Critical factors of success for hyper complex railway projects

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Critical factors of success for hyper complex railway projects

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Why are railway project **HYPER** complex?

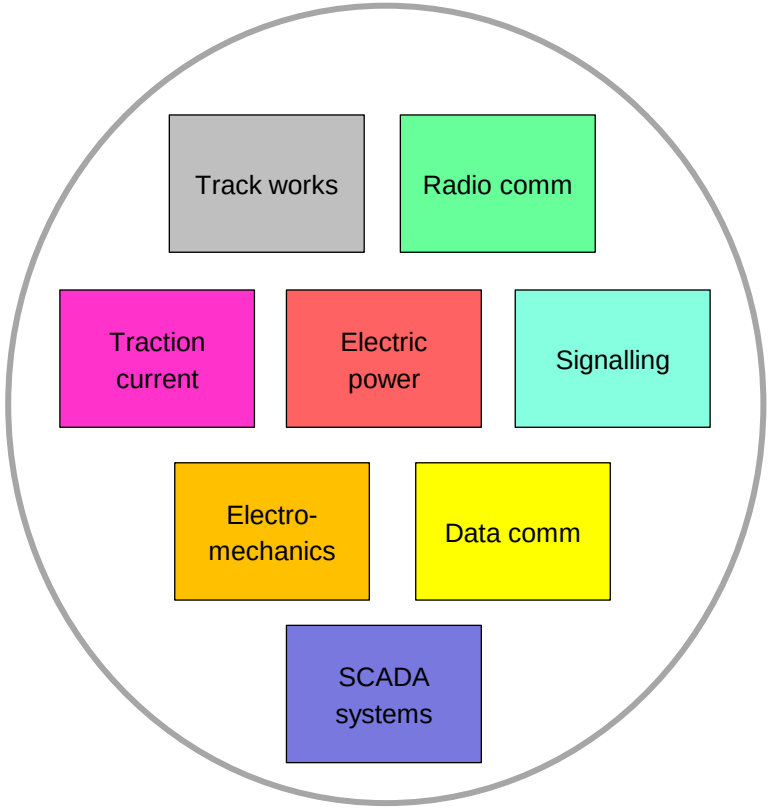
- Every railway project has a lot of focuses:

Technical railway system:





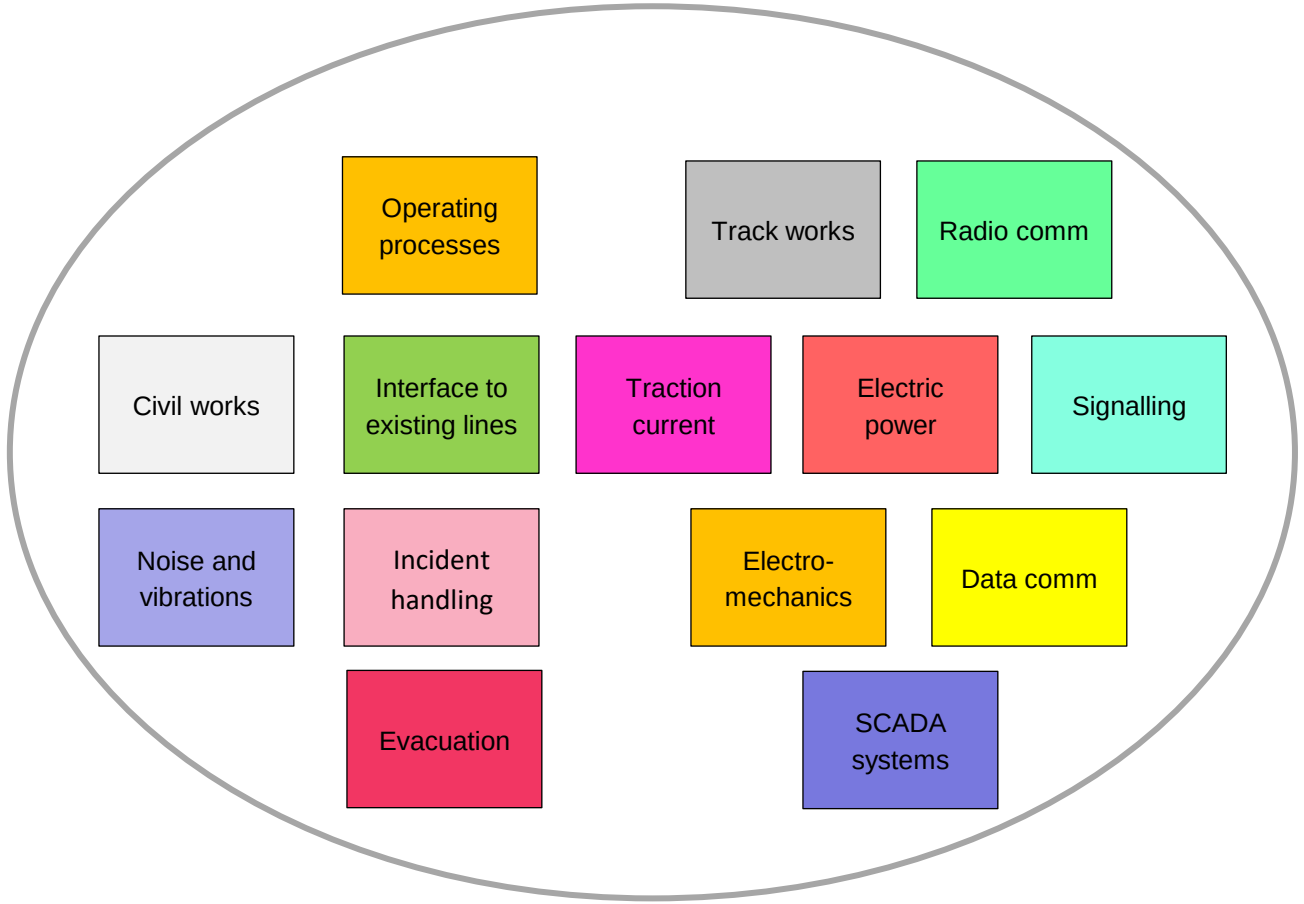




Why are railway project **HYPER** complex?

- Every railway project has a lot of focuses:

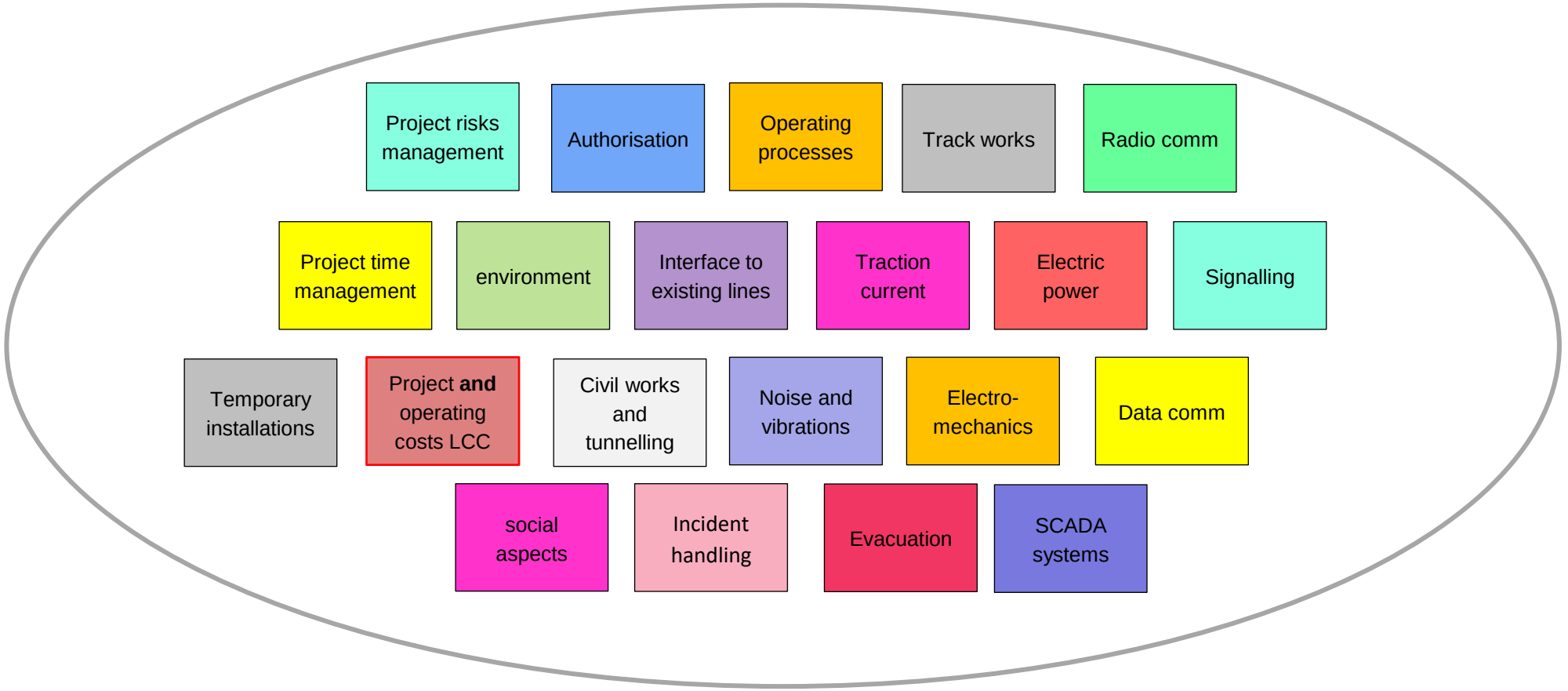
extended railway system:



Why are railway project **HYPER** complex?

- Complex railway project system:

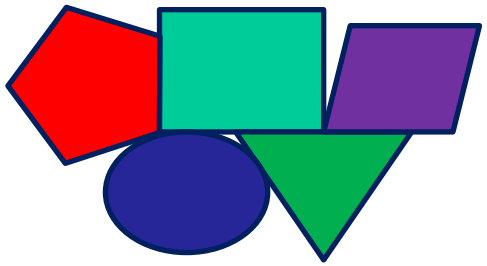
And you have to coordinate all this focuses one with others!



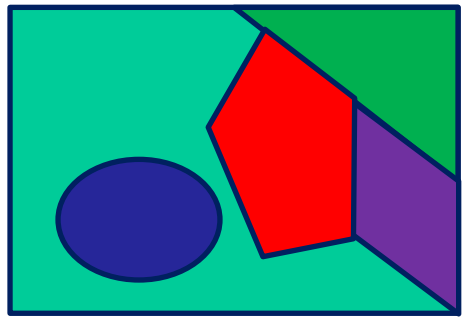
Main risks / success factors

- If you want to solve a complex requirement with an optimal project you will have to construct an all including, well balanced solution!
- For a component or multi subsystem solution you need a perfect interface management:

suboptimal Solution:



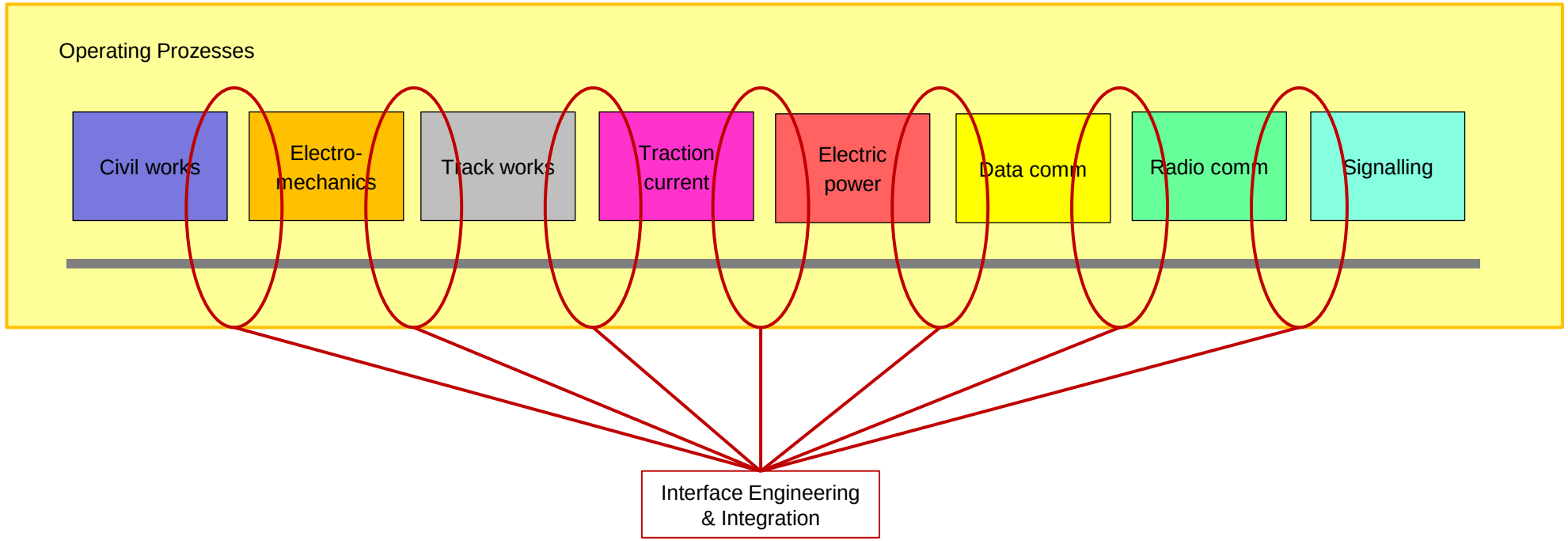
optimal solution:



- With a collection of not to the superior goals optimised subsystems you will never reach a optimal solution!
- So you need an interface / integration manager!

Integration management view

- In a major construction project operating process specialists are needed because the operating processes define the basic requirements for the system.
- And you need system integrators and interface engineers for a well balanced system from signing the contract on!



Requirements to the project

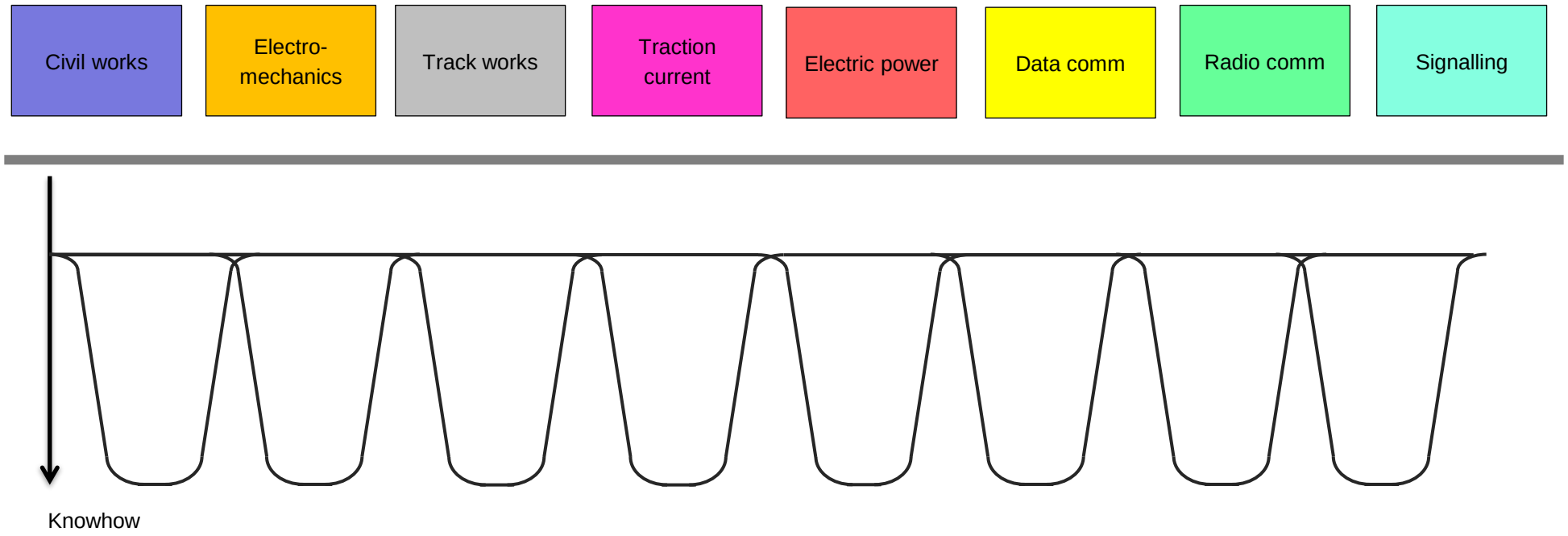
- The different trade have different languages, even when all are speaking English. So you need an **interpreter** to prohibit misunderstanding.

  For example is a civil engineer thinking in concrete and statics, while a signalling engineer is thinking in processes an risks acceptance. This produce some misunderstanding, because the same word has different semantics in the different trade.
- So the project needs at least one **systems engineer**, who has the overview over the whole project. In smaller projects (s)he can also be the **interpreter**.
- In additional every subsystem needs a **system engineer** with the following skills:

  In **every** field of activity you need at least one specialist of who can discuss solutions interdisciplinary -> see next slide.

Requirement to system engineers

- A successful engineer is an engineer who understands the users processes and the interrelationship of the complete system.
- For achieving this goal you have to discuss with engineers of other disciplines and coordinate the integration of the entire system.



Procedures for successful projects

- An (extended) quality method for complex projects is RAMS and documented in EN 50126.
- RAMS = Reliability, Availability, Maintainability, Safety.

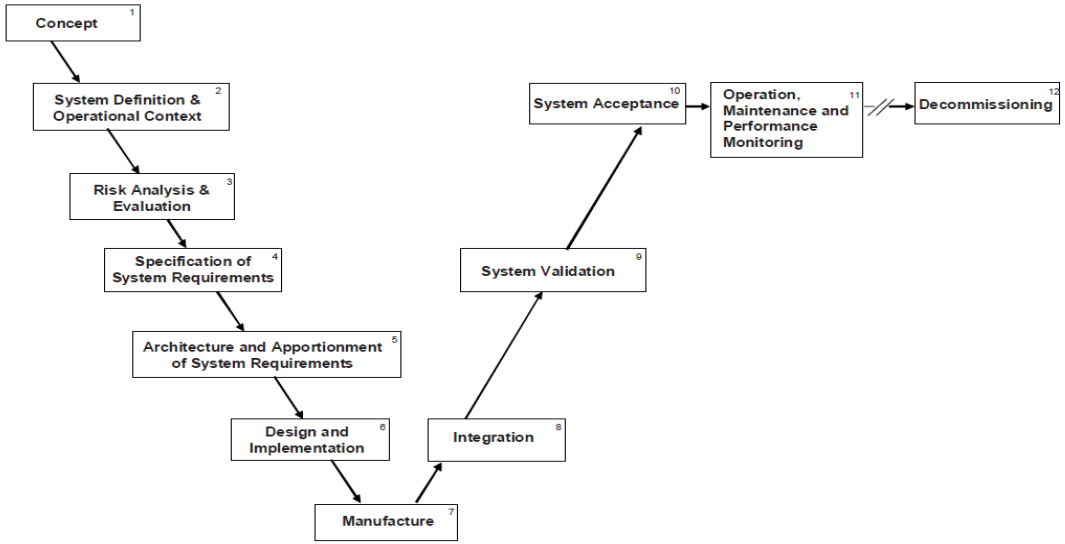
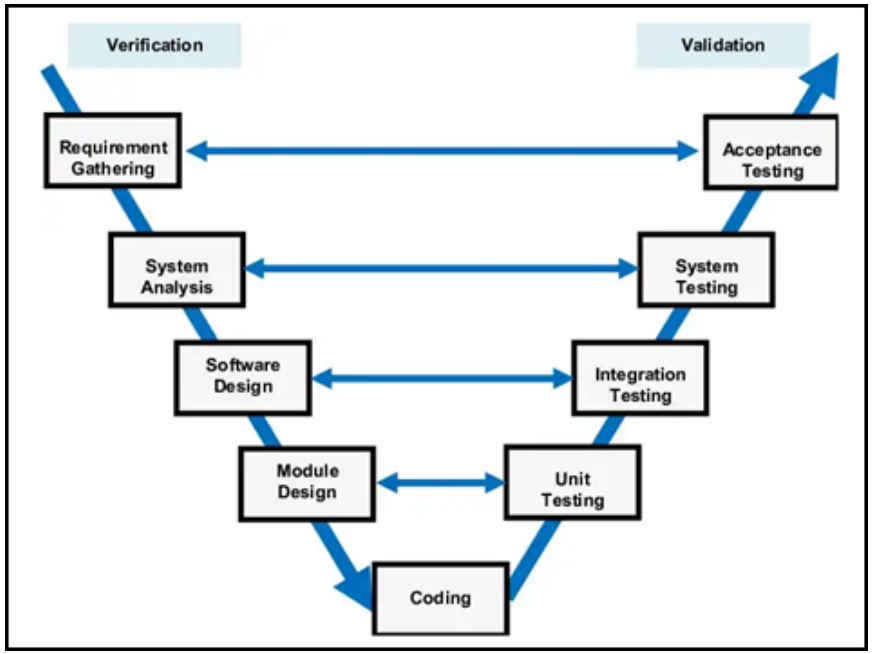


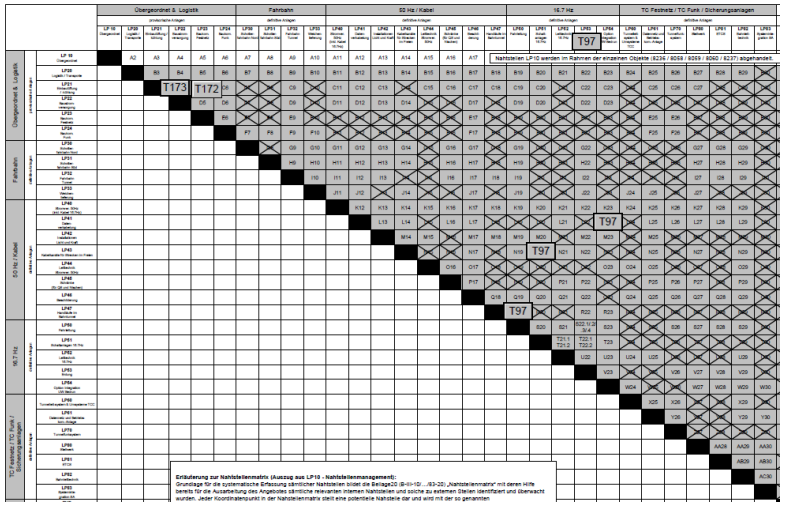
Figure 5 – The "V" representation drawing



- RAMS contains a lot of well known parts as for example FMEA.
- RAMS has for the first time a substantial initial effort to develop the model.
- And the not very well documented **advantage** of RAMS is the **sensitivity analysis of the severity** for incidents and faults!

Procedures for interface management

- As the interface management is an important success factor, following a possible procedure:
  - Make a two-dimensional matrix with all trades / subsystems.
  - For every intersection between two sides make in interface document.
  - The interface document contain in minimum timeline, responsibility, technical requirements, localized requirements and signed from the partners. This is the collaboration contract and has to be actualised, when facts are changing.
  - Even if there is no interface between two possible partners, this has to be documented and signed from both side.



1 ZUSAMMENFASSUNG

ID-Nummer der Nahtstelle	K33	
Nahtstellenkoordinator	40 / Stromversorgung 50 Hz / L. Kappeler	
Beteiligte Leistungspakete	40 / Stromversorgung 50 Hz / H. Glanzmann	ENS / Entwässerung / -
Koreferat	Pöyry / A. Siegrist	

	Ja	Nein	Bemerkung
Nahtstelle identifiziert?	☒	☐	
Wurde Nahtstelle bereits in einem anderen Projekt realisiert?	☒	☐	Im Lötschberg
Neuentwicklung innerhalb LP notwendig Angabe des Sicherheitslevel (SIL0-SIL4)?	☐	☒	
Neue amtliche Zulassung für LP-Kombination notwendig?	☐	☒	
Untergeordnete Nahtstellen	☐	☒	

1.1 Tabelle Angebot

Definition und Abgrenzung der Nahtstelle	Anforderung und Massnahme
Bereitstellung der notwendigen NS-Abgänge für Antriebe der Entwässerung wie Pumpen, Schieber etc.	Ort und Anzahl und Dimension der Antriebe sind von ENS nicht bekannt. LP40 trifft hierfür entsprechende Annahmen.
Die notwendigen Kabelverbindungen zwischen jeweiligem Abgang und dem Antrieb sind nicht im Lieferumfang des LP40 enthalten.	
Entsprechend Beilage B-II-201 erfolgt die Erstellung der Entwässerungsinfrastruktur durch den „Rohbau". Jedoch ist über die zugehörige Peripherie wie Pumpen, Schieber und zugehörige Sensorik nichts erwähnt.	

Thanks for your attention,

Questions?