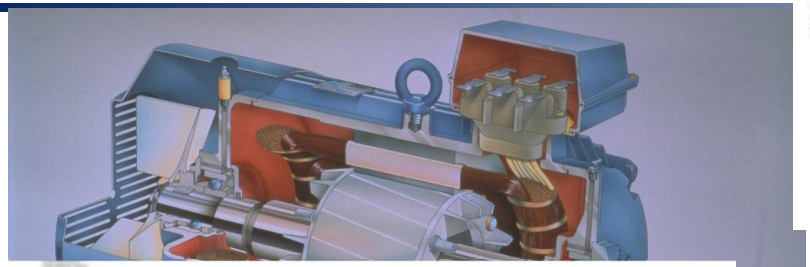
ISO 15288

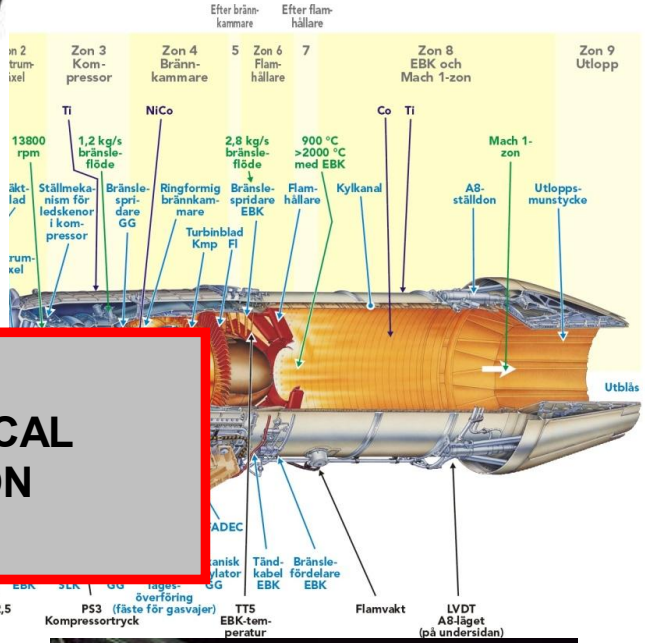
Practical experience within SAAB

Erik Herzog, Ph.D., CSEP, Technical Fellow Systems Engineering

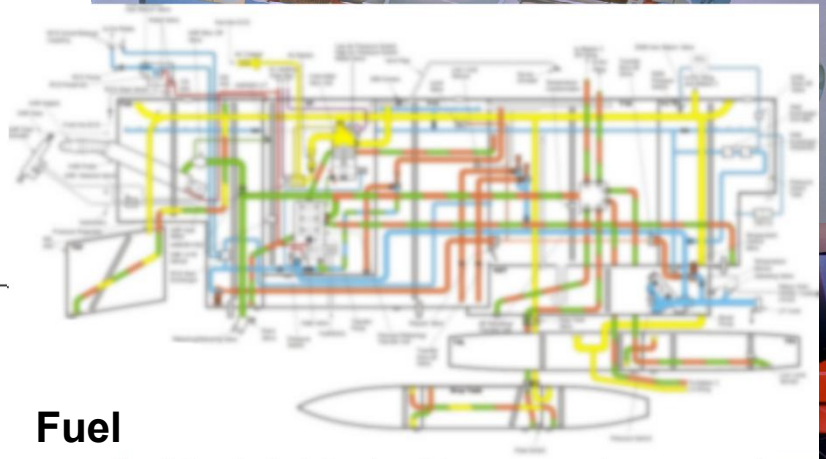
OUTSIDE GRIPEN

INSIDE GRIPEN

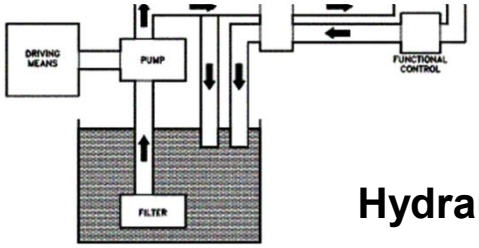




SAFETY CRITICAL APPLICATION

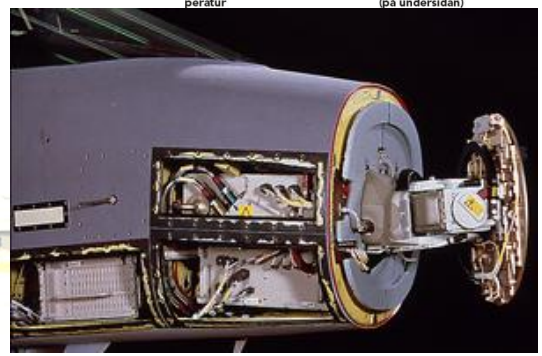


Fuel



Hydraulics

Computing performance



Sensors

EXAMPLE SYSTEM PROPERTIES

RCS

Payload

Fuel capacity

Fuel consumption

Service life

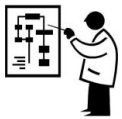
Weight

Center of Gravity

Environmental impact

Range

Safety



Supportability

Availability

Development Cost

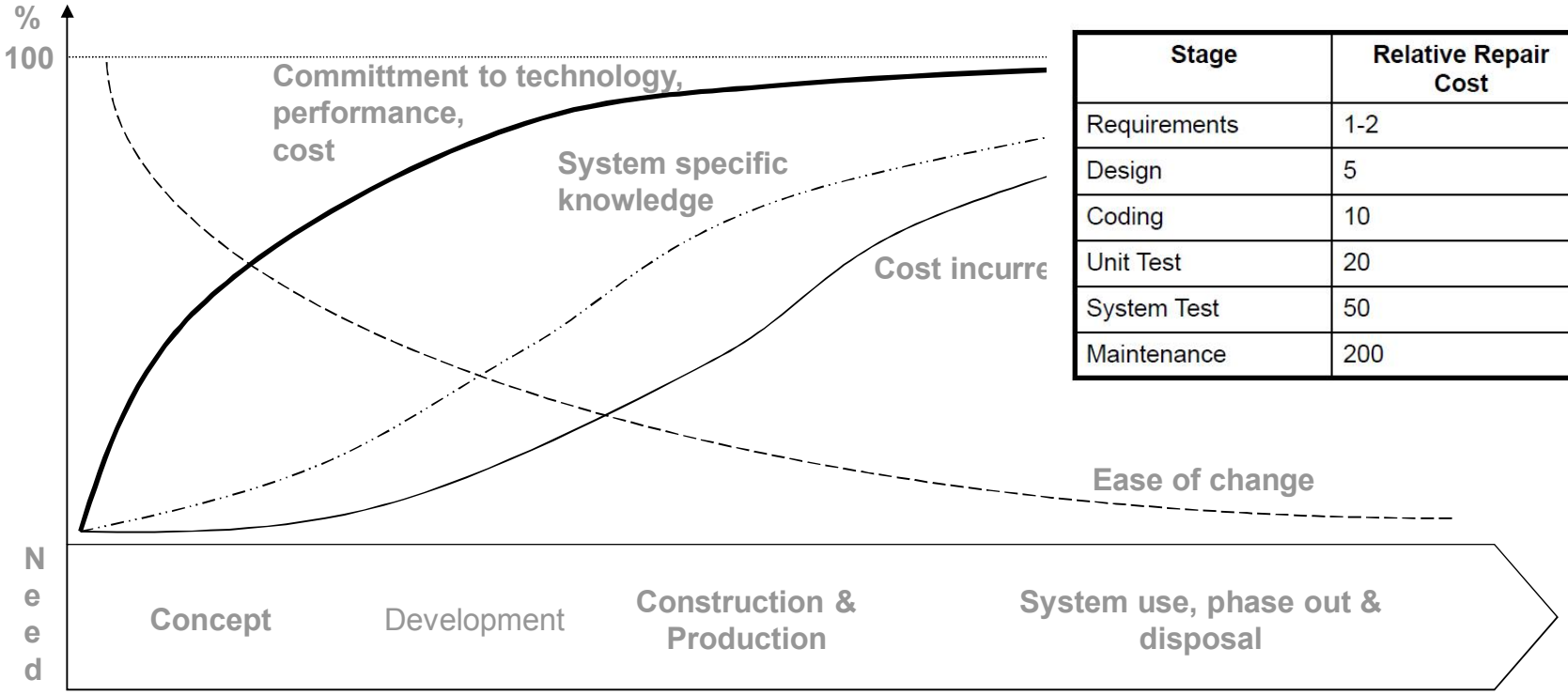
Maintenance interval

Flight envelope

Survivability

Operational cost

COMMITMENT, COST AND EASE OF CHANGE

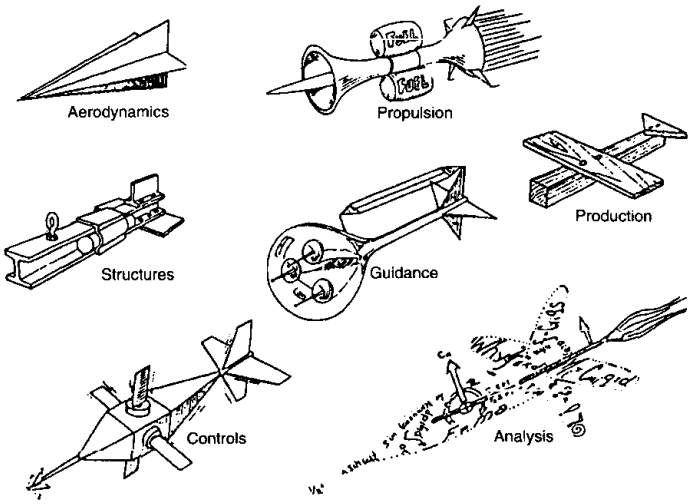


Stage	Relative Repair Cost
Requirements	1-2
Design	5
Coding	10
Unit Test	20
System Test	50
Maintenance	200

- It is valuable to communicate intent prior to commitment!
- Allow other experts to identify lapses and mistakes as early as possible

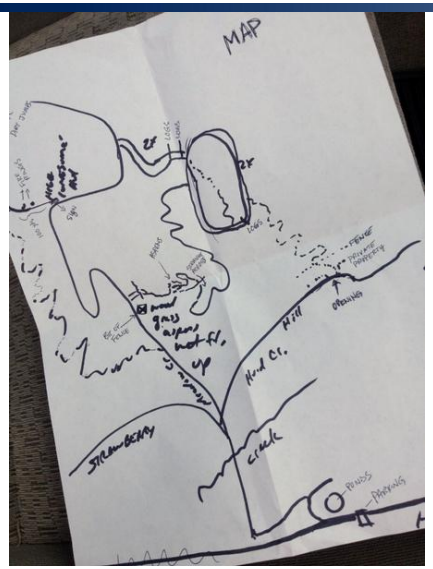
SYSTEMS ENGINEERING - RATIONALE

- In a large organisation it is important that internal staff have a good understanding of the complete process
- and their individual contribution to the process
- There must be a common shared language and a common understanding of what is being developed
- Minimise waste
  - Building the wrong product
  - Inconsistent views on the product in the development team
  - Focusing on features not required
  - …



SO WHAT DOES PROCESS LOOK LIKE?

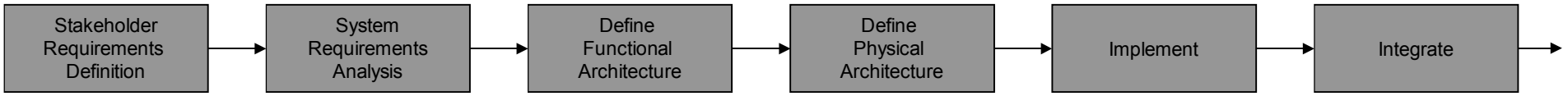
OBSERVATION ON PROCESS

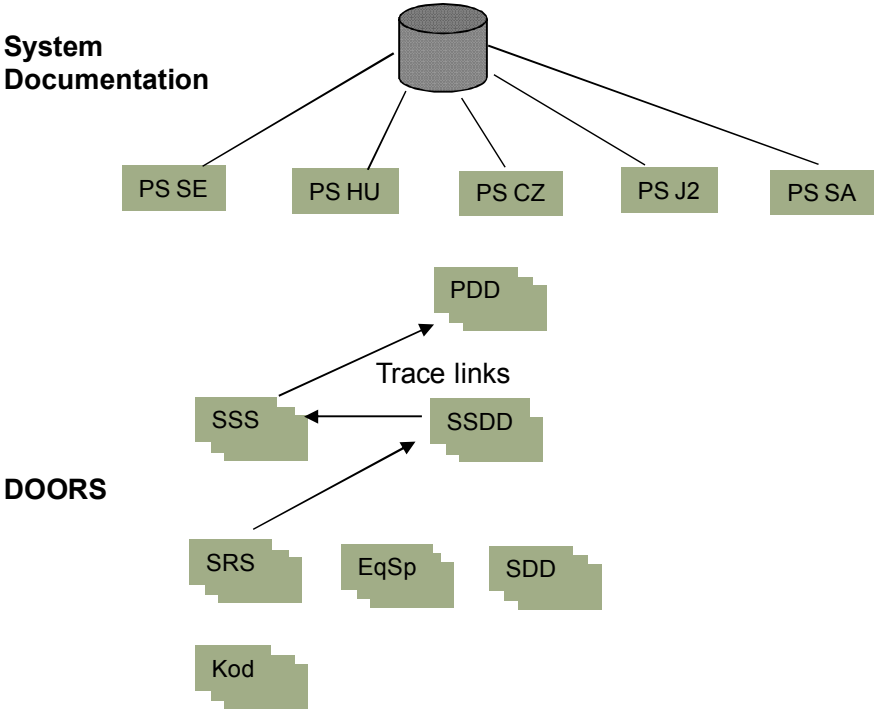


If the map does not match reality
then reality appears to take precedence

WHERE WE WERE

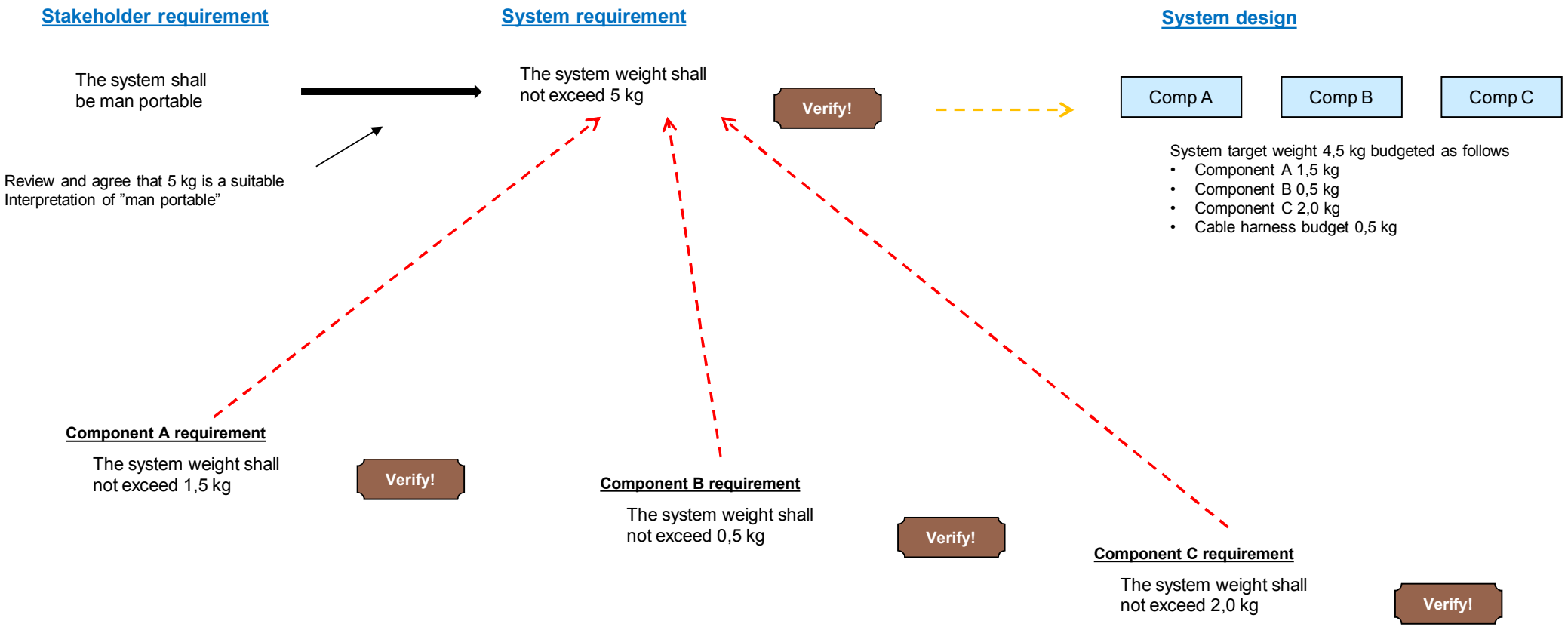
Our 'old' development process





- Sequential process
- Complete one document prior to initiating work on the next one
- Fixed document structure
- Much focus on requirements (requirements in design documentation)
- Traceability is costly to implement and maintain
- No attempt to actually describe what the system looks like (in a reader friendly format)
- A separate safety process

INTERACTION BETWEEN REQUIREMENTS AND DESIGN (1)



INTERACTION BETWEEN REQUIREMENTS AND DESIGN (2)

System requirement

The system weight shall not exceed 5 kg

System design

- The system handle shall be comfortable
- There shall be wheels for effortless transportation

- The sling shall be padded for comfortable wear
- There shall not be any loose connectors
- Connectors shall not be damaged when exhibited to a force of 200N

Potential implementation alternatives

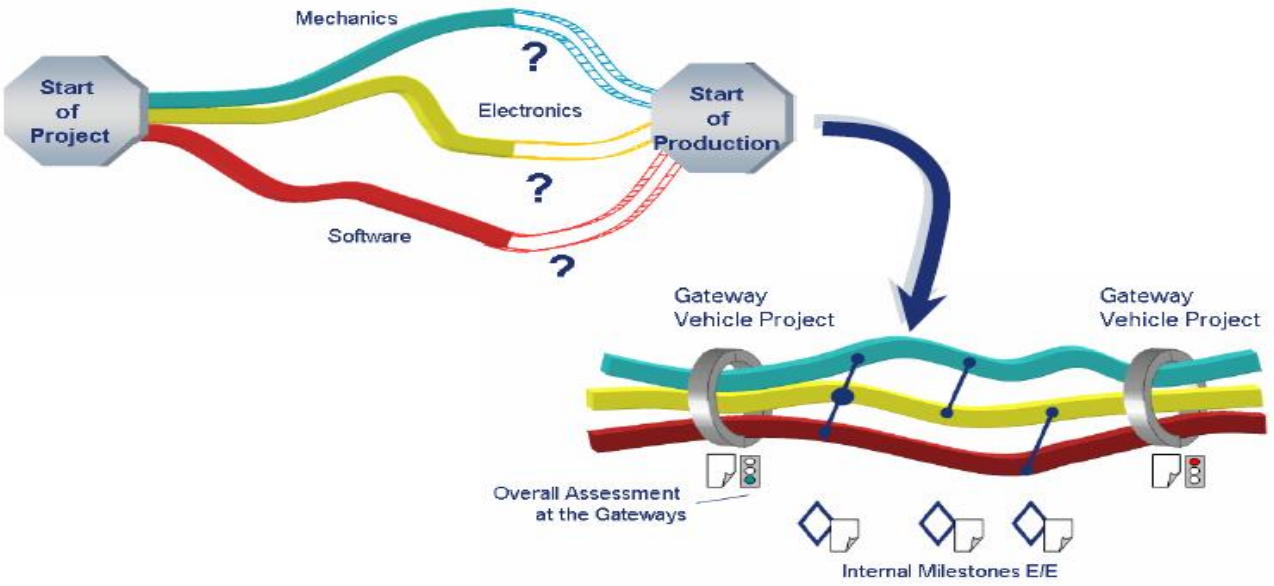
Selection of alternative will generate new requirements

Requirements (i.e., properties requiring verification) will emerge as the design matures

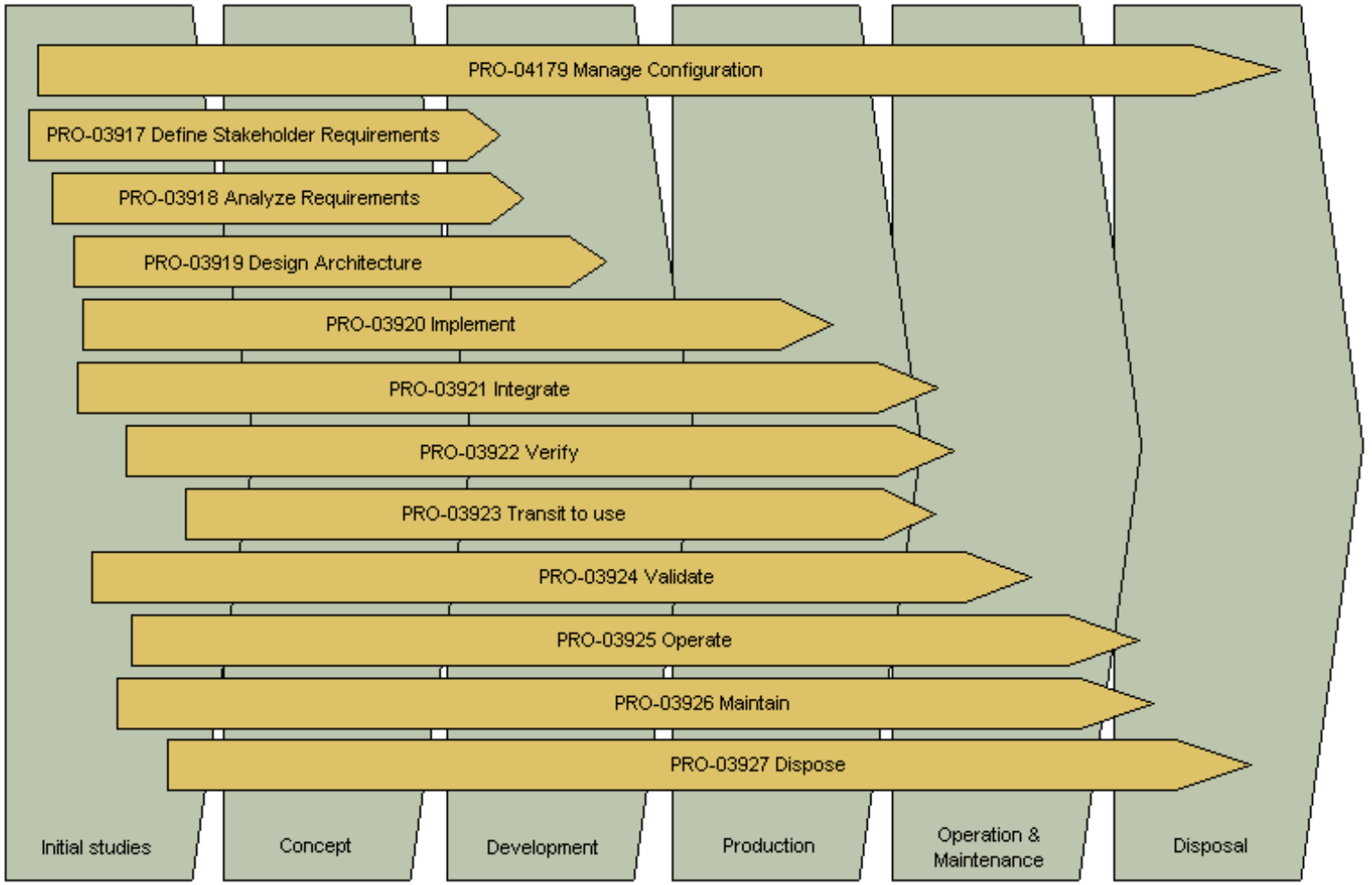
Add such requirements to the appropriate section in the SSS

PRINCIPLES FOR COMMUNICATING PROCESS BASED ON ISO 15288

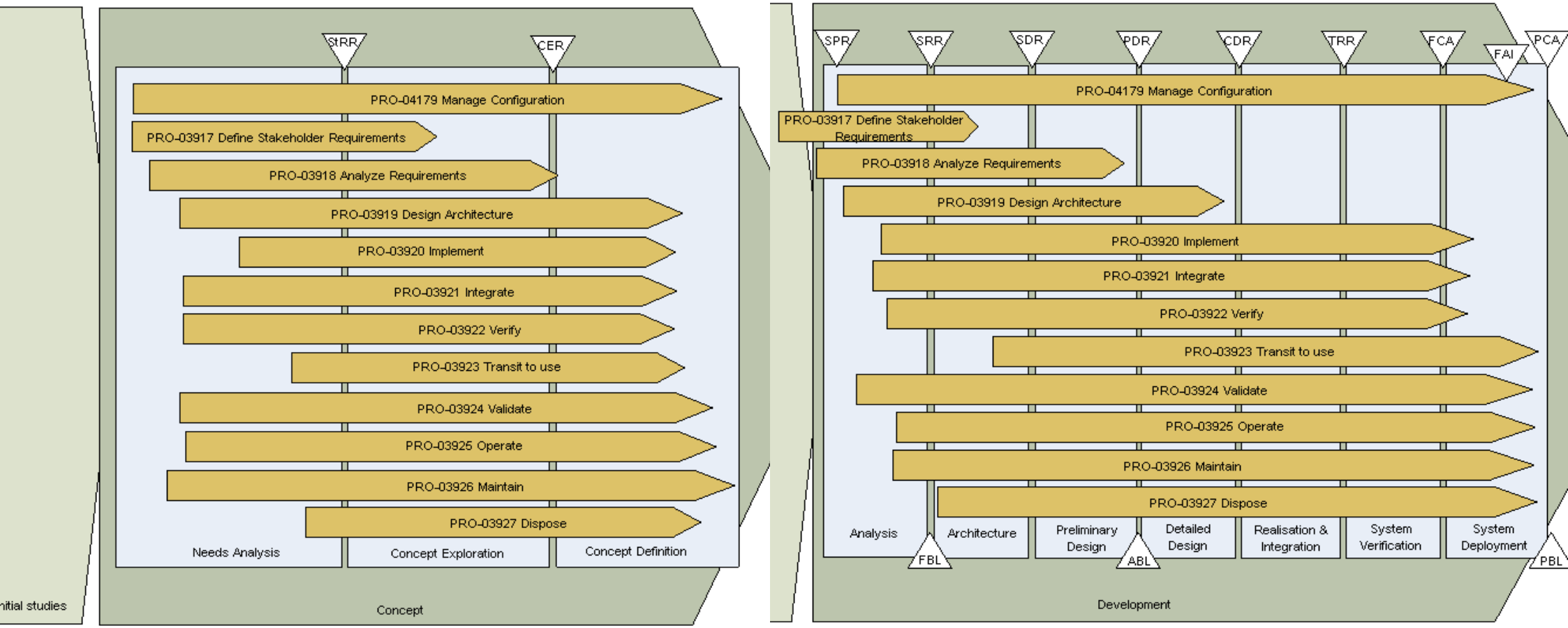
- Need to consider three dimensions
  - Lifecycle – how the system evolves over time
  - Process – contributions made by specialists
  - Technical reviews – checkpoints where consistent configurations are reviewed



PROCESS OVER LIFECYCLE

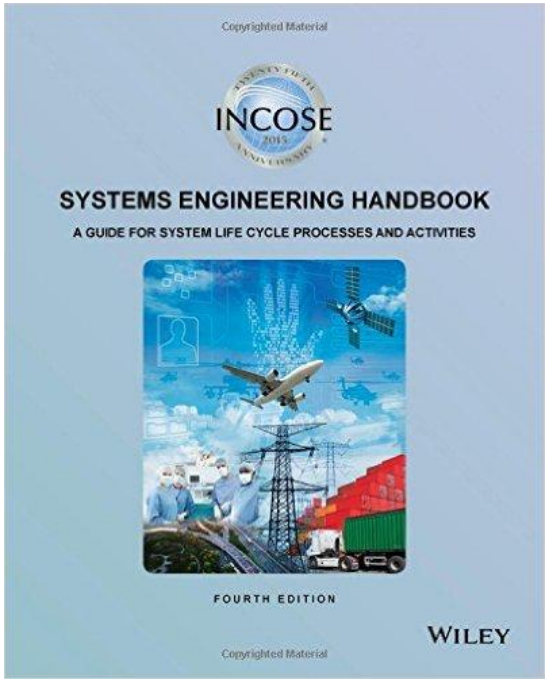


TECHNICAL MILESTONES IN DEVELOPMENT



WHAT WE HAVE LEARNT

- Strength to build on a standard
  - Communication: Our partners recognises our process
  - Training: We use INCOSE CSEP examination to certify Systems Engineers
- Lifecycle is very valuable from a planning and execution perspective
- Strength that a complete picture can be communicated to the users
- Information maturity is a very valuable tool to describe what shall be delivered when



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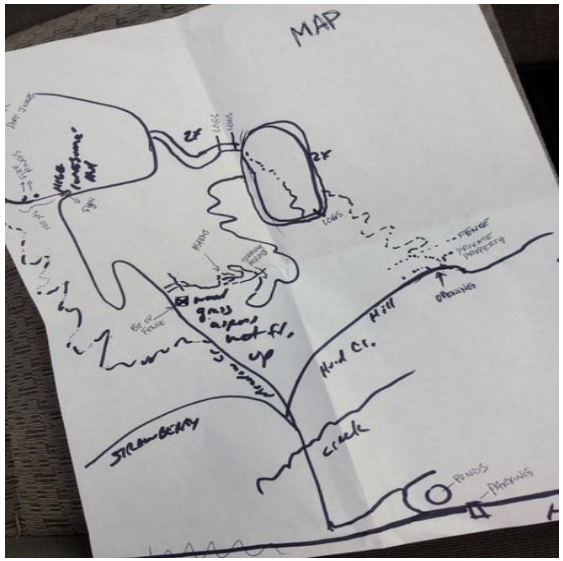
- More processes
- Not necessaily a good thing

BUT TO SOME PEOPLE



If the reality is too complex – lets try with a simple map!

SAAB