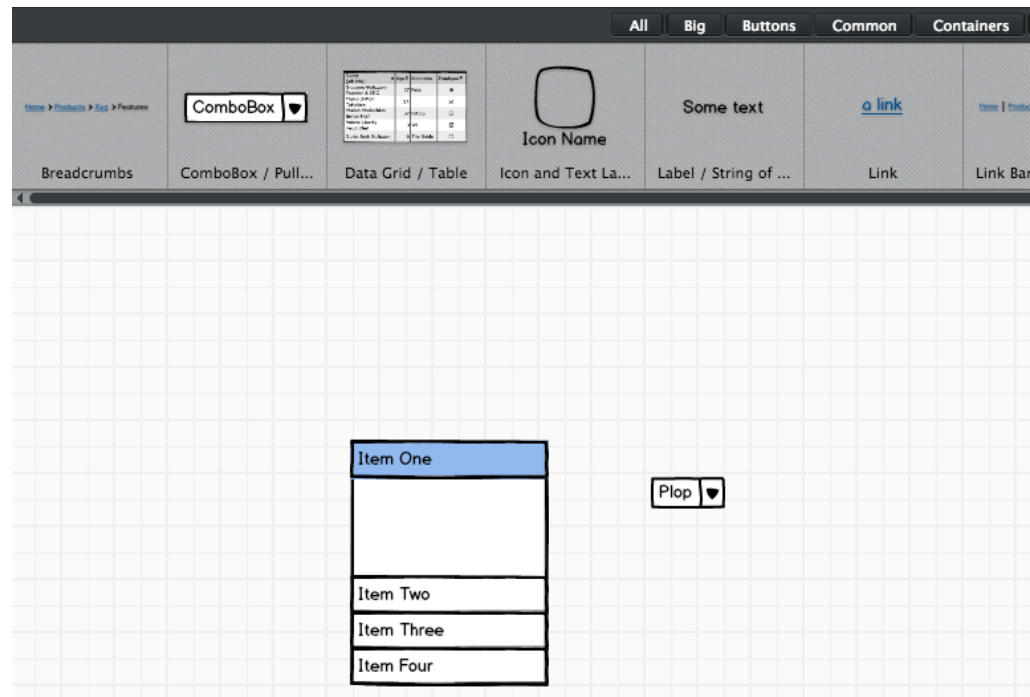
Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
Find	Q	Q	Q	Q	≡	≡	≡	≡
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xa	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%

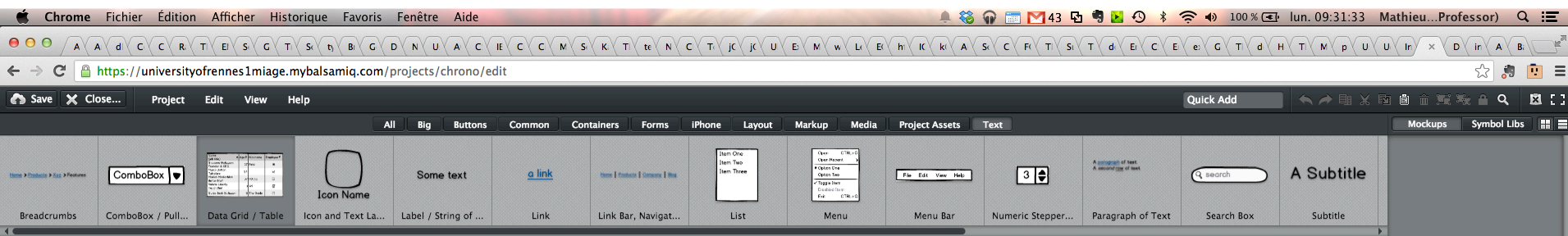
Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...	
Find	Q	Q	Q	Q	≡	≡	≡	≡	
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%	
D2Xa	-	APS-C	CMOS	Sony	12.4	11	1005	100%	
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%	
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%	
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%	
D2Xs	D4S	EXPED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D2H	D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D810	D810	EXPED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D800	D800	EXPED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	D700	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D3	D3	EXPED 4	Full-frame	CMOS	Nikon(station ne...	24.9	51	91000	100%
D2Hs	D2Hs	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%
D2H	D2H	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



Prototyping UI

- Intuitive, not cheap
- Iterative
- Exploration
- Focus on purpose
- Modeling
 - Forget technology a few seconds





Rapid prototypes of screens

Web

Time (job title)	Age	Nickname	Employee
Giacomo Guilizzoni Founder & CEO	37	Peldi	<input type="radio"/>
Marco Bolton Tuttofare	34		<input checked="" type="checkbox"/>
Mariah MacLachlan Better Half	37	Patata	<input type="checkbox"/>
Valerie Liberty Head Chef)	Val	<input checked="" type="checkbox"/>
Guido Jack Guilizzoni	6	The Guide	<input type="checkbox"/>

Drag and Drop

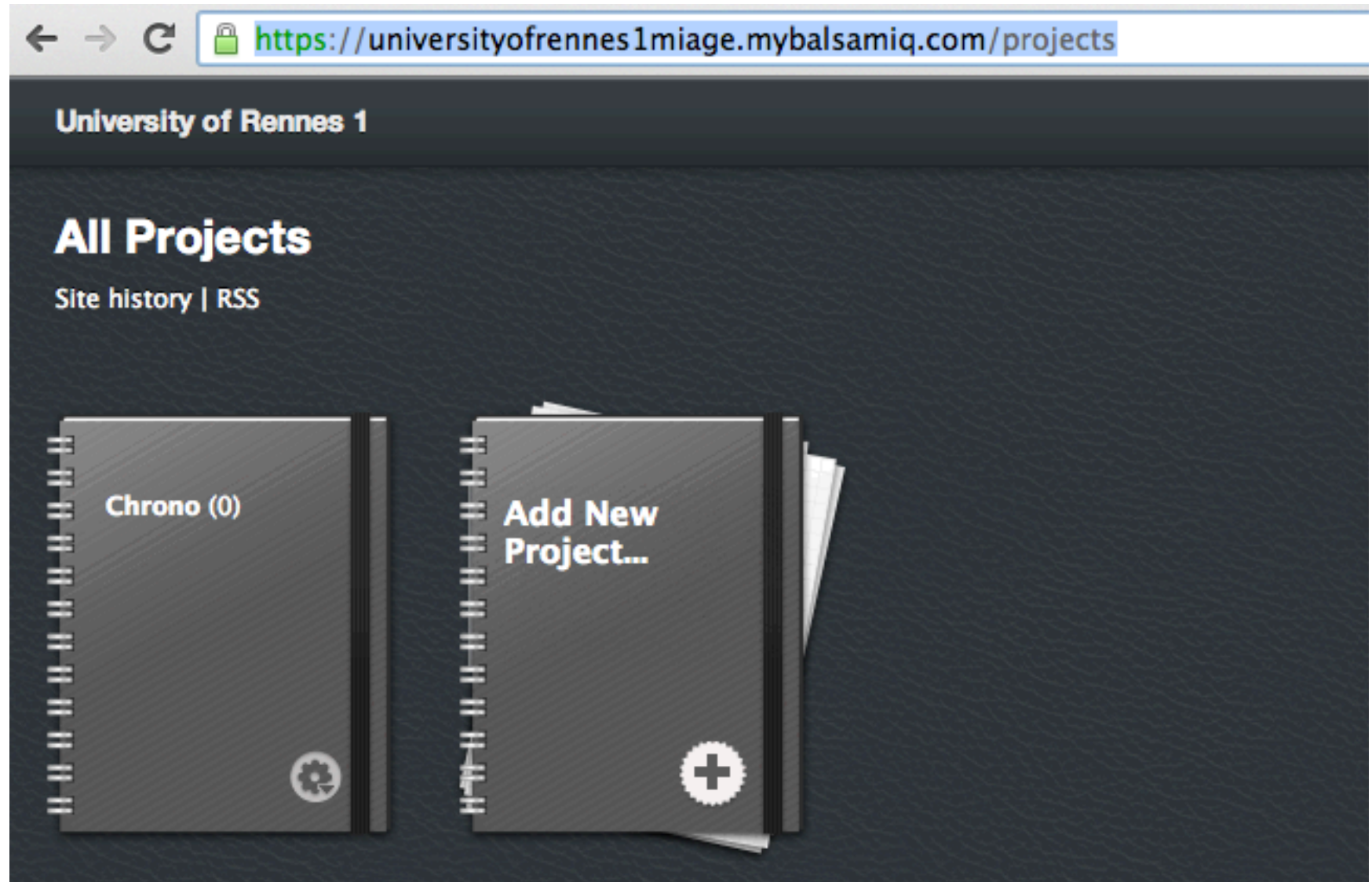
Easy

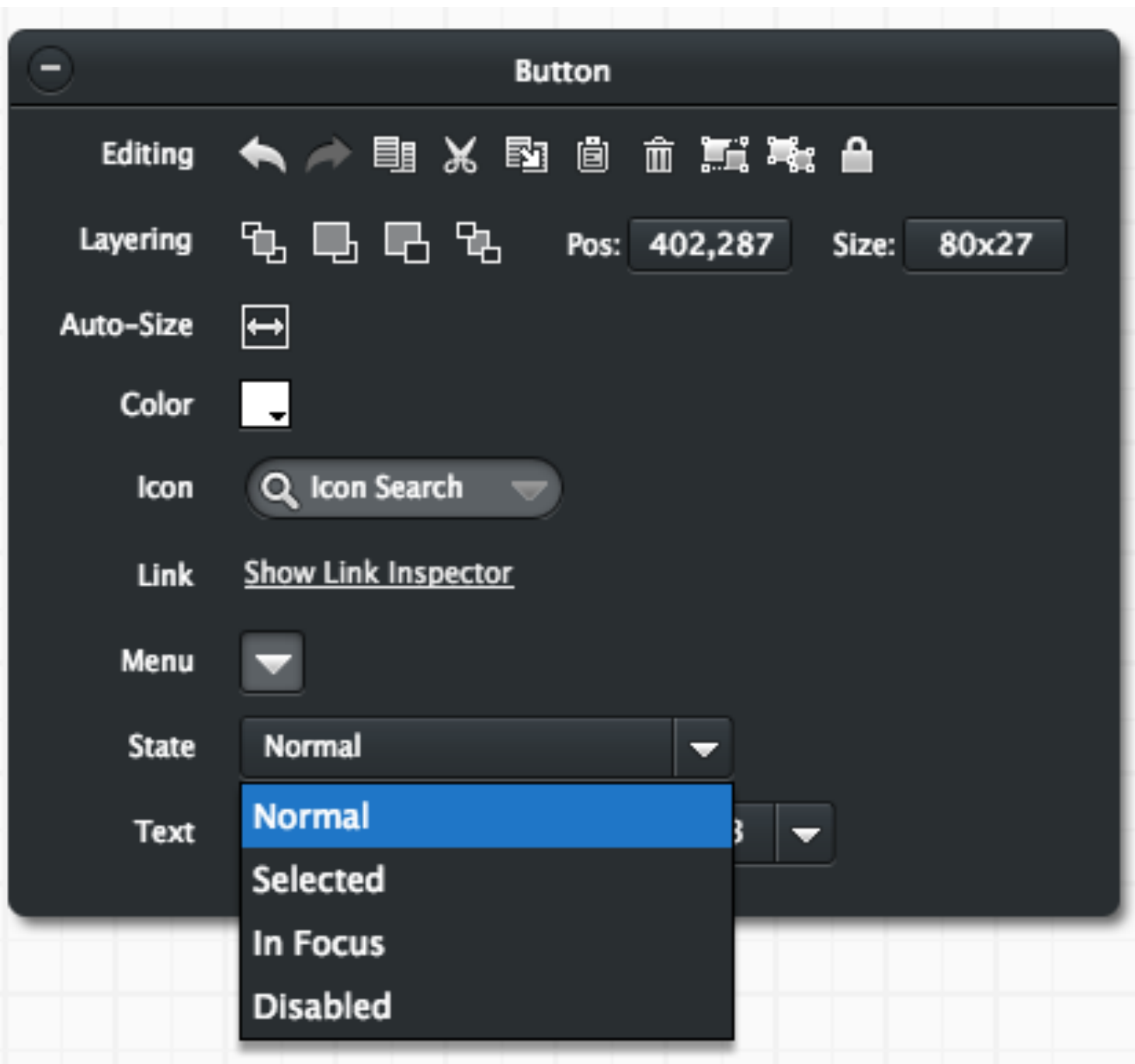
Recovered 2 mockups from auto-save.

Enter mockup notes here. You can hide this panel from the View menu.



<https://universityofrennes1miage.mybalsamiq.com/>





All

Big

Buttons

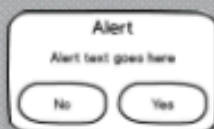
Common

Containers

Forms



Accordion



Alert Box



Arrow / Line

[Home](#) > [Products](#) > [XYZ](#) > Features

Breadcrumbs



Browser Window

Button

Button

One Two Three

Button Bar / Tab ...

iPhone

Layout

Markup

Media

Project Assets

Text



Calendar



Callout

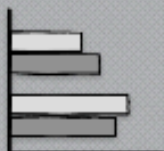


Chart: Bar Chart

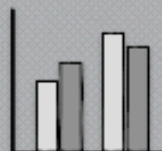


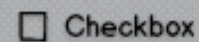
Chart: Column C...



Chart: Line Chart



Chart: Pie Chart



Checkbox

Button

Button

One Two Three

Button Bar / Tab ...

Checkbox

Checkbox

- not selected
- selected
- indeterminate
- disabled
- disabled selected
- disabled indeterminate
- A row without a checkbox

Checkbox Group



Color Picker

ComboBox

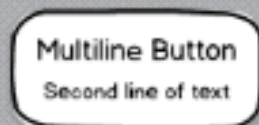
ComboBox / Pull..



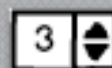
Date Chooser / ...



Help Button



Multiline Button



Numeric Stepper...



ON/OFF Switch /...



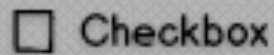
Playback Controls



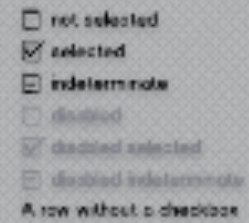
Browser Window



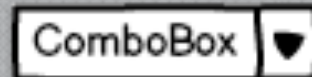
Button



Checkbox



Checkbox Group



ComboBox / Pull.



Geometric Shape



Icon



Icon and Text La...



Image

Some text

Label / String of ...

Home > Products > Xyz > Features

ComboBox ▼

Order	Product Name	Price	Quantity
1	Product A	100	5
2	Product B	200	3
3	Product C	150	7
4	Product D	300	2
5	Product E	50	10

Icon Name

Some text

[a link](#)

Home | Products | Contacts | Help

Breadcrumbs ComboBox / Pull... Data Grid / Table Icon and Text La... Label / String of ... Link Link Bar, Navigat...

Button

One Two Three

Checkbox

- not selected
- selected
- indeterminate
- disabled
- disabled selected
- disabled indeterminate

A row without a checkbox

ComboBox ▼

/ /

Group Name

Button Button Bar / Tab ... Checkbox Checkbox Group Color Picker ComboBox / Pull... Date Chooser / ... Field Set / G

Browser Window

Group Name

Geometric Shape

Rectangle / Canv...

One Two Three Four

First Tab
Second Tab
Third Tab
Fourth Tab

Window / Dialog

Browser Window Field Set / Group... Geometric Shape Rectangle / Canv... Tabs Bar / Ribbon Vertical Tabs Window / Dialog

All

Big

Buttons

Common

Containers

[Home](#) > [Products](#) > [Xyz](#) > [Features](#)

ComboBox 

Item	Value	Icon	Enable
System WebUser	10/10/2010		W
Product 2010	11		W
Product			W
Product 2010	10/10/2010		W
Product 2010	10/10/2010		W
Product 2010	10/10/2010		W
Product 2010	10/10/2010		W



Icon Name

Some text

[a link](#)

[Home](#) | [Features](#)

Breadcrumbs

ComboBox / Pull...

Data Grid / Table

Icon and Text La...

Label / String of ...

Link


Link Ba

Item One

Item Two

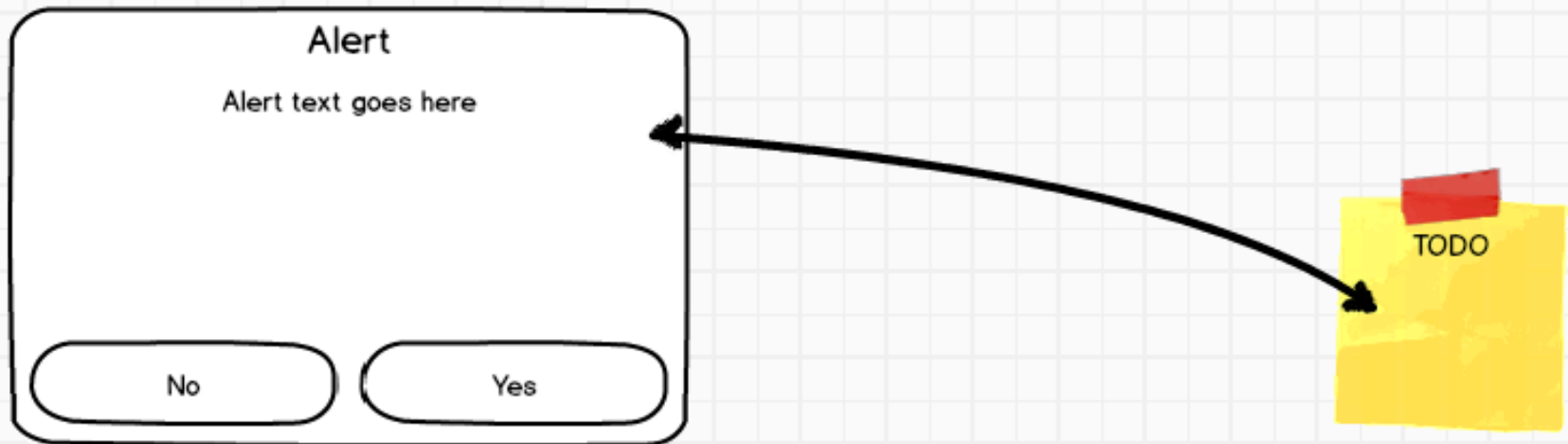
Item Three

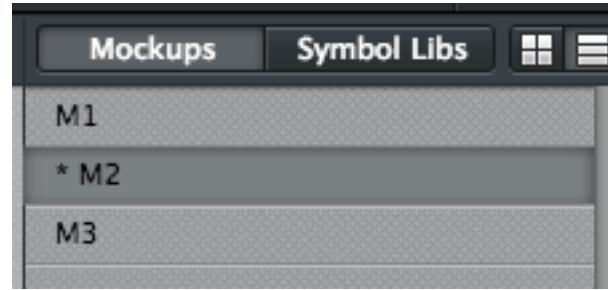
Item Four

Plop 

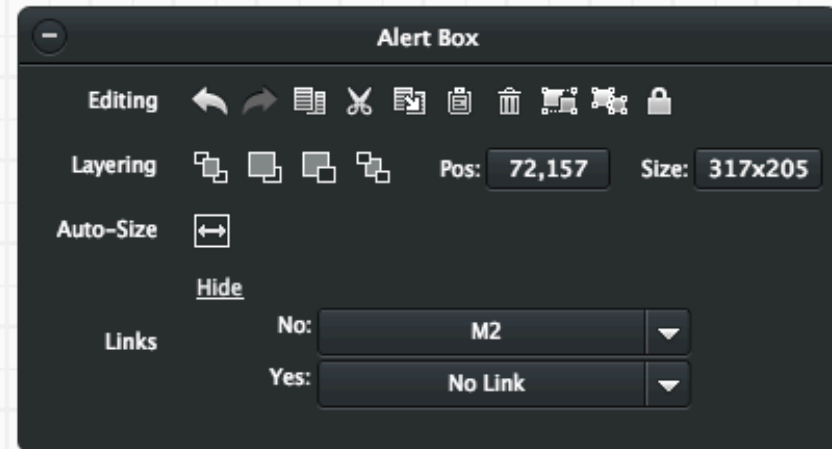


Collaborative



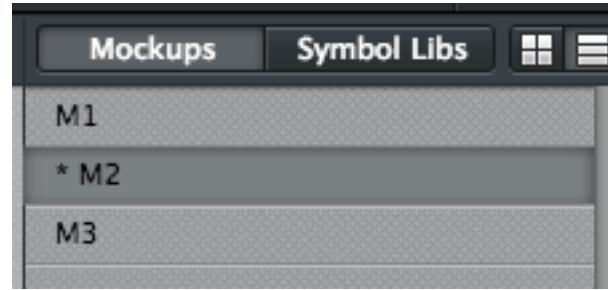


Interaction between Mockups

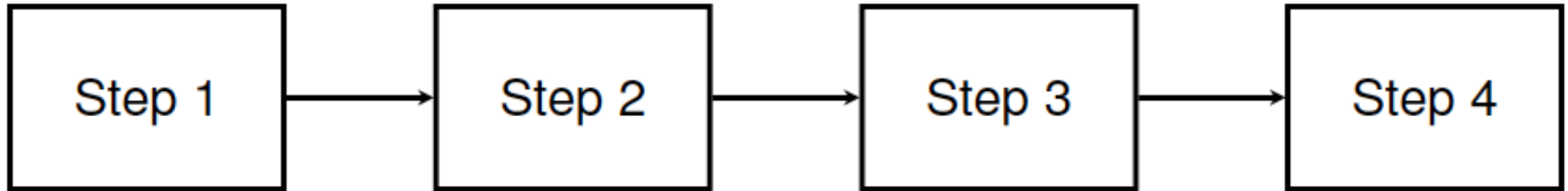


Modélisation UML

- Modélisation selon 4 points de vue principaux :
 - Aspects statiques du système (*le QUI?*)
 - » Description des objets et de leurs relations
 - Modularité, contrats, relations, généricité, héritage
 - » Structuration en paquetages
 - Vision utilisateur du système (*le QUOI?*)
 - » Cas d'utilisation
 - Aspects dynamiques du système (*le QUAND?*)
 - » Diagramme de séquences (scénarios)
 - » Diagramme de collaborations (entre objets)
 - » Diagramme d'états-transitions (Harel)
 - » Diagramme d'activités
 - Vision implantation (*le OÙ?*)
 - » Diagramme de composants et de déploiement



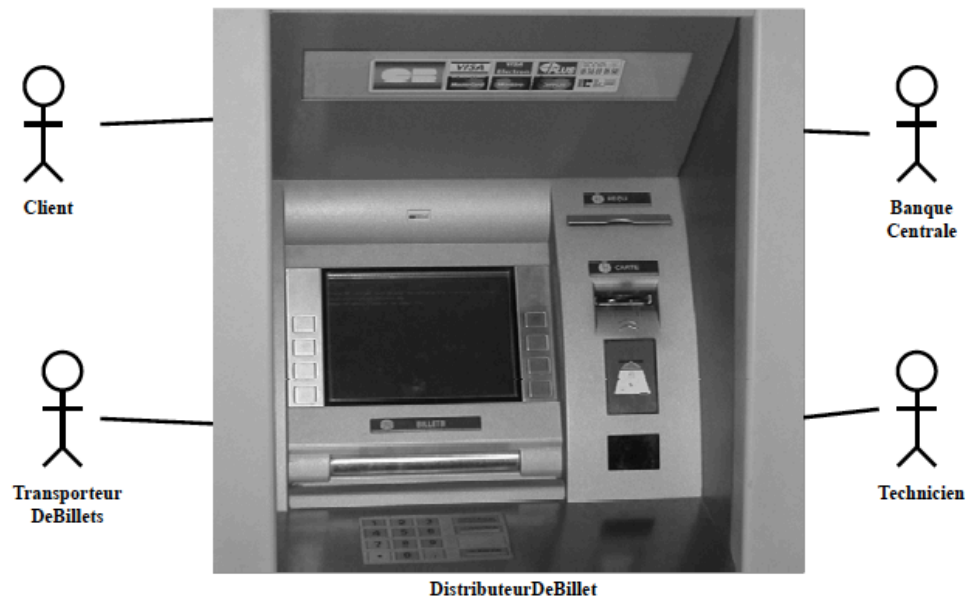
Interaction between Mockups

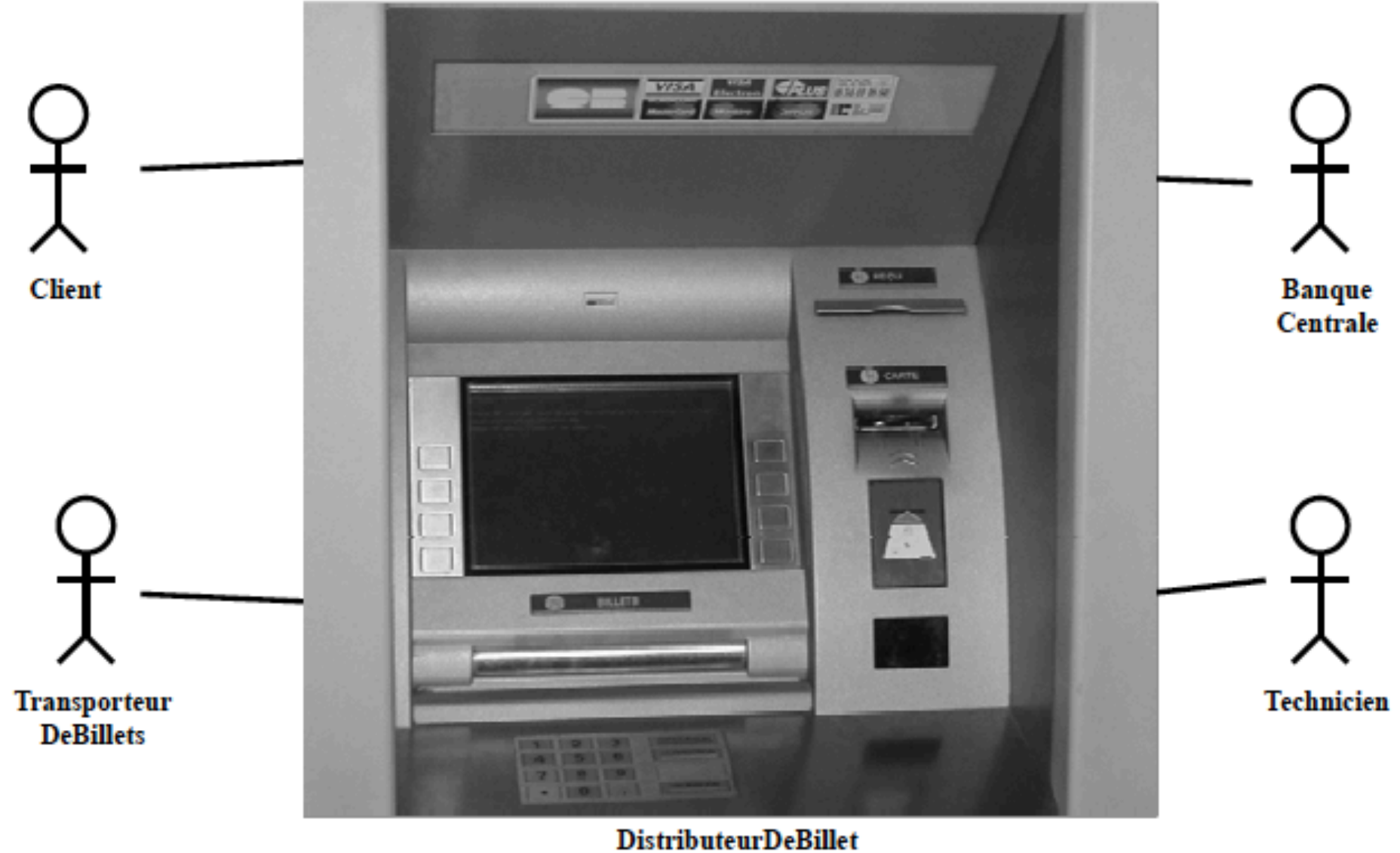


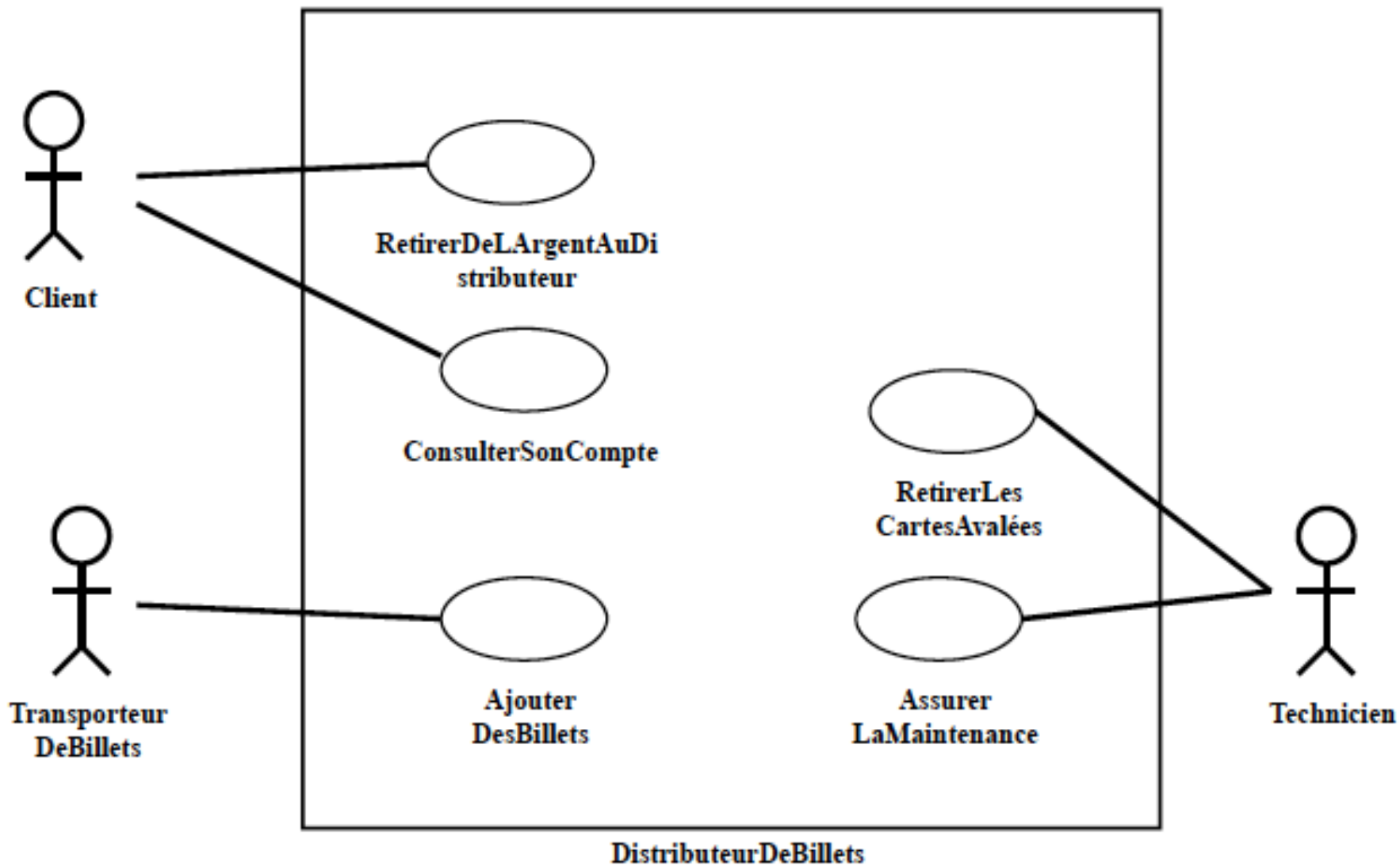
Modélisation UML

- Modélisation selon 4 points de vue principaux :
 - Aspects statiques du système (*le QUI?*)
 - » Description des objets et de leurs relations
 - Modularité, contrats, relations, généricité, héritage
 - » Structuration en paquetages
 - Vision utilisateur du système (*le QUOI?*)
 - » Cas d'utilisation
 - Aspects dynamiques du système (*le QUAND?*)
 - » Diagramme de séquences (scénarios)
 - » Diagramme de collaborations (entre objets)
 - » Diagramme d'états-transitions (Harel)
 - » Diagramme d'activités
 - Vision implantation (*le OU?*)
 - » Diagramme de composants et de déploiement

"A use case is a sequence of transactions in a system whose task is to yield a measurable value to an individual actor of the system." [– Jacobson et al., 1995]







■ Pour chaque cas d'utilisation

- ◆ choisir un identificateur représentatif
- ◆ donner une **description textuelle simple**
- ◆ la fonction réalisée doit être comprise de tous
- ◆ préciser ce que fait le système, ce que fait l'acteur
- ◆ pas trop de détails, se concentrer sur le **scénario "normal"**



Retirer
DeLArgent
AuDistributeur

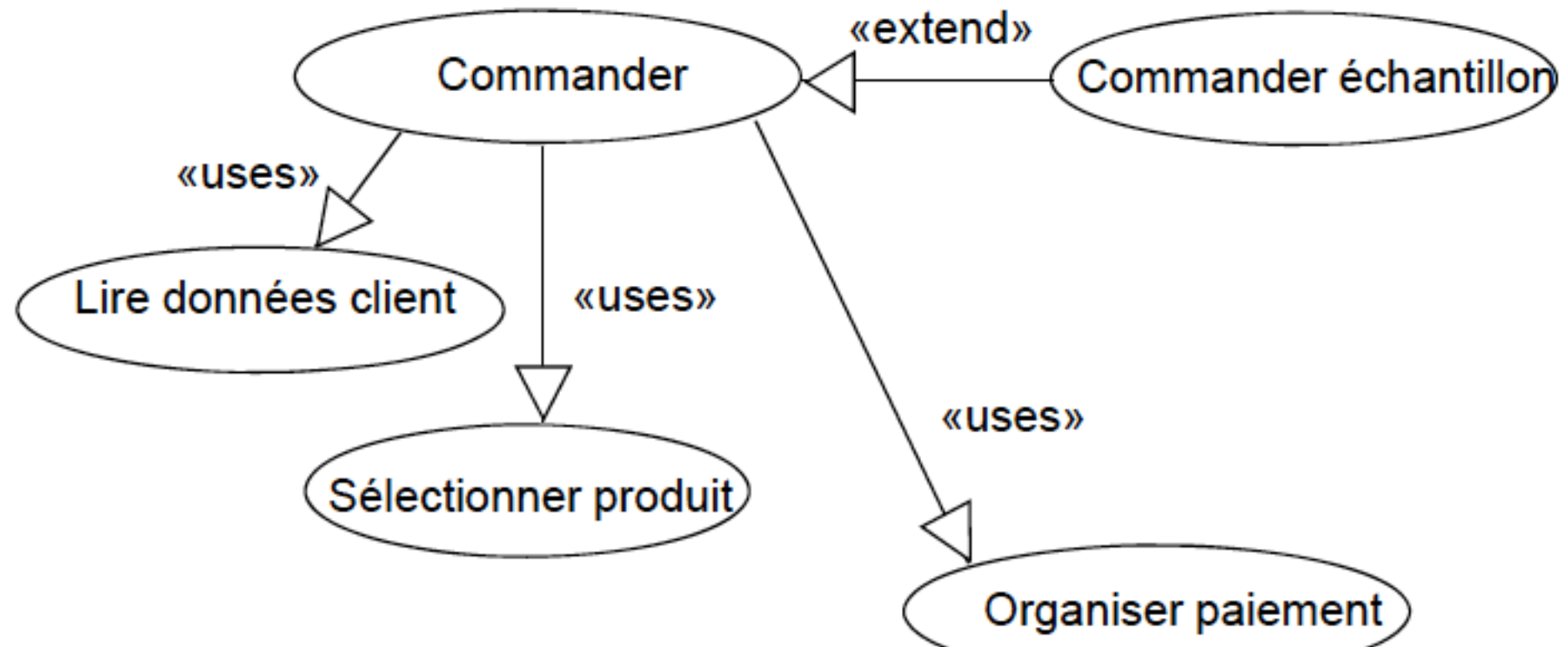
Lorsqu'un *client* a besoin de liquide il peut en utilisant un distributeur retirer de l'argent de son compte. Pour cela :

- le *client* insère sa carte bancaire dans le distributeur
- le *système* demande le code pour l'identifier
- le *client* choisit le montant du retrait
- le *système* vérifie qu'il y a suffisamment d'argent
- si c'est le cas, le *système* distribue les billets et débite le compte du client
- le *client* prend les billets et retire sa carte

Uses: refine the case by use of other cases

Extends: specialization of another use case

Relations sur les *use-cases* : notation

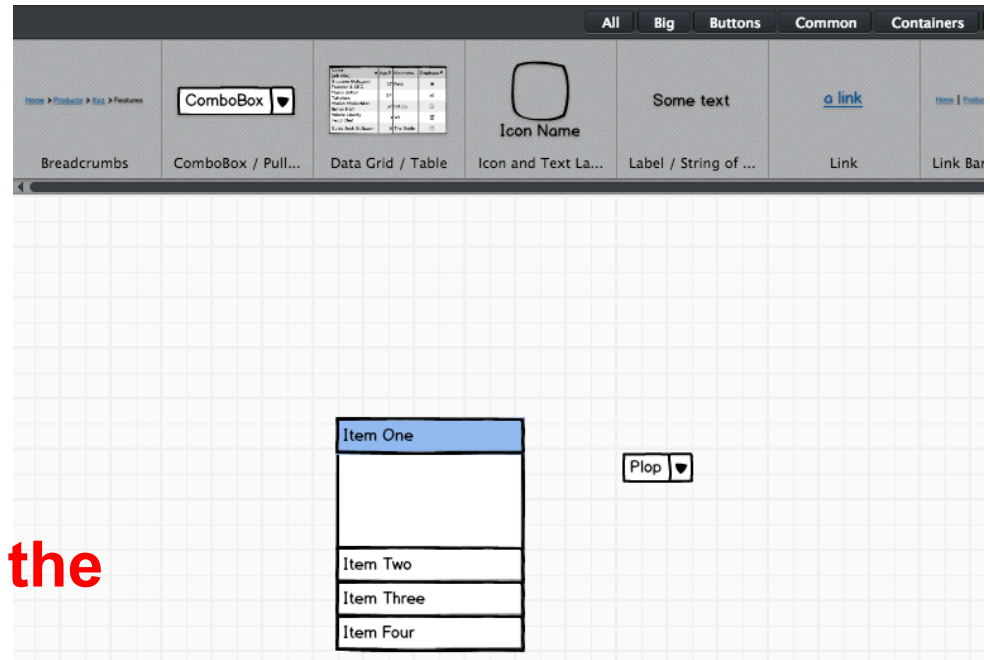


Modélisation UML

- Modélisation selon 4 points de vue principaux :
 - Aspects statiques du système (*le QUI?*)
 - » Description des objets et de leurs relations
 - Modularité, contrats, relations, généricité, héritage
 - » Structuration en paquetages
 - Vision utilisateur du système (*le QUOI?*)
 - » Cas d'utilisation
 - Aspects dynamiques du système (*le QUAND?*)
 - » Diagramme de séquences (scénarios)
 - » Diagramme de collaborations (entre objets)
 - » Diagramme d'états-transitions (Harel)
 - » Diagramme d'activités
 - Vision implantation (*le OU?*)
 - » Diagramme de composants et de déploiement

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UML diagrams



Complementary!
Focus on some aspects of the system/requirements

Valider l'implémentation
(tests automatisés)

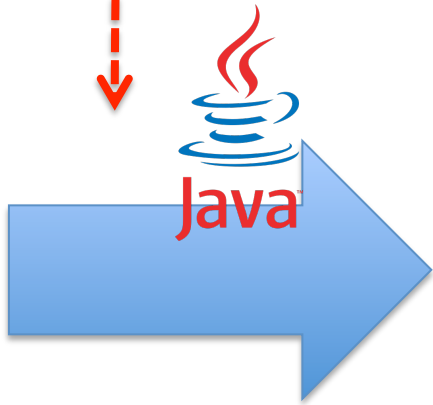
Tests

(sur les entrées)

(sur la transformation)

(sur la sortie)

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megap...	Focus points	Metering pixels	Viewfinder cov...
Find	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
D3X	EXPEED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xa	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.88	5	1005	96%
D4S	EXPEED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	EXPEED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D810	EXPEED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D800	EXPEED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D790	EXPEED 4	Full-frame	CMOS	Nikon(japanese re...	24.9	51	91000	100%
D610	EXPEED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%

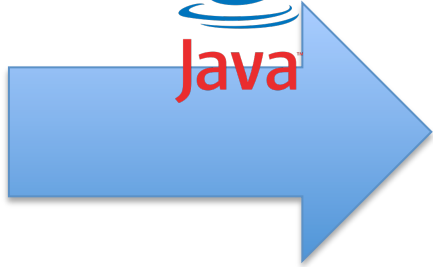


Tests



(sur les entrées)

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megap...	Focus points	Metering pixels	Viewfinder cov...
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xa	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.88	5	1005	96%
D4S	EXPED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
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D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D810	EXPED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D800	EXPED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D790	EXPED 4	Full-frame	CMOS	Nikon(otation re...	24.9	51	91000	100%
D610	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



Tests

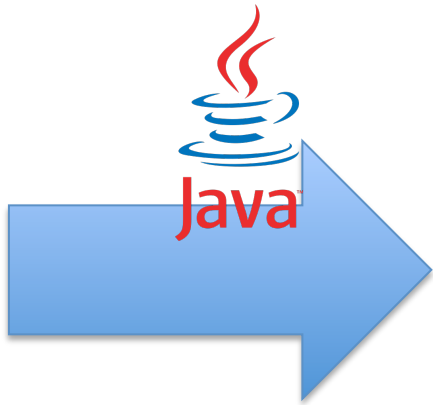


(sur les entrées)

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megap...	Focus points	Metering pixels	Viewfinder cov...
Find								
D3X	EXPEED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.88	5	1005	96%
D4S	EXPEED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	EXPEED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
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D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D810	EXPEED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
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D790	EXPEED 4	Full-frame	CMOS	Nikon(otation re...	24.9	51	91000	100%
D610	EXPEED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



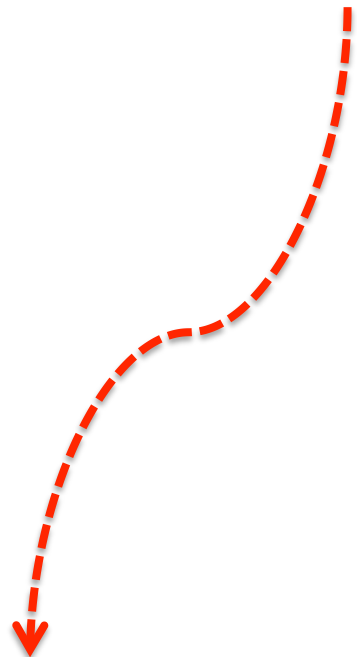
RuntimeException....



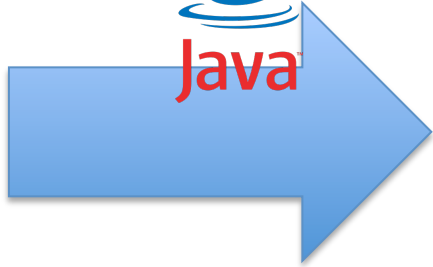
Tests



(sur les entrées)



Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
D3X	EXPEED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%
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D4	EXPEED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
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D3	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D610	EXPEED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D600	EXPEED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D750	EXPEED 4	Full-frame	CMOS	Nikon(plateau re...	24.9	51	91000	100%
Df	EXPEED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



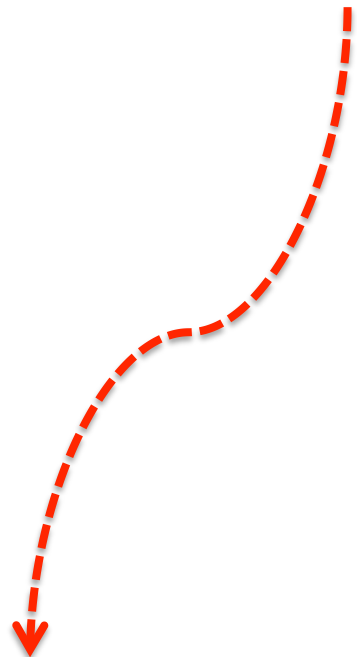
```
<div>  
</div></li>
```



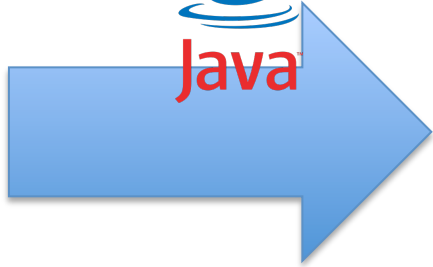
Tests



(sur les entrées)



Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
D3X	EXPEED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
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D3	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
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D750	EXPEED 4	Full-frame	CMOS	Nikon(plateau re...	24.9	51	91000	100%
Df	EXPEED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



```
<div>  
<ul><li>...</li></ul>  
</div>
```



Manual testing is a terrible idea

non reproducible; error-prone; time-consuming



Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
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D700	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D750	EXPED 4	Full-frame	CMOS	Nikon(platino ne...	24.9	51	91000	100%
Df	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



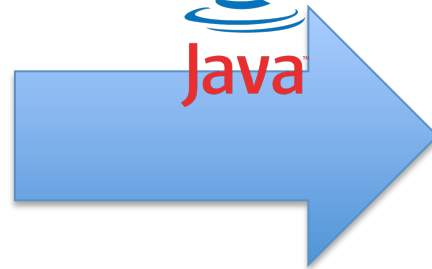
```
<div>
<ul><li>...</li></ul>
</div>
```



You can start with some values/ inputs and then (manually) observe



Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
D3X	EXPEED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%
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D4	EXPEED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
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D600	EXPEED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D750	EXPEED 4	Full-frame	CMOS	Nikon(platone re...	24.9	51	91000	100%
Df	EXPEED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



```
<div>  
<ul><li>...</li></ul>  
</div>
```

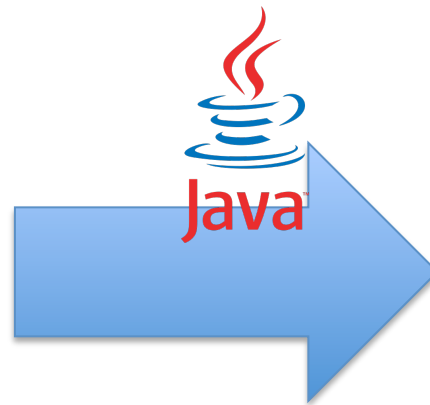


But manual testing is a terrible idea

non reproducible; error-prone; time-consuming



Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
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D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%
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D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
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D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
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D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
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Df	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



```
<div>
<ul><li>...</li></ul>
</div>
```



Whenever you are tempted to type something into a print statement or a debugger expression, **write it as a test instead.**

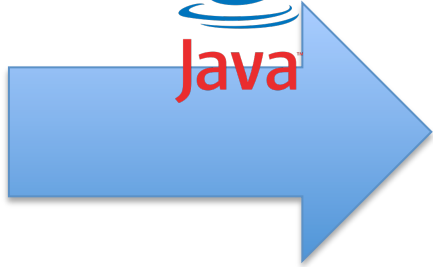


Tests

(sur les entrées)

Product	Image process...	Sensor format	Sensor type	Sensor manufa.:	Megap...	Focus points	Metering pixels	Viewfinder cov.:
Find	🔍	🔍	🔍	🔍	🔍	🔍	🔍	🔍
D3X	EXPEED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xa	-	APS-C	CMOS	Sony	12.4	11	1005	100%
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D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.68	5	1005	96%
D4S	EXPEED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	EXPEED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
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D790	EXPEED 4	Full-frame	CMOS	Nikon	24.9	51	91000	100%
D610	EXPEED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%

Observer par des assertions
(vérification de propriétés) 

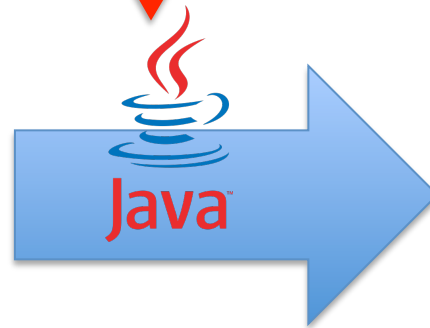


Tests automatisés

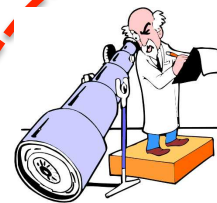
(sur les entrées)

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
Find	🔍	🔍	🔍	🔍	🔍	🔍	🔍	🔍
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xa	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
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D1	-	APS-C	CCD	Sony	2.88	5	1005	96%
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D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
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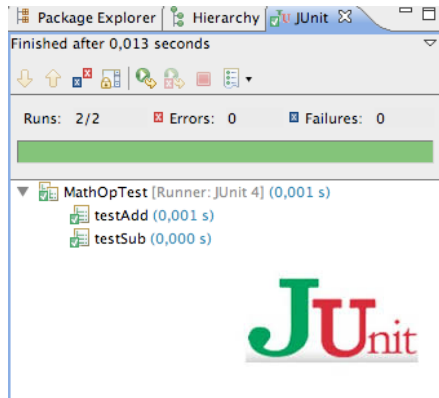
(sur la transformation)



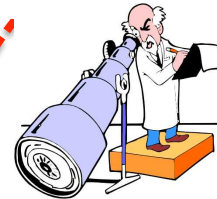
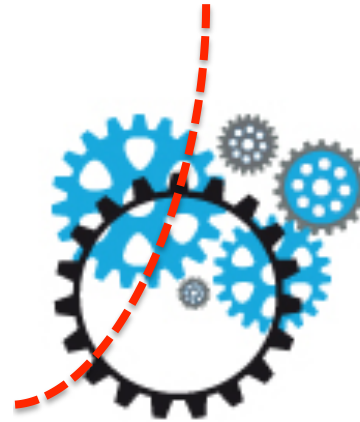
(sur la sortie)



Tests automatisés

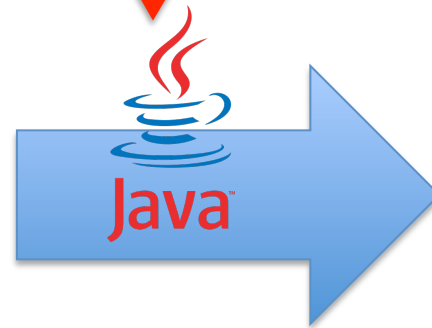


```
// Tests adding a product to the cart.  
public void testProductAdd() {  
    Product book = new Product("Refactoring", 53.95);  
    _bookCart.addItem(book);  
  
    assertTrue(_bookCart.contains(book));  
  
    double expected = 23.95 + book.getPrice();  
    double current = _bookCart.getBalance();  
  
    assertEquals(expected, current, 0.0);  
  
    int expectedCount = 2;  
    int currentCount = _bookCart.getItemCount();  
    assertEquals(expectedCount, currentCount);  
}
```



(sur la transformation)

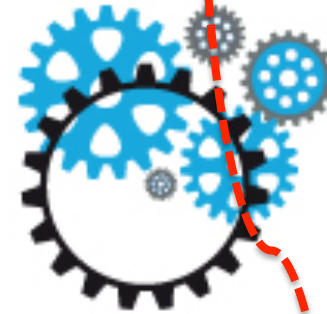
Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
Find								
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xa	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.88	5	1005	96%
D4S	EXPED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D810	EXPED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D600	EXPED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D790	EXPED 4	Full-frame	CMOS	Nikonoptation re...	24.9	51	91000	100%
D610	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



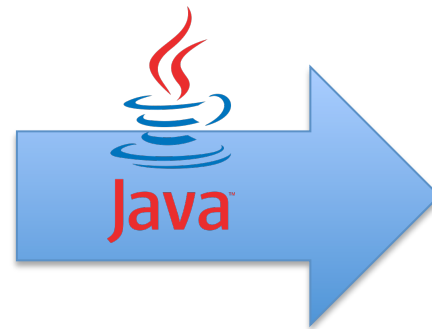
Tests automatisés

(sur les entrées)

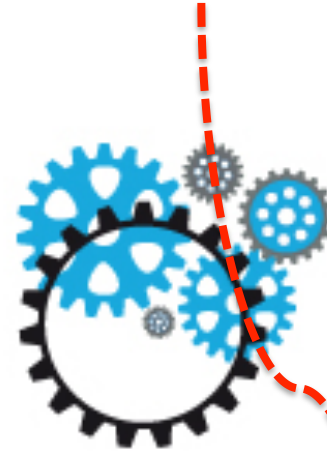
Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
Find	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
D3X	EXPEED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.88	5	1005	96%
D4S	EXPEED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	EXPEED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D810	EXPEED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D800	EXPEED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	EXPEED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D810	EXPEED 4	Full-frame	CMOS	Nikonoptation re...	24.9	51	91000	100%
D800	EXPEED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



(sur la sortie)



Tests automatisés



↓ (sur la sortie)



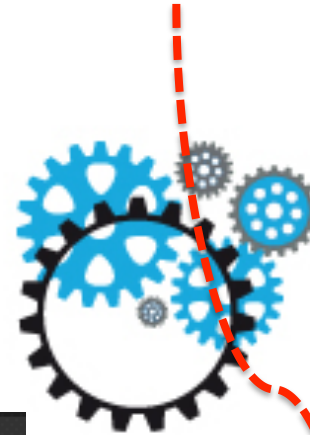
```
@Test
public void homePage() throws Exception {
    final WebClient webClient = new WebClient();
    try (final WebClient webClient = new WebClient()) {
        final HtmlPage page = webClient.getPage("http://htmlunit.sourceforge.net");
        Assert.assertEquals("HtmlUnit - Welcome to HtmlUnit", page.getTitleText());

        final String pageAsXml = page.asXml();
        Assert.assertTrue(pageAsXml.contains("<body class=\"composite\">"));

        final String pageAsText = page.asText();
        Assert.assertTrue(pageAsText.contains("Support for the HTTP and HTTPS protocols"));
    }
}
```

<http://htmlunit.sourceforge.net/gettingStarted.html>

Tests automatisés



↓ (sur la sortie)



```
// googletesting.js
casper.test.begin('Google search retrieves 10 or more results', 5, function suite(test) {
  casper.start("http://www.google.fr/", function() {
    test.assertTitle("Google", "google homepage title is the one expected");
    test.assertExists('form[action="/search"]', "main form is found");
    this.fill('form[action="/search"]', {
      q: "casperjs"
    }, true);
  });

  casper.then(function() {
    test.assertTitle("casperjs - Recherche Google", "google title is ok");
    test.assertUrlMatch(/q=casperjs/, "search term has been submitted");
    test.assertEval(function() {
      return __utils__.findAll("h3.r").length >= 10;
    }, "google search for \"casperjs\" retrieves 10 or more results");
  });

  casper.run(function() {
    test.done();
  });
});
```

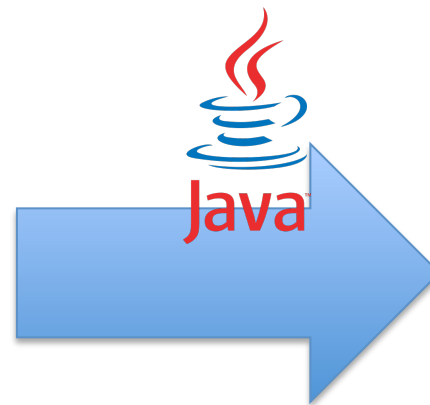
<http://docs.casperjs.org/en/latest/testing.html>

Tests automatisés

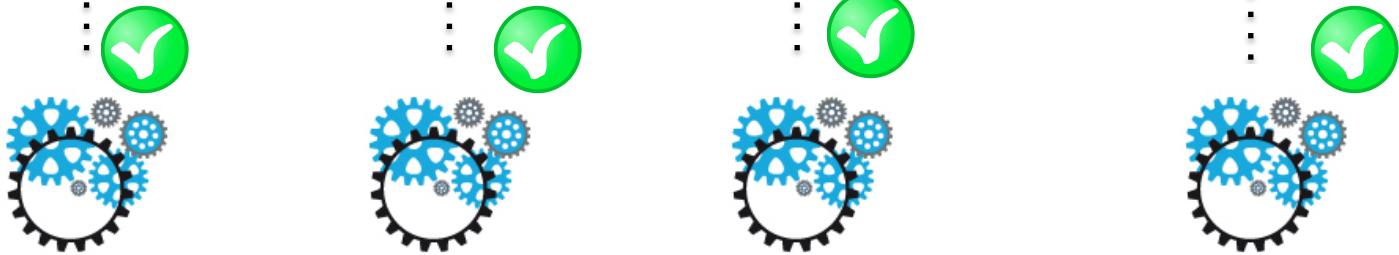
(concevoir un ensemble de données en “input” pertinent pour le test et couvrant un maximum de cas)

(vérifier des assertions « génériques » ou bien produire la sortie attendue puis comparaison aka « diff »)

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xa	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2X	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.88	5	1005	96%
D4S	EXPED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D2Hs	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D2H	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D810	EXPED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D800	EXPED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D810	EXPED 4	Full-frame	CMOS	Nikonoptatron ne...	24.9	51	91000	100%
D800	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%



SP (sprints; implémentation)



Execute the tests before/after each commit
Don't break (no regression)
Continuous validation

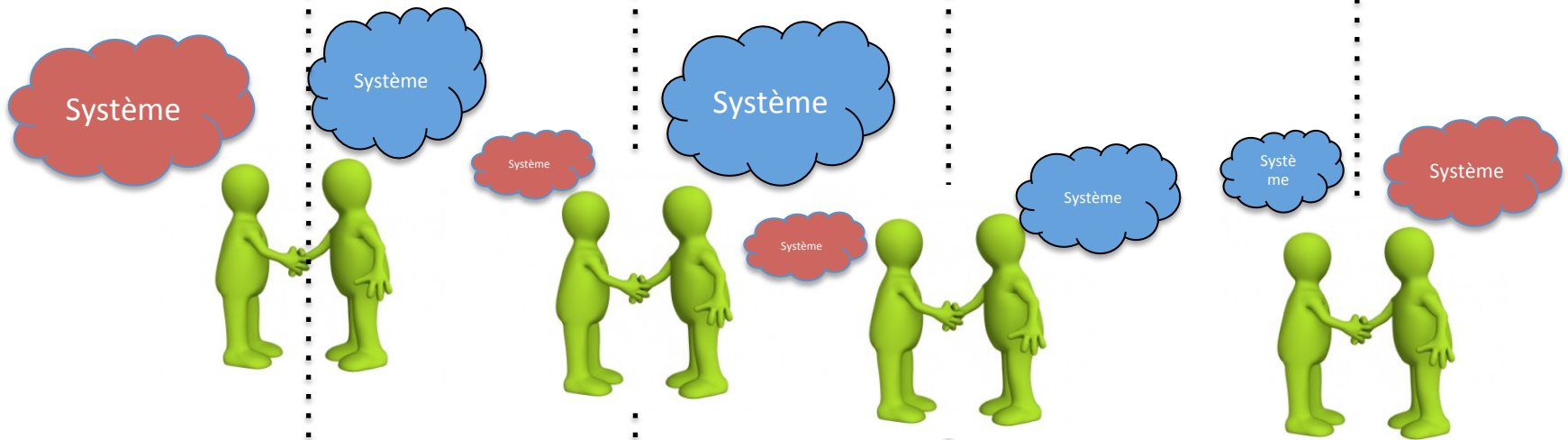
Valider les exigences et
l'implémentation
à chaque itération
avec le client

Systeme

Systeme



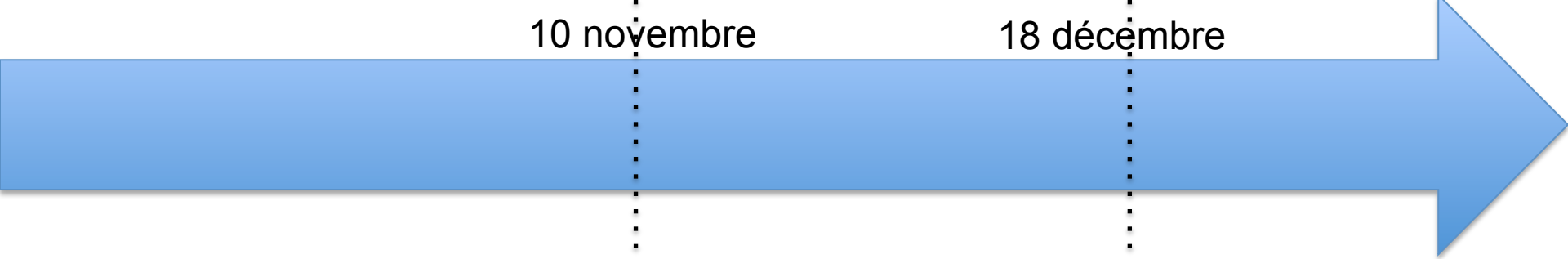
EX (exigences; cahier des charges)



Valider à chaque itération avec le client: montrer les modèles, expliquer les choix technologiques, etc.

10 novembre

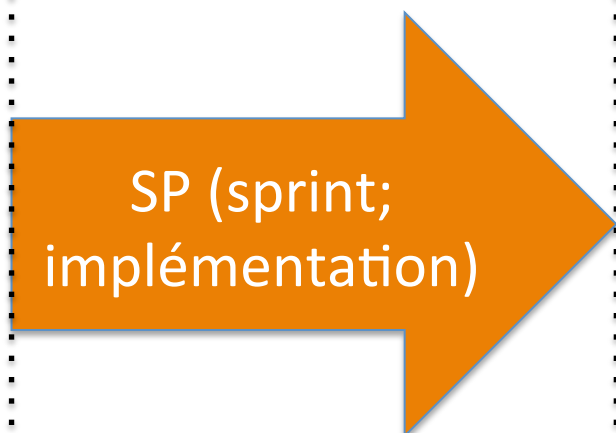
18 décembre



EX (exigences; cahier
des charges)



SP (sprint;
implémentation)

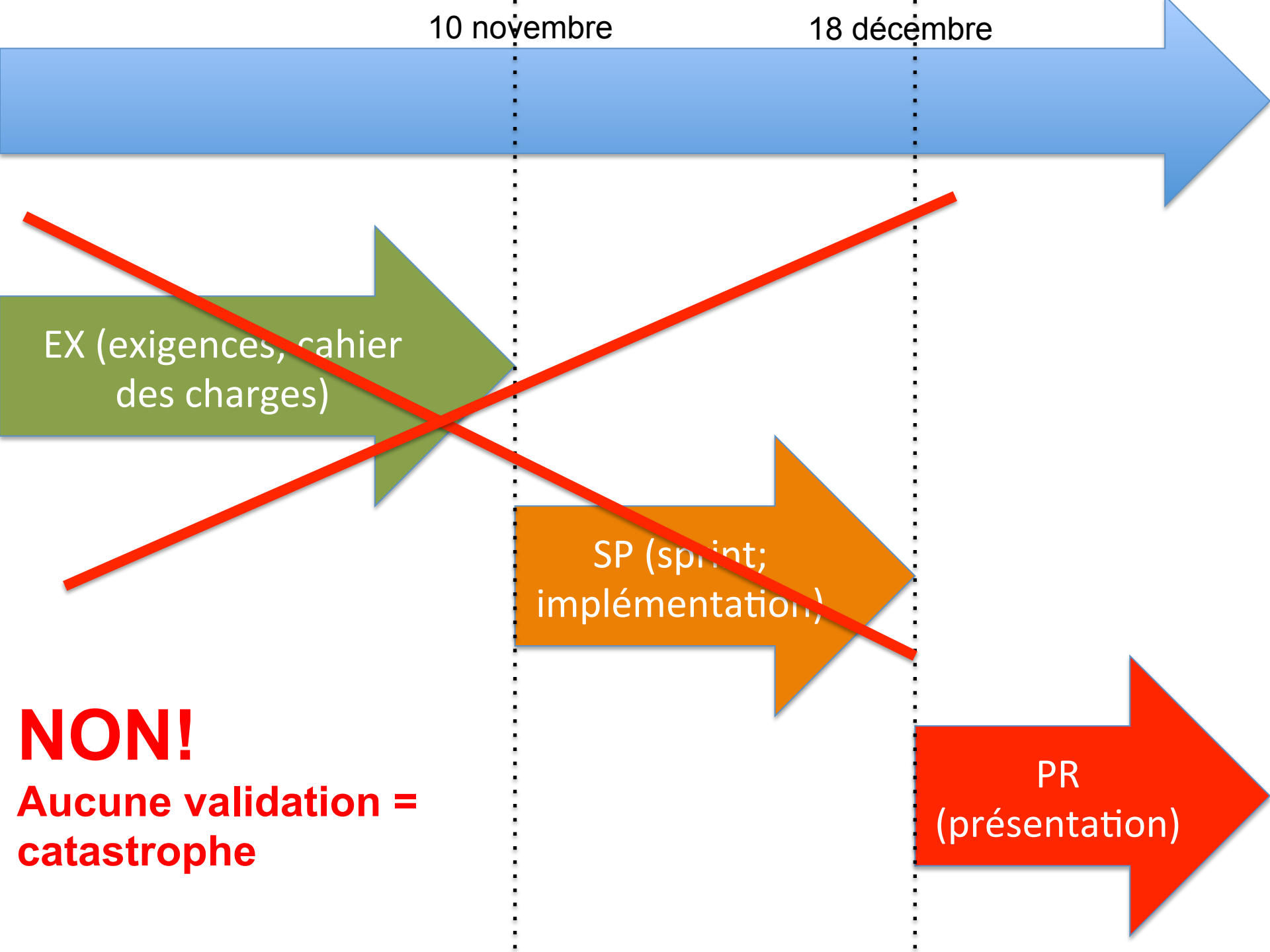


PR
(présentation)



10 novembre

18 décembre

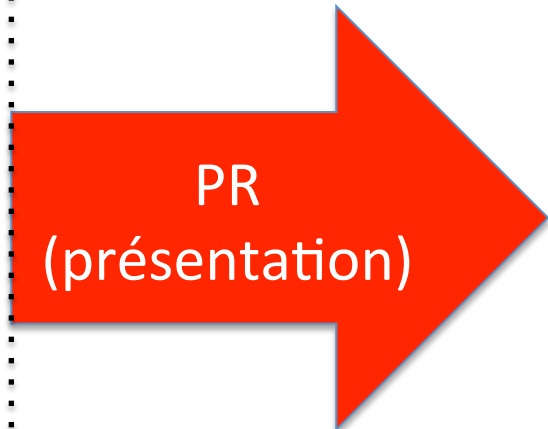
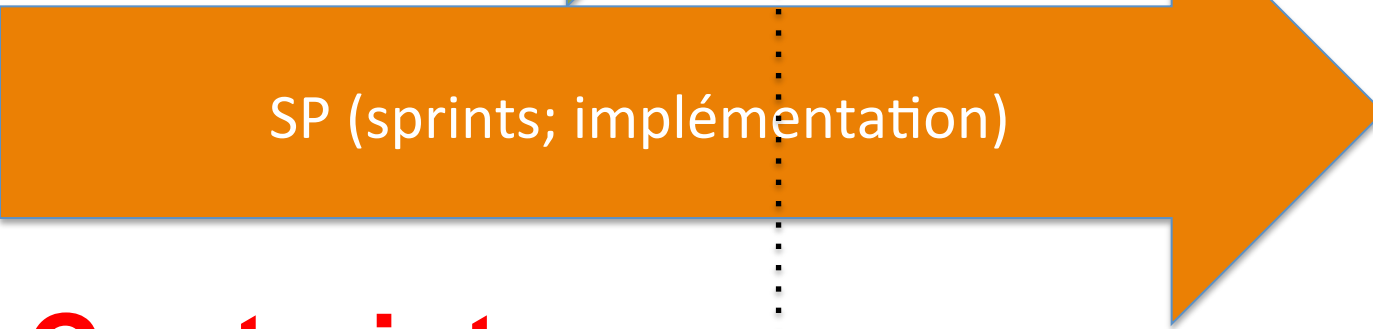
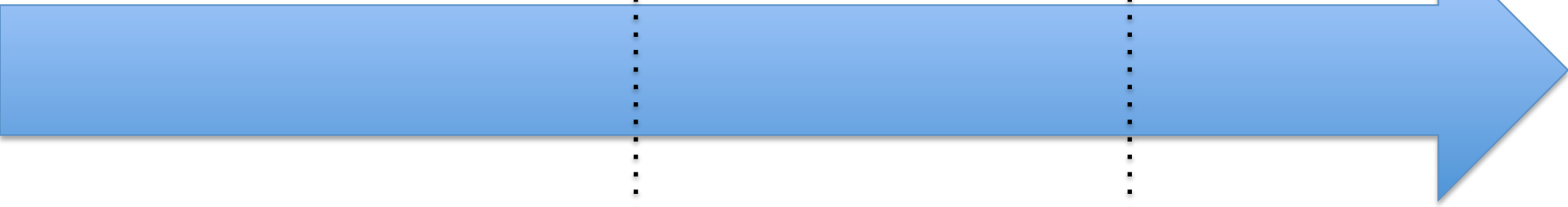


NON!

Aucune validation = catastrophe

10 novembre

18 décembre



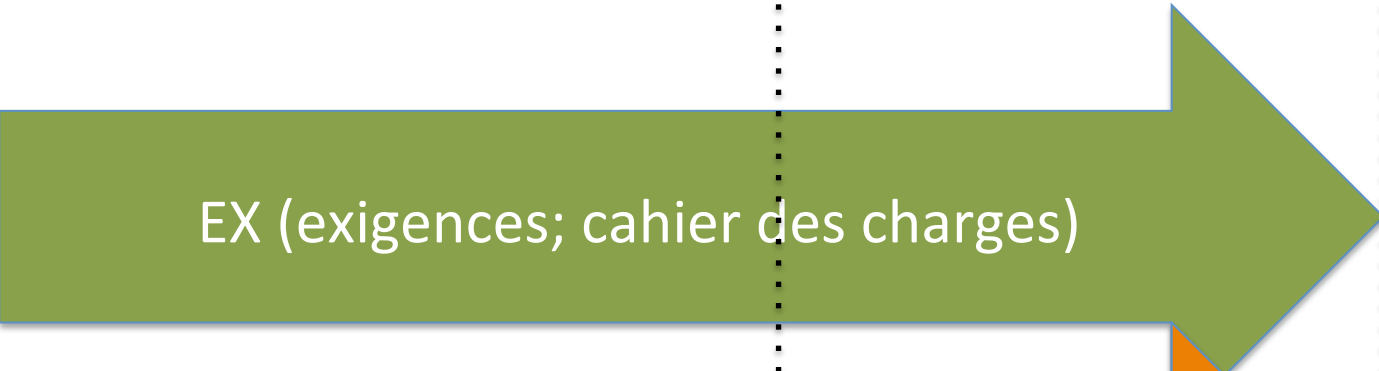
Contrainte:
On ne fixe pas les exigences (même après le 1er livrable)

10 novembre

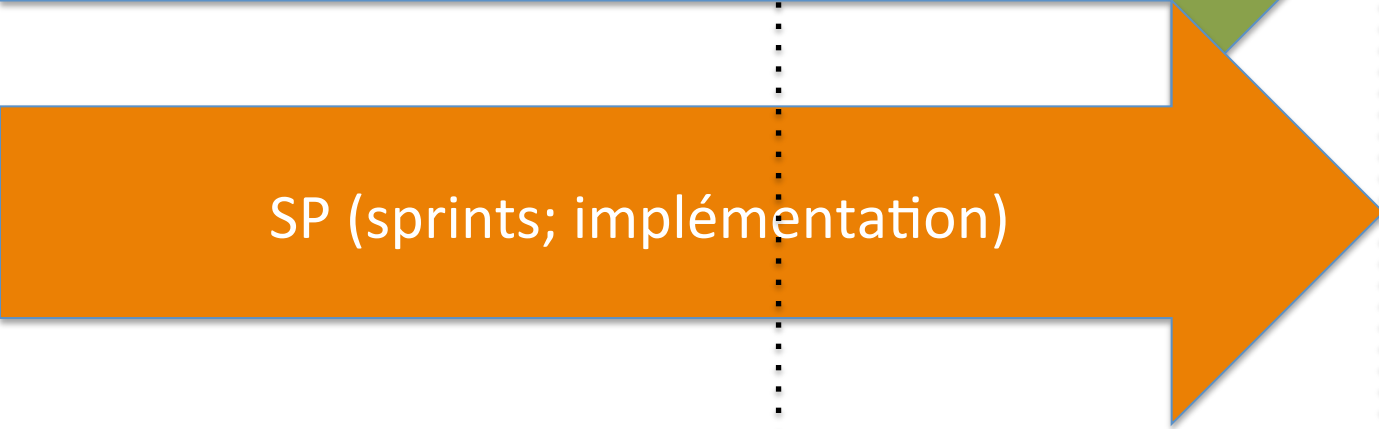
18 décembre



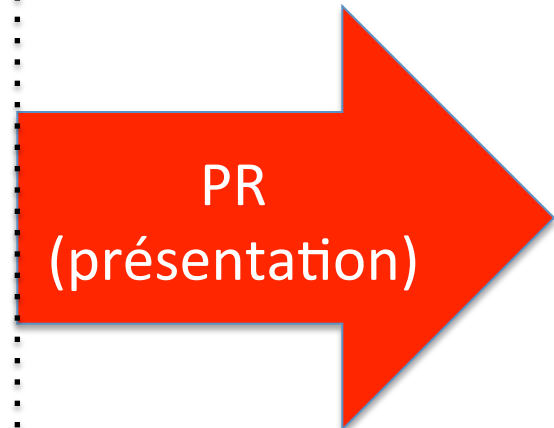
EX (exigences; cahier des charges)



SP (sprints; implémentation)

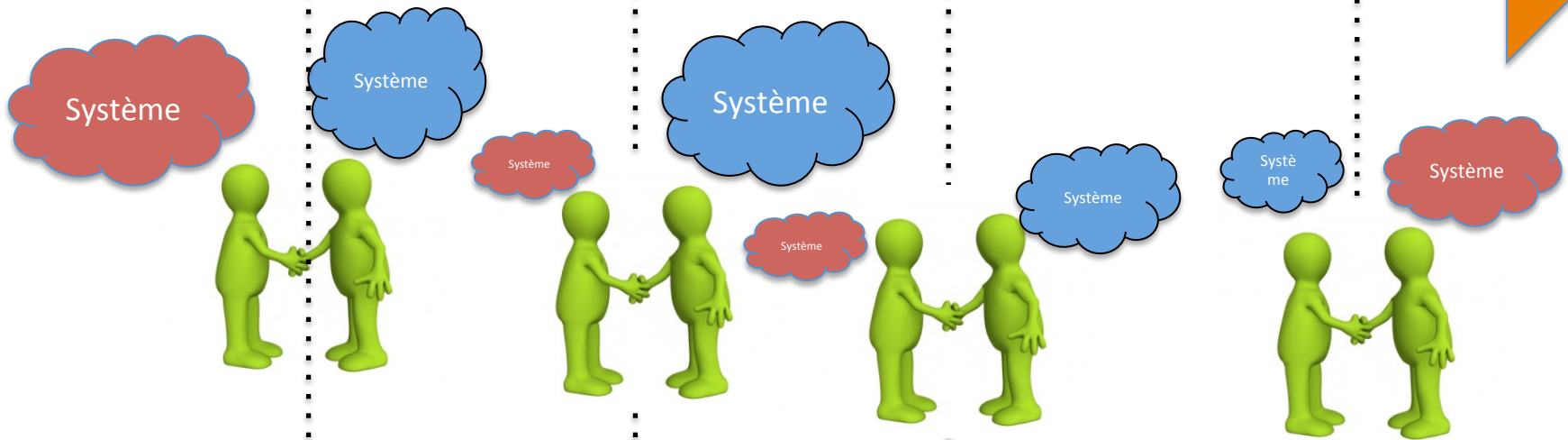


PR
(présentation)



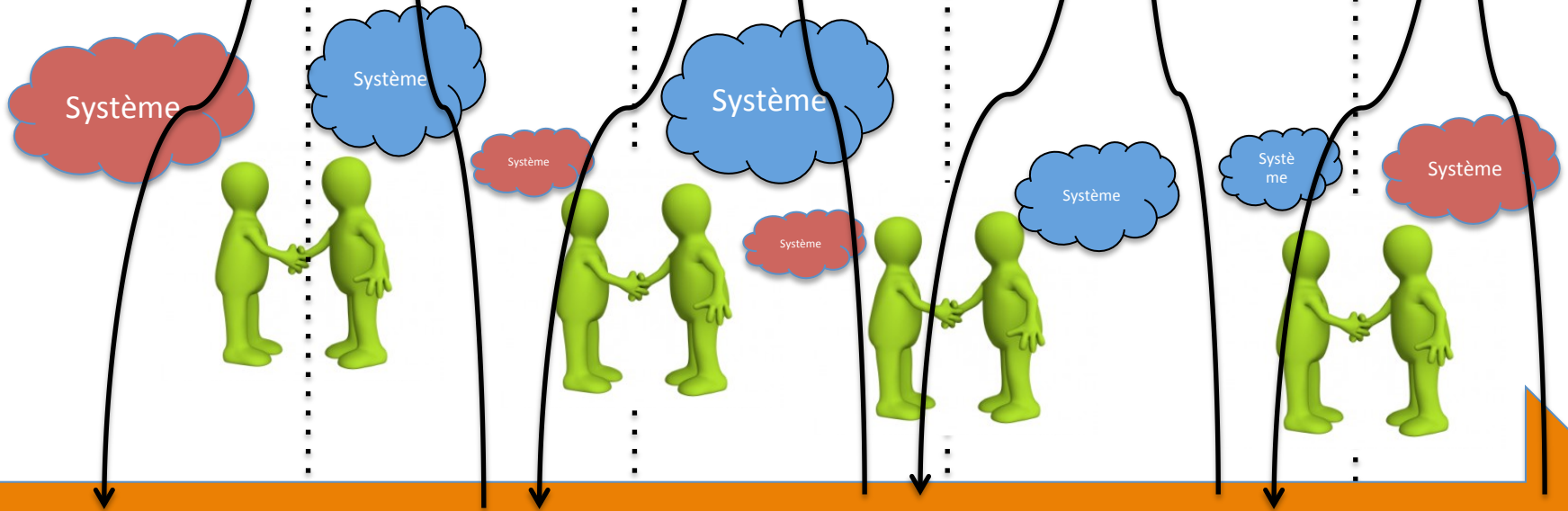
EX (exigences; cahier des charges)

SP (sprints; implémentation)



Valider à chaque itération avec le client: montrer les exigences et l'implémentation (le « produit » en action)

EX (exigences; cahier des charges)



SP (sprints; implémentation)

Conclusion

En résumé

- Modéliser les exigences/besoins avec le client de manière continue (EX)
- Valider l'implémentation par le test (SP)
- Valider les exigences et l'implémentation à chaque itération avec le client
 - Montrer le “produit” en action permet de raffiner les exigences
- Conséquence: sorties fréquentes de “release”
 - Solution: procédure de tests automatisée (git + Jenkins + Junit + PhantomJS)

10 novembre

18 décembre

EX (exigences; cahier des charges)

SP (sprints; implémentation)

PR
(présentation)

- Comment commencer?
 - Comprendre le domaine d'application
 - Comprendre techniquement l'existant
 - Comprendre l'objectif "global" et raffiner / itérer

Travail collaboratif et itératif (multi-persons, multi-versions)



Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2x	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%

Product	Image process...	Sensor format	Sensor type	Sensor manufa...	Megapixels	Focus points	Metering pixels	Viewfinder cov...
D3X	EXPED	Full-frame	CMOS	Sony	24.5	51	1005	100%
D2Xs	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D2x	-	APS-C	CMOS	Sony	12.4	11	1005	100%
D1X	-	APS-C	CCD	Sony	5.3	5	1005	96%
D1	-	APS-C	CCD	Sony	2.66	5	1005	96%
D4S	EXPED 4	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D4	EXPED 3	Full-frame	CMOS	Nikon	16.2	51	91000	100%
D3S	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D3	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	100%
D99s	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D99	-	APS-C	JFET-LBCAST	Nikon	4.1	11	1005	100%
D1H	-	APS-C	CCD	Sony	2.7	5	1005	96%
D810	EXPED 4	Full-frame	CMOS	Sony	36.3	51	91000	100%
D800	EXPED 3	Full-frame	CMOS	Sony	36.3	51	91000	100%
D700	EXPED	Full-frame	CMOS	Nikon	12.1	51	1005	96%
D790	EXPED 4	Full-frame	CMOS	Nikon station ne...	24.9	51	91000	100%
D610	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%
D800	EXPED 3	Full-frame	CMOS	Nikon	16.2	39	2016	100%

