

# System Partitioning Fundamentals

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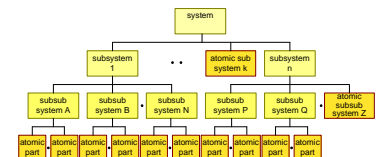
## Abstract

The fundamental concepts and approach system partitioning are explained. We look at physical decomposition and functional decomposition in relation to supply chain, lifecycle support, project management, and system specification and design.

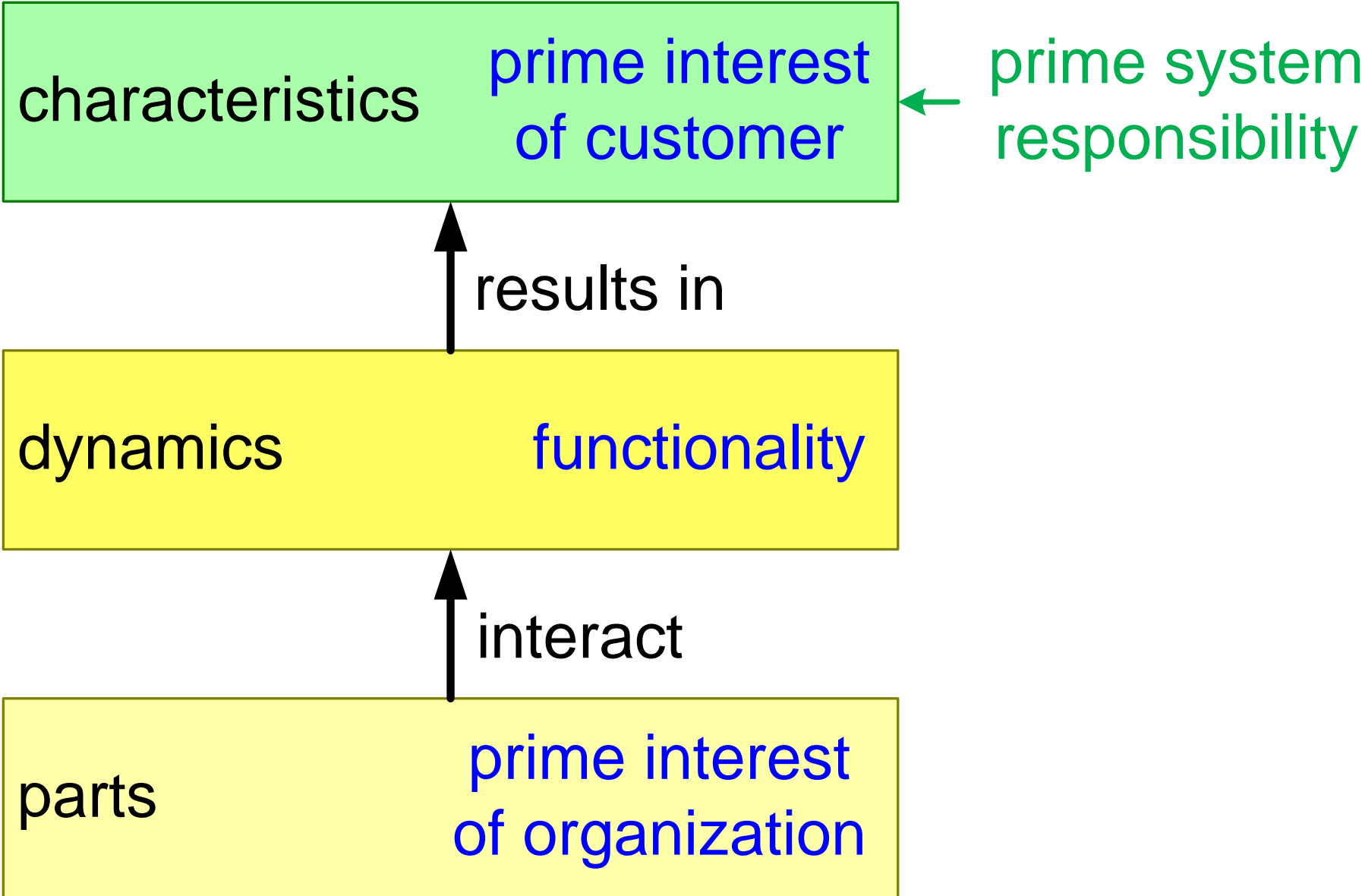
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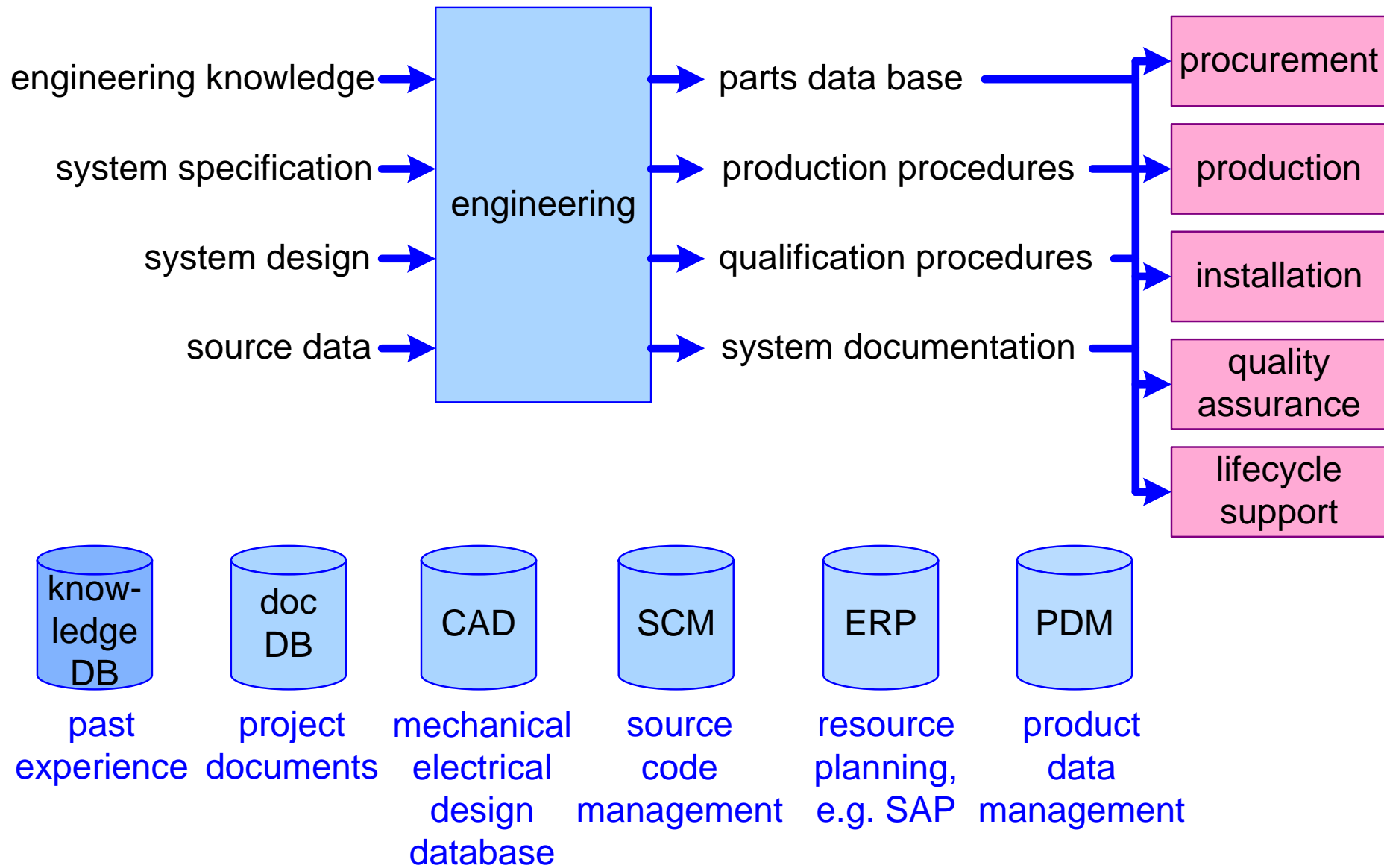
October 4, 2020  
status: preliminary  
draft  
version: 0.2



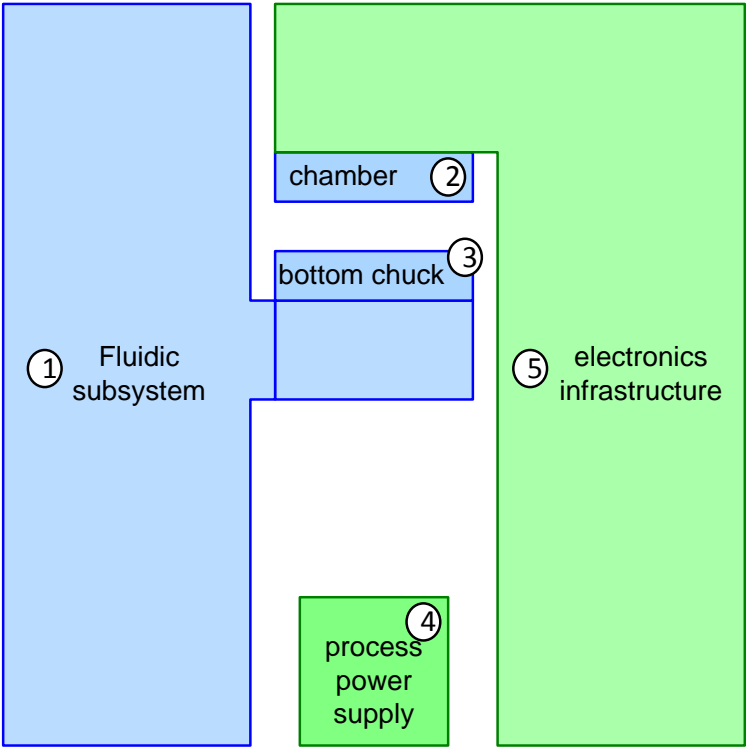
# Parts, Dynamics, Characteristics



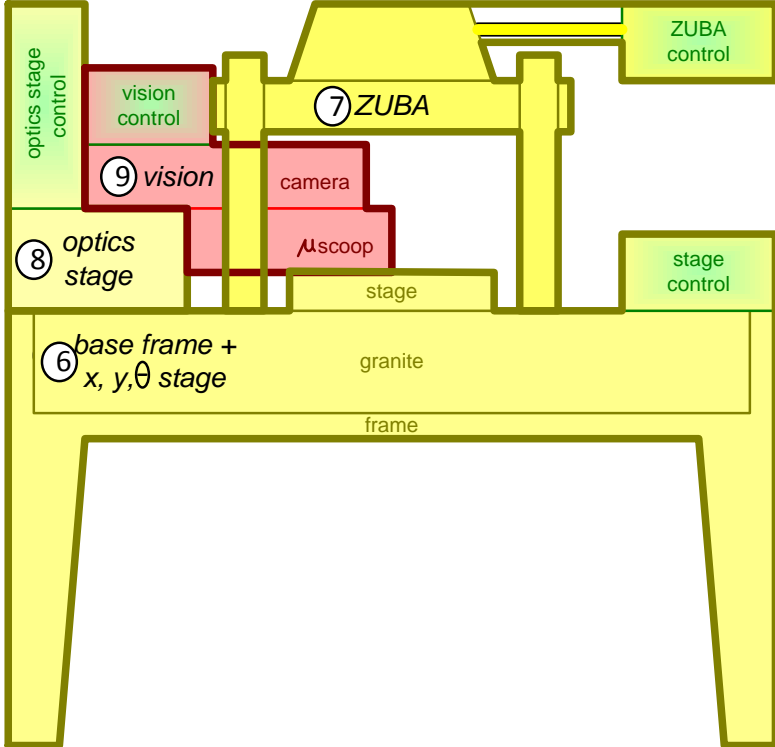
# Engineering



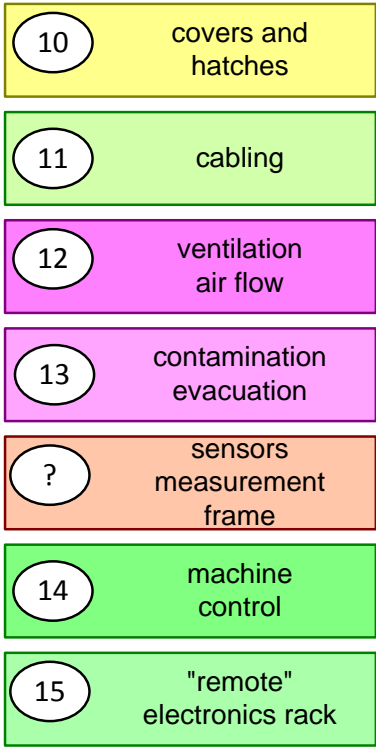
# Example Physical Decomposition



back side view

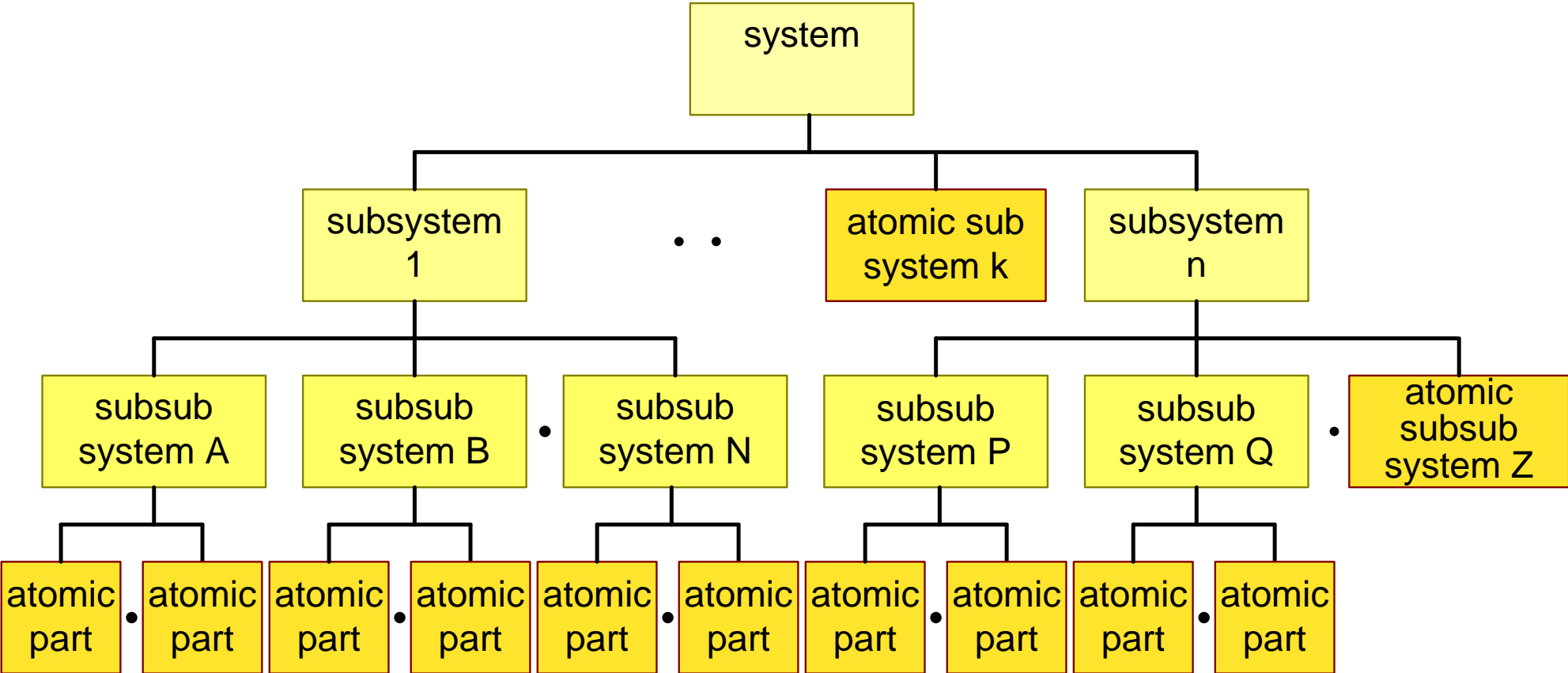


front side view

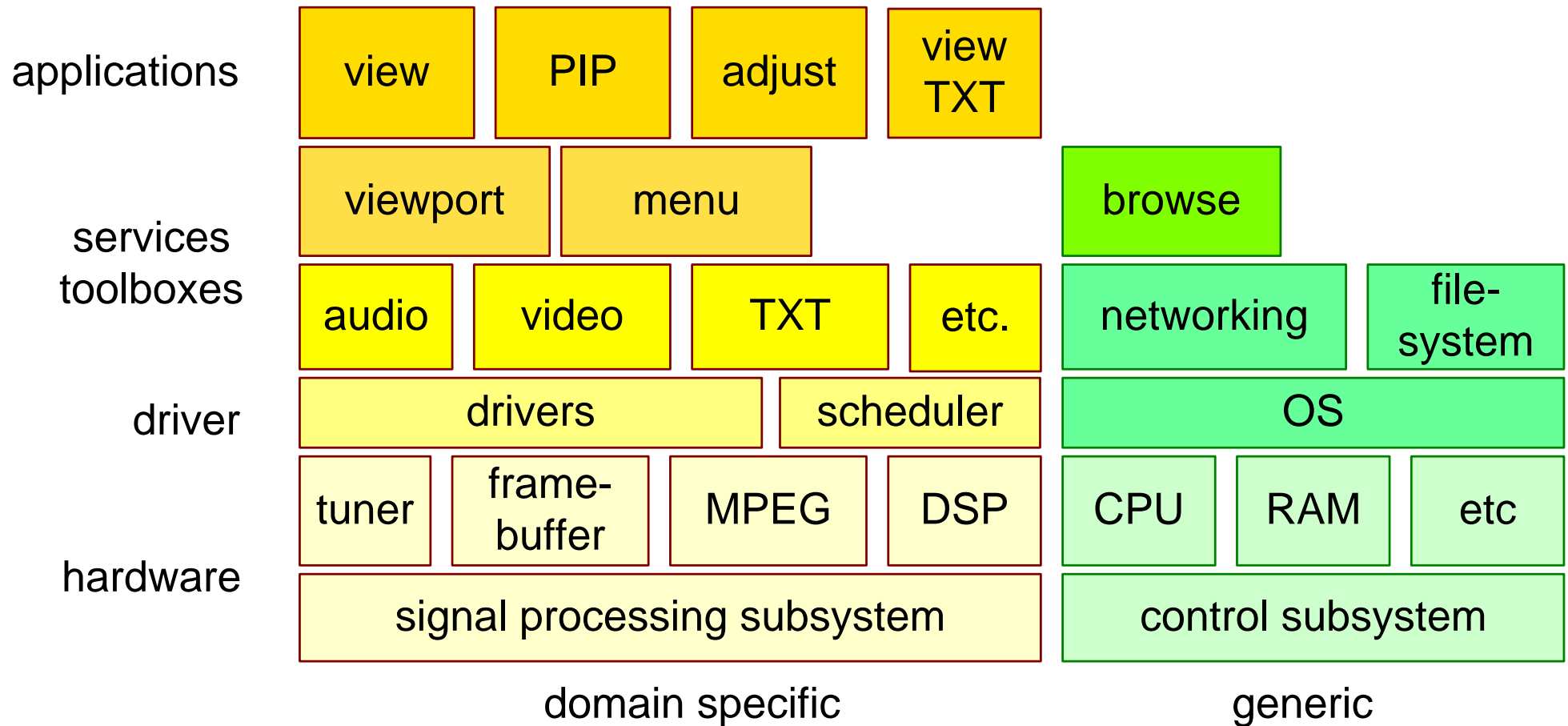


integrating

# Partitioning is Applied Recursively



# Software plus Hardware Decomposition



the part is cohesive

functionality and technology belongs together

the coupling with other parts is minimal

minimize interfaces

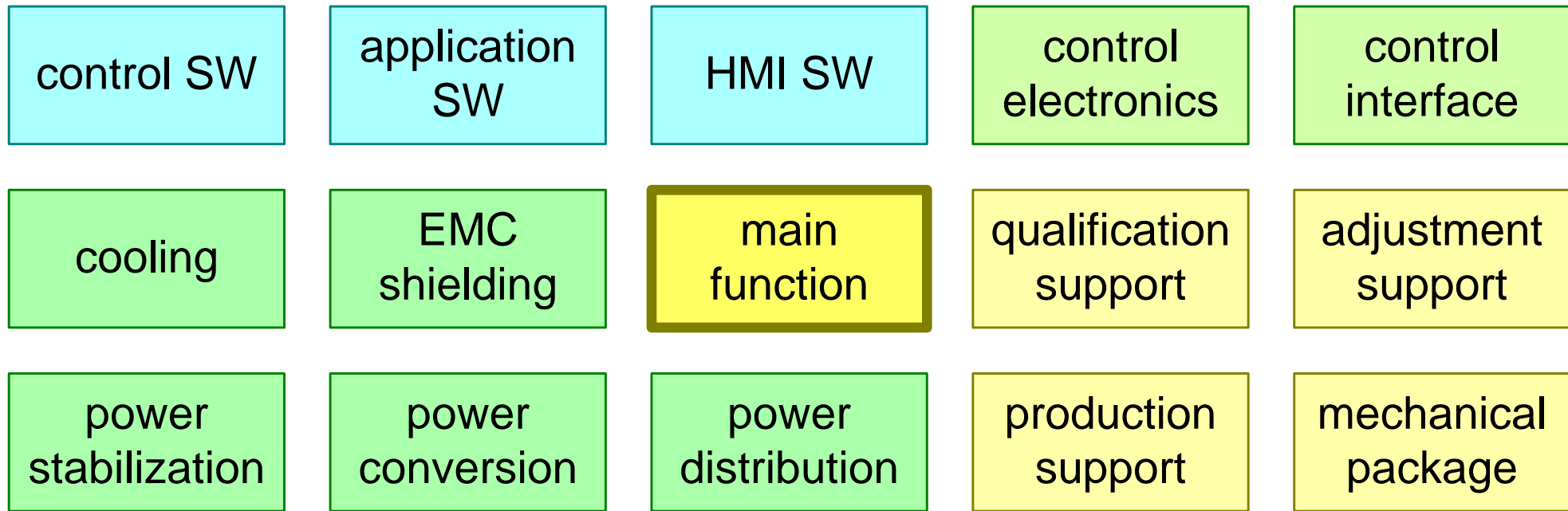
the part is self-sustained for production and qualification

can be in conflict with cost or space requirements

clear ownership of part

e.g. one department or supplier

# How much self-sustained?



How self sustained should a part be?

trade-off:

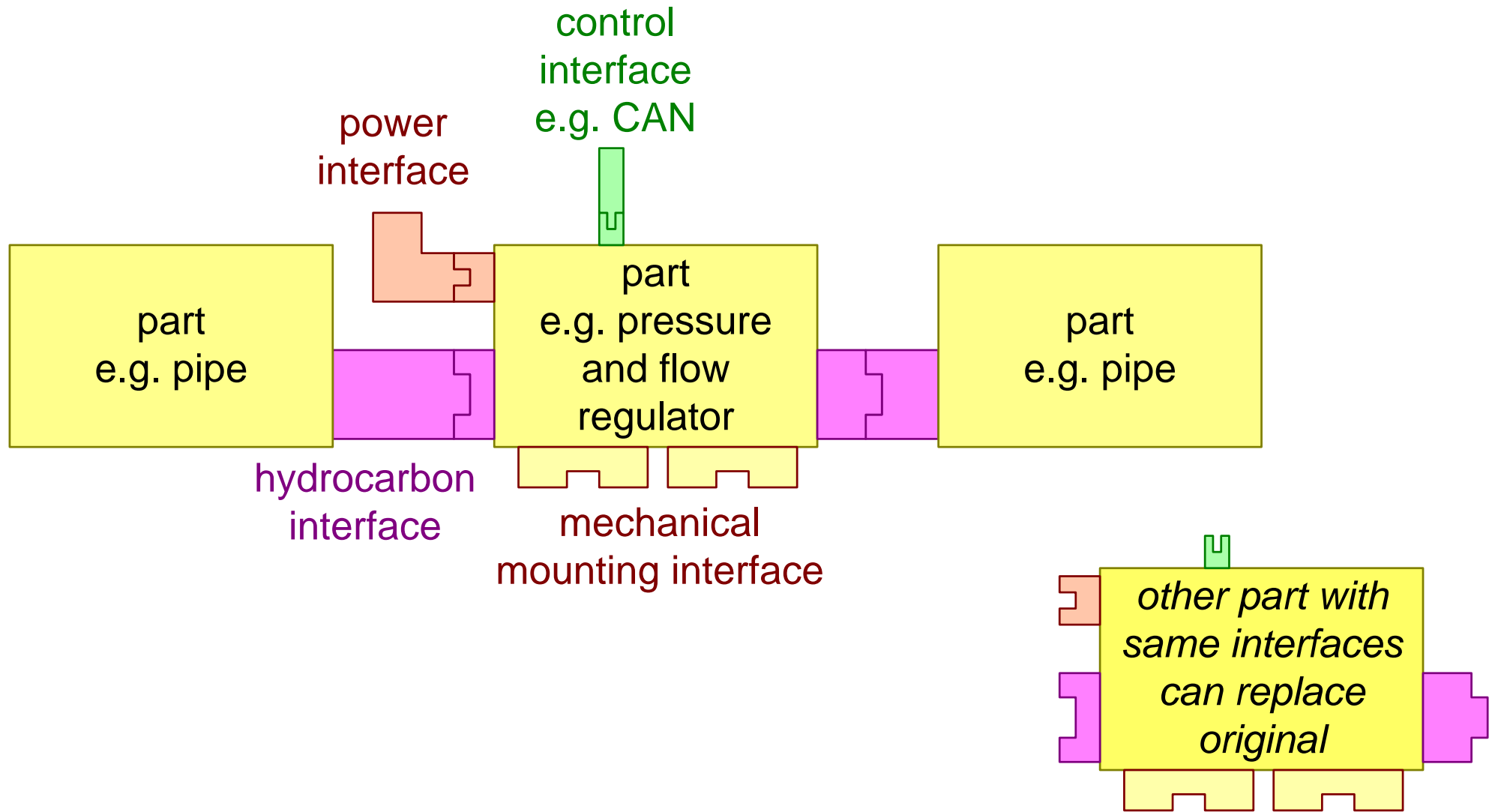
cost/speed/space  
optimization



logistics/lifecycle/production  
flexibility  
clarity



# Decoupling via Interfaces



# The Ideal Modularity

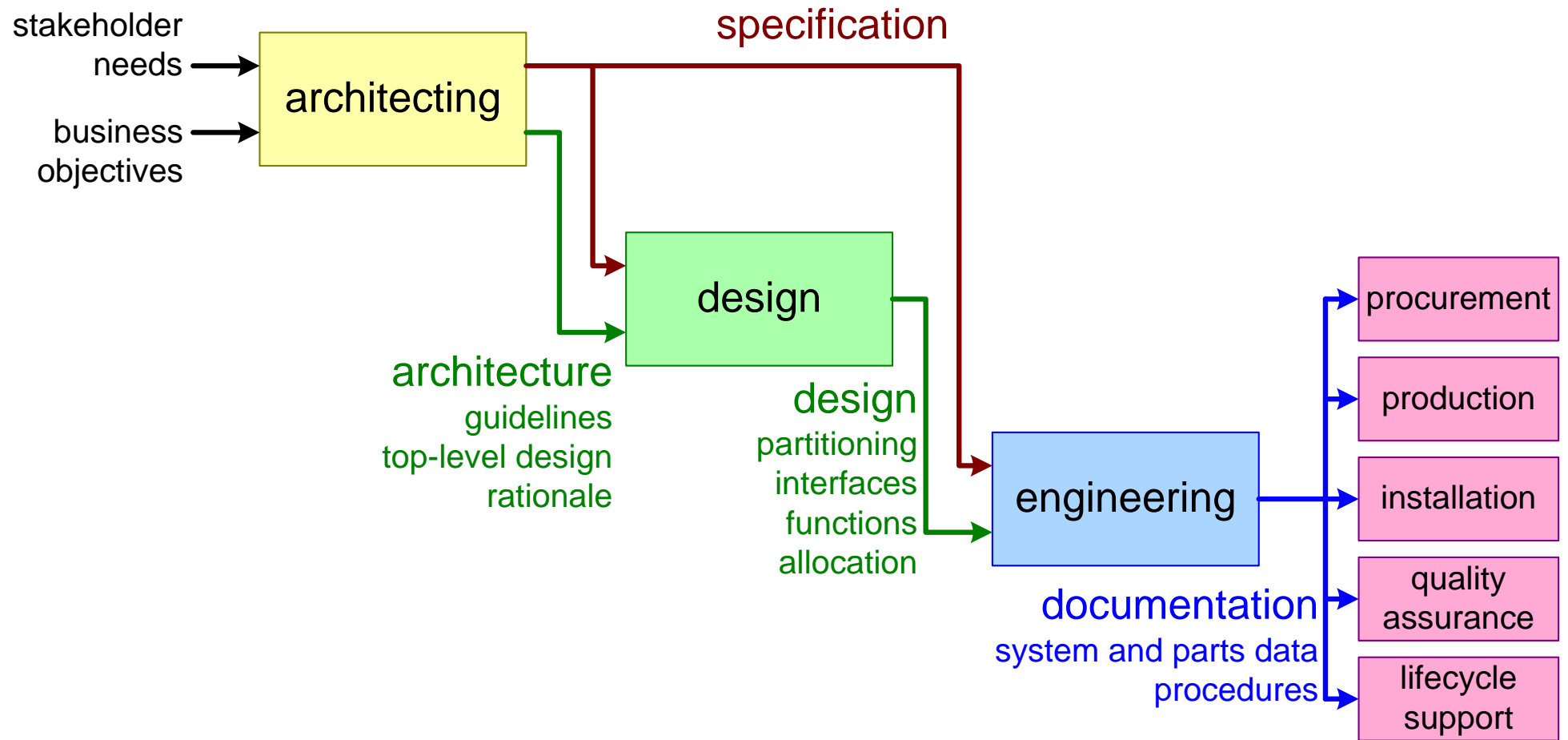
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System is composed

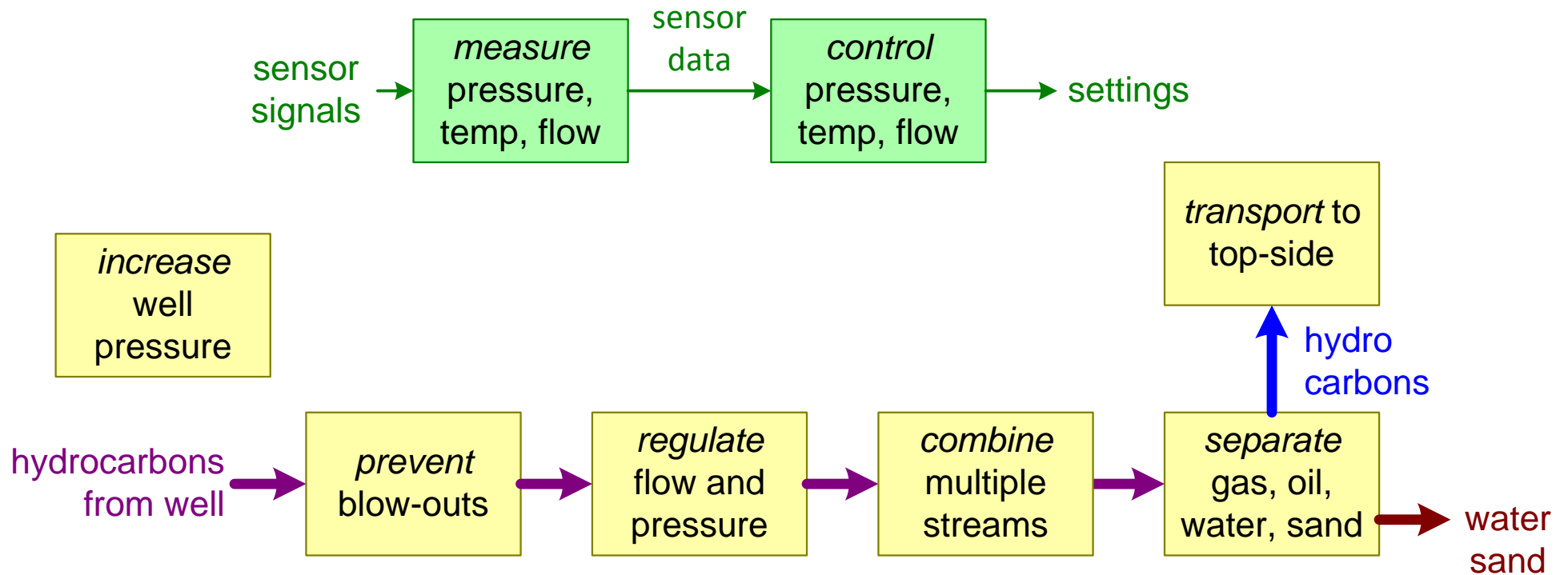
by using standard interfaces

limited catalogue of variants (e.g. cost performance points)

# System Creation



# Simplistic Functional SubSea Example



# Functional Decomposition

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How does the system work and operate?

Functions describe *what* rather than *how*.

Functions are *verbs*.

Input-Process-Output paradigm.

Multiple kinds of flows:

- physical (e.g. hydrocarbons)

- information (e.g. measurements)

- control

At lower level one part  $\approx$  one function

- pump pumps, compressor compresses, controller controls

At higher level functions are complex interplay of physical parts

- e.g. regulating constant flow, pressure and temperature

# Quantification

Size 2.4m \* 0.7m \* 1.3m

Weight 1450 Kg

Cost 30000 NoK

Reliability MTBF 4000 hr

Throughput 3000 l/hr

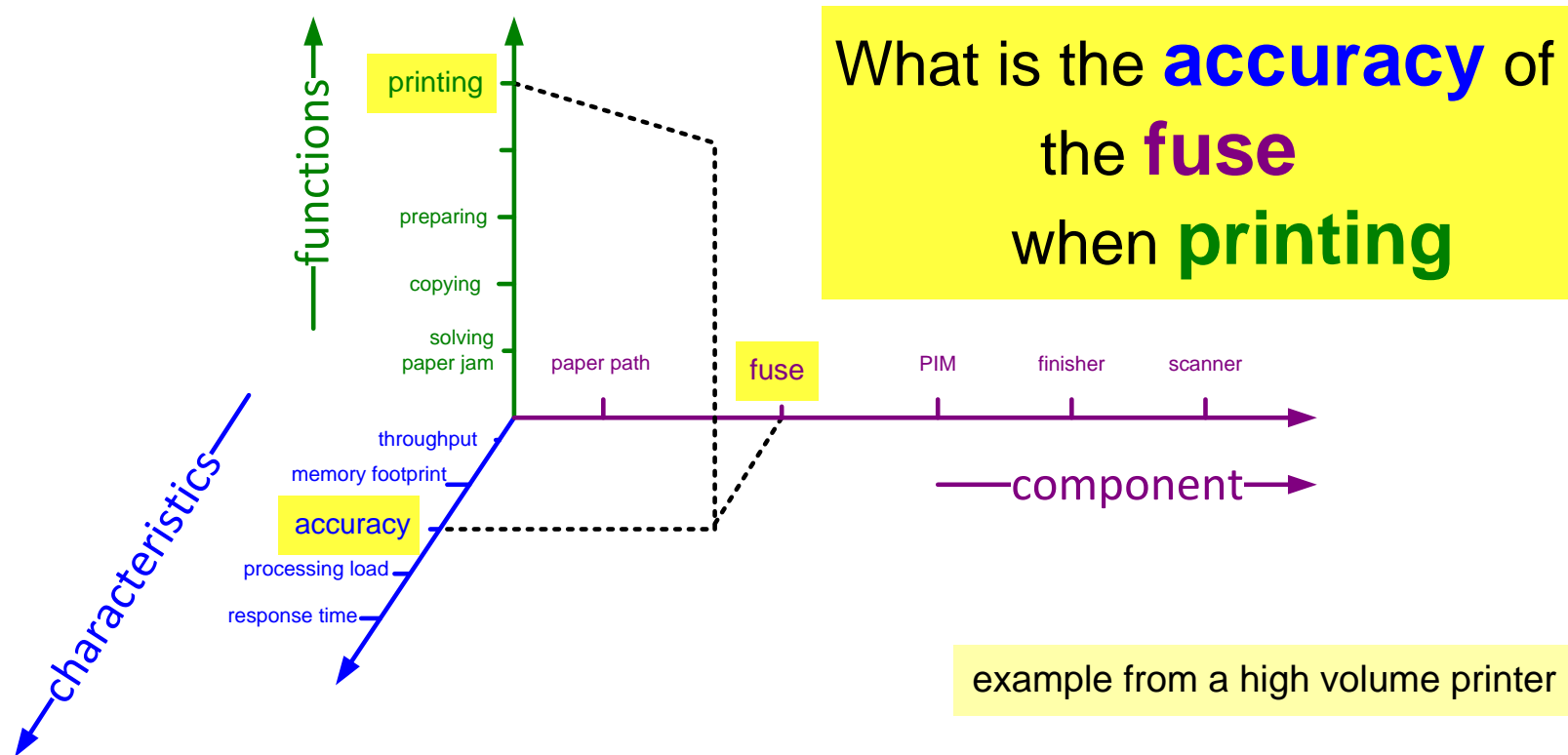
Response time 0.1 s

Accuracy +/- 0.1%

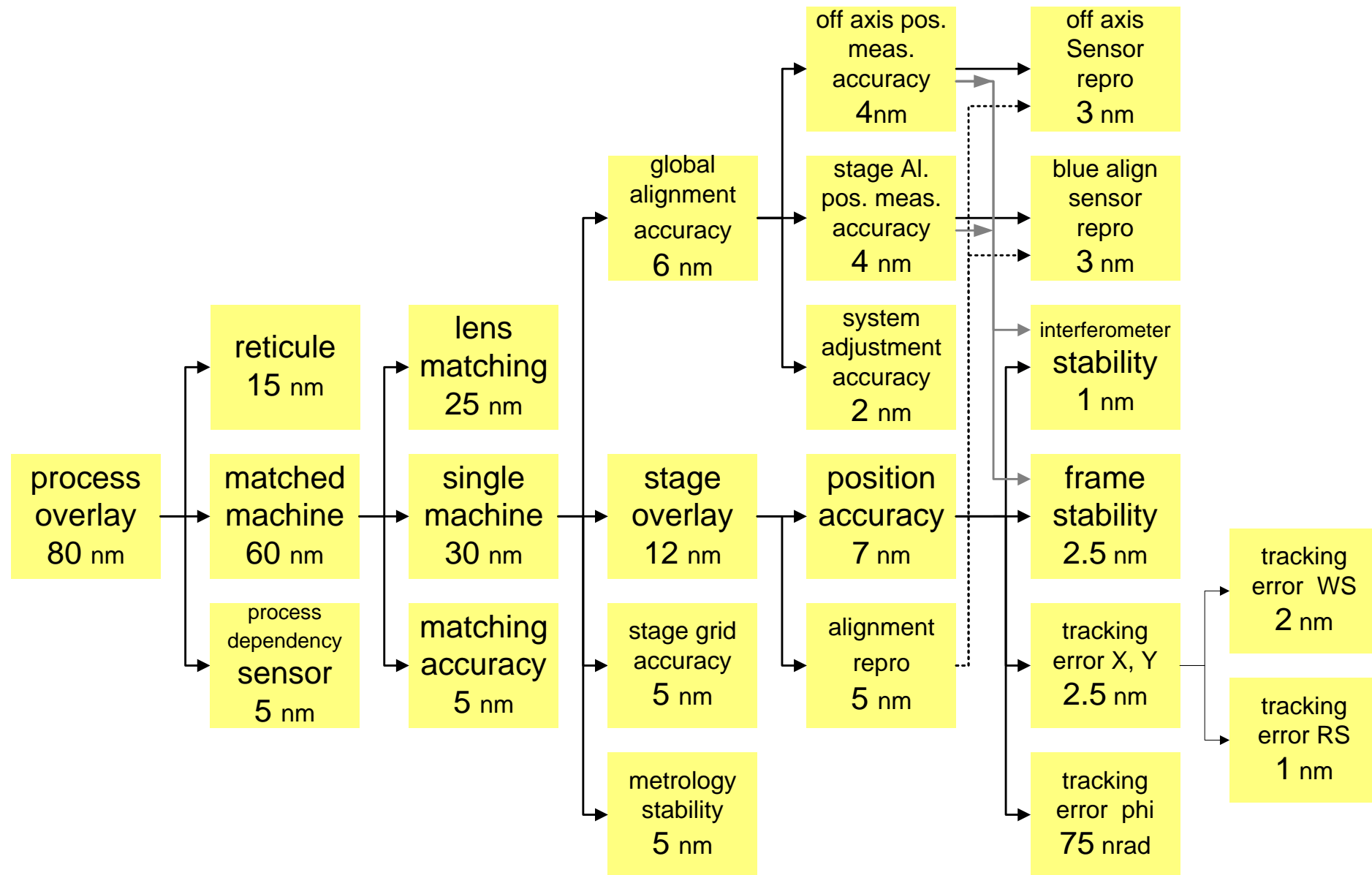
*many characteristics  
of a system, function or part  
can be quantified*

*Note that quantities  
have a **unit***

How about the **<characteristic>**  
of the **<component>**  
when performing **<function>**?



# Example Technical Budget





# Example of A3 overview

## A3 architecture overview of the Metal Printer (all numbers have been removed for competitive sensitivity)

