Retour d’expérience : Gestion des d'exigences en cycle incrémental/itératif

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November 2017

Agenda

1 Context- Automotive software embedded development
- Requirement Management usual/specific issues
- Development Lifecycles

2 Requirements Elicitations – Practices
- Baselines - Strategy

3 Requirement Management – Practices
- Product development Governance
- Traceability models

4 Conclusion

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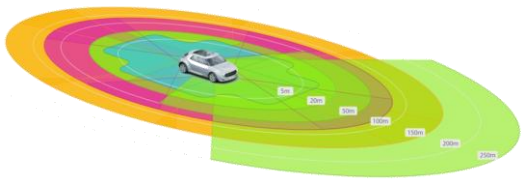
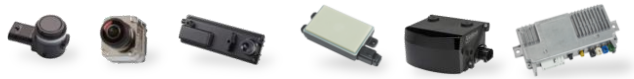
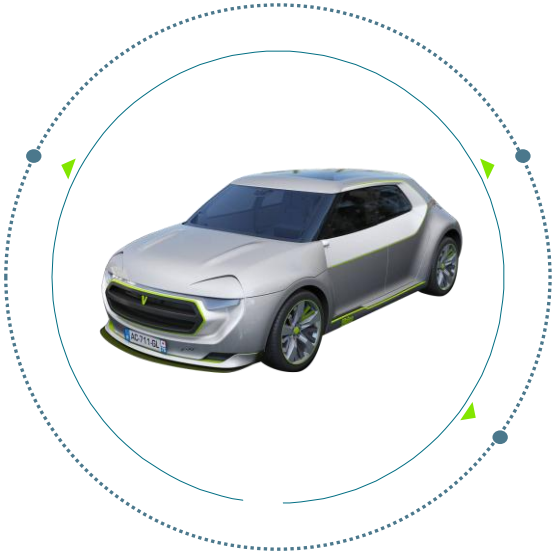
Intuitive driving for safe and connected mobility

AUTOMATED CAR

FULL ADAS TECHNOLOGIES AND SYSTEM OFFER FOR AUTOMATED CARS







CONNECTED CAR

FULL CONNECTIVITY FROM SHORT DISTANCE TO CLOUD

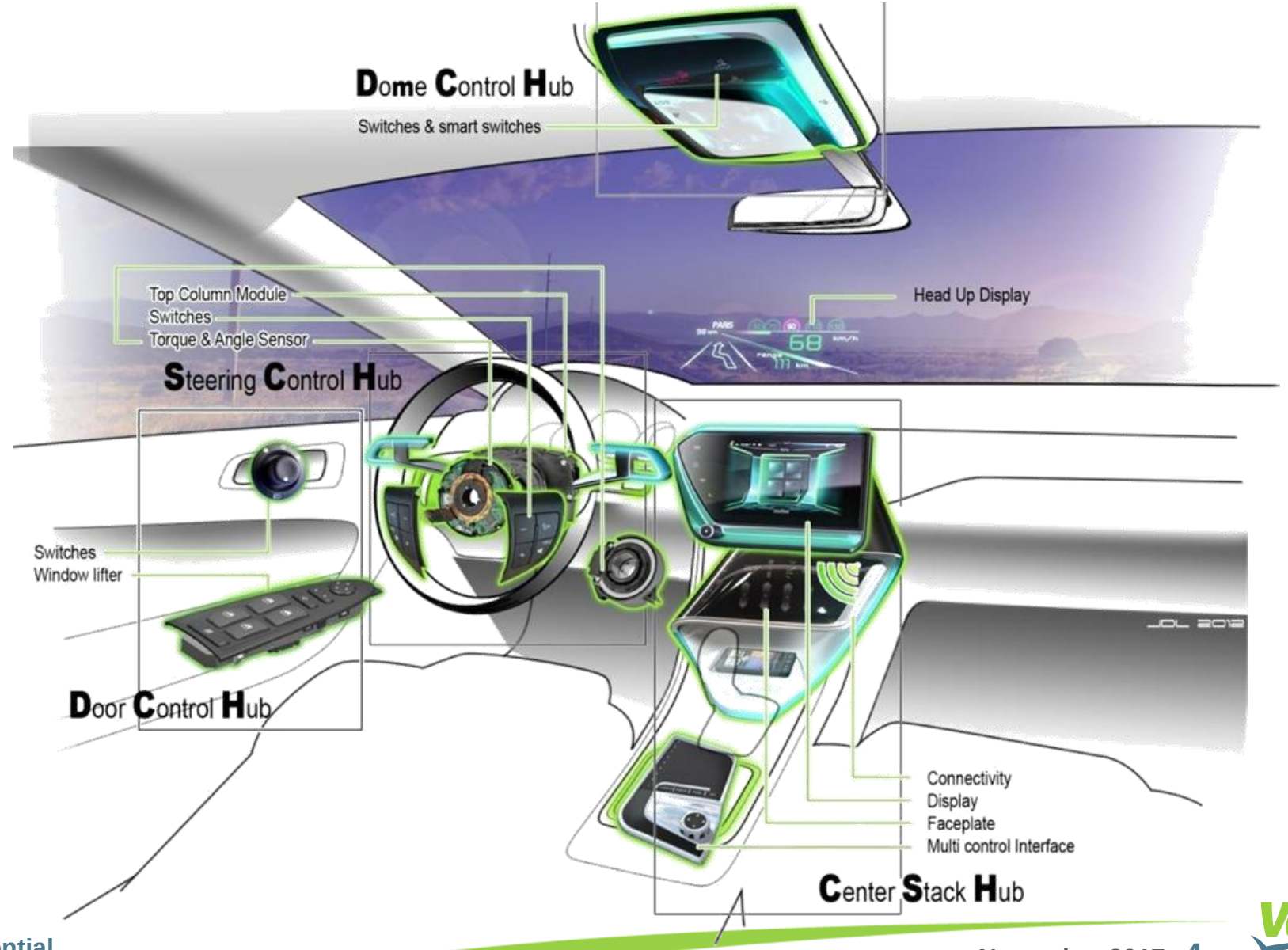
INTUITIVE CONTROLS

NEW USER EXPERIENCE THROUGH INTUITIVE CONTROLS

Intuitive driving for safe and connected mobility while reducing CO_2 emissions

VALEO Intuitive Driving Cockpits

VALEO INTUITIVE DRIVING
INTUITIVE CONTROLS



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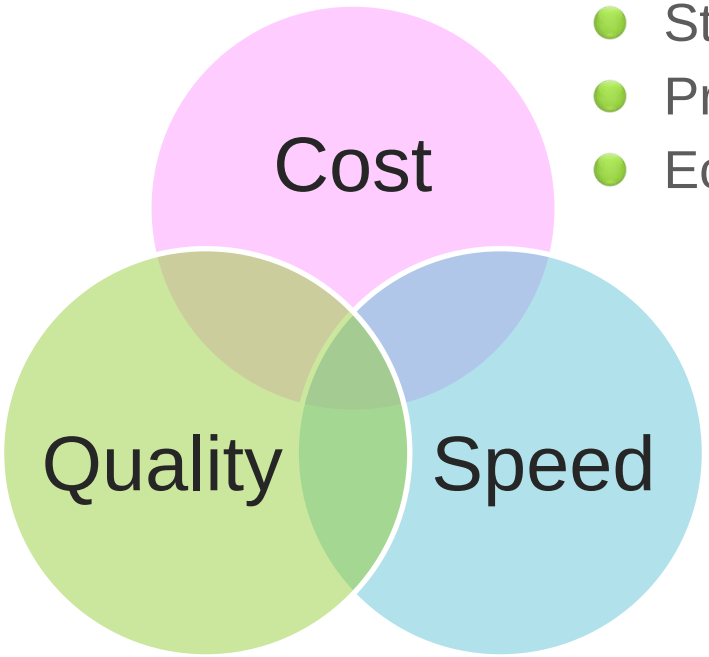
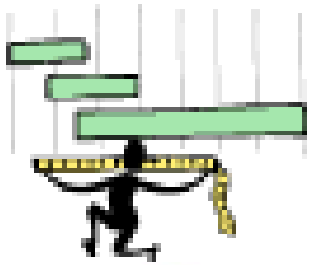
Software automotive constraints

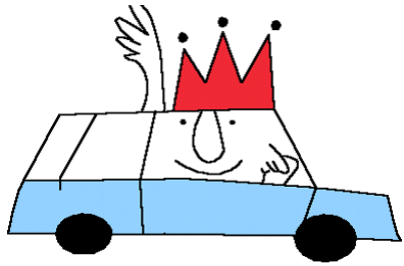


- Stay in cost frame (R&D budget)
- Project profitability (Margin)
- Eco design (Limit HW resources usage, commercially viable)

- Automotive industry is planning-driven *(Start Of Production never shifts)*
- Strong VALEO commitment but Customer needs uncertainty

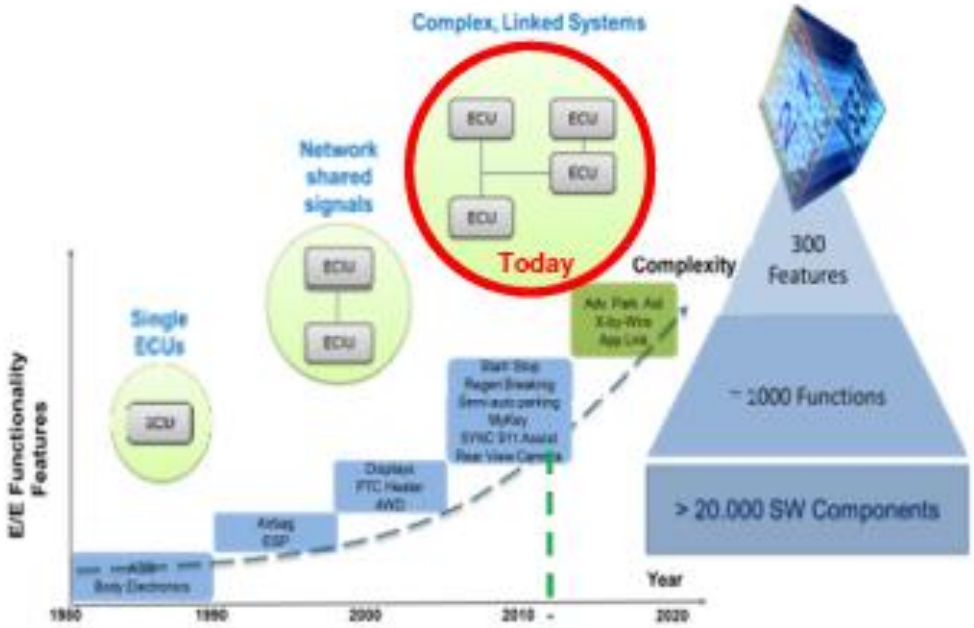


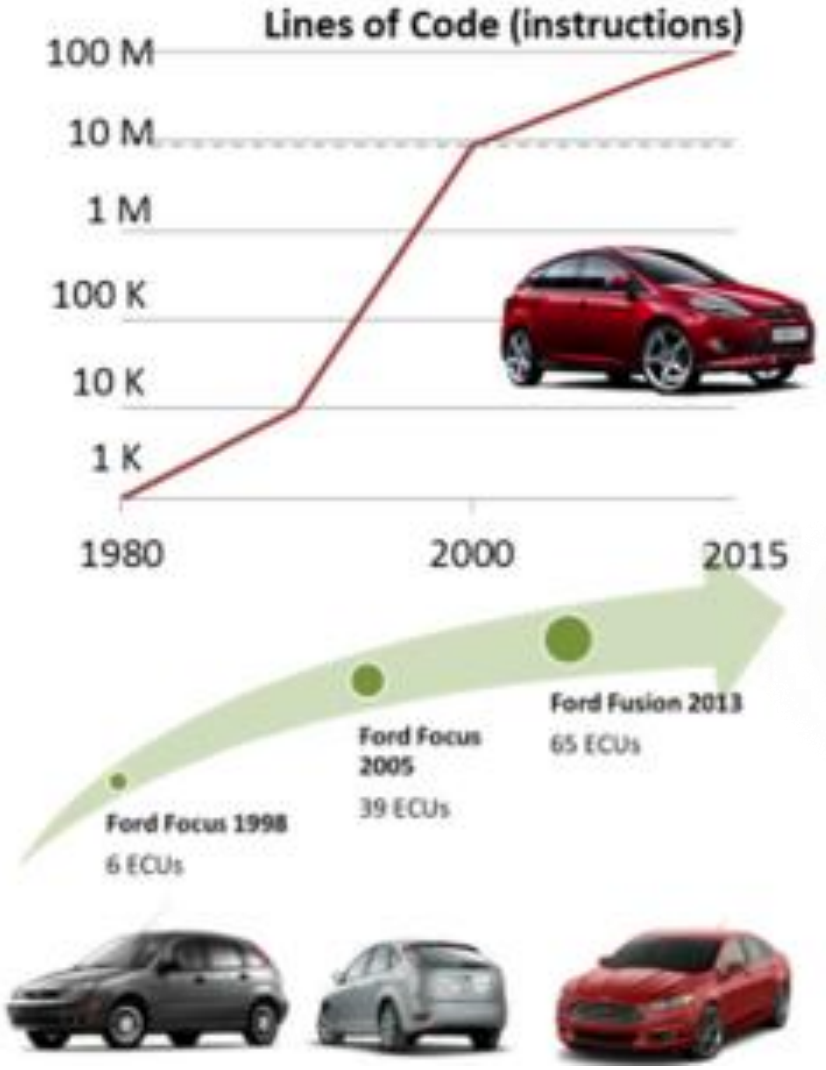
- *Economic Security* (Mass production)
- Complexity increase due to innovations in Premium Cars
- Dependability *(ISO 26262)*
- Deliver demanded functionality without trial & errors



Software automotive increased complexity

Features are highly complex and often distributed over many physical modules





Growth of Software and increasing complexity require enhanced Processes, Methods&Tools to support development of high quality software.

Source : FORD QPIP11C

Ford
Go Further

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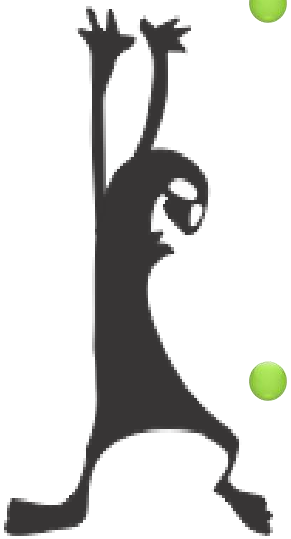
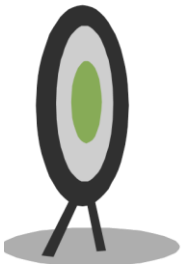
Requirements Mgt: What keep us up at night?



- Requirement uncertainty

- Volume of requirement / Planning
  - Up to 40 000 requirements in Customer Requirement Matrixes
  - Short time for offer, from offer to architecture freeze (<6 months)

- Appropriate requirement elicitation
  - Norms requirements (Safety, environmental test…)
  - Involve all métiers/Multi-sites
  - Effective acceptance/clarification process
  - Track assumptions
  - Realistic and commercially viable



Vehicle development process

OEM determines vehicle

Vehicle functions
Vehicle SOP & price

OEM validates vehicle

Part acceptance

OEM defines parts

Part specification / requirements
Parts supplier / costs

OEM defines milestones

Sample definition (scope & quality)

OEM integrate parts

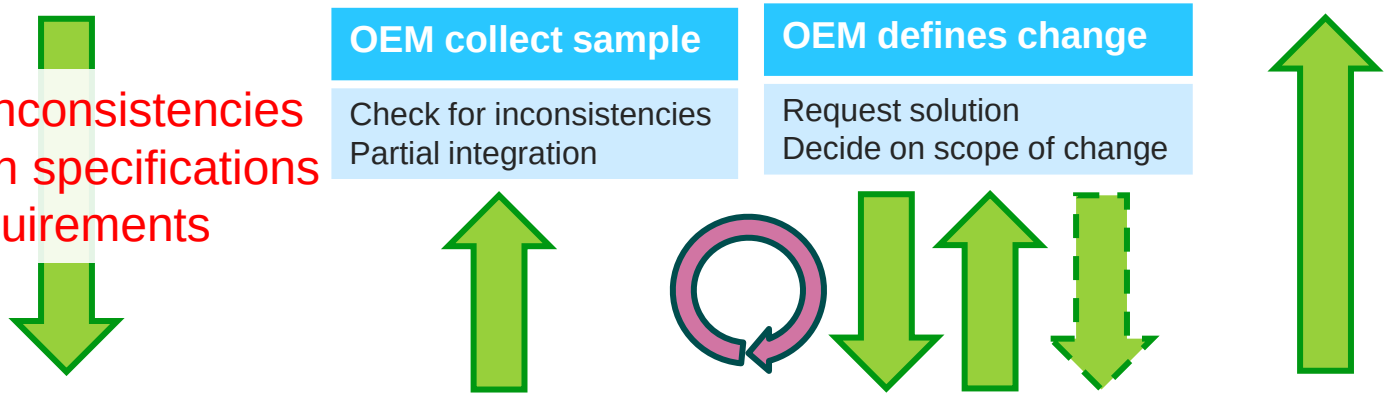
Issue: inconsistencies between specifications and requirements

OEM collect sample

Check for inconsistencies
Partial integration

OEM defines change

Request solution
Decide on scope of change

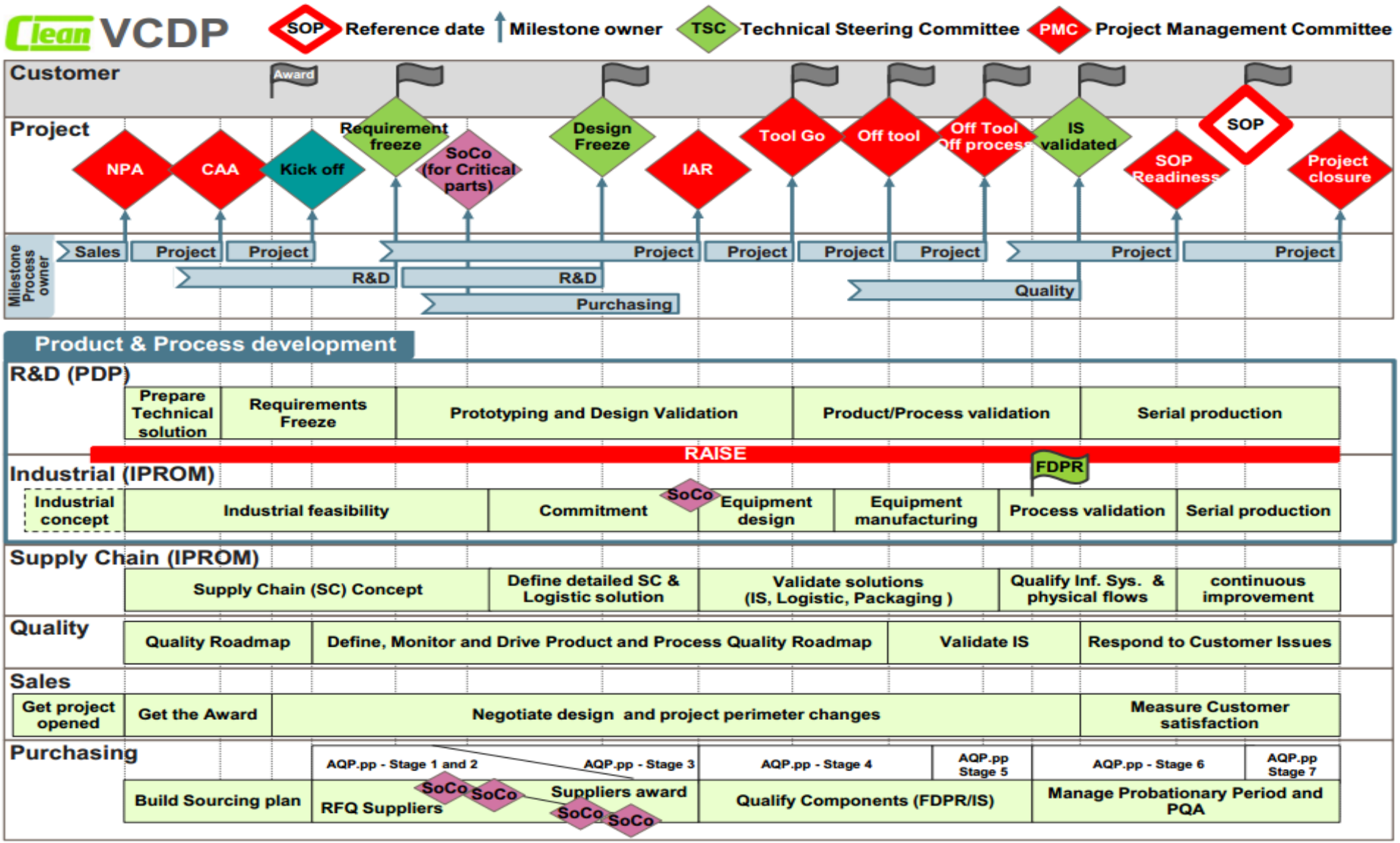


Supplier develop part

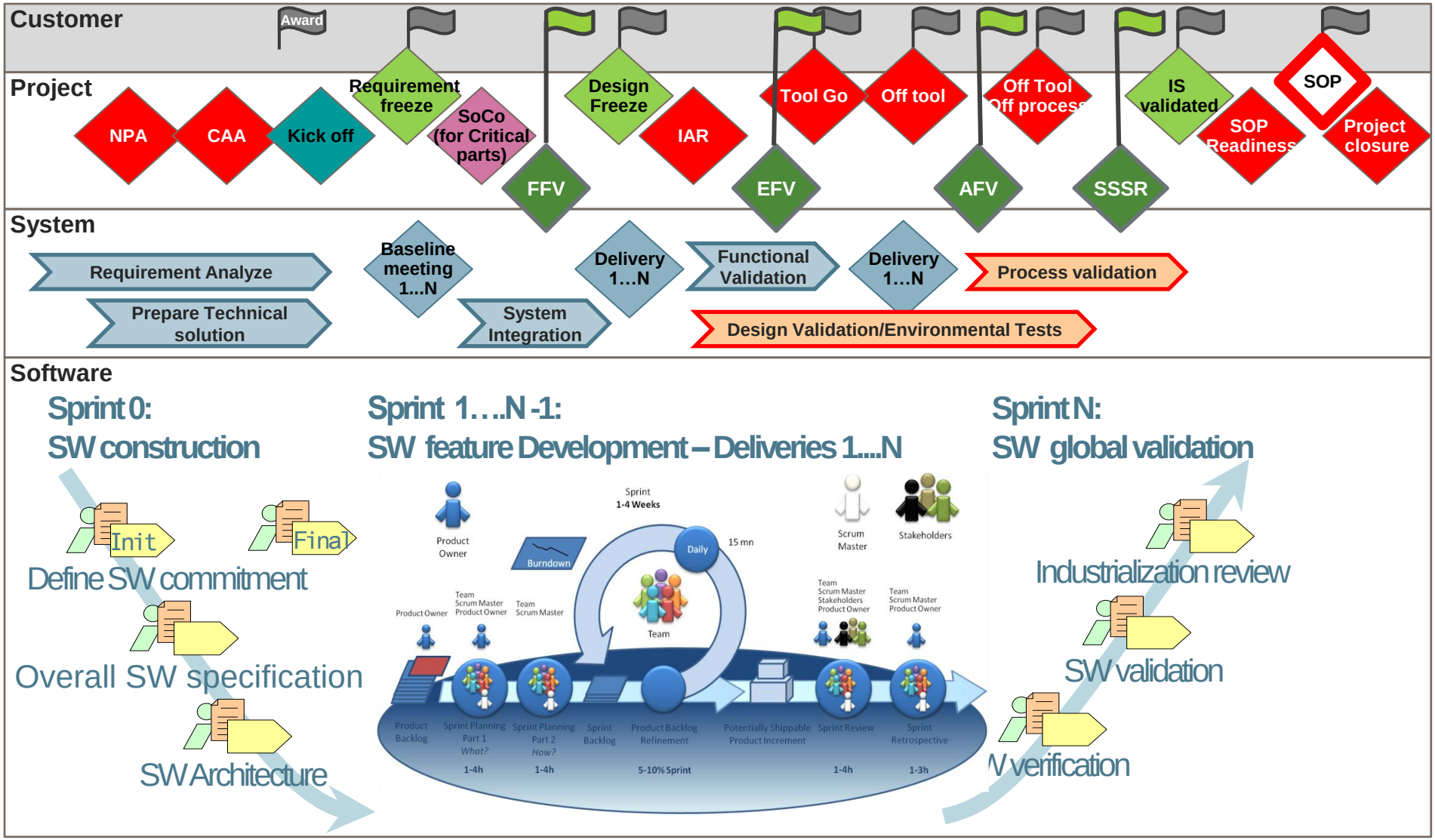
Requirements Analysis, determine sub parts, determine reuse, develop new sub parts, integrate sub parts, validate parts
Develop sample, support milestones

Process is Iterative in Nature and OEMs need to start somewhere

VALEO Product development Lifecycle

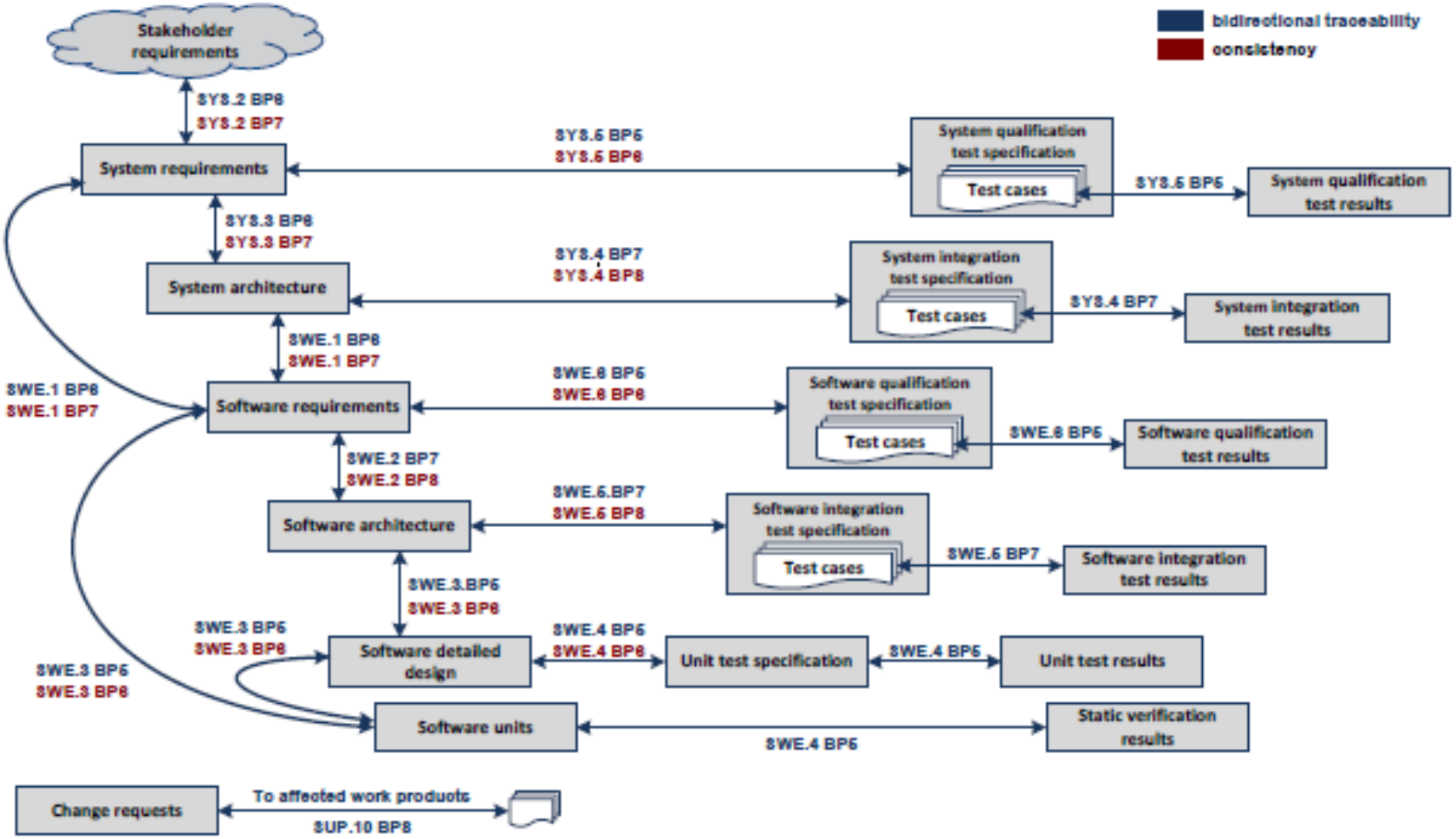


VALEO System &Software development lifecycle



Automotive specific practices (A-SPICE)

- *"Communicate agreed system requirements to all relevant parties"*
- *"Establish bidirectional traceability", "Manage Consistencies"*



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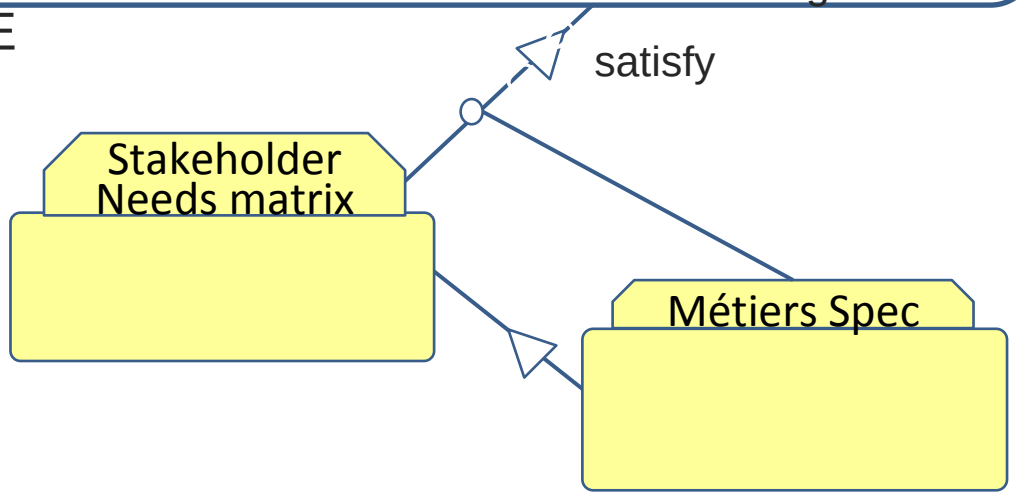
Requirement baseline definition

Num	Origin	Document revision				Date	Doors module link	Doors module baseline			Available	Allocation	Status
			A	B				C	D				
		RFQ	B-sample	B2				BDV	C1				
		Closed	Closed	InWork				Closed	InWork				
00-GENERAL													
00.00	CUSTOMER	2.0	2.1	2.1		?	http://doorsedb:808	B-DV[1.0 (REV)]	3.0C1		Yes	Product Electronics Mechanics Software Optic Testing Quality	Applicable
00.04	CUSTOMER	?	?	?		23/11/2015	http://doorsedb:808	B-DV[1.0 (REV)]	3.0C1		Yes	Optic	Applicable
05.01.04	CUSTOMER	C	C	C		04/2015	http://doorsedb:808	B-DV[1.0	3.0C1		Yes	Software	Applicable

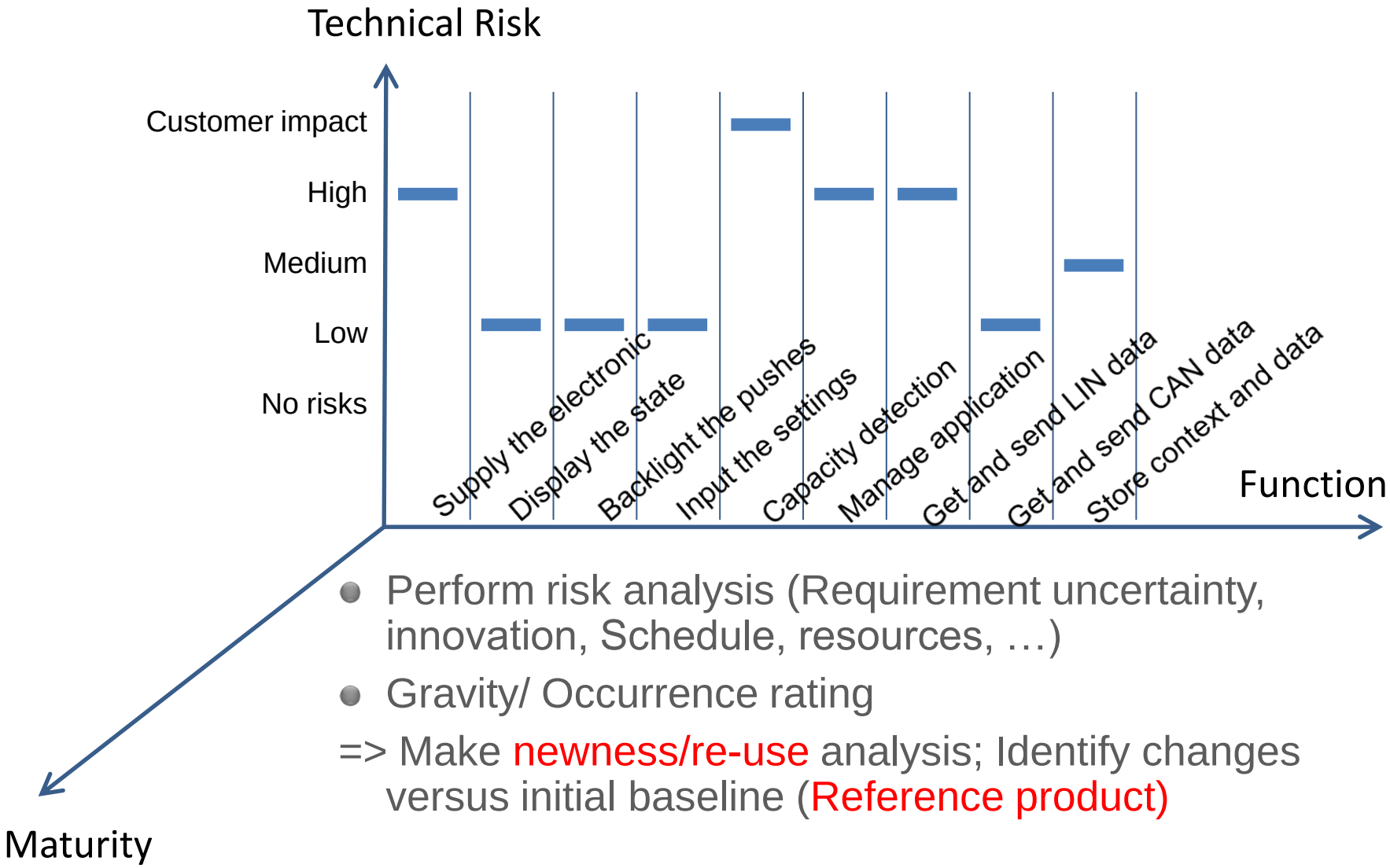
Document Tracking List

BASELINE

- List
  (Customer docs, norms…)
- Baseline
  stakeholder needs
- High level allocation
  to métier for requirement elicitation



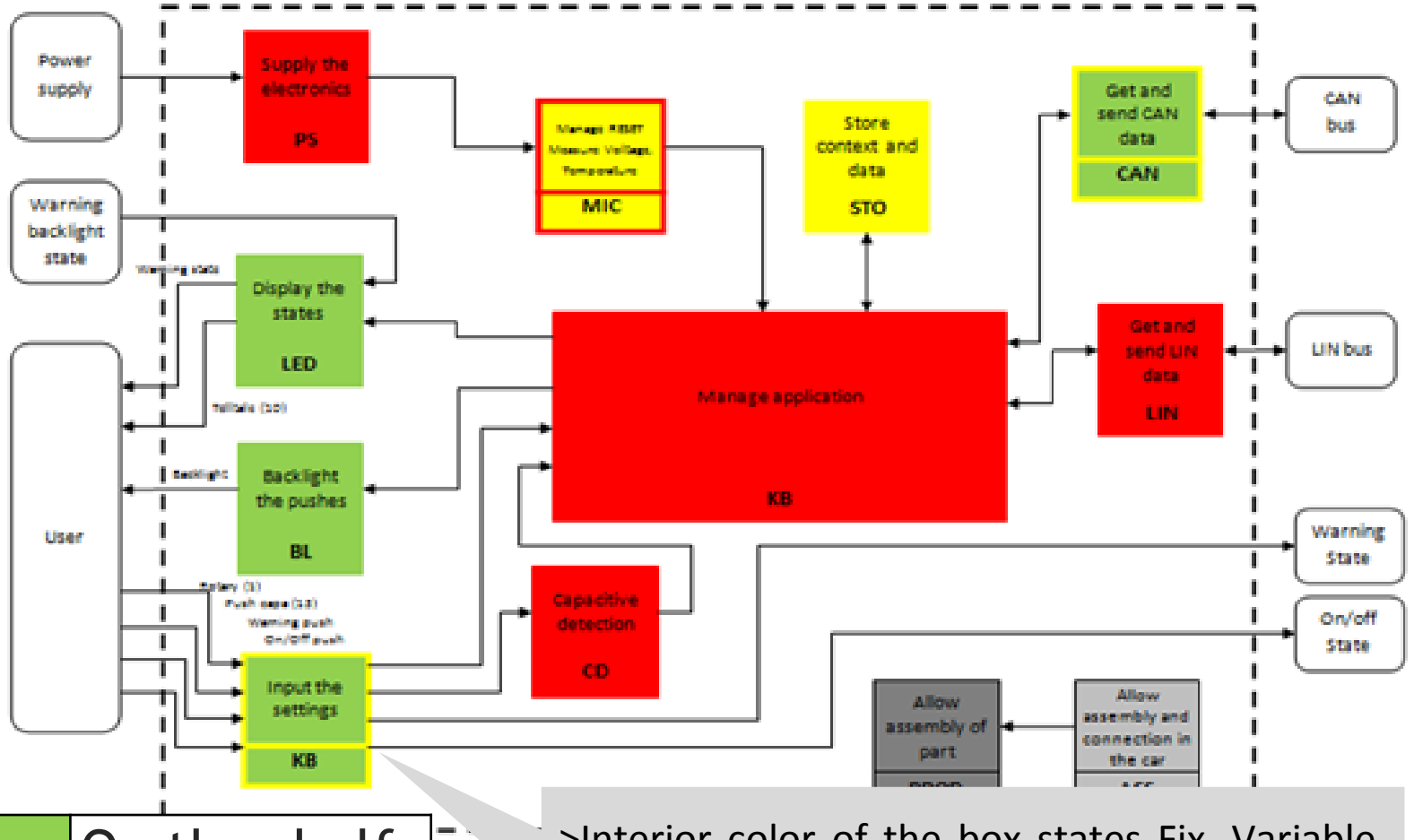
Req^{t} elicitation strategy – Technical Risk



- Perform risk analysis (Requirement uncertainty, innovation, Schedule, resources, …)
- Gravity/ Occurrence rating

=> Make newness/re-use analysis; Identify changes versus initial baseline (Reference product)

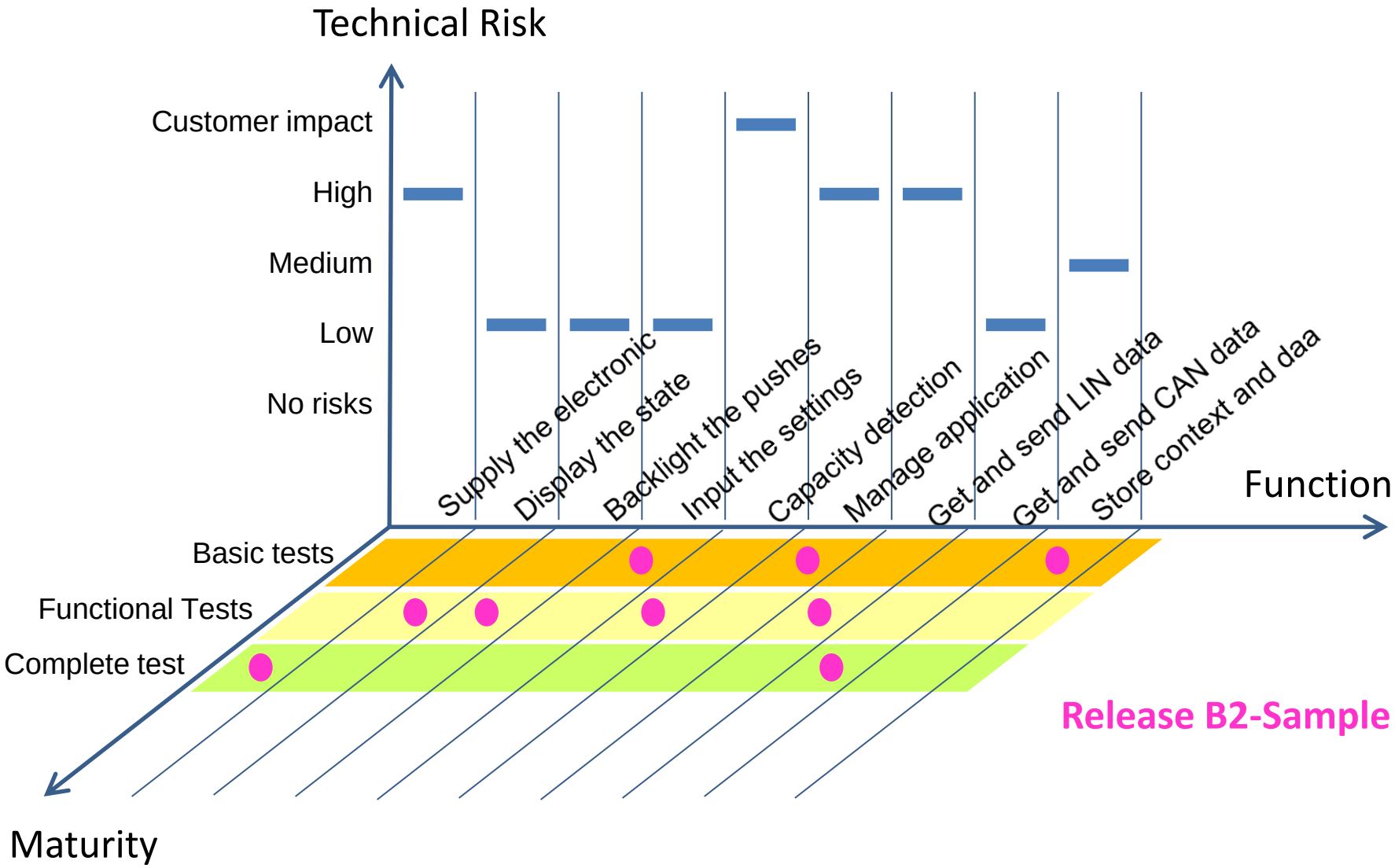
Technical risk analysis – Newness/re-use



Fix	On the shelf
Variable	Similar dvt
Specific	First time

>Interior color of the box states Fix, Variable, Specific status of the function
>Border color of the box states Fix, Variable, Specific status of Development and Test

Req^{t} elicitation strategy - Function maturity



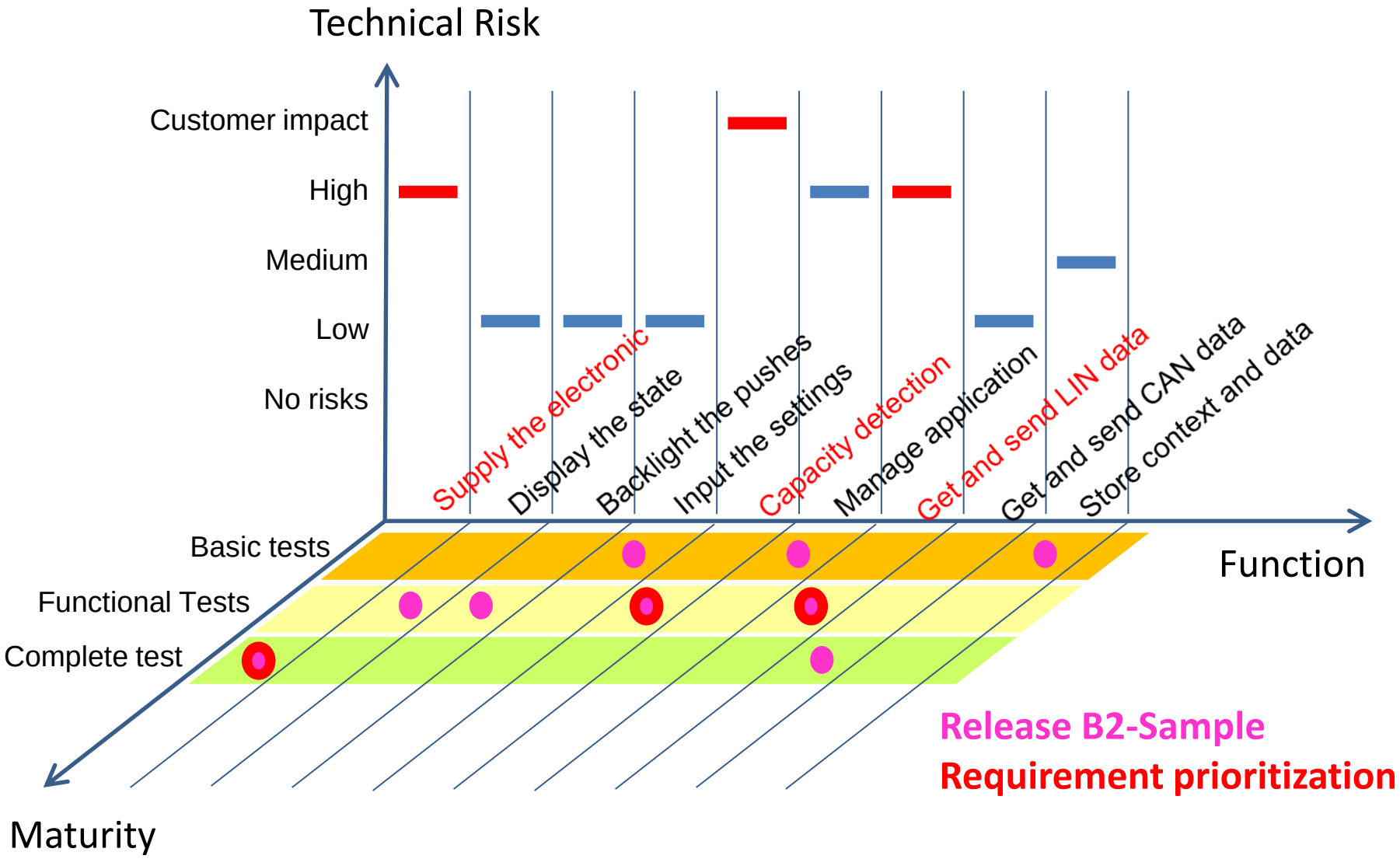
Release B2-Sample

Function maturity definition – Release plan

Nominal implementation	Basic Tests	**NI**
	Functional tests	**NI**
	Full test	**NI**
Complete implementation (Degraded mode + diagnosis)	Basic Tests	**CI**
	Functional tests	**CI**
	Full test	**CI**

Métier	Sub-Package	Function	CUST A0/B1	CUST B2	NTERNAL DV	CUST B3 (Tool launch)	CUST C4 (Off tool)	CUST C5 (PV Start)
System / Product		SUPPLY THE ELECTRONIC	NI	CI	CI	CI	CI	CI
		DISPLAY THE STATE	NI	CI	CI	CI	CI	CI
		BACKLIGHT THE PUSHES	NI	CI	CI	CI	CI	CI
		INPUT THE SETTINGS	NI	NI	CI	CI	CI	CI
		CAPACITY DETECTION	NI	CI	CI	CI	CI	CI
		MANAGE APPLICATION	NI	NI	NI	CI	CI	CI
		GET END SET LIN DATA	NI	CI	CI	CI	CI	CI
		GET END SEND CAN DATA	NI	CI	CI	CI	CI	CI
		STORE CONTEXT AND DATA	NI	NI	NI	CI	CI	CI

Req^{t} elicitation strategy - Prioritization



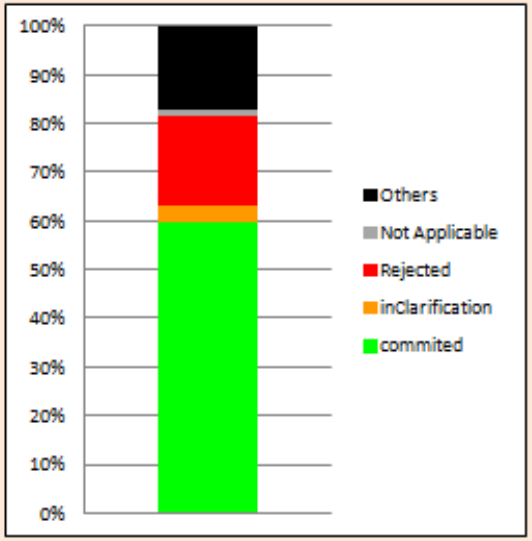
Release B2-Sample

Requirement prioritization

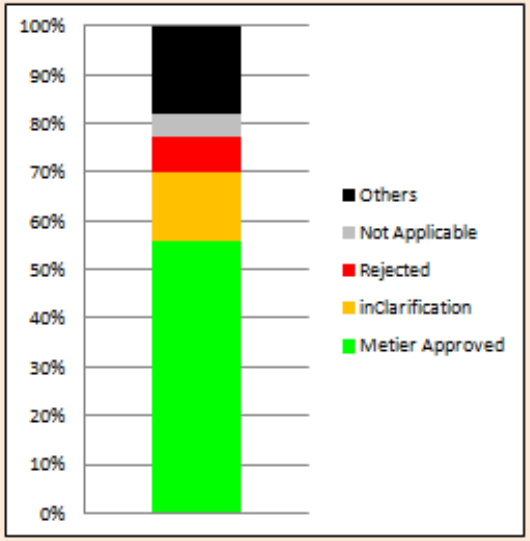
Requirement elicitation – Main attributes

- VALEO acceptance: Customer compliance matrix
- Métier Acceptance: Internal / refined requirement
- Verification strategy: Fully part of requirement elicitation

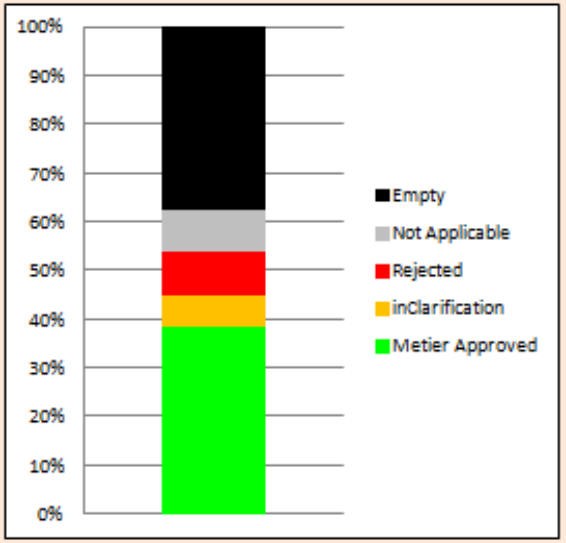
Valeo Acceptance Status	
1561	Total of Requirement
935	green : commited
51	orange : In Clarification
286	red : Rejected
23	Not Applicable
266	Others



Metier Acceptance Status per Acceptance Status (Internal)	
1561	Total of SHN
874	green : Metier Approved
215	orange : In Clarification
115	red : Rejected
74	Not Applicable
283	Others



Verification Strategy Approval Status per Acceptance Status (Internal)	
1561	Total of SHN
600	green : Strategy Approved
98	orange : Strategy In Clarification
144	red : Strategy Rejected
134	Not Applicable
585	Empty



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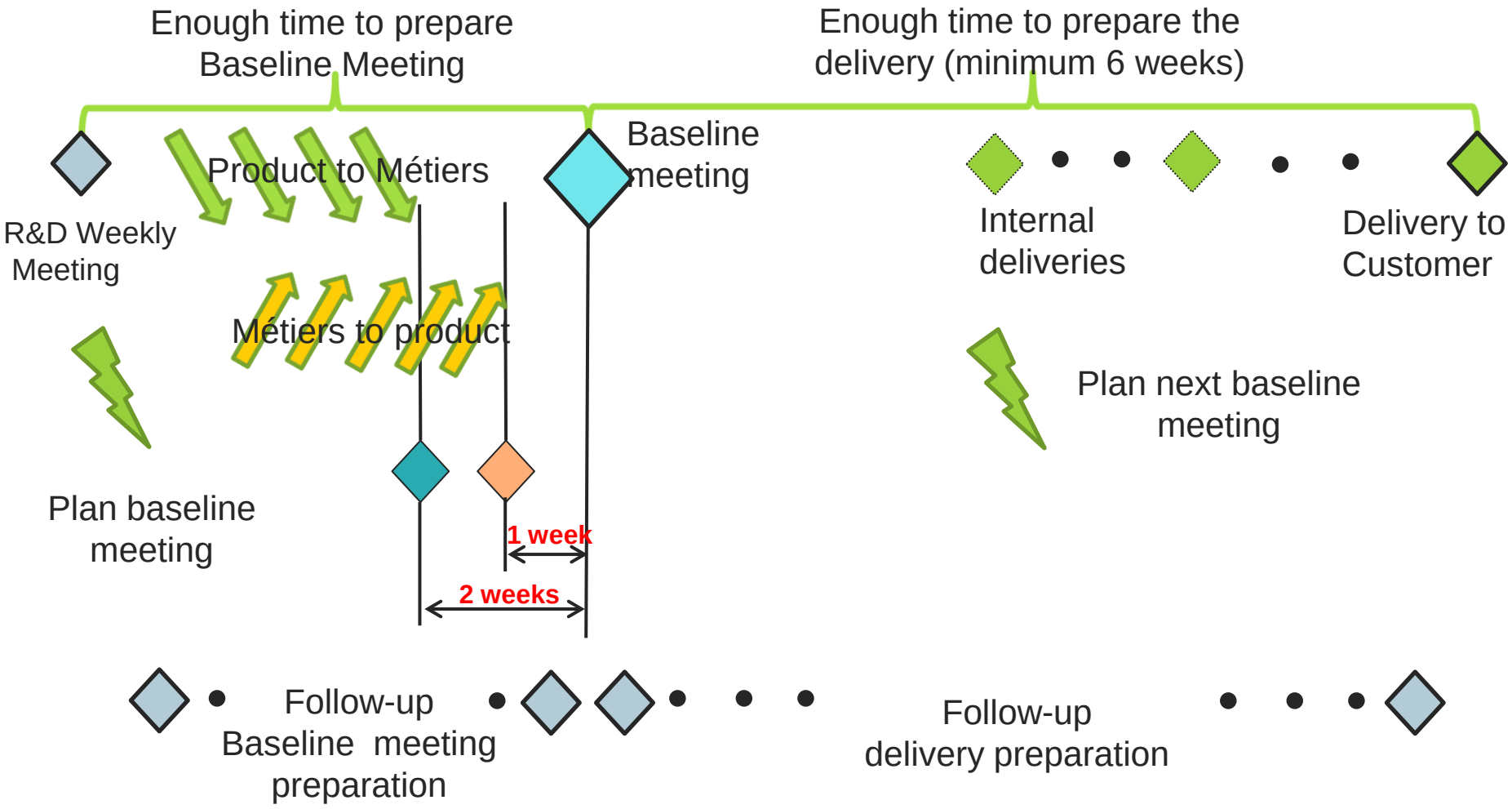
Baseline meeting - Objectives

- Review outputs of Development Planning & Requirements Engineering activities to ensure that :
  - Planned deliveries are defined and understood by all contributors (Functional & physical content, expected maturity level)
  - Requirements baseline for the next delivery is mature enough to ensure that product to be delivered will be at expected level in terms of functional content and maturity level
  - Team deliverable dependencies review
- Obtain commitment from métiers to implement & test the requirements they are responsible for, at expected maturity level
- Register gaps versus above expectation;
  Identify actions needed to go back on track.
- Is the main technical project governance

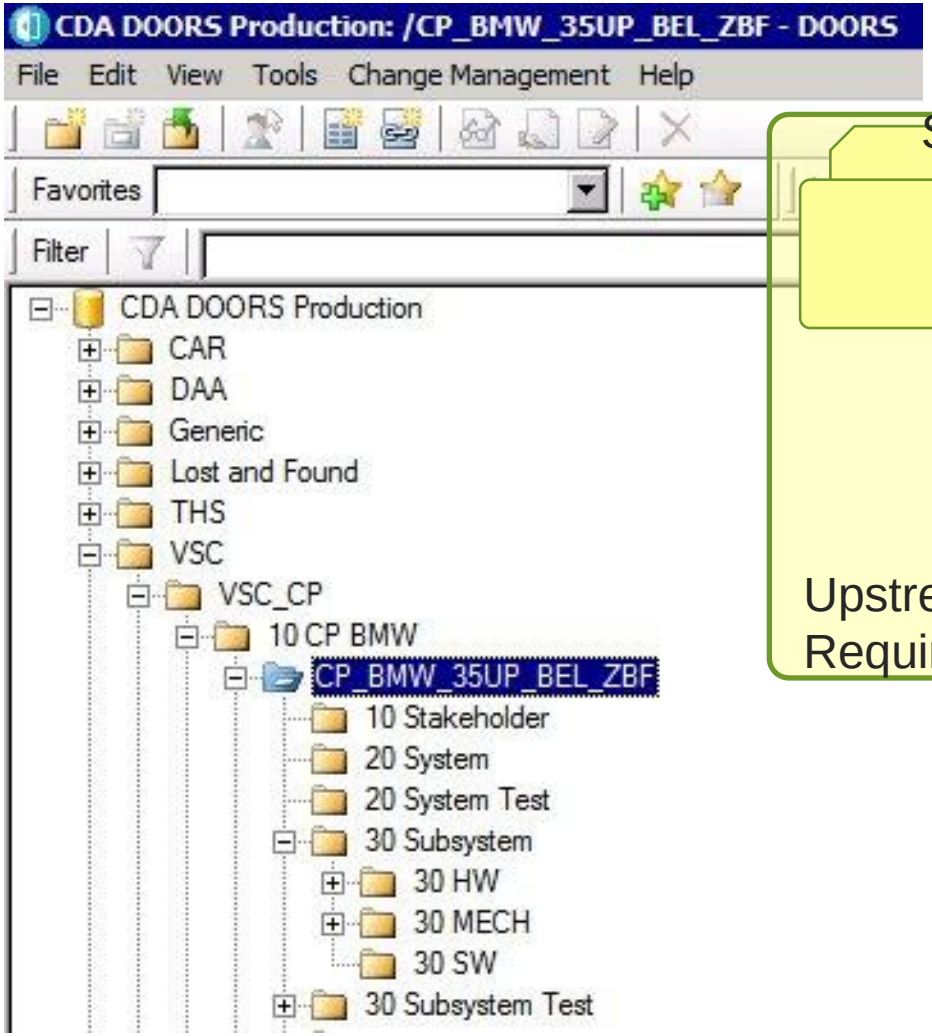
Baseline meeting – Planning pattern

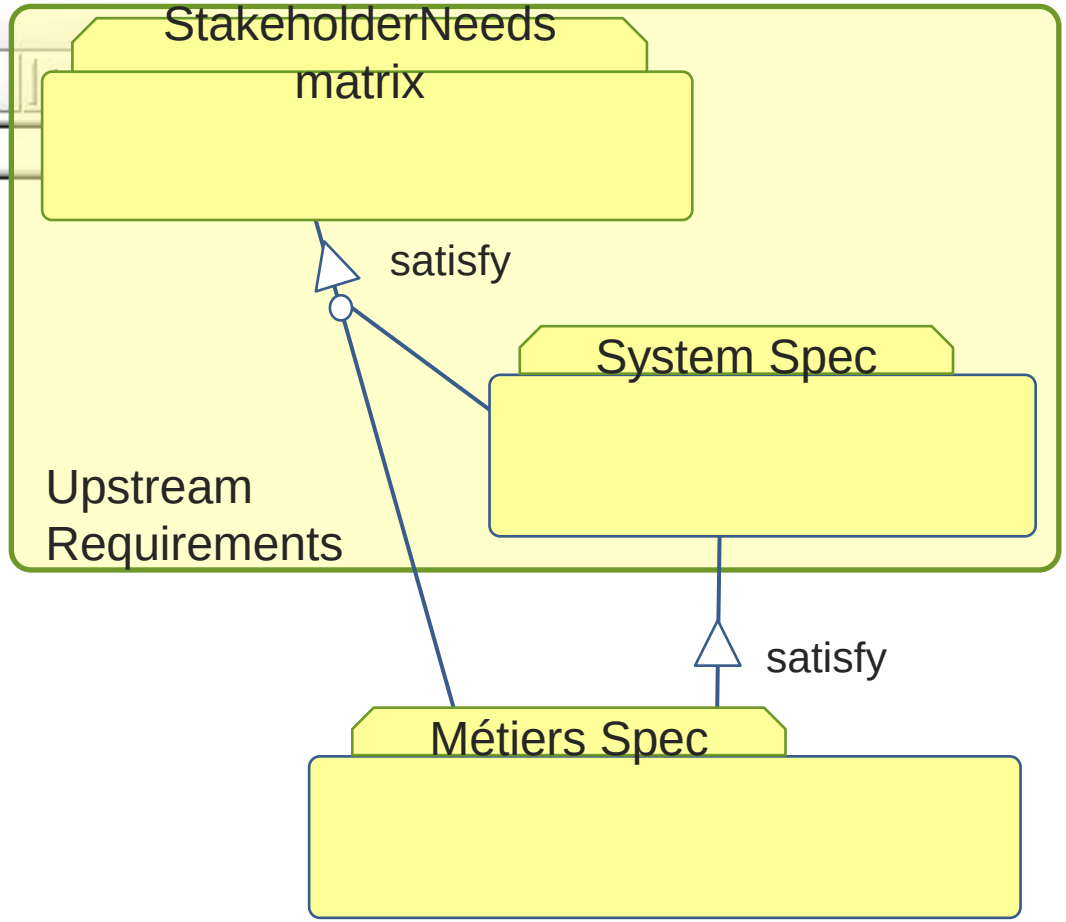


Baseline meeting – Defined protocol

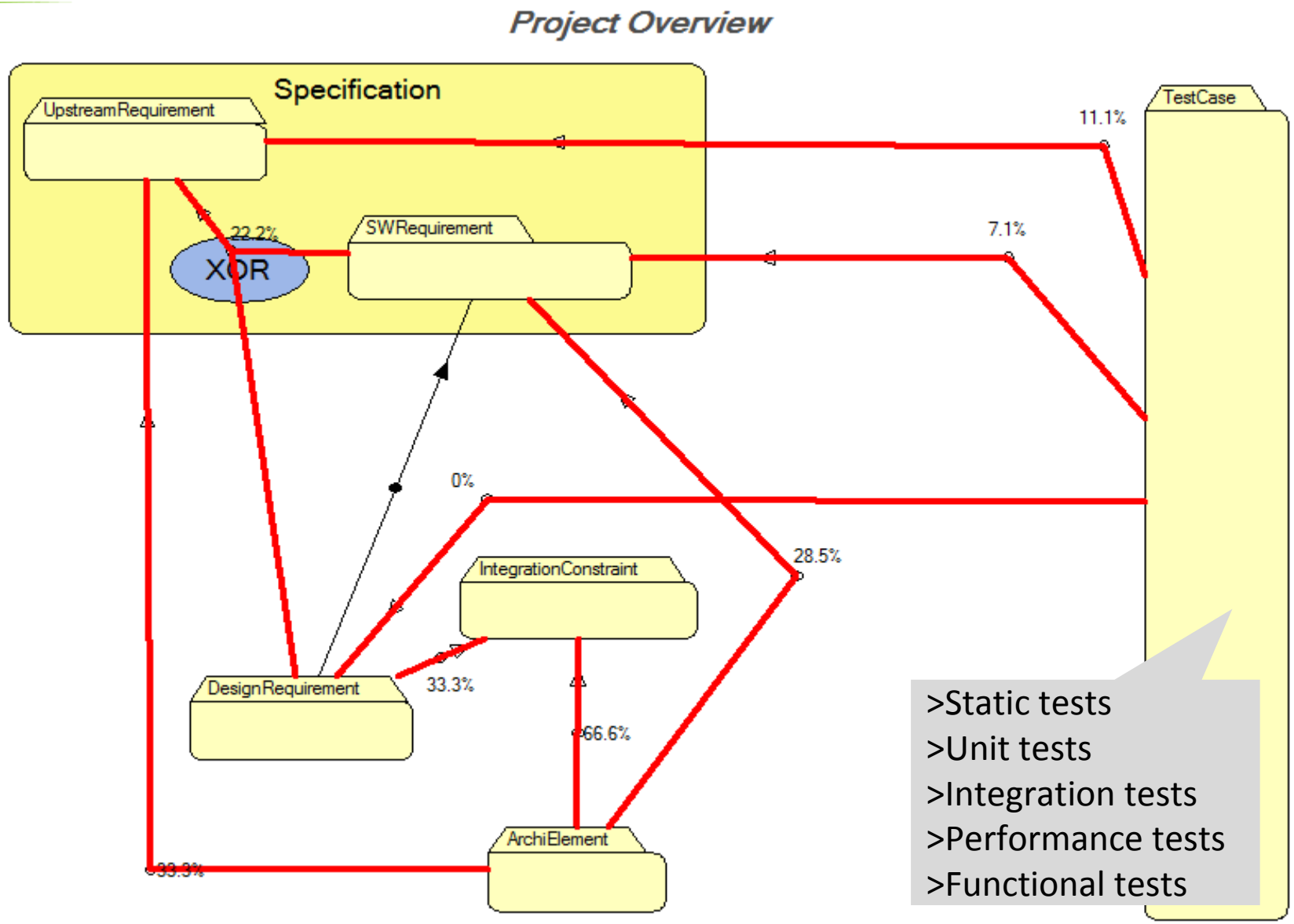
1. Baseline Meeting Checklist		Page 1/3
To-Do's	Remark/Ref. of Action	Status
MILESTONE		
RELEASE PLAN		
DOCUMENT BASELINE		
COMPLIANCE MATRIXES		
Identify which requirements are applicable and will be implemented in the first and second delivery		
Identify which métier is responsible for implementation of the above requirements		
Depending on the expected maturity level of the first and second deliveries, agree the verification strategy for each requirement that will be implemented in these deliveries		
Ensure all applicable requirements are assigned to only one métier for implementation and to at least one test team?		
INTERACTIVE QUESTIONNAIRE		
CHANGE REQUEST		
ANOMALIES		

Requirement Specification - Decomposition





Requirement Traceability in Software métier



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Conclusion - Summary

- Requirement elicitation strategy is needed because:
  - Requirements cannot be fully analyzed before the first delivery
  - Features have not same technical risks (innovation, requirement uncertainty, schedule, re-use…)
- Baselines meetings are needed
  - To monitor the execution of requirement elicitation strategy
  - To reduce the risk of requirement misunderstanding
  - To communicate agreed system requirements to all stakeholders
- Requirement management tools are essential for
  - Monitoring the execution of requirement elicitation strategy
  - speeding requirement development and impact analysis
  - Supporting verifications of requirements consistancy
  - Optimizing Customer/system/Sub system requirement development

Automotive technology, naturally

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