Abstract

Defining and illustrating architectures. Architectures go beyond system structure (parts, interfaces, functions, allocation). Architectures connect design to the context, by capturing customer value proposition, and the business proposition.
One Architecture Facilitates many Solutions

single cardio vascular X-ray architecture

many designs
many variants
### Value Proposition
*Why does customer want to buy?*
- customer key drivers
- cost of ownership
- customer business analysis
- customer stakeholders and concerns
- work flow or ConOps
- et cetera

*Why do users like to use the system?*

### Business Proposition
*How do we earn money?*
- life cycle key drivers
- business model
- cash flow analysis
- life cycle stakeholders and concerns
- life cycle model
- supply chain

### System Specification
*What does customer get?*
- functions
- qualities (e.g. quantified performance)
- interfaces
- constraints, standards, regulations

*What is the system-of-interest that we deliver?*

### Design
*How will we realize this specification?*
- partitioning and interfaces
- dynamic behavior, e.g. functional model
- performance models and budgets
- concept and technology selection

*How do we ensure performance, safety, robustness, etc.?*

### Engineering
*Getting all details right for all business functions.*
- technical product documentation

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**Why**

**What**

**How**
Functional Model for System Creation

stakeholder needs → architecting
business objectives → architecting

architecture guidelines top-level design rationale

specification → design

design partitioning interfaces functions allocation

design → engineering

engineering → documentation

procurement → procurement
production → production
installation → installation
quality assurance → quality assurance
lifecycle support → lifecycle support

system and parts data procedures

Architectural and Design Fundamentals

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Structure = Parts + Interfaces + Configuration

**ultimate goal:**
- modular component catalogue
- well-defined interfaces
- independent testable

**to facilitate:**
- fast creation of solutions
- concurrent engineering
- logistics and production
- variations and changes
Designing Desired Qualities and Behavior

- How do parts interact to create desired dynamic behavior?
  - allocate functions

- How do desired qualities and performance emerge from the interaction?
  - dimension and configure parts and functions
Design = Structure + Dynamics + Quantification

- **characteristics**
  - prime interest of customer

- **dynamics**
  - functionality

- **parts**
  - prime interest of organization

Results in prime system responsibility.
Our Primary Interest

- developing organization
- architect

- system of interest
Context, Zoom-out and Zoom-in

- Customer organization
- Developing organization
- Architect
- Supplier organization

Super system

System of interest

Subsystems
Adding the Time Dimension

customer organization

developing organization

architect

supplier organization

past super system

past system of interest

past subsystems

based on TRIZ

supersystem

system of interest

subsystems

future system

future system of interest

future subsystems

knowledge

innovation

Architecture and Design Fundamentals
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SEMABentitiesInTime
Architect, Architecture, Architecting

Architecture and Design Fundamentals
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SEMABArchitecting