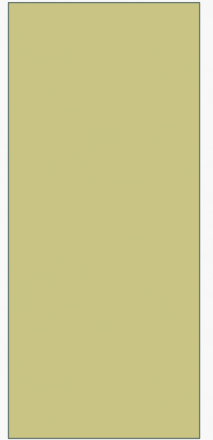# INTRO S/W ARCHITECTURE

OBJECTIVES

- explain what architecture is
- explain why architecture is important
- explain the role of software architecture in the development process
- explain the role of stakeholders
- know the main concepts

SO WHAT'S THIS GOT TO DO WITH ME?

- awareness of
  - business context and business drivers
  - stakeholders' concerns
  - requirements and quality attributes
  - architecture in the company
  - conflicts and tradeoffs
- taking the right design decisions …
- … and documenting them well

This all makes you a better software engineer !

CONTENTS

- **literature**
- what is architecture
- levels of architecture
- architecture between requirements and design
- importance of stakeholders

http://www.viewpoints-and-perspectives.info/home/resources/
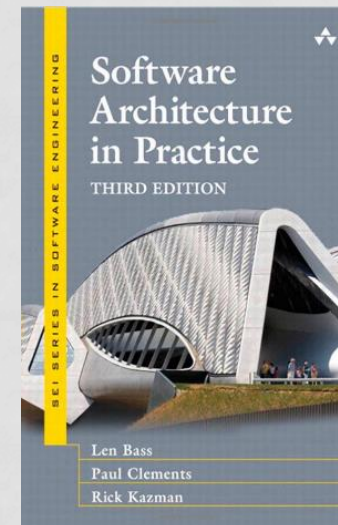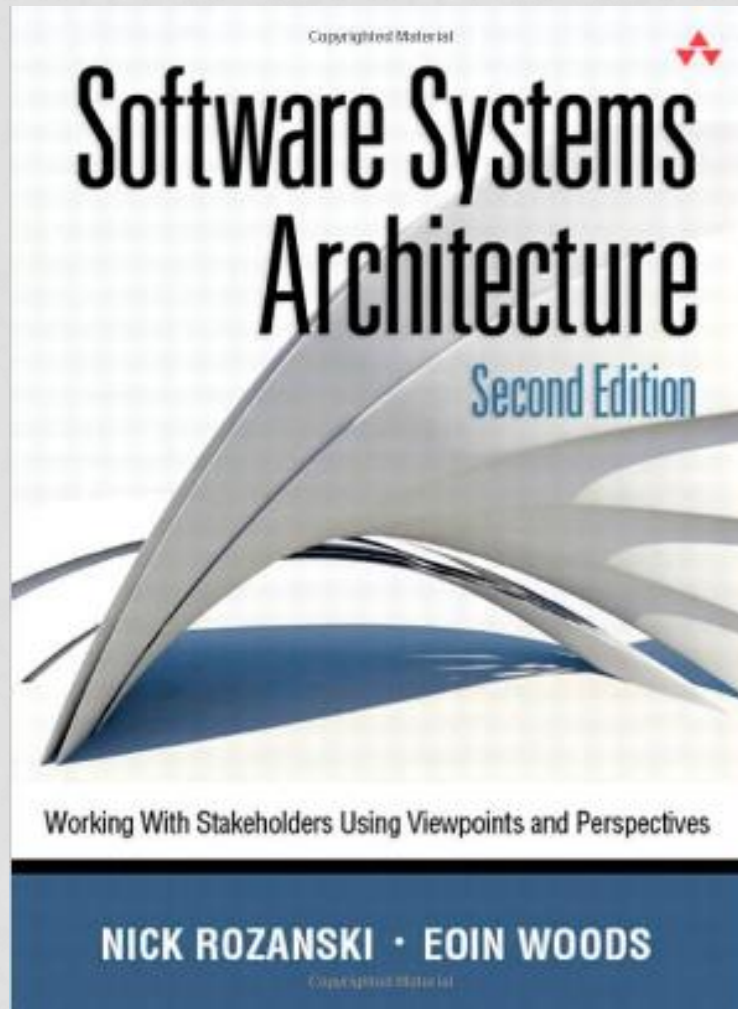
CONTENTS

- literature
- **levels of architecture**
- what is architecture
- why do architecture
- architecture between requirements and design
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LEVELS OF ARCHITECTURE

- enterprise
- application, product
- embedded system
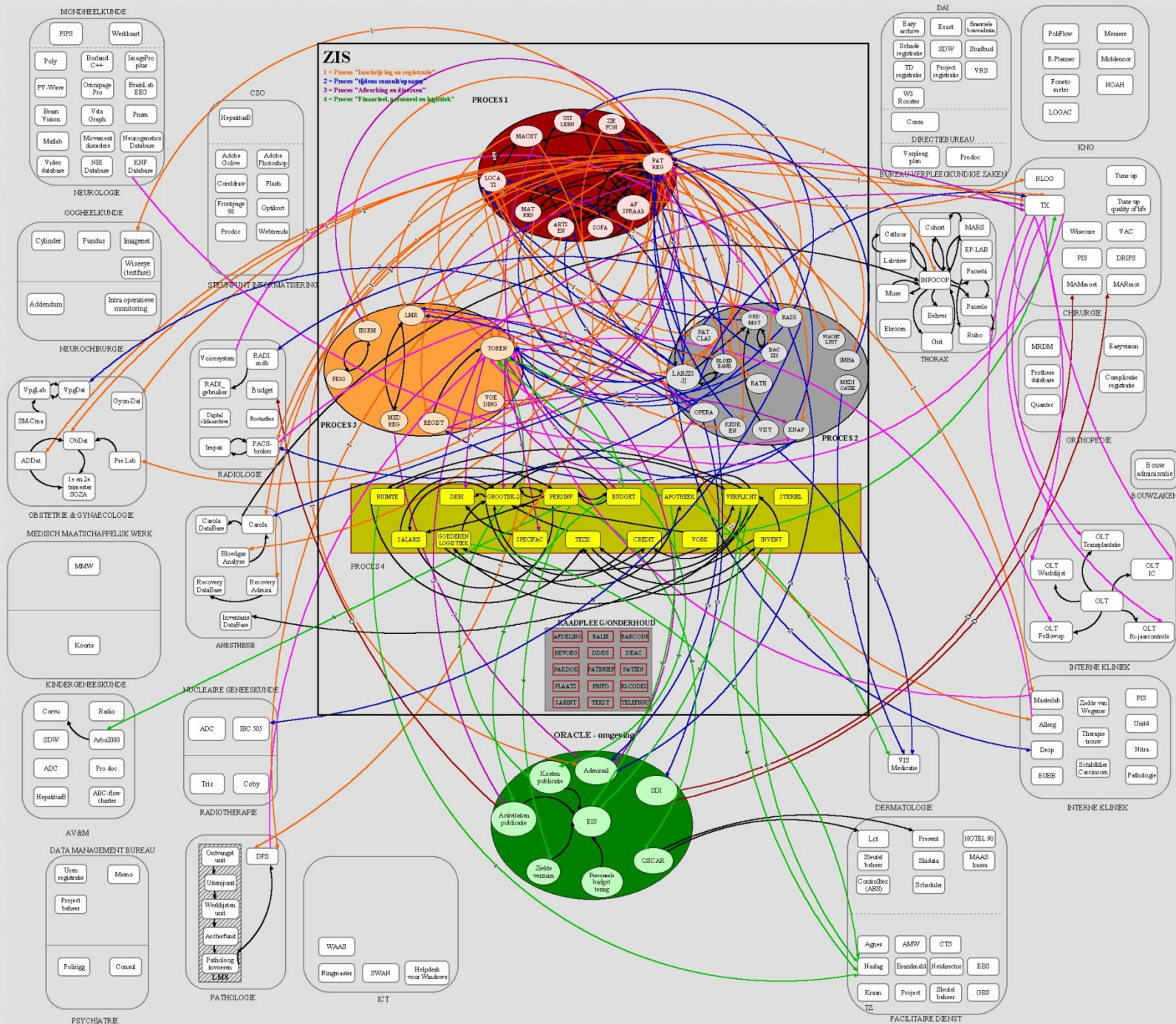- infrastructure (system, network)
- platform
- CPU

LEVELS OF ARCHITECTURE

enterprise architecture …

- … is an attempt to get to grips with "everything"
- … contains different models with different emphasis
- … is in general top down, starting with the business

software architecture …

- … is high-level requirements & design of a software system

R&W : focus is on large software systems

ARCHITECTURE: THE ENTERPRISE VIEW

Business processes and activities use ...

Data that must be collected, organized, safeguarded, and distributed using ...

Applications such as custom or off-the-shelf software tools that run on ...

Technology such as computer system and telephone networks.

BUSINESS = LEADING!

Business goals

Business/Domain Architecture

System arch.

Application/Product Architecture

IT/Platform Architecture

Driving

Enabling

Alignment

TOGAF : ARCHITECTURE DEVELOPMENT METHOD
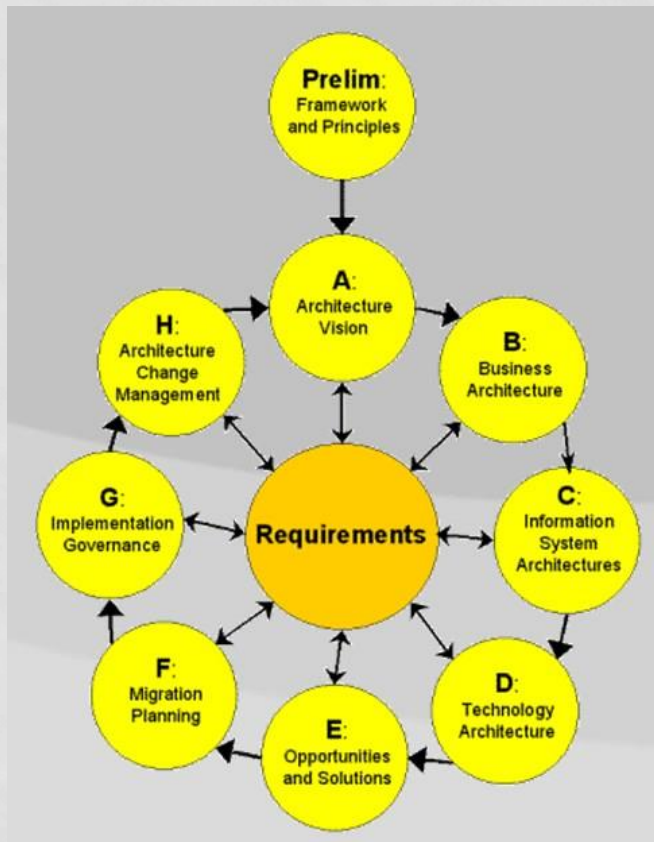
Preliminary phase: Frameworks & Principles
A: Architecture Vision
B: Business Architecture
C: Information Systems Architecture
D: Technology Architecture
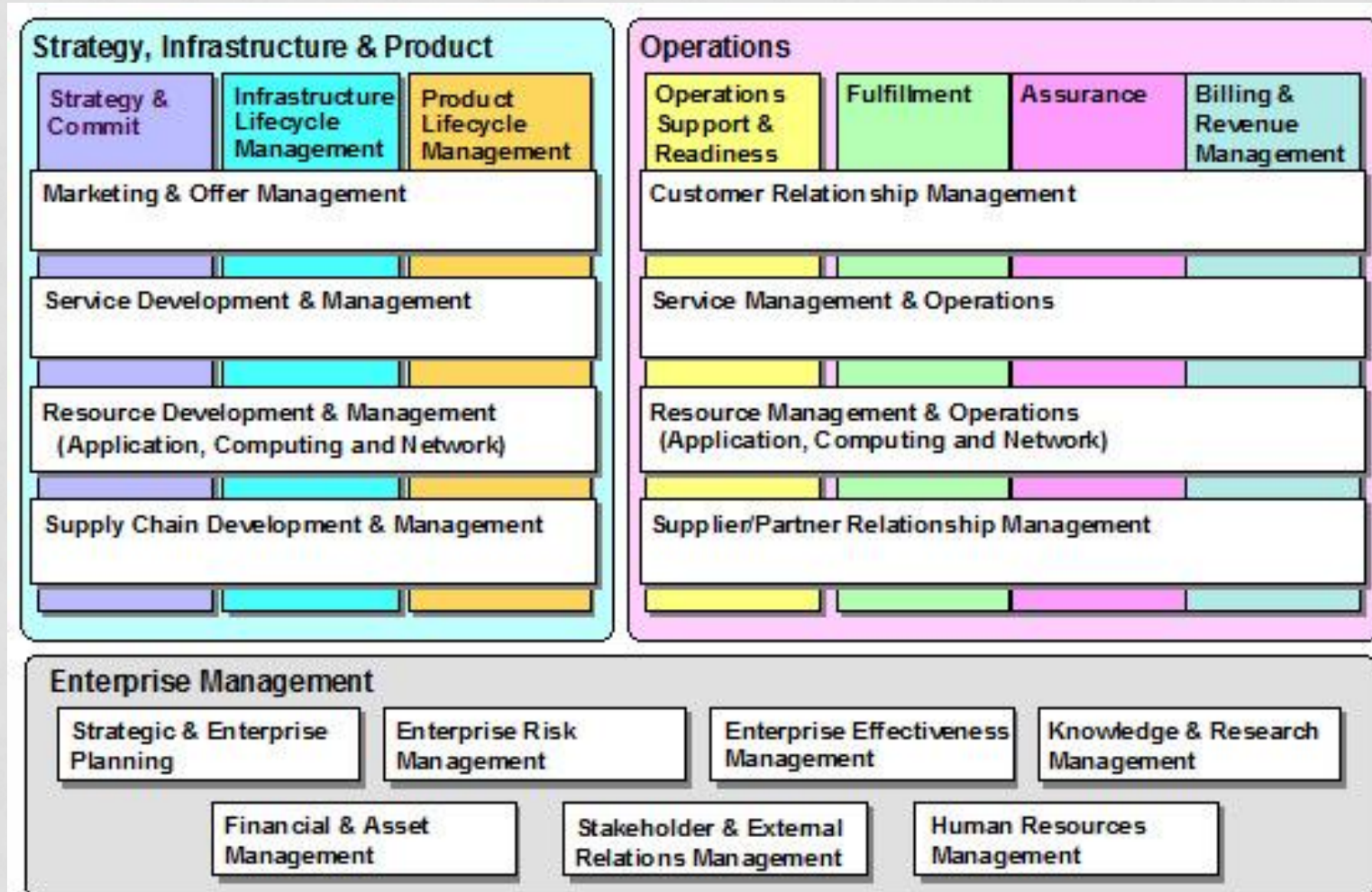**E: Opportunities and Solutions**
F: Migration Planning
G: Implementation Governance
H: Architecture Change Management

BUSINESS PROCESS FRAMEWORK eTOM

Strategy, Infrastructure & Product

Strategy & Commit	Infrastructure Lifecycle Management	Product Lifecycle Management
Marketing & Offer Management		
Service Development & Management		
Resource Development & Management (Application, Computing and Network)		
Supply Chain Development & Management		

Operations

Operations Support & Readiness	Fulfillment	Assurance	Billing & Revenue Management
Customer Relationship Management			
Service Management & Operations			
Resource Management & Operations (Application, Computing and Network)			
Supplier/Partner Relationship Management			

Enterprise Management

| Strategic & Enterprise Planning	Enterprise Risk Management	Enterprise Effectiveness Management	Knowledge & Research Management
Financial & Asset Management	Stakeholder & External Relations Management	Human Resources Management	

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ARCHITECTURE IS...

- ... a way to communicate with stakeholders
- ... the decisions you cannot change easily later
- ... the choices that kill your project if you get them wrong
- ... high-level design
- ... all about non-functional requirements
- ... the 10% effort up front that determines 90% of the costs
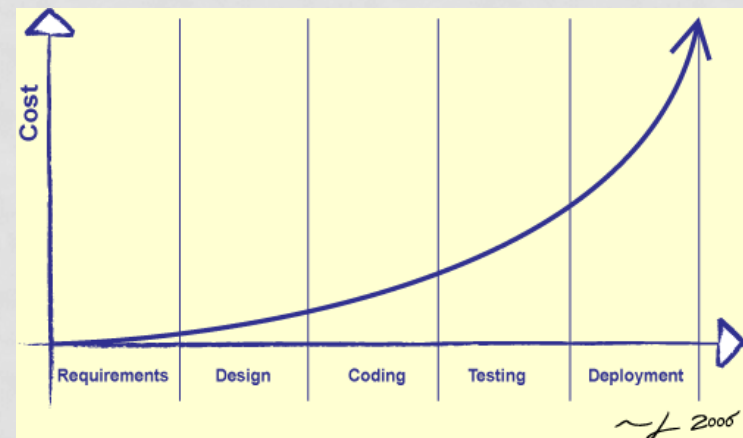
SOFTWARE ENGINEERING INSTITUTE

The architecture of a software system is the structure or structures of the system, which comprise software elements, the externally visible properties of those elements, and the relationships between them.

ISO/IEC/IEEE 42010:2011

(System) fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution

FOWLER : WHO NEEDS AN ARCHITECT ?

- developers have a shared understanding (big picture) which is called architecture
  - how the system is divided into components and how components interact through interfaces
- architecture is a 'social construct'
  - because : whether something is part of the architecture is entirely based on whether the developers think it is important
  - CRM vs. MRI
- architecture is about things that developers perceive as hard to change
- a piece of software is easy to change, but we don't know how to make everything easy to change
  - software is only limited by human imagination

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WHY DO ARCHITECTURE?

- shared understanding, the big picture
- a basis for further design and implementation
- align stakeholders, make requirements explicit
- resolve conflicting requirements → tradeoffs
- a framework for evaluating requirements
- what-if analysis
- emphasis on system's quality attributes
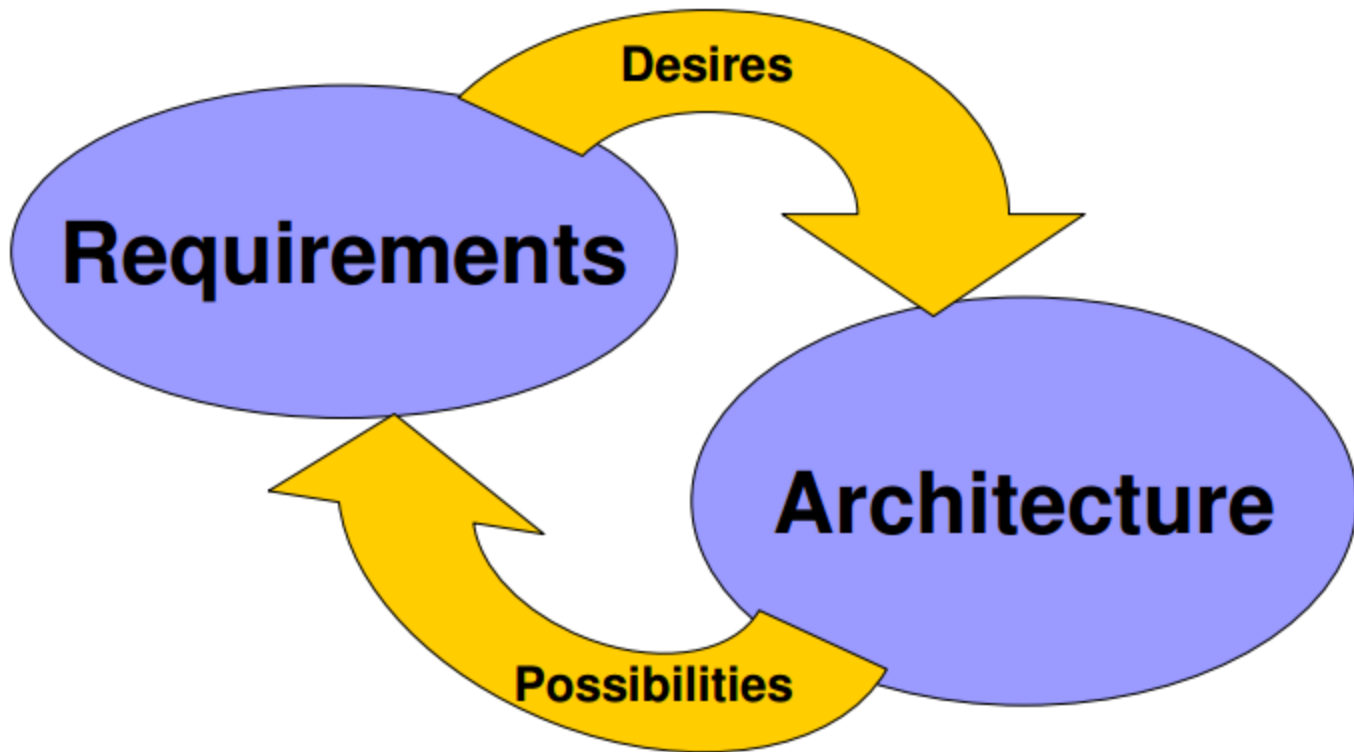- manage complexity
- avoiding duplication

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WHERE DO YOU THINK ARCHITECTURE FITS IN THE LIFECYCLE?

The bridge between requirements and design

Requirements

Architecture

Design
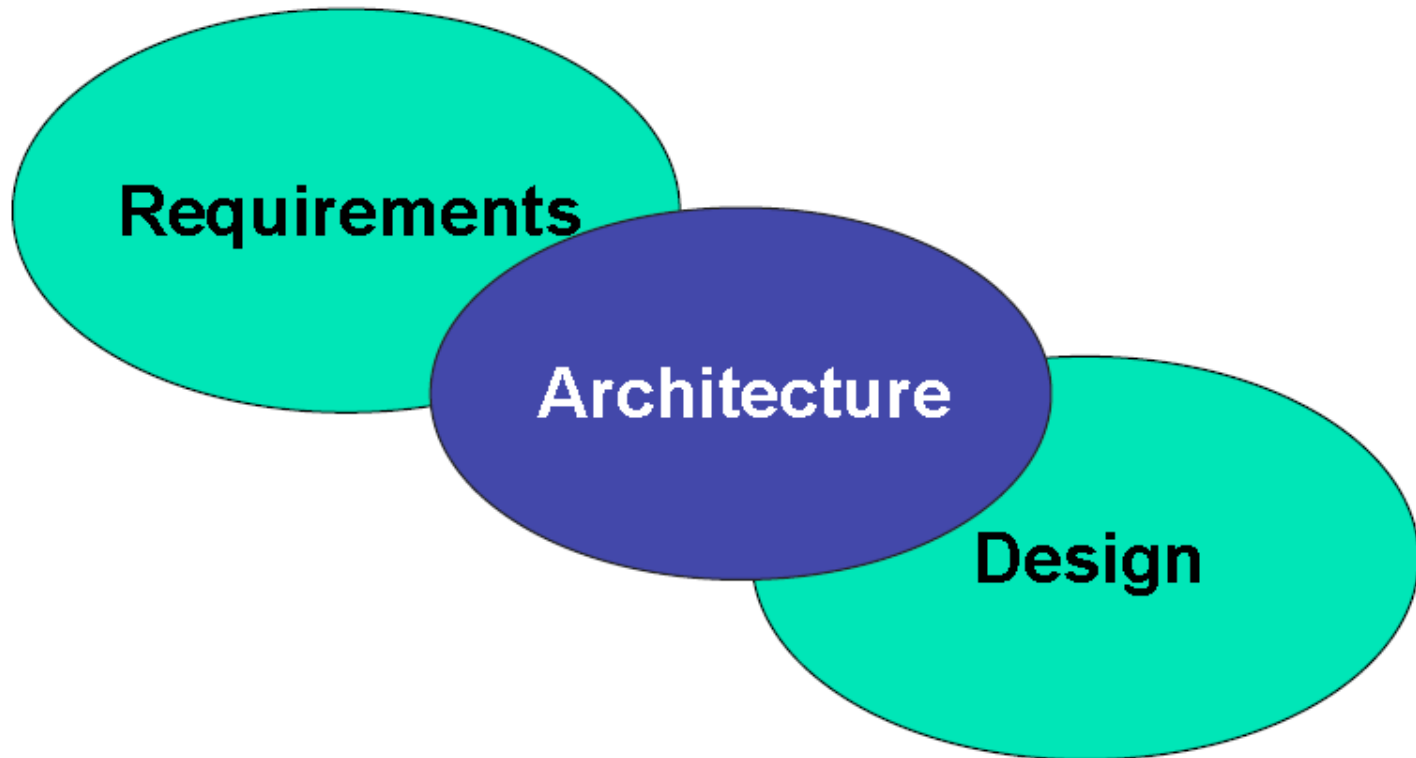
ARCHITECTURE & REQUIREMENTS

ARCHITECTURE & REQUIREMENTS

- requirements are an input to architecture
  - requirements frame the architectural problem
  - you don't need all the requirements!
  - focus on architecturally significant requirements (ASR's)
- architecture is framework for evaluating requirements
  - "The art of the possible"
  - stakeholder understanding of risk/cost & possibilities

ARCHITECTURE & DESIGN

- architecture frames design
  - architecture is part of the design process
  - but not all design is architectural
- captures the system-wide decisions
  - what has to be consistent or constant
- importance of role increases with scale
- compatible with agile
  - even XP with the right approach

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- literature
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- architecture between requirements and design
- **importance of stakeholders**

LEARN TO THINK 'STAKEHOLDERS'

- identifying stakeholders
  - people, groups, entities
  - those who have an interest in or concerns about the realization of the system
  - not just the guy with the money!
- importance of stakeholders
  - architectures are built for stakeholders
  - decisions must reflect stakeholder needs
- the challenge of stakeholders
  - different stakeholders will have different concerns
  - these requirements will often conflict with each other and the budget
  - stakeholders will speak a different language

EXAMPLE STAKEHOLDERS

- klanten
- gebruikers (super user)
- opdrachtgevers / management
- ontwikkelteam (m.n. testers)
- systeem/netwerk beheer, functioneel beheer (operations)
- technische experts, architecten, ontwikkelaars
- customer operations
- helpdesk / support
- facturatie & incasso
- security officer
- product management / marketing
- juridische medewerkers
- ...

ATTRIBUTES OF A GOOD STAKEHOLDER

- informed, to allow them to make a good decision
- committed, even if decisions are hard
- authorized
- representative

Q: Stakeholder ←→ PO?

STAKEHOLDERS ?

Think about OSIRIS, who are the stakeholders?