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Gathering Requirements that drive Architecture decisions

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SASG meeting at Sioux – February 7, 2023

innovation you

Gathering requirements….

- That can't be that difficult…?

- OK, we need to better elicitate requirements with the user…

  *But **who** is "the user"…*

  Are the requirements SMART…

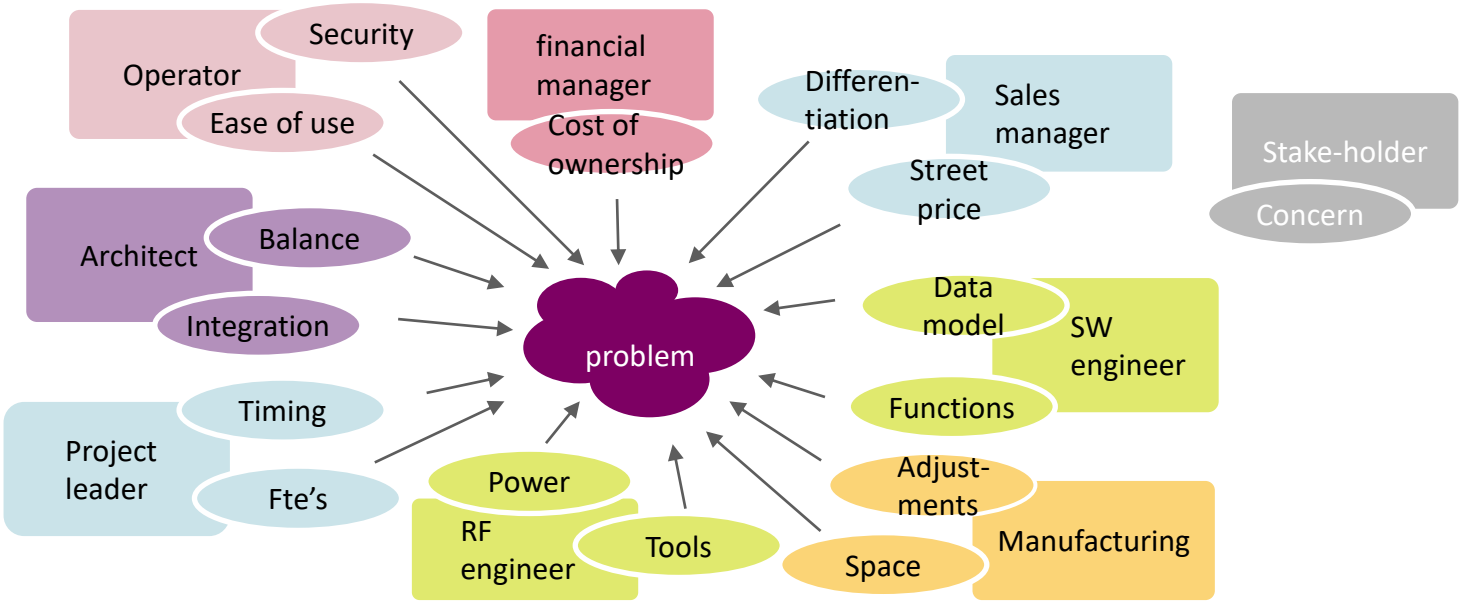
  And did we capture requirements from other Stakeholders…

1.	Incomplete requirements	13%
2.	Lack of user involvement	12%
3.	Lack of resources	11%
4.	Unrealistic expectations	10%
5.	Lack of executive support	9%
6.	Changing requirements & specs	9%
7.	Lack of planning	8%
8.	Didn't need it any longer	8%
9.	Lack of engineering management	6%
10.	Technology illiteracy	4%
	Other	10%

Source : The CHAOS Report, Standish Group, 1995

From *all* Stakeholders …

- Service personnel, IT staff, regulatory, doctors, nurses, patients, transport, Marketing,…

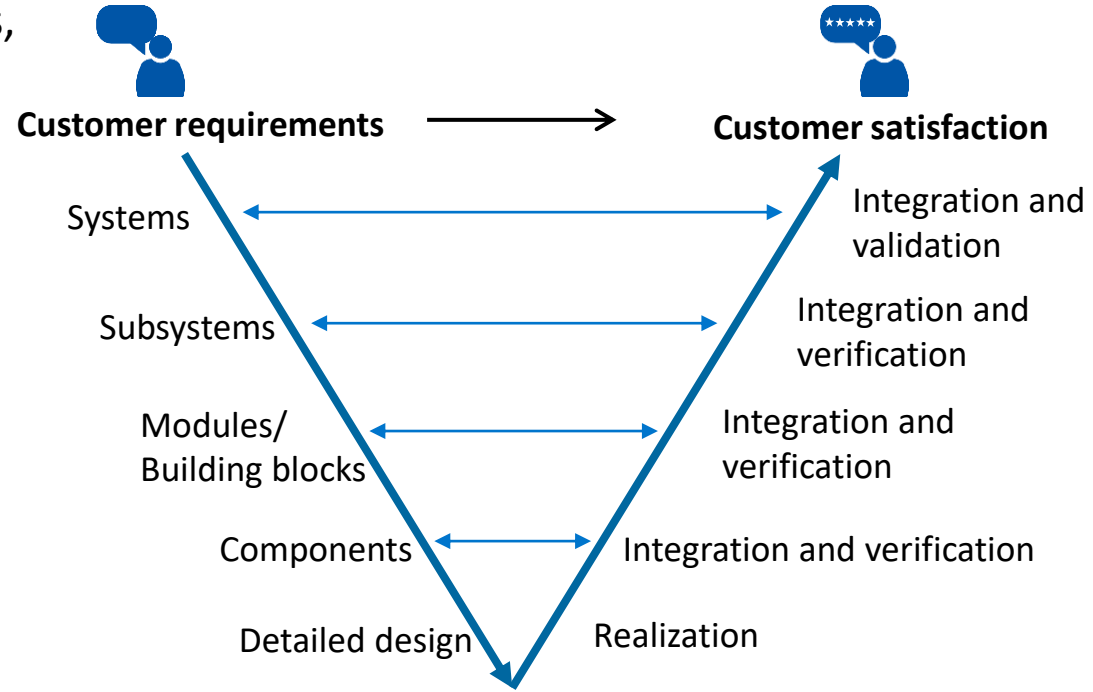


From: Structured Architecting training, Gerrit Muller

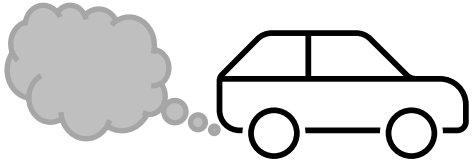
And start designing once we have all requirements…?

- E.g. Alternating design iterations, concept creation/selection, iterations..
- Applying KANO analysis, CAFCR+, Kruchten 4+1,…

	Concept 1	Concept 2	Concept 3
Criteria 1	1	3	5
Criteria n	5	5	2

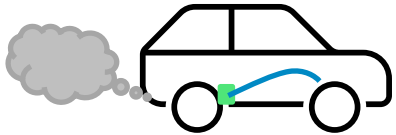


Or did we miss anything ?



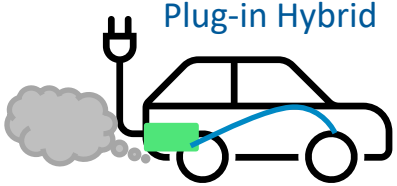
- Do we *really* know what is needed / needs to be solved?
- **Example**: Need a car that is more fuel efficient, emits less greenhouse gasses…

Mild-Hybrid



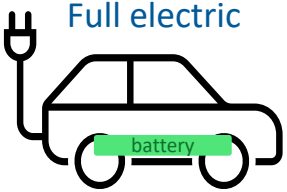
- Best long-haul fuel efficiency
- Minimal extra weight
- Best agility, handling
- Extra complexity, cost

Plug-in Hybrid



- Fuel *efficiency* worse
- Full electric on short distance, lower *overall* fuel-usage
- High additional weight
- Reduced handling, extra cost

Full electric



- "Zero" emission
- Quiet, Yet tire noise & wear
- High weight, limited range
- Requires new design: Less complex, but costly

Modification of existing (reference) architecture

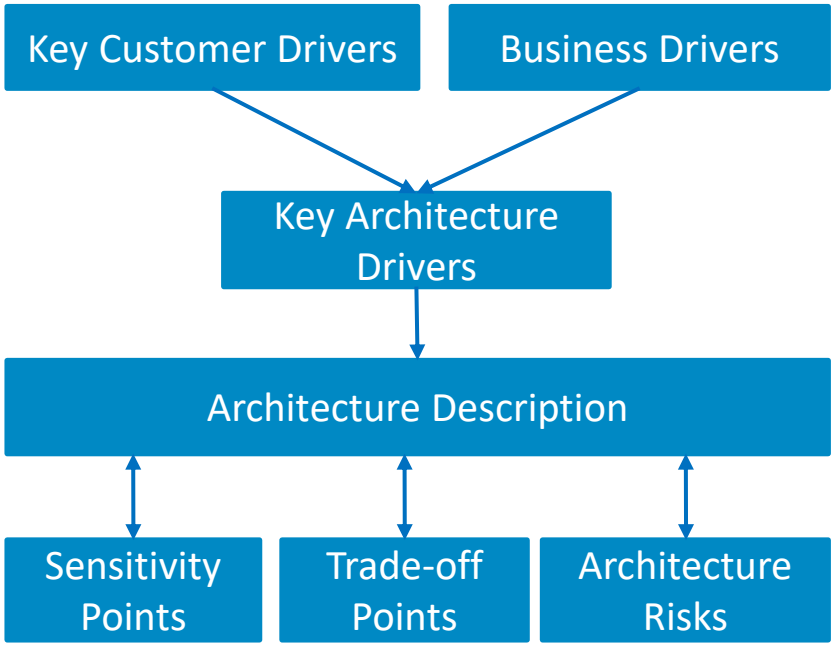
New (reference) architecture

That’s where the Architect comes in

- Understanding *What* the problems are to be solved (Needs)
- Understanding What criteria to apply when ranking different concepts
- Understanding What the consequences are of Choices:
  In-depth domain knowledge + technical understanding of the product system
- Able to reason about the 3rd dimension:
  How would needs, product, use, suppliers, competitors, evolve over time
- **And translating that to design concepts, (reference) architecture and/or architecture roadmaps**

Starting the (reference) Architecture work

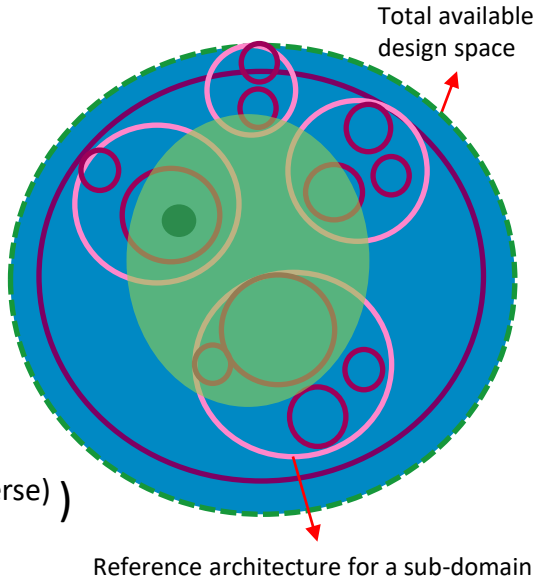
- Understanding Customer & Business needs
  - E.g. ‘X as a Service’ has other constraints than ‘transactional sales model + Service contract’
- Analyzing
  - *What* to solve for our Customers, BU’s
  - *What* are operating and usage constrains
  - *What* drives ’cost’ (over life time)
  - *What* drives ‘value’ (over life time)
  - *What* …
- Realization & sustaining aspects
  - Integration, technology choices, supply chain, dependencies, Risks, Sustainability, …



Capturing Essential aspects in the (Reference) Architecture

Driving commonality, compatibility and structure as a standard

- Reference Architecture: An architecture at reasonably high-level of abstraction
  - Covering most important functional blocks (high-level partitioning)
  - Depicting important & strategic interfaces essential for realizing value over life-time, e.g:
    - Enabling Future updates / upgrades / extensions / …
    - Integration with other systems, 3rd party systems
  - Safeguarding **strategic** decisions, E.g.:
    - Use of certain (industry standard) interfaces
    - Supply chain choices (incl. make-buy, re-use, partnering, …)
    - Desired commonality (to reach operational efficiency), …
  - Applicable to overall design, and/or specific design aspects:
    - Guiding & constraining designs of (derived) products/systems
    - Guiding & constraining individual elements of products/systems
- In some way, a blueprint for an organization(Conway's law^{-1} (inverse))

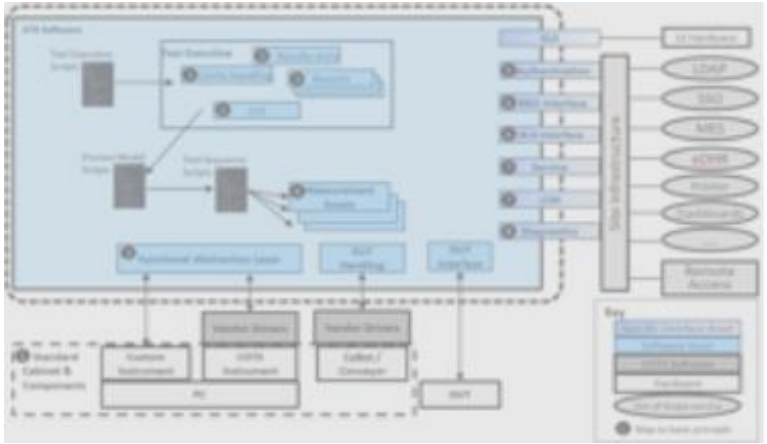


Some examples for which we created Reference Architecture

- Sonicare Tooth Brush
  - Strategic Interface: Brush head
    - standardized to allow combinations of handles & brush heads
  - Important internal Interfaces: Mechanical/battery

- Battery pack
  - Power & geometrical interfaces
  - Industry standard (SBS 1.1) data interface for battery state-of-health monitoring

- Automated test equipment
  - Defining the standard way of realizing them
  - Based on common design patterns
  - Facilitating integration & Configuration in different manufacturing environments



Reference Architecture for Automated Test Equipment

Conclusion/summary

- A Reference Architecture is a powerful concept, enabling cross-business cooperation
- Creating consistency towards users
- Improving efficiency (Supply chain, R&D, Life Cycle Maintenance, …)

- Observation:
  - Many people typically dive into Technical design very quickly – often *too* quickly
  - The real architecting work starts at Understanding the problem(s) to be solved
    - Iterating on technical design is good, especially for understanding and evaluating concepts
  - Focus of the reference architecture is

Not only on making the product right, but also making the right product !
and sustaining that over product portfolio and time, consistently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