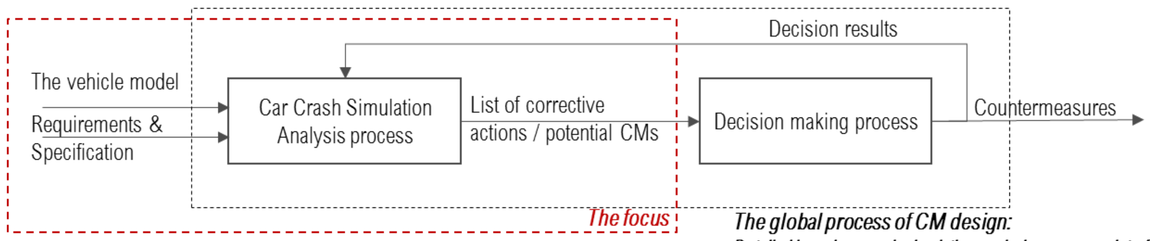
INITIATIVE DOCTORALE INTERDISCIPLINAIRE

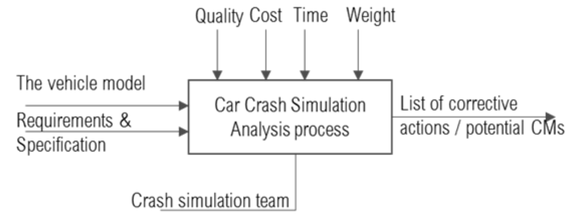
Axe « Science et innovation »

Analysis and Diagnosis Support for Car Crash Simulation Results

The subject of interest is the process of analysis of the crash behavior of the vehicle: Car crash simulation analysis.



The global process of CM design:
Detailed based on crash simulation analysis process point of view



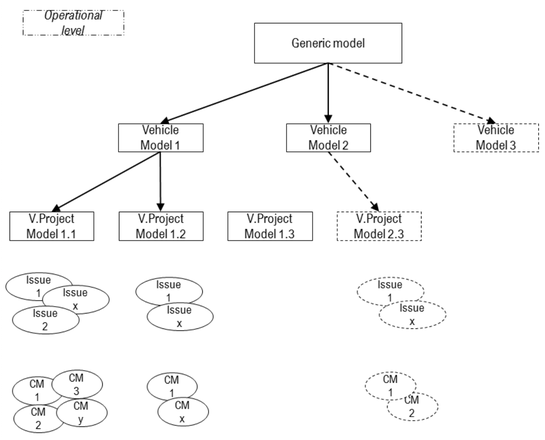
SADT: Car crash simulation analysis process

CONTEXT, STAKES & OBJECTIVES

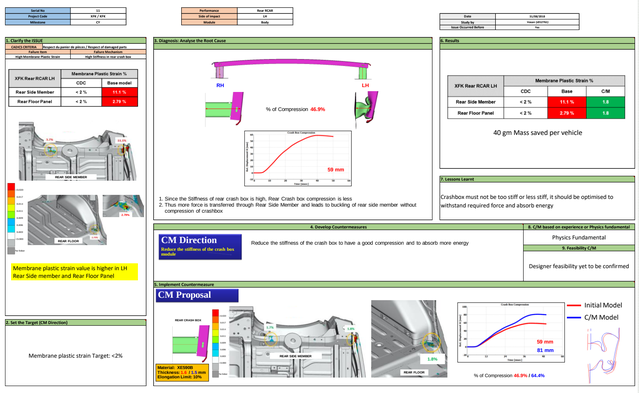
- Collaboration
  - A collaboration with the engineers in India is taken into consideration
  - Collaboration: international teams & teams from other disciplines
- Complexity
  - The team is international and decentralised
  - The sample of the team studied is in France and is composed of 11 engineers
  - Each engineer is working on a vehicle project (sometimes more than on)
- Exigencies
  - Deliver potential CMs on a daily basis
  - Ensure the activity at a lower cost
  - Robustness of the proposed corrective actions
- *OBJECTIVES*
  - Ease the activity of crash simulation analysis
  - Reduce the time of the activity

NEED FOR KNOWLEDGE REUSE

Multiple projects, multiple issues

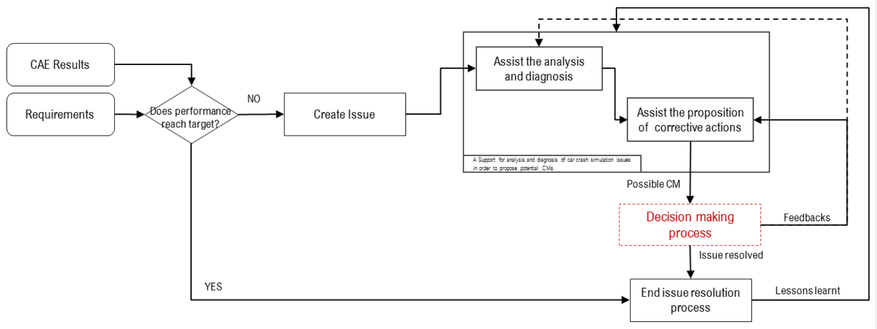


Capitalisation on an issue analysis, diagnosis and CM proposition



CHALLENGES

➢ Design a ***Knowledge Management System*** (KMS) to support the analysis & diagnosis of the simulation issues and the proposition of corrective actions to meet the requirements.



- The KMS will assist the engineers so the need of an interaction human KMS will be taken into account.
- The KMS ensures the collaboration within the team and needs to be adequate to their actual activity.

CONTACT

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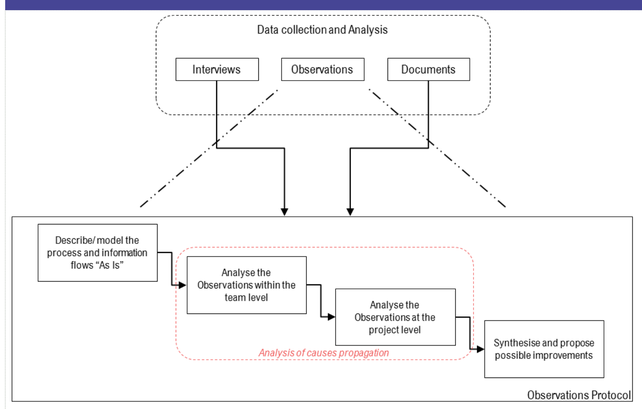
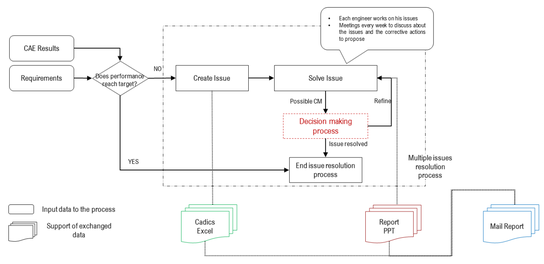
OBSERVATIONS & ANALYSIS

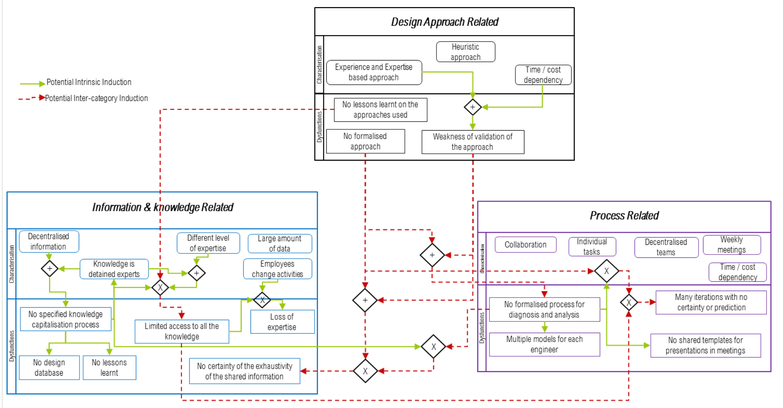


Description As is: Process & Data/ Information Transfer



Analysis of causes propagation

Observations at the team level: Induced dysfunctions



- Induced dysfunctions are dysfunctions potentially engendered by the proper characteristics (intrinsic) of the category or by dysfunctions of another one (inter-category).

Impact on the project level (inspired from "Process Hazard Analysis")
(Mazouni et al., 2007)

Dangerous Situation (Project level)	Contact causes	Feared event (Project level)	Initiating cause
Difficulties in the decision making process	No certainty of the exhaustivity of the shared information	*No respect of QCDP*	Missing information about QCDP
Loss of time	Many iterations with no certainty or prediction	*A Issue is standing throughout the project*	No CM is proposed
Non Feasibility of the proposed design action (CM)	No certainty of the exhaustivity of the shared information	*Loss of time*	Approving a non feasible CM
Difficulties in the decision making process	No certainty of the exhaustivity of the shared information	Missing some important information	No shared templates for presentations in meetings
Loss of time	Many iterations with no certainty or prediction	*A Issue is standing throughout the project*	Limited access to knowledge
No efficiency of the results	No formalised process or approach	Taking a wrong decision about a CM	Non valid approach when searching for CM
Non Feasibility of the proposed design action (CM)	No certainty of the exhaustivity of the shared information	Taking a wrong decision about a CM	No lessons learnt about the manufacturing process

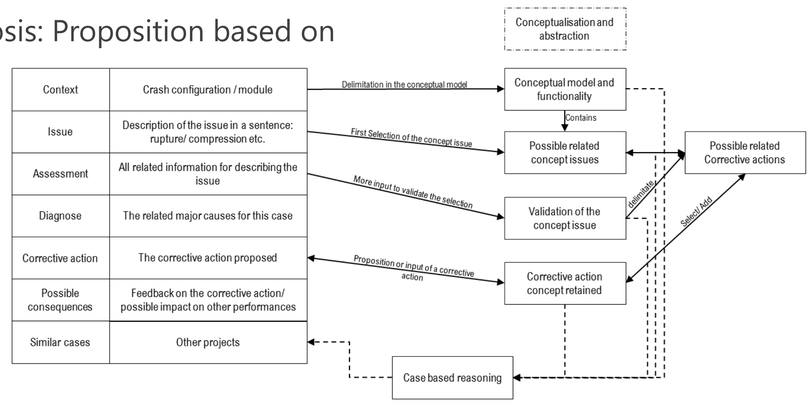
Mazouni, M. H. et al. (2007) 'Proposal of a generic methodology to harmonize Preliminary Hazard Analyses for guided transport', in IEEE International Conference on System of Systems Engineering.

- Interdependency between the most important dysfunctions.
- Most inducing dysfunctions comes form the information & knowledge category.

Design a support system, based on the knowledge and expertise, to assist the experts activity.

PROPOSITION

KMS for analysis and diagnosis: Proposition based on pattern language



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Arora, P., Owens, D. and Khazanchi, D. (2010) 'A Pattern Based Tool for Knowledge Management in Virtual Projects', The IUP Journal of Knowledge Management, VIII(3), pp. 60–80.