Enterprise Architecture in Practice

Methods and Tools

INFORTE seminar 15.-16.12.2011 Jyväskylä

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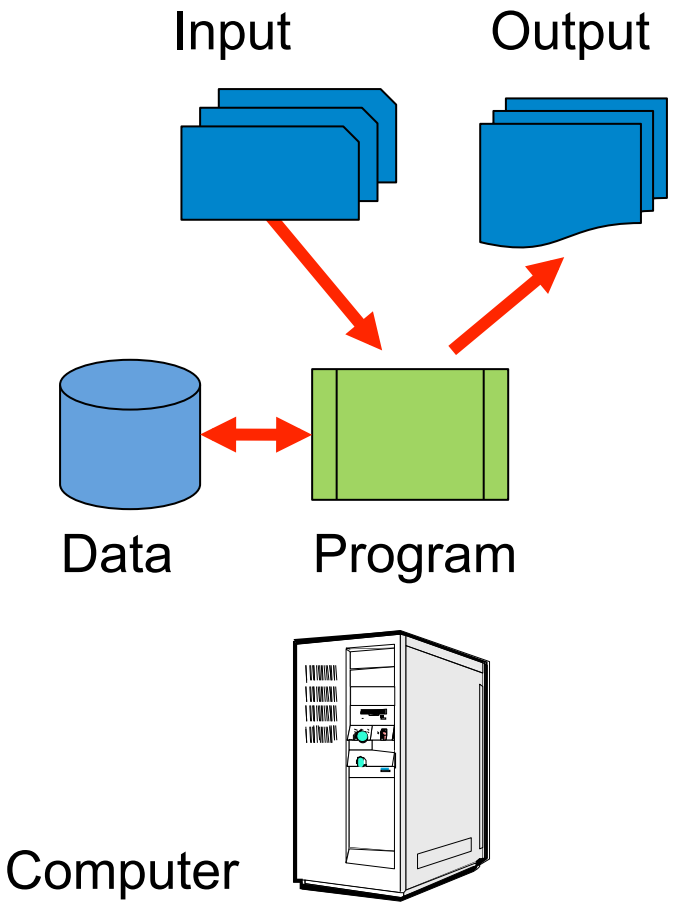
Aalto University

In the early days...



Automation of manual tasks

- Payroll
- Bookkeeping
- Order entry
- Invoicing
- Statistics

In-House Development:
Close relations between
Business and IT-department

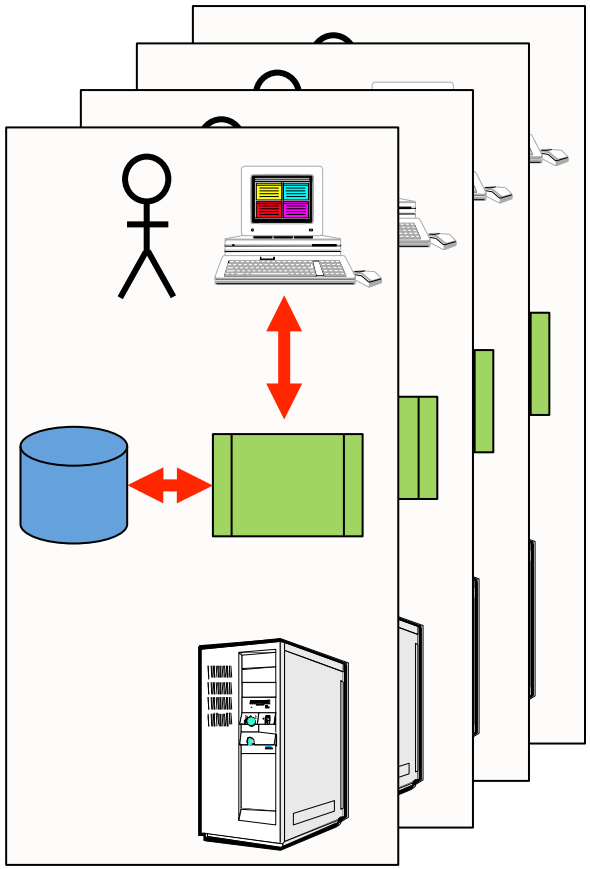
The next steps...

User tasks

Applications

Databases

Platforms



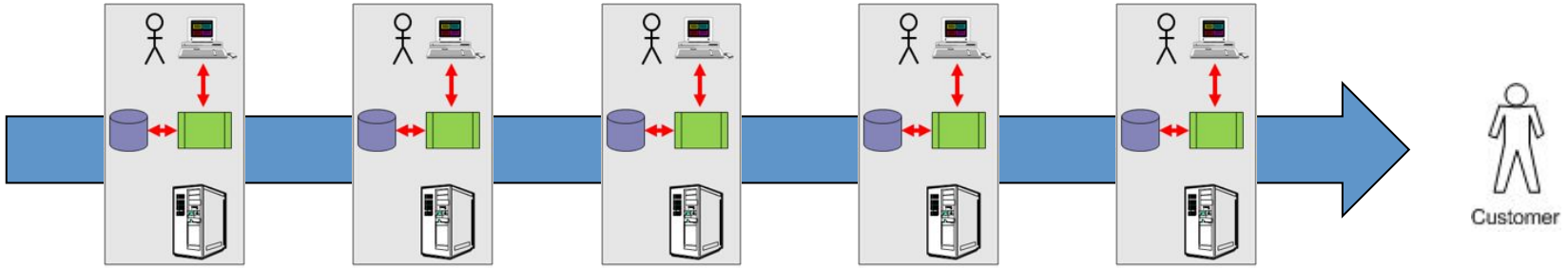
Application packages

- Personnell
- Financial administration
- Production Control
- Material Requirements
- Inventory-Orders-Shipping-Invoicing
- Purchasing
- Product development
- ...

Development by softwarehouses

Not so close relations between Business and IT-department

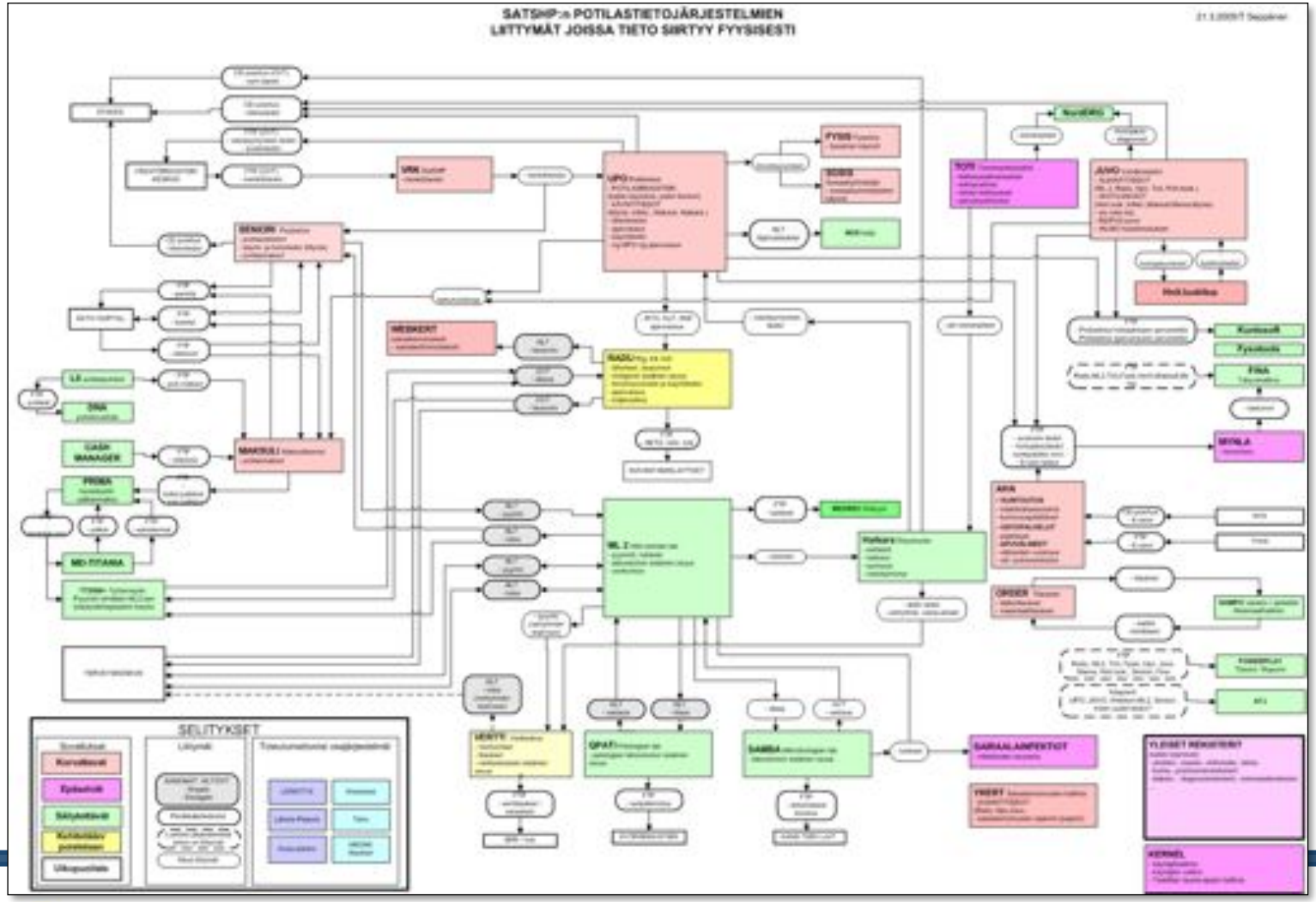
The running business needs applications to be integrated



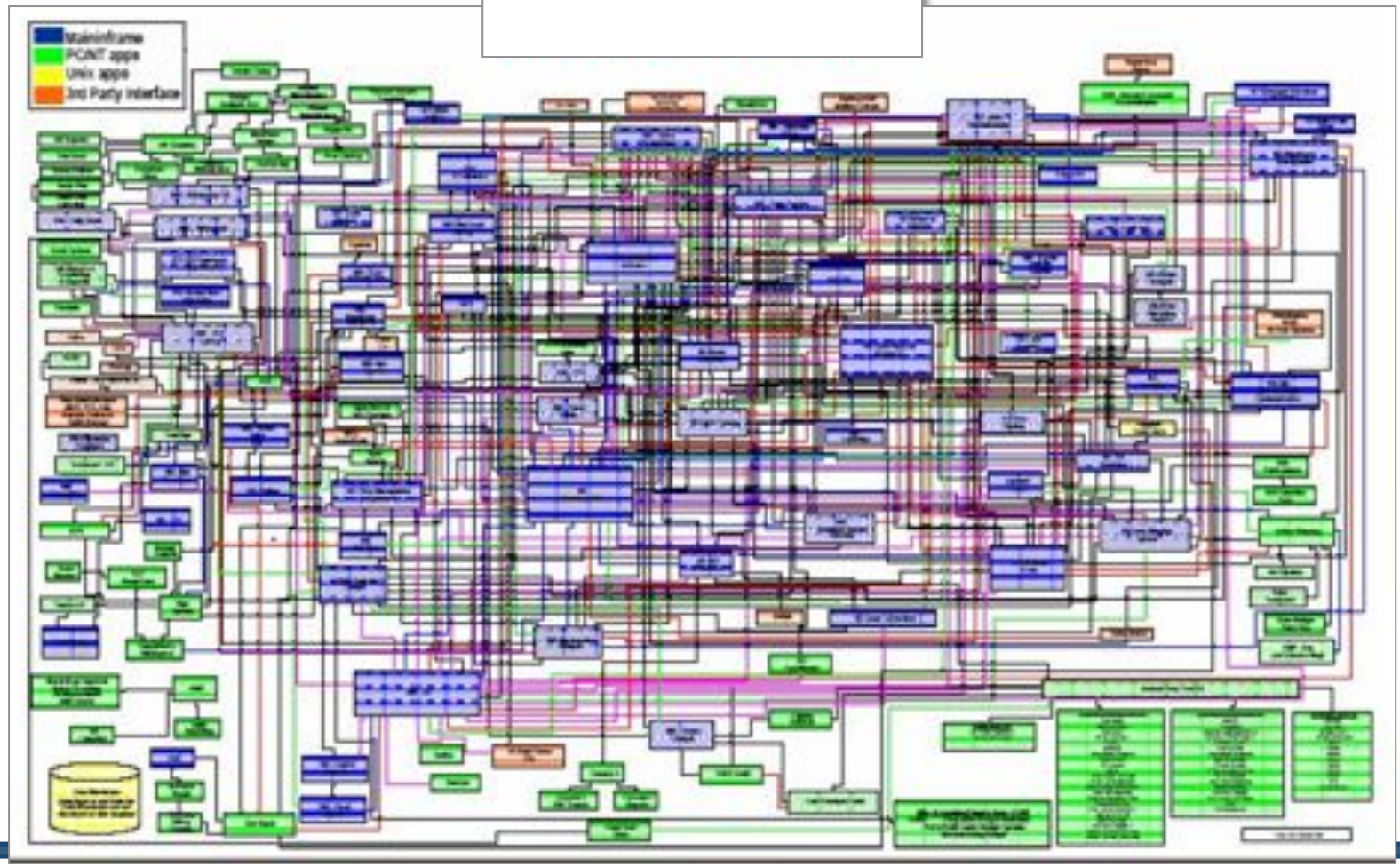
Chains of business functions = Business Processes

- Purchasing
- Raw material inventory control
- Manufacturing
- Finished product inventory control
- Sales, order entry
- Shipments
- Invoicing

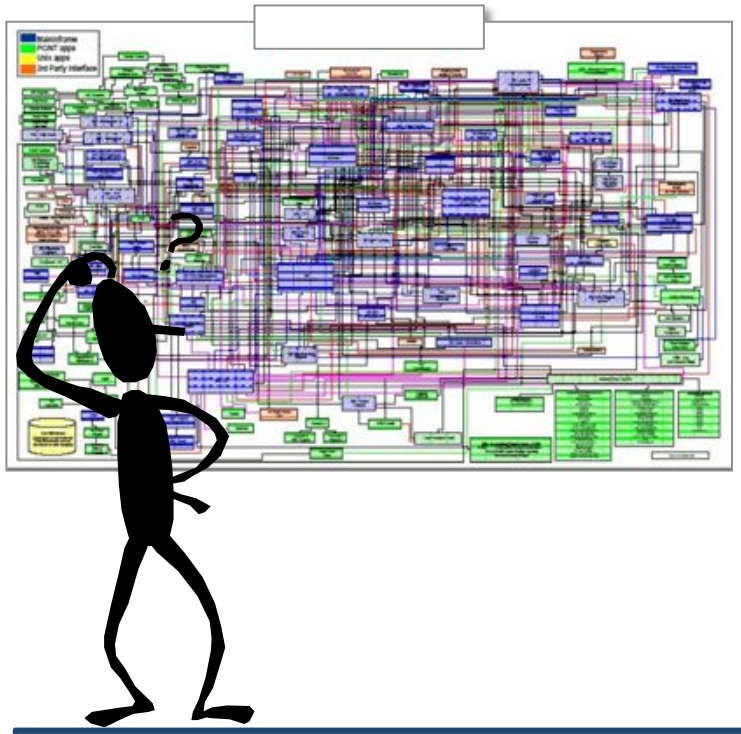
Example: An Enterprise



Example: Larger enterprise

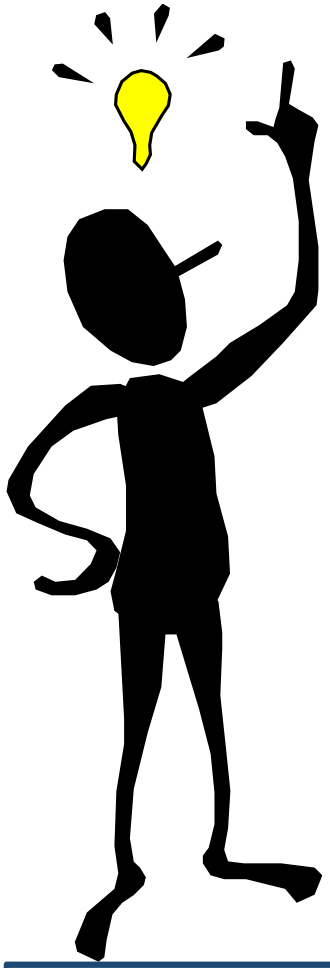


How do we survive in this jungle?



Incompatibilities

- Data between applications
- User interfaces
- Terminologies
- Workflows
- Hardware and software platforms
- Business and IT !



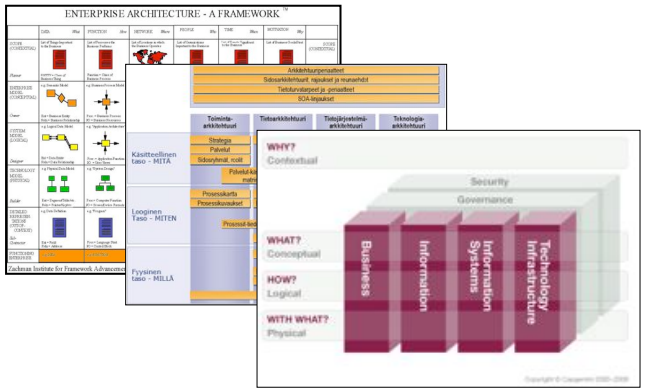
Enterprise Architecture!

Speaker background

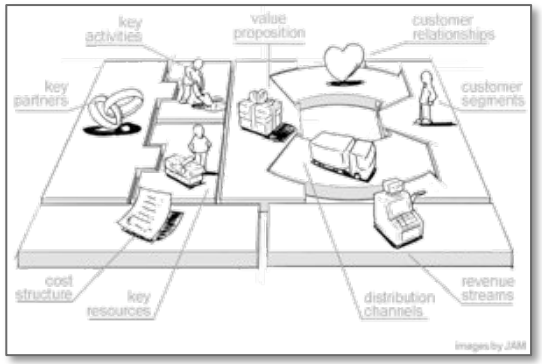
- Teacher, Aalto Yliopisto, SoberIT
  - Enterprise Systems Architecture, 2006-2010
  - Business Process Design and Implementation, 2009-2010
  - Thesis supervisor
- Researcher,
  - SOLEA, Service Oriented Locally Adapted Enterprise Architecture, 2008-2011
  - MyWellbeing, 2008-2010, Citizen Centric Architecture
- PhD Student, Dynamic Business Framework for Networks in Health and Wellbeing Services
- Consultant, Conceptia Oy, 2000 ->

Enterprise Architecture in Practice

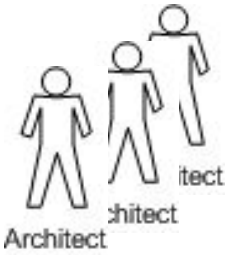
Frameworks



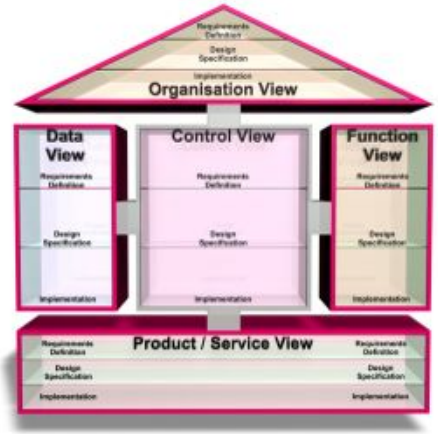
Model Templates



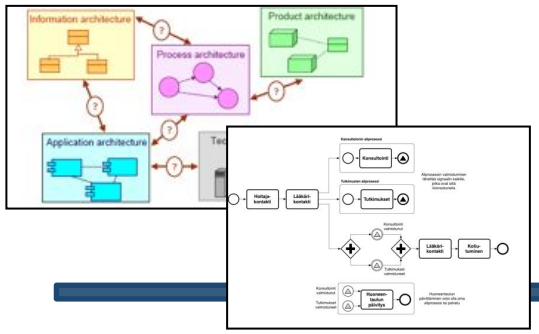
Skills



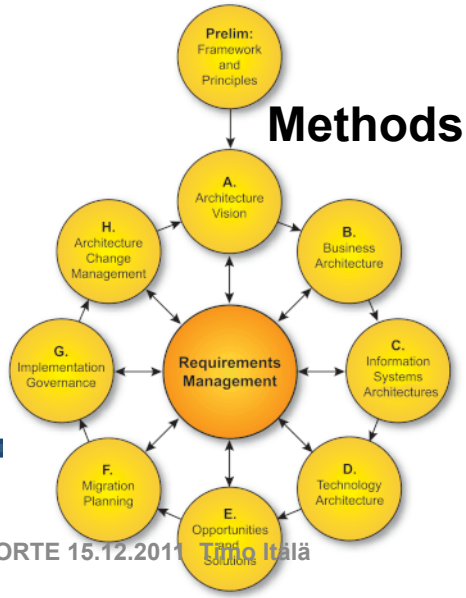
Tools



Notations



Methods

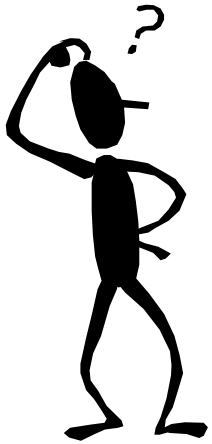


Enterprise Architeture:

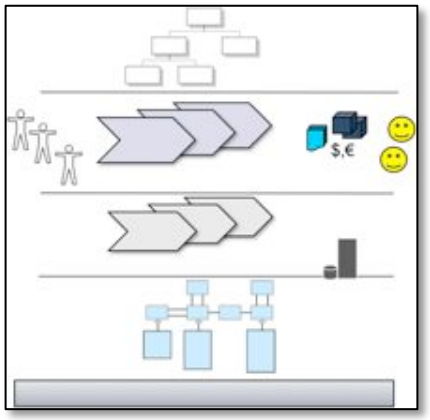
- **To build**
- To change

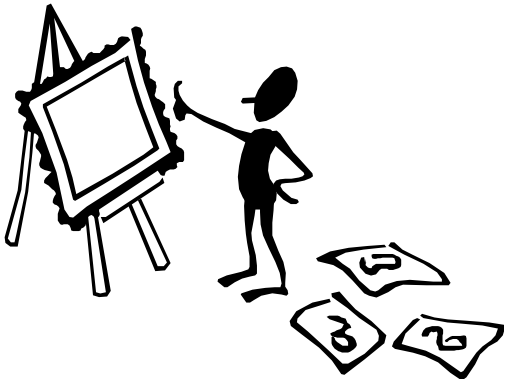
Building Enterprises

The user of the model



The Enterprise to be modeled





The modeler and the resulting model

The purpose of the models?

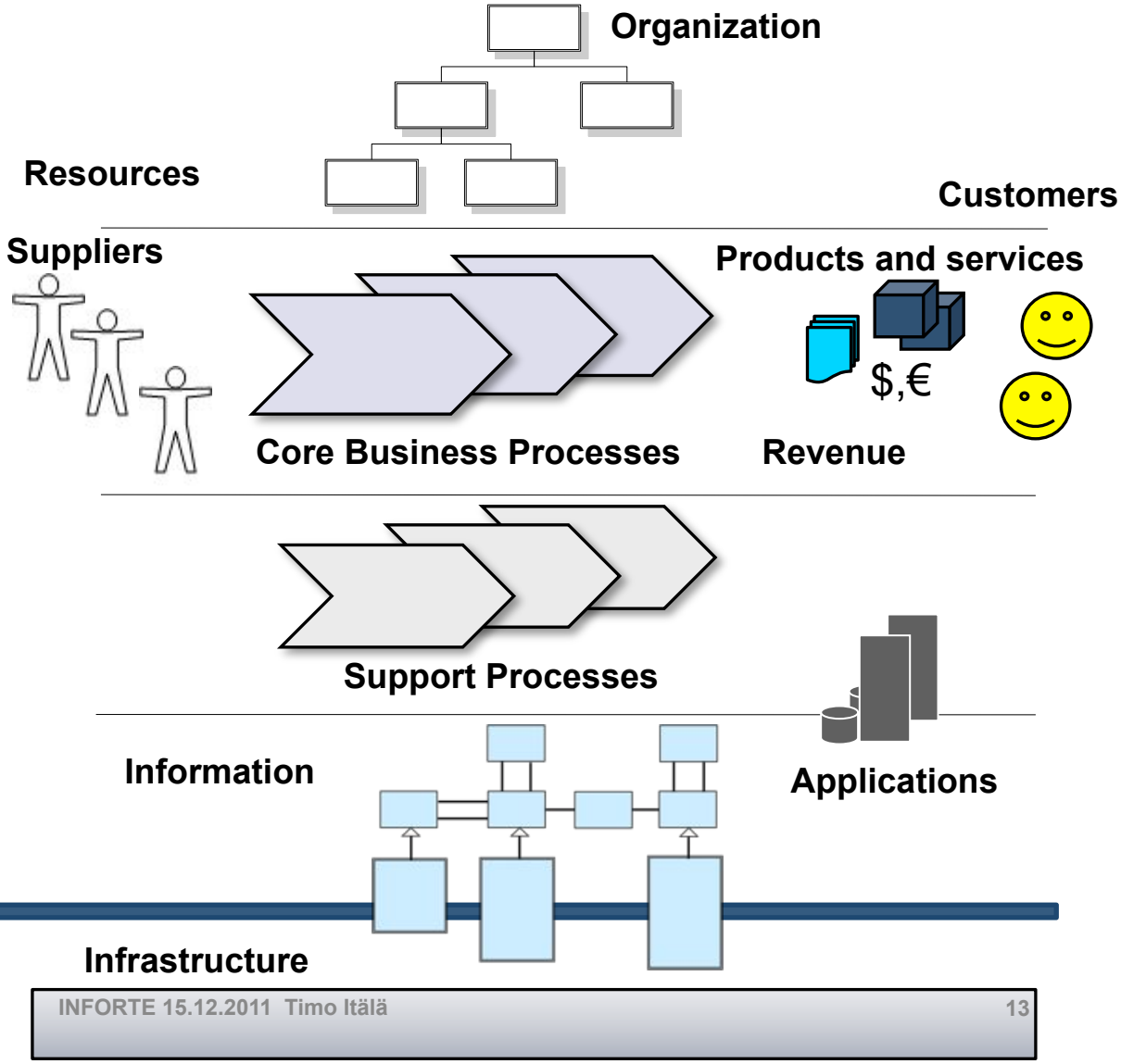
Enterprise?

What is Enterprise? Systems? Architecture?

Our **organization** produces **products** and **services** for our **customers**.

The **revenue** covers our **costs** and makes profit to our owners.

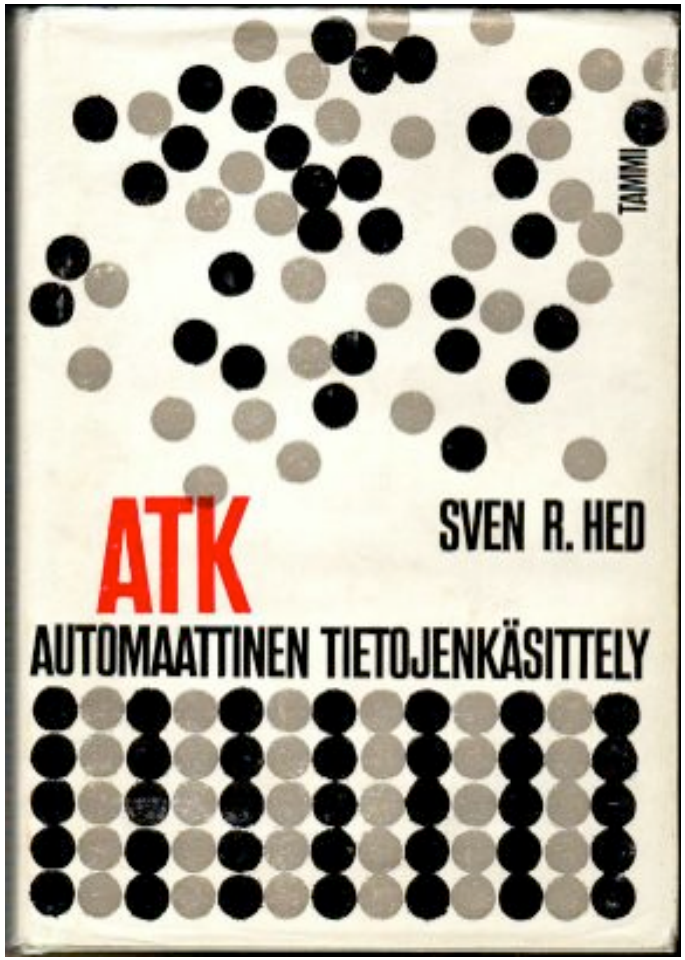
The products and services are results of our **core business processes** which need **information** processed by our **applications** which run on our **infrastructure**.



-60´s

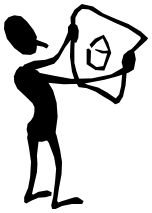
Textbook 1969

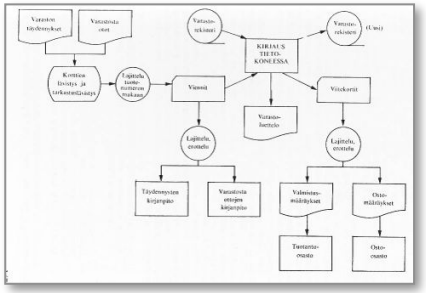
"Automated Data Processing"



Viewpoints of the system to be built

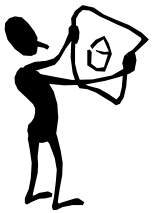
Systems Analyst

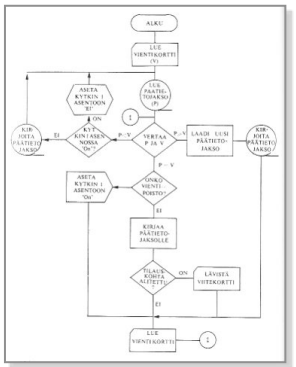




Workflow

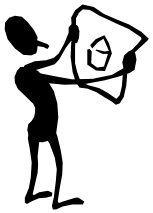
Programmer

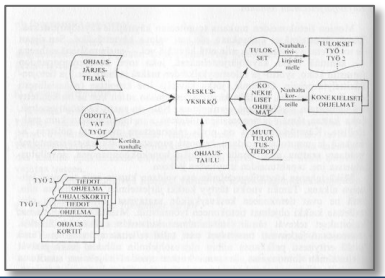




Flowchart

Operator





Job Control

Zachman Framework

? ? ? ? ? ?

ENTERPRISE ARCHITECTURE - A FRAMEWORK ™

	DATA What	FUNCTION How	NETWORK Where	PEOPLE Who	TIME When	MOTIVATION Why	
SCOPE (CONTEXTUAL) Planner	List of Things Important to the Business	List of Processes the Business Performs	List of Locations in which the Business Operates	List of Organizations Important to the Business	List of Events Significant to the Business	List of Business Goals/Strat	SCOPE (CONTEXTUAL) Planner
ENTERPRISE MODEL (CONCEPTUAL) Owner	e.g. Semantic Model	e.g. Business Process Model	e.g. Logistics Network	e.g. Work Flow Model	e.g. Master Schedule	e.g. Business Plan	ENTERPRISE MODEL (CONCEPTUAL) Owner
SYSTEM MODEL (LOGICAL) Designer	e.g. Logical Data Model	e.g. "Application Architecture"	e.g. "Distributed System Architecture"	e.g. Human Interface Architecture	e.g. Processing Structure	e.g. Business Rule Model	SYSTEM MODEL (LOGICAL) Designer
TECHNOLOGY MODEL (PHYSICAL) Builder	e.g. Physical Data Model	e.g. "System Design"	e.g. "System Architecture"	e.g. Presentation Architecture	e.g. Control Structure	e.g. Rule Design	TECHNOLOGY CONSTRAINED MODEL (PHYSICAL) Builder
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT) Sub-Contractor	e.g. Data Definition	e.g. "Program"	e.g. "Network Architecture"	e.g. Security Architecture	e.g. Timing Definition	e.g. Rule Specification	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT) Sub-Contractor
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

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http://apps.adcom.uci.edu/EnterpriseArch/Zachman/zachman.jpg

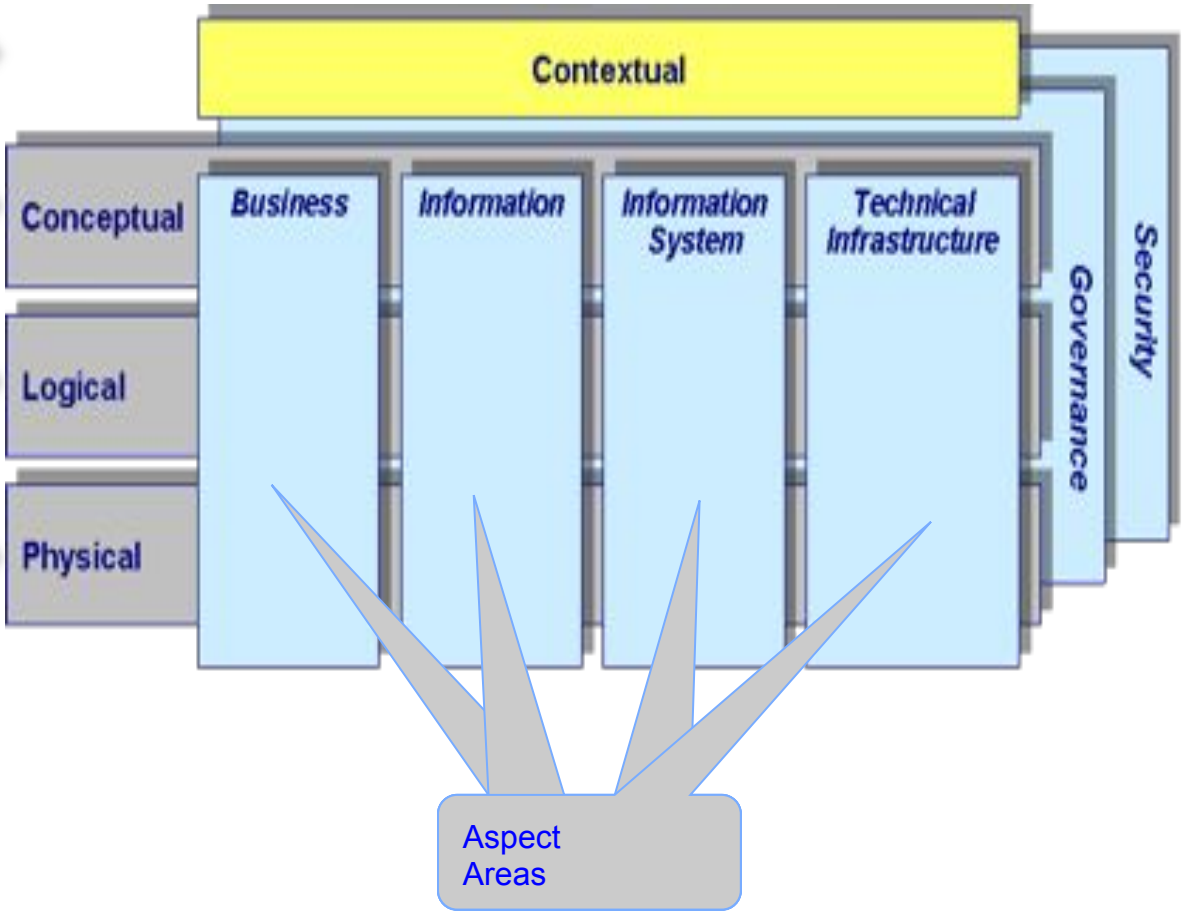
IAF Framework

Why do I want to do this?

What do I want to do?

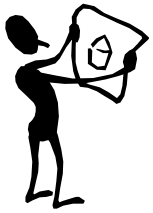
How could it be realized?

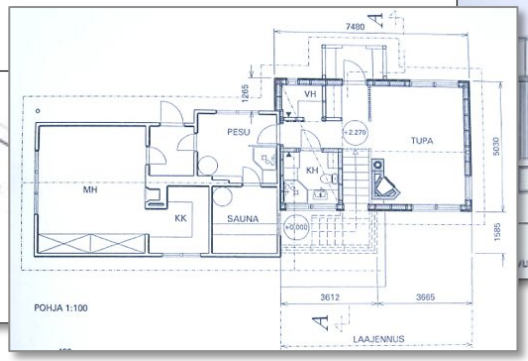
With what can it be realized?



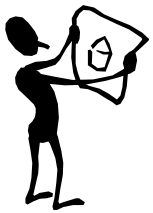
Architecture to build

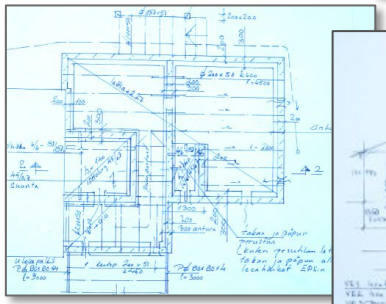
Architect

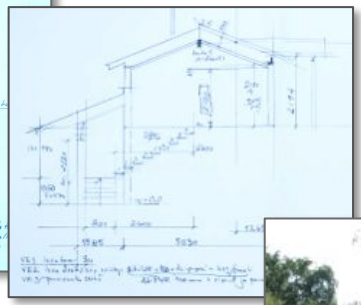




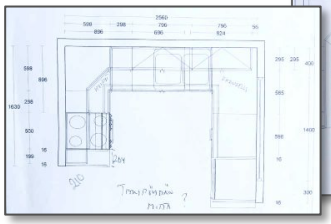
Engineer

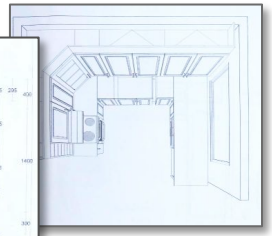






Builder

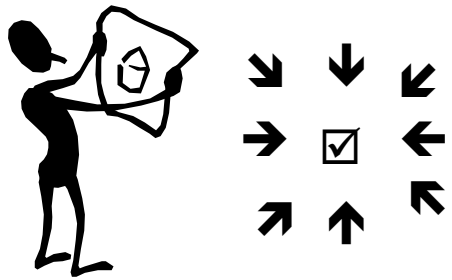




What is the result of Architects work?

- IEEE 1471: Software Architecture: The fundamental organization of a system embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution.

- Practicing Architect: Develop a solution, which satisfies the needs and requirements (often conflicting) of the stakeholders



Example: Helsinki Music Hall Architecture

- How it looks?
- How it functions?
- How it sounds?

- **How it fulfills its purpose?**

Enterprise Architeture:

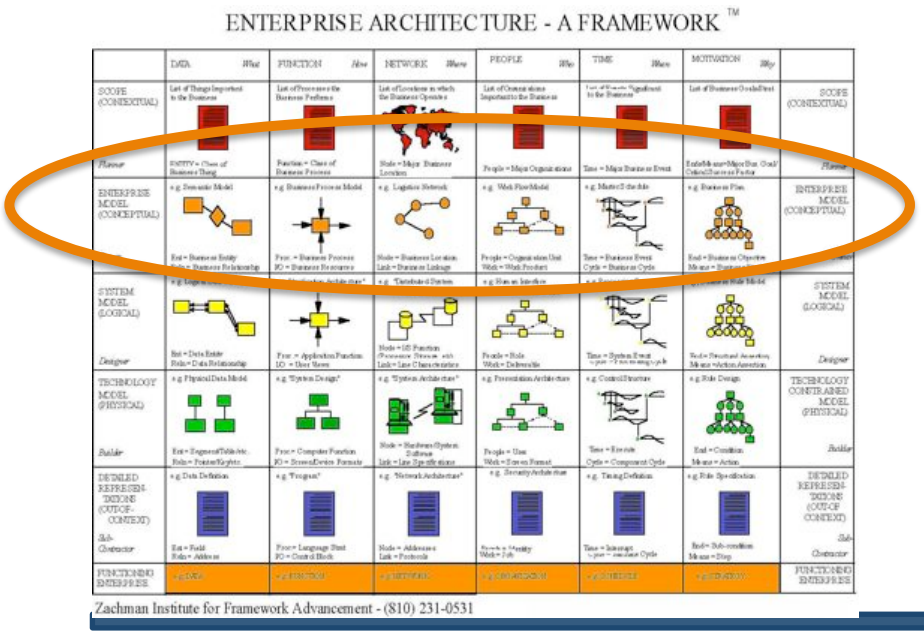
- To build
- **To change**

How Architect works?

- Listen to
- Ask questions
- Collect needs
- Make drafts
- Iterate

Worlds most used platform for drafts

Drafts


ENTERPRISE ARCHITECTURE - A FRAMEWORK ™
DATA What
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NETWORK Where
PEOPLE Who
TIME When
MOTIVATION Why
SCOPE (CONTEXTUAL)
ENTERPRISE MODEL (CONCEPTUAL)
SYSTEM MODEL (LOGICAL)
TECHNOLOGY MODEL (PHYSICAL)
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
FUNCTIONING ENTERPRISE
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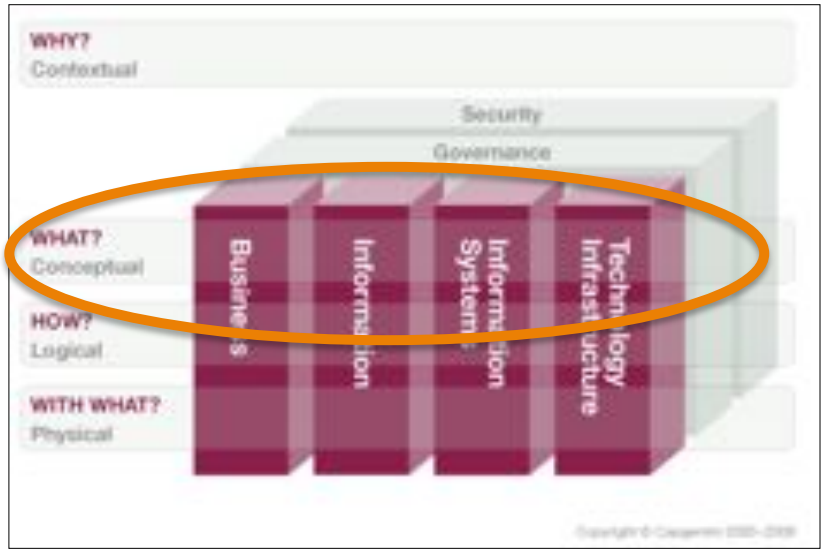
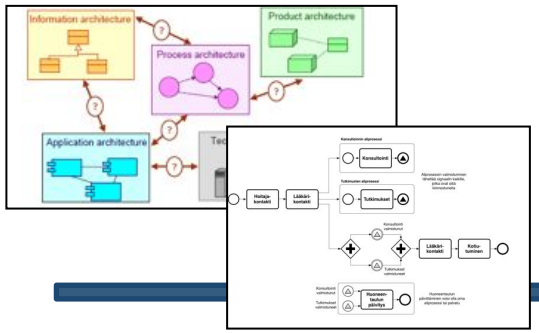
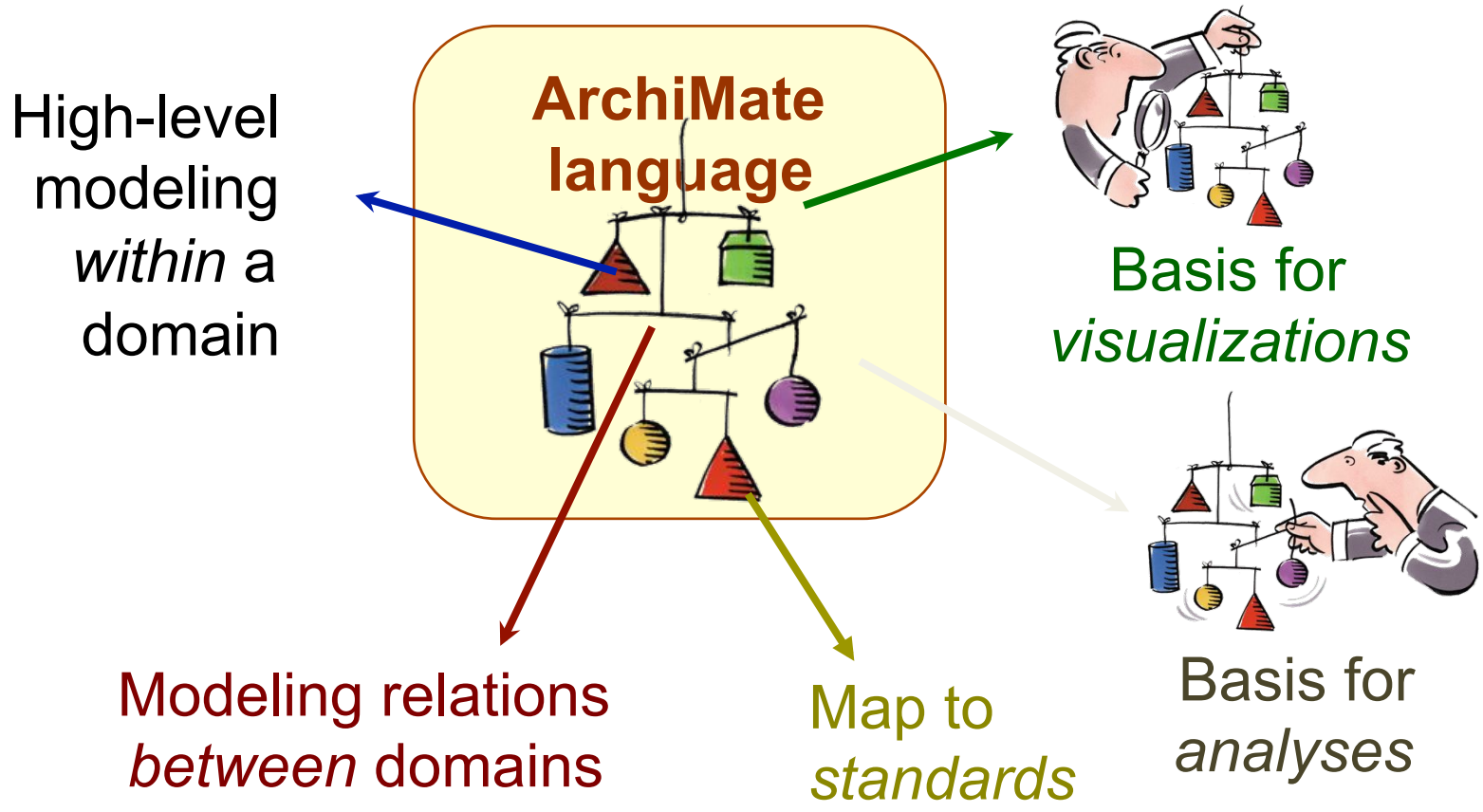

WHY?
Contextual
Security
Governance
WHAT?
Conceptual
HOW?
Logical
WITH WHAT?
Physical
Business
Information
Information System
Technology Infrastructure

Notations: ArchiMate

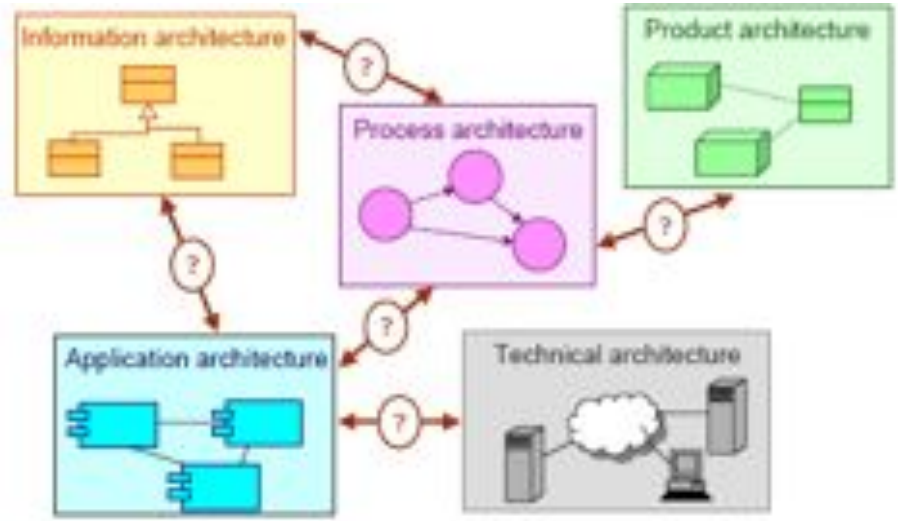


The ArchiMate Language



Key requirements of an Enterprise Architecture Modelling Language

- Focused on modelling inter-domain relations
- Modelling the global structure within each domain, showing the main elements and their dependencies, in a way that is easy to understand for non-experts of the domain
- Visualise models in a differentway, tailored towards specific stakeholders with specific information requirements

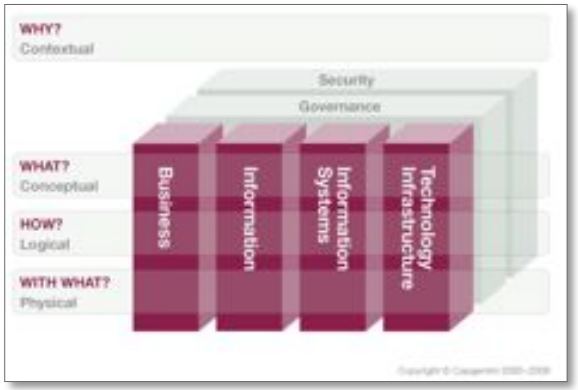


Layered Services Approach

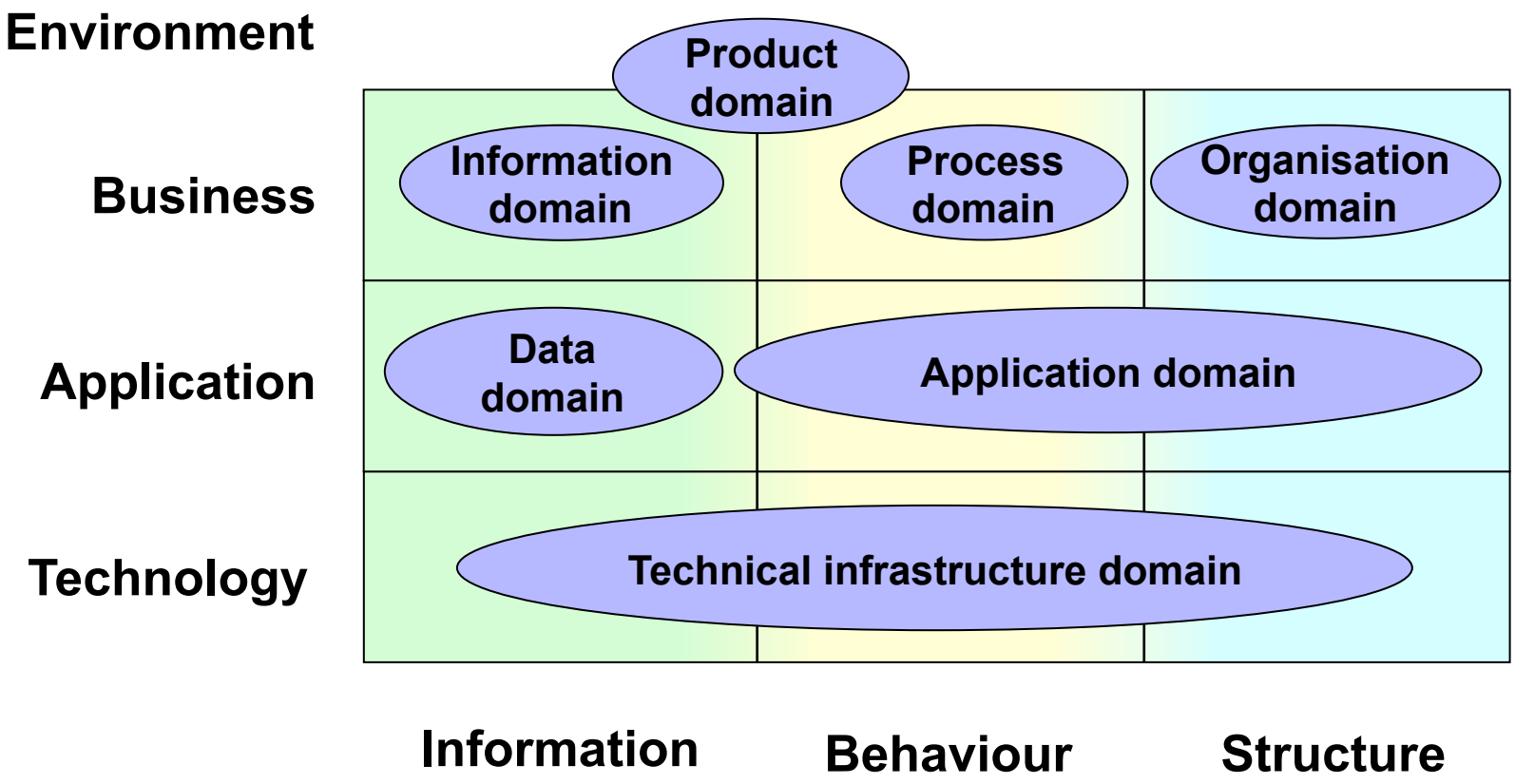
Business Layer
The Business layer offers products and services to external customers, which are realised in the organisation by business processes performed by business actors.

Application Layer
The Application layer supports the business layer with application services which are realised by (software) applications.

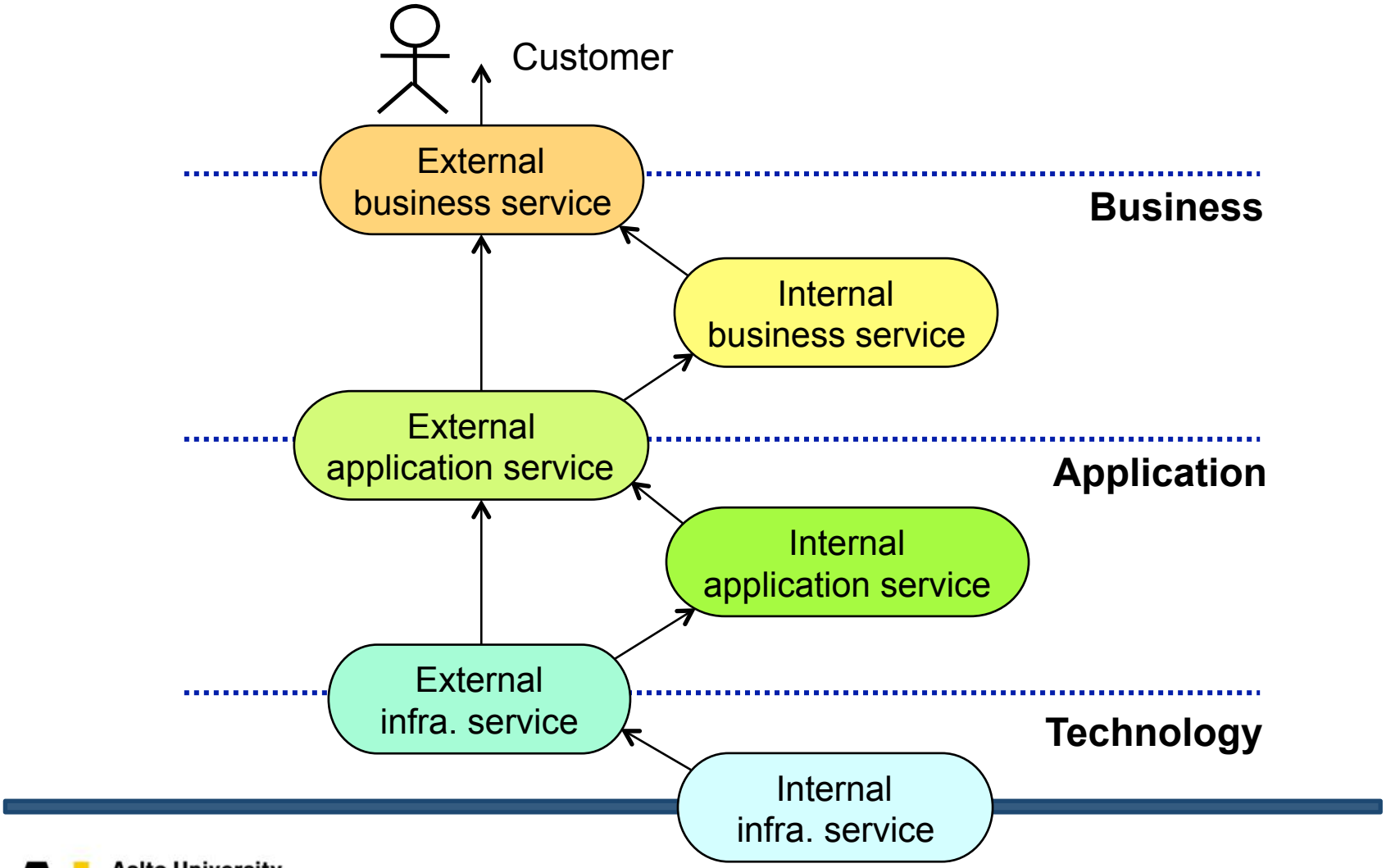
Technology Layer
The Technology layer offers infrastructural services (e.g., processing, storage and communication services) needed to run applications, realised by computer and communication hardware and system software.



Layers, Aspects and Domains



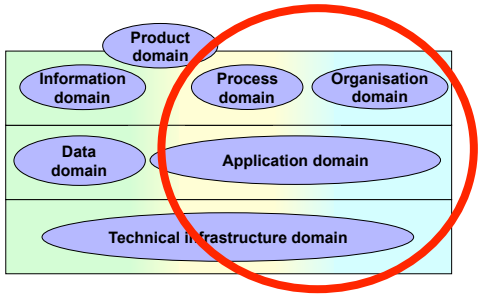
Services as Binding Concept



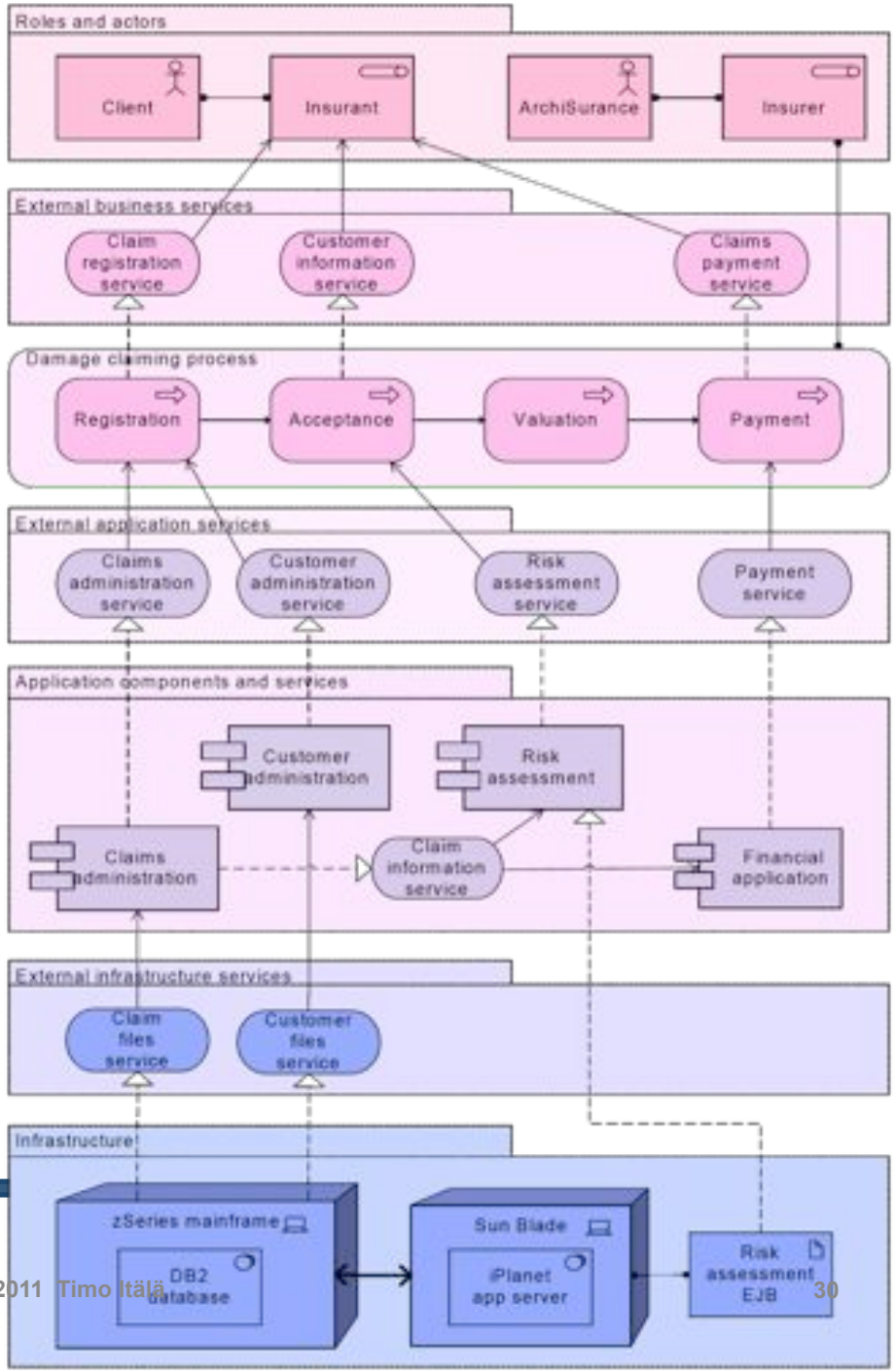
Example of layers

Business layer

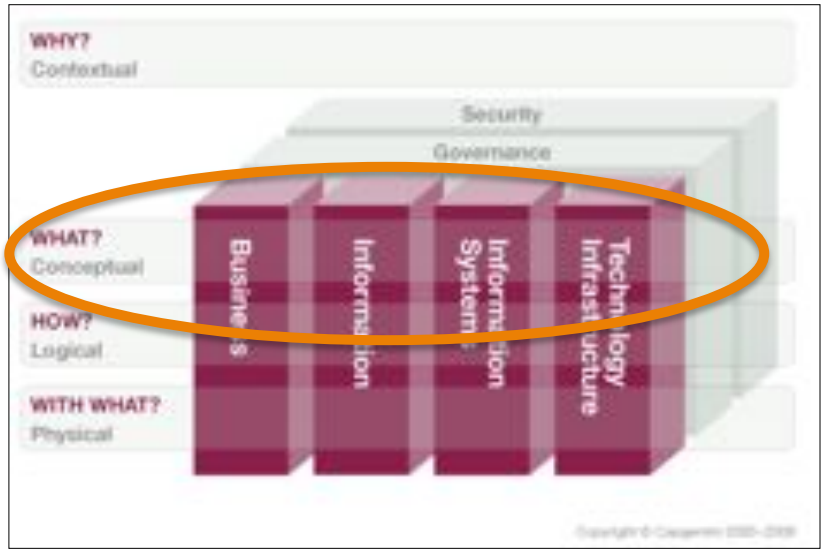
Application layer



Technology layer



Examples


WHY?
Contextual
Security
Governance
WHAT?
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HOW?
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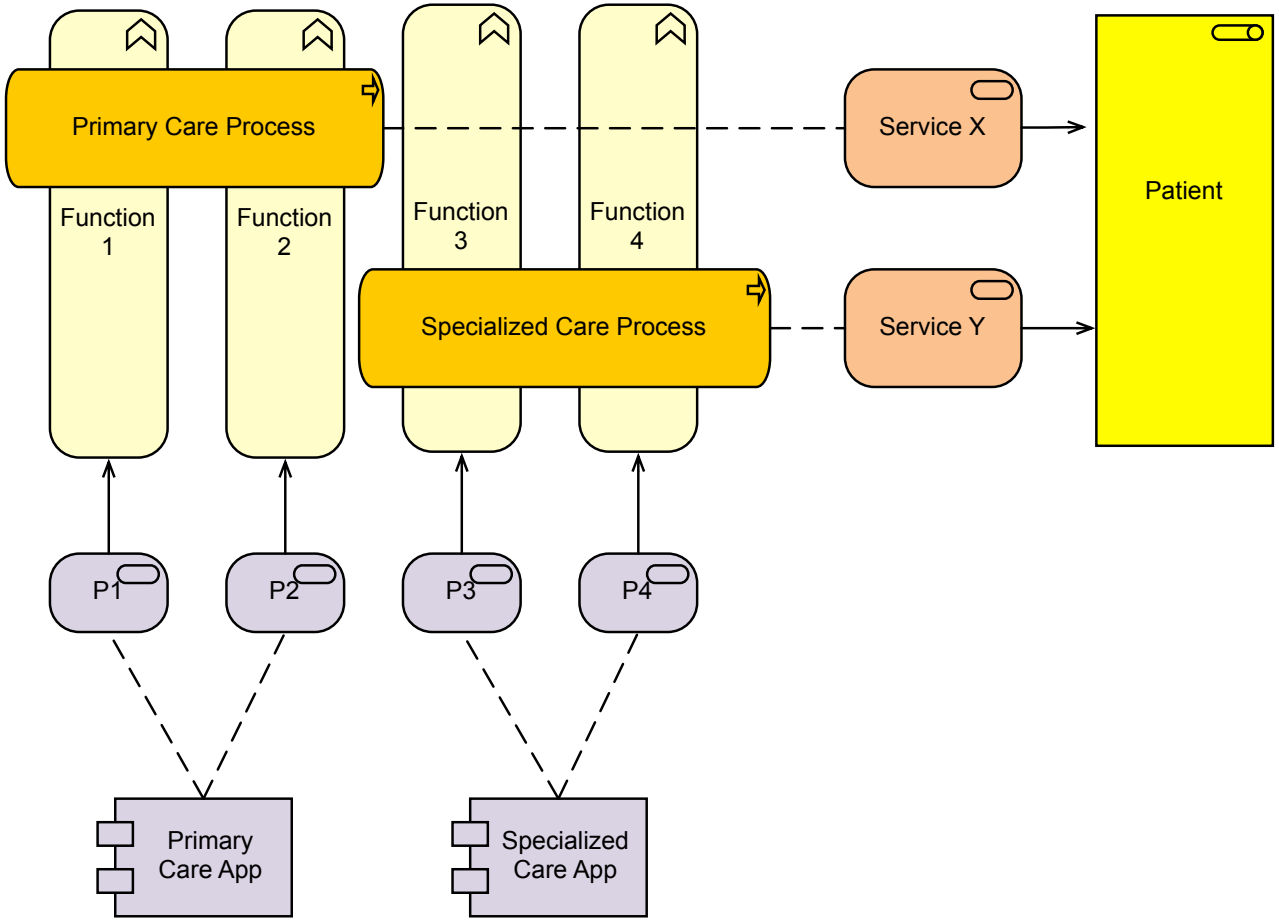
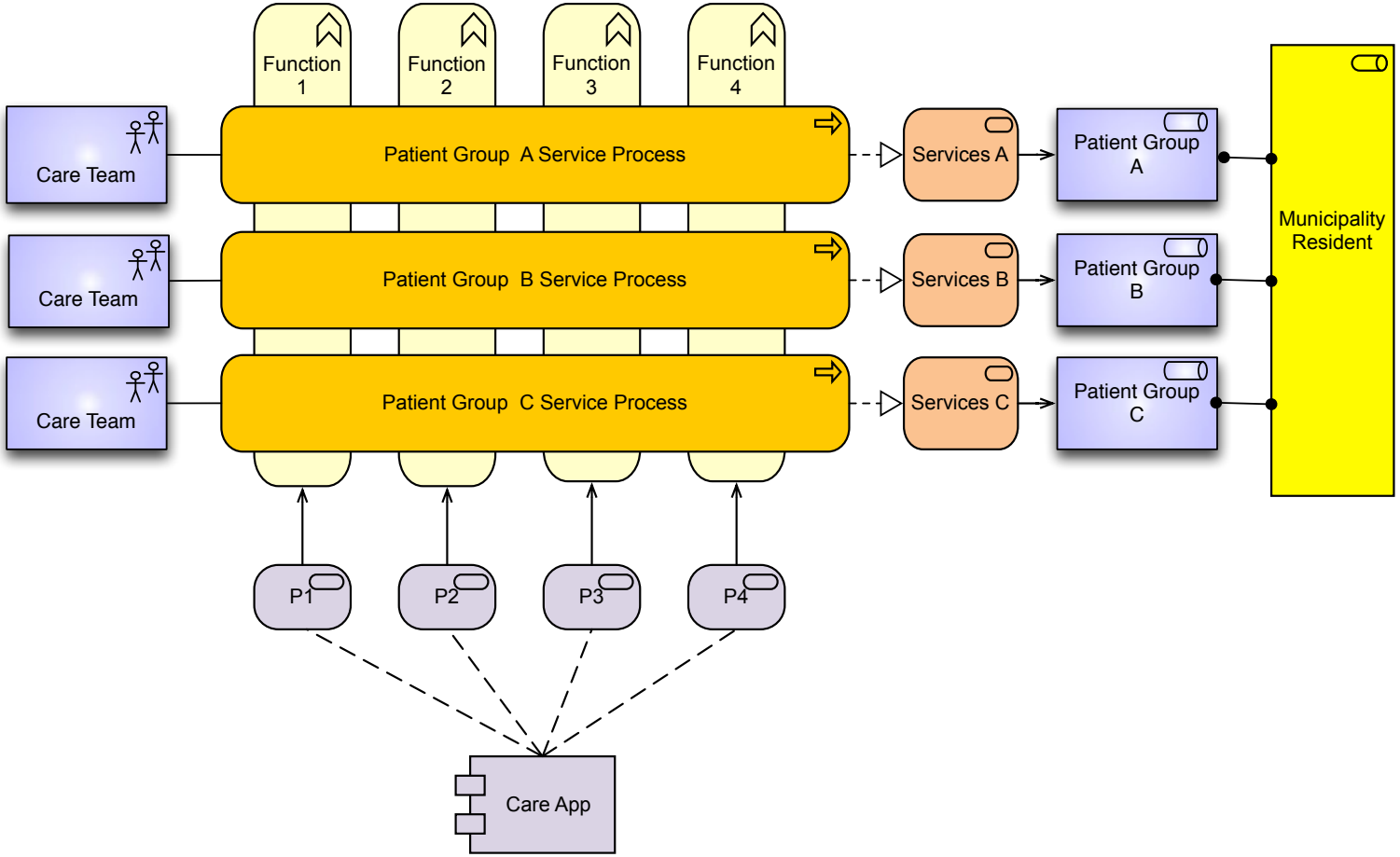
WITH WHAT?
Physical

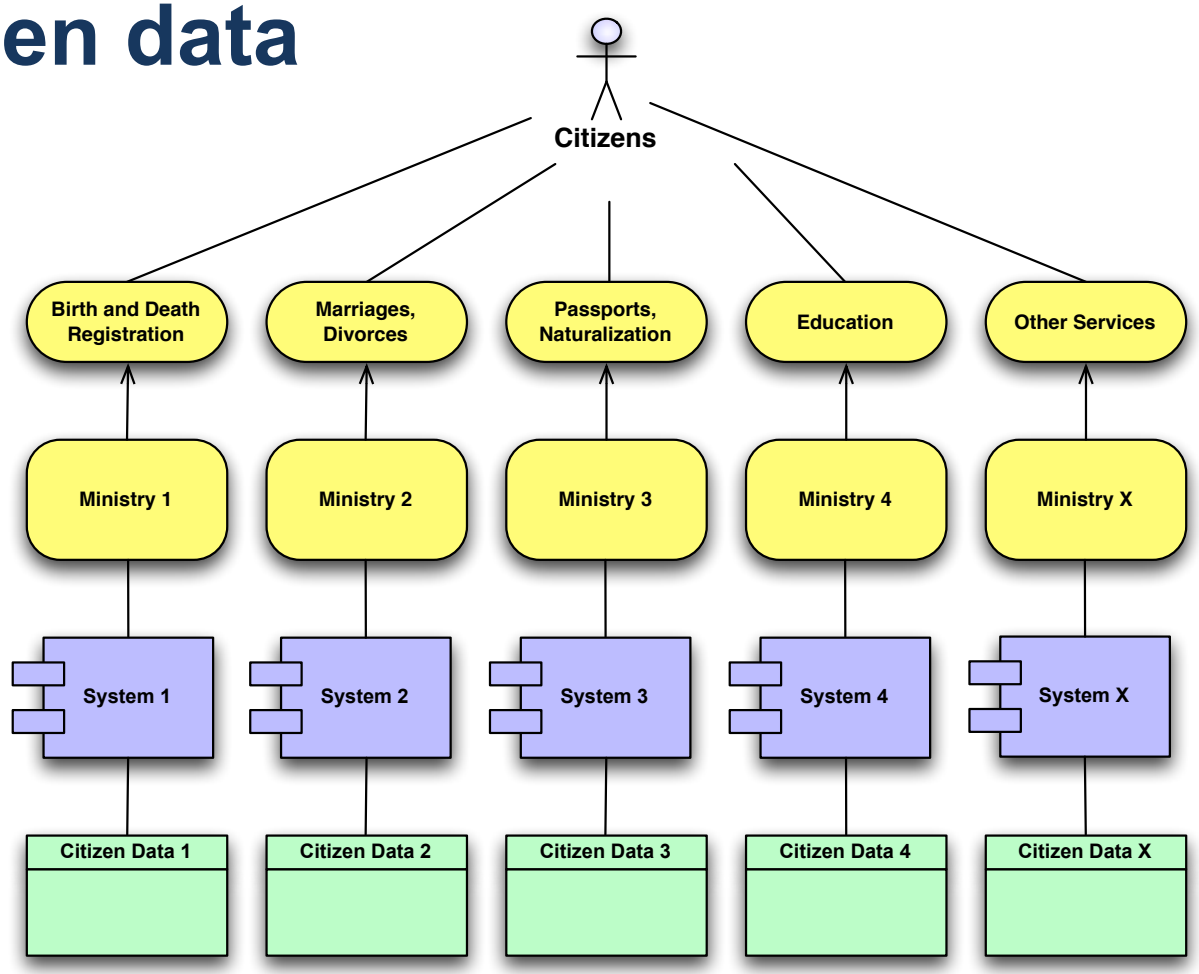
As-Is: Provider centric processes



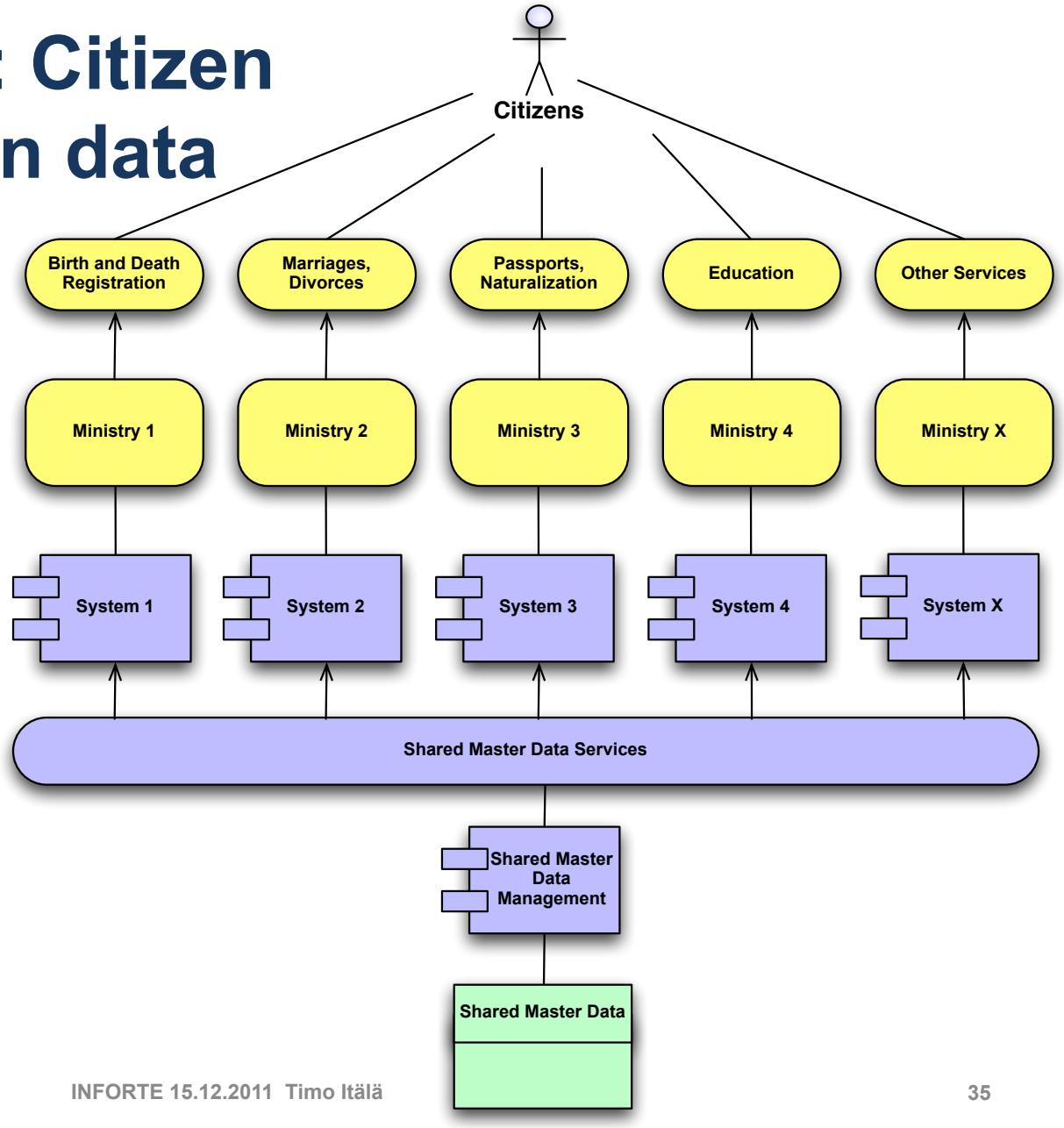
To-Be: Customer centric processes



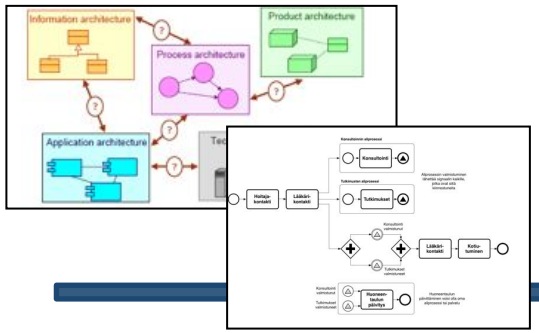
To-Be Opt.1: Organization centric citizen data

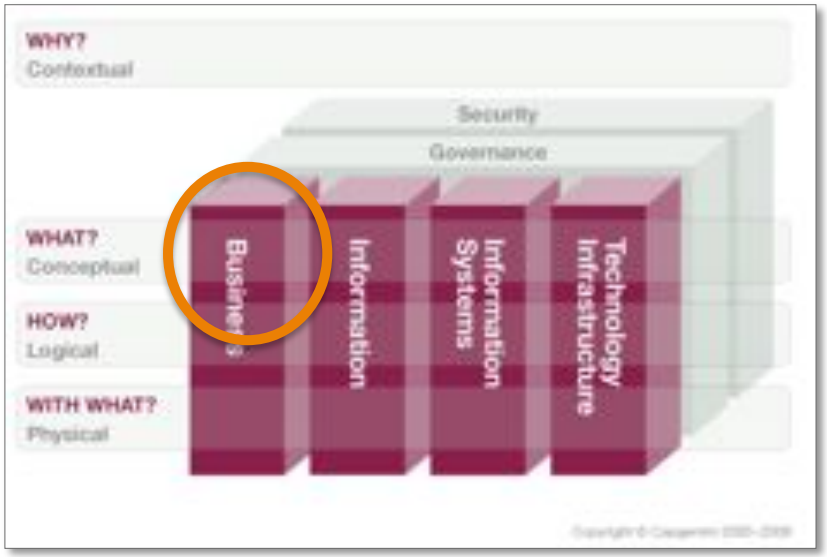


To-Be Opt. 2: Citizen centric citizen data



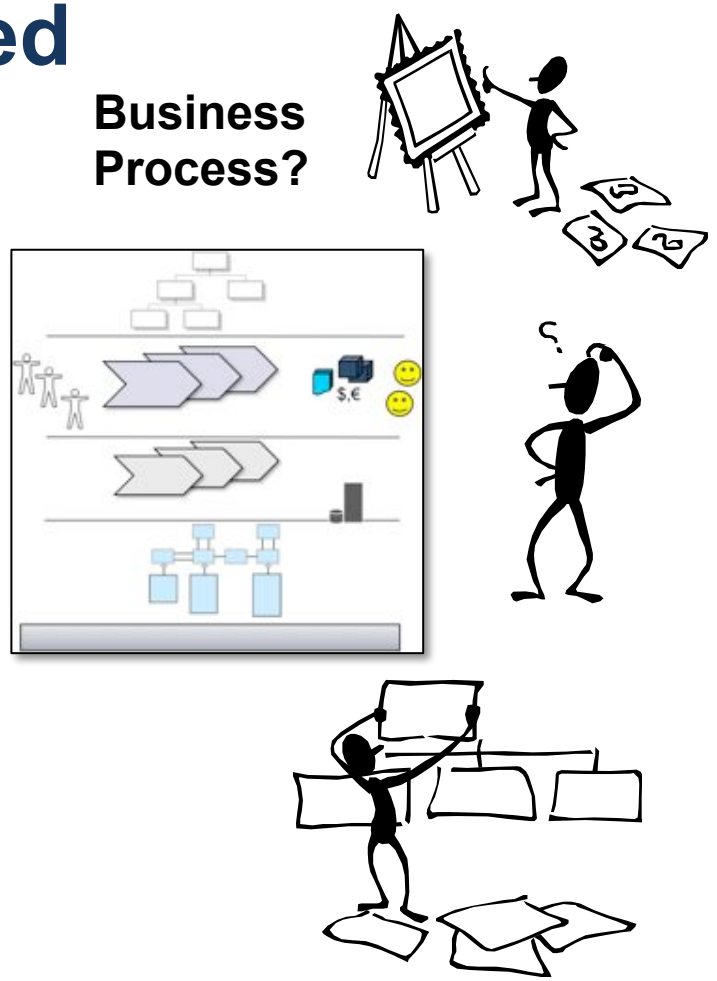
Notations


Information architecture
Product architecture
Process architecture
Application architecture


WHY?
Contextual
Security
Governance
WHAT?
Conceptual
HOW?
Logical
WITH WHAT?
Physical
Business
Information
Information Systems
Technology Infrastructure

The purpose of the model is to help to find the solution to the need

- Example: Business Process Modeling
- Model the **As-Is** process
  - Show areas of problems or opportunities
- Analyse problems or opportunities
  - What are related to the process?
- Model the **To-Be** process
  - Solutions to problems or opportunities
  - Basis for implementation

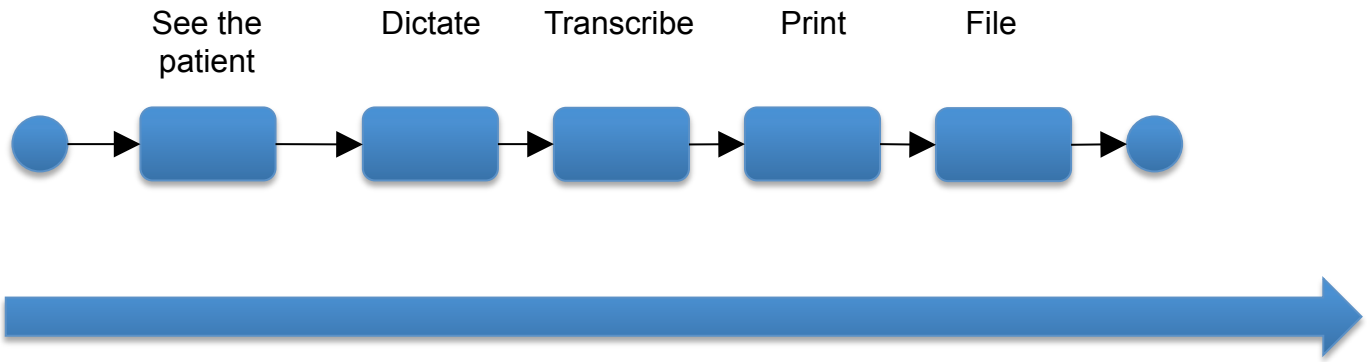


Example in Hospital: As-Is situation



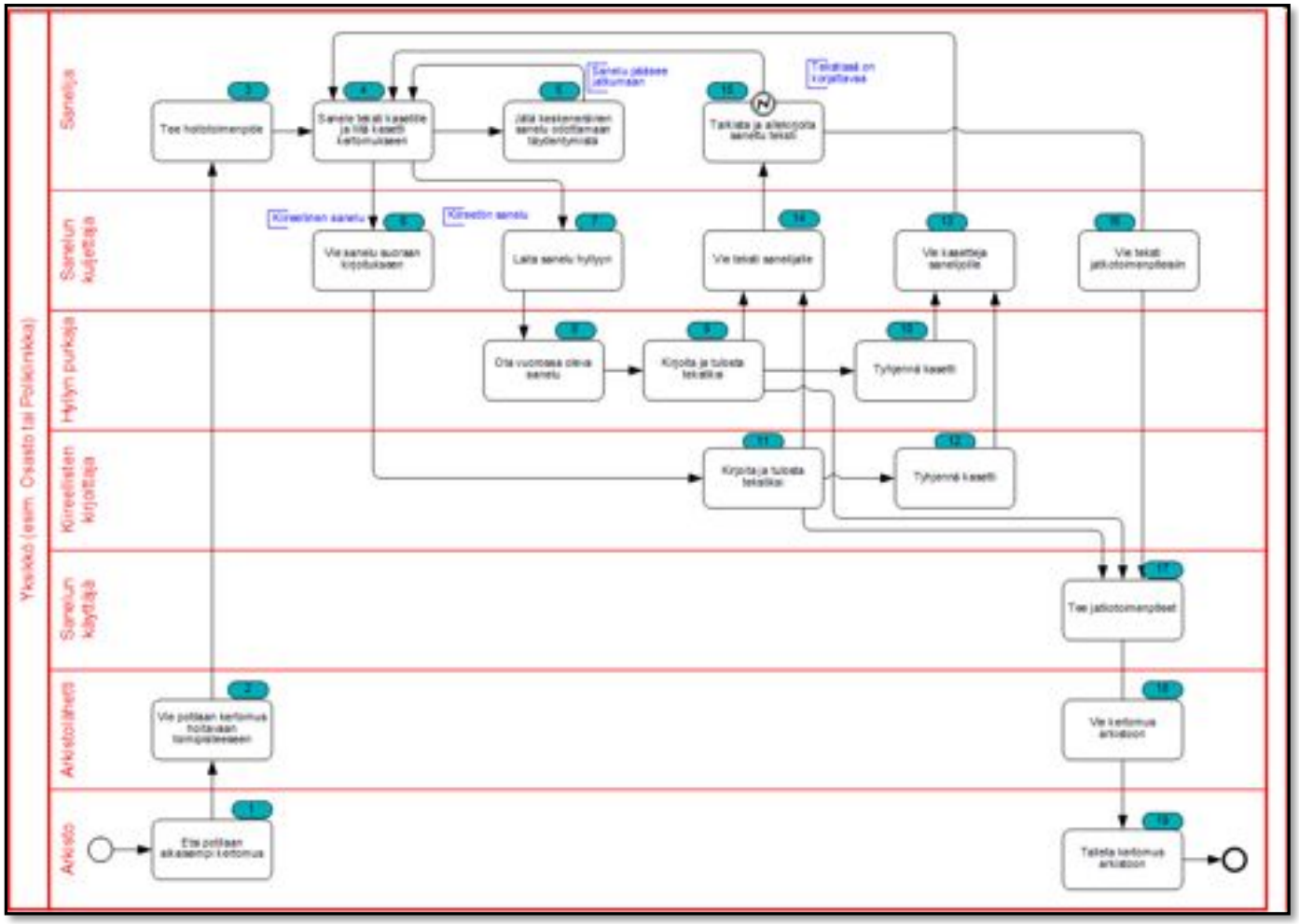
- Process of medical records:
  Doctors dictate the medical records, typists write them into the medical record system and print them on paper
- Problem with throughput at some departments
- Long backlogs of dictations waiting for transcription
- A requirement to deliver the transcription in five days
- What is causing the problem?

A simple process model



Why backlogs?

More complete process model (BPMN)

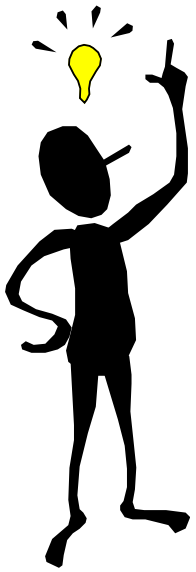


Why backlogs?

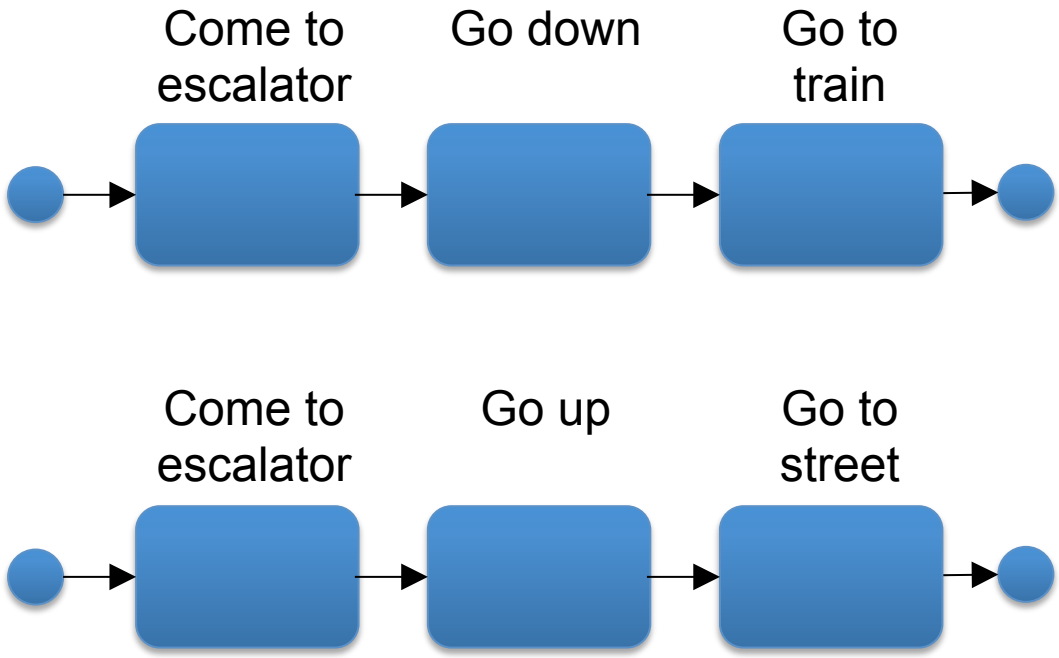
This model does not help.

Idea: Escalators at Helsinki metrostation

- When do the traffic lights change?
- Why?



Process model:
Same process down and up



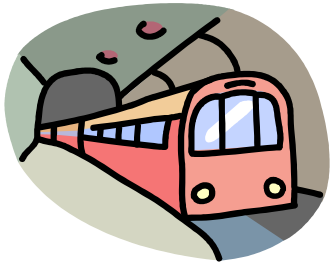
Why lights do not change?

This model does not help.

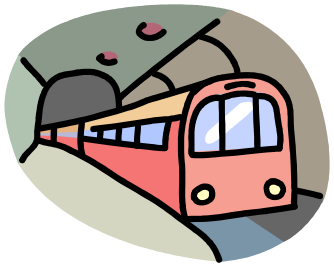
Look at the flow!

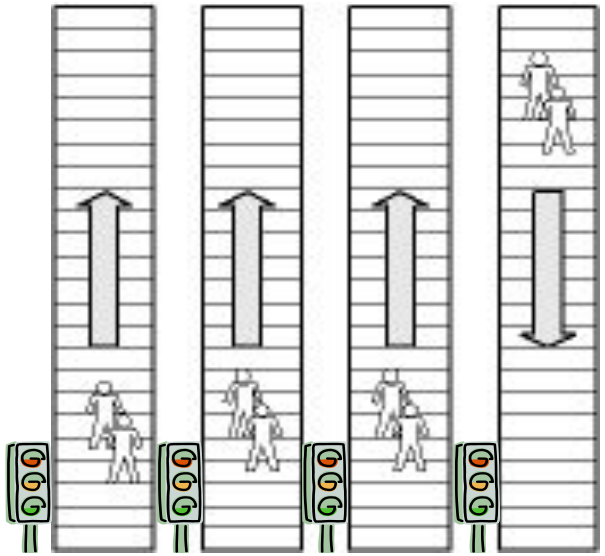
Steady flow of people

Bursts of people



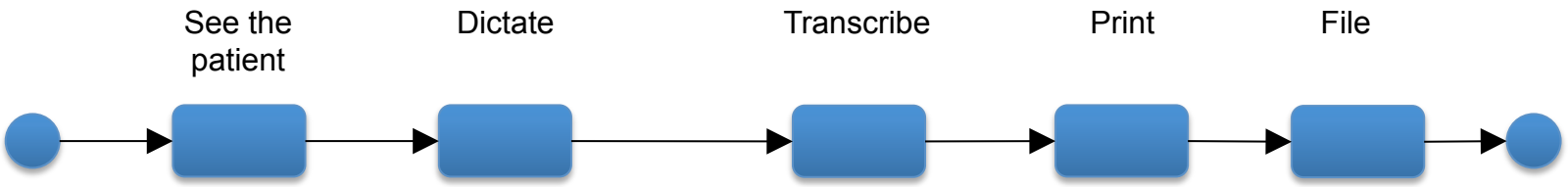
Let us use Stock and Flow models

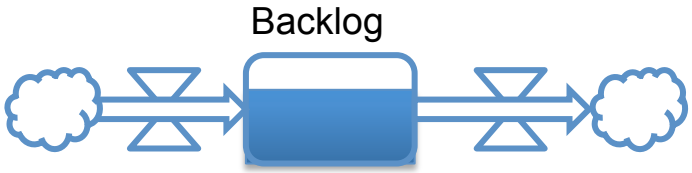




The behaviour of the process

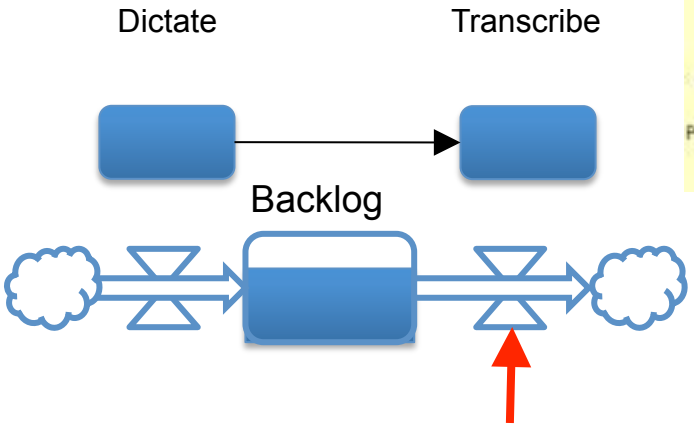
Back to hospital

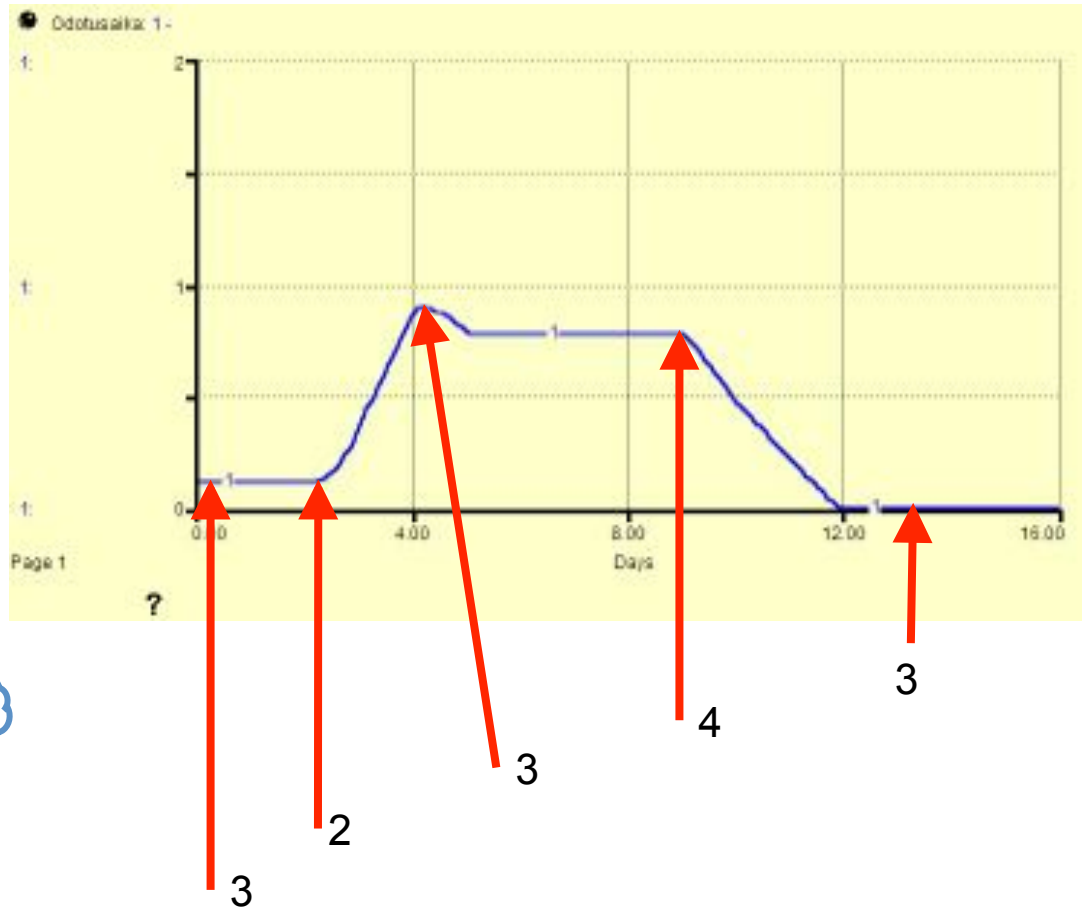




Why backlogs?

Simulation: Wait time behaviour

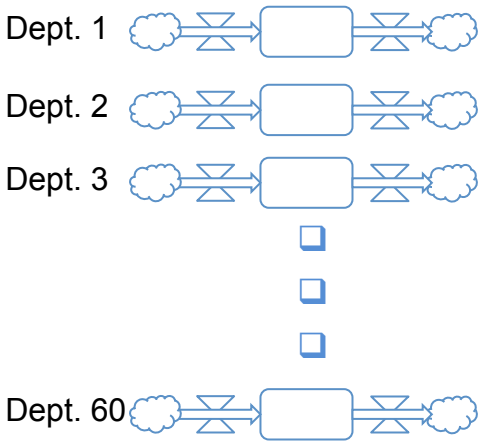




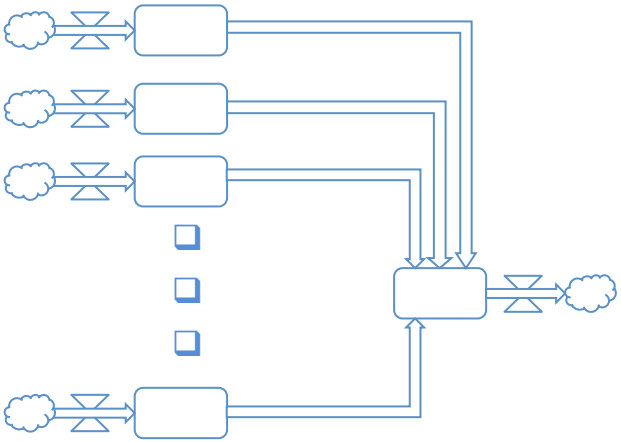
Number of transcriptionists

Solution to backlogs?

As-Is: Distributed



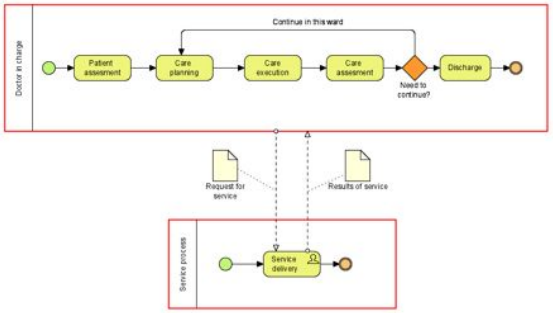
To-Be: Centralized

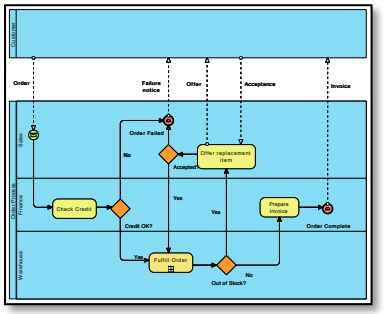


- Digital dictation was introduced
- Transcriptionist center was established
- Backlogs disappeared
- Response times shortened
- Throughput increased

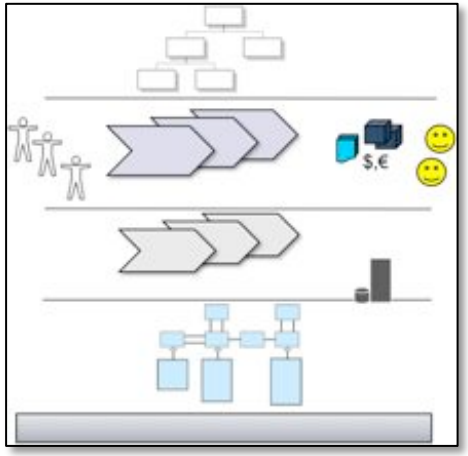
Lesson learned: The model has to enable understanding the problem

- Task centric:
  - What to automate
  - What to integrate
  - What to implement as services





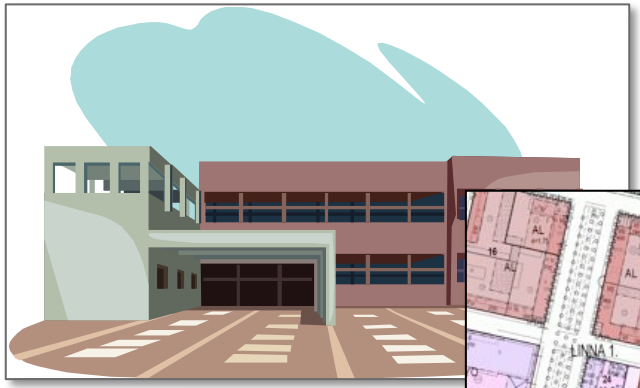
- Flow centric:
  - Behaviour of the process
  - Locate bottlenecks
  - Improve throughput



- Improve, Redesign, Reengineer

Needs of an Enterprise?

EA metaphors



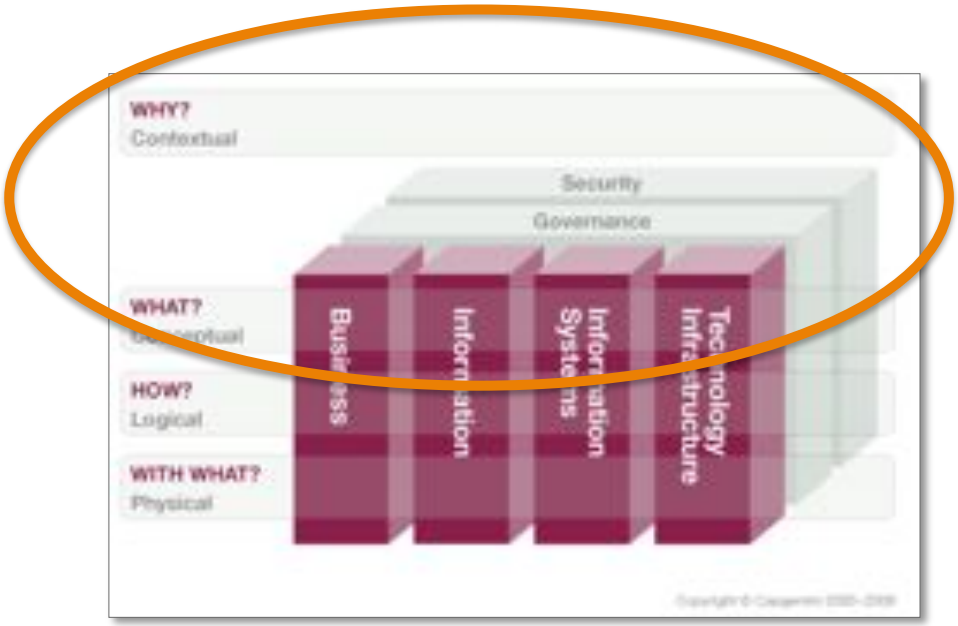
Building

City Plan

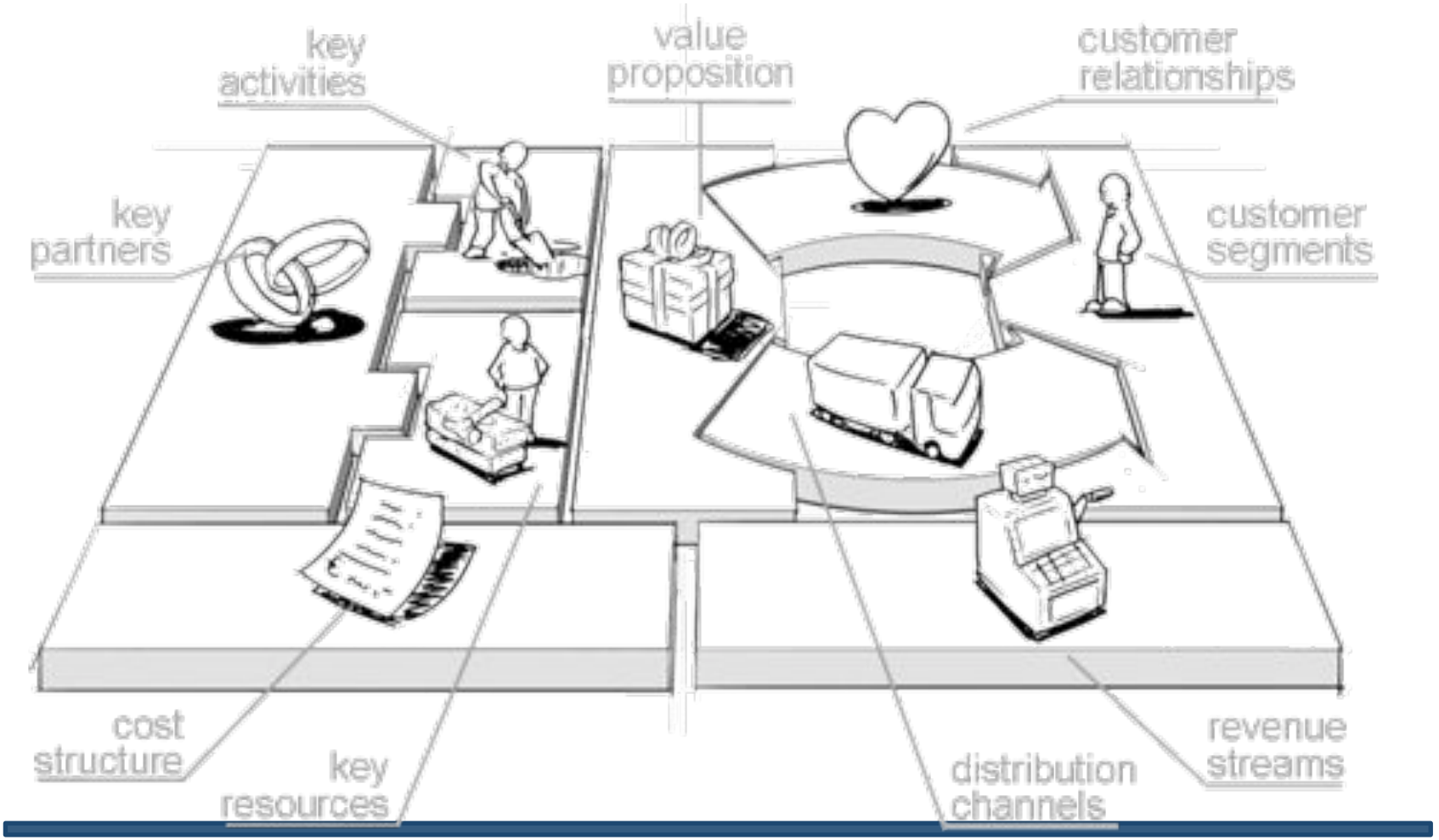
Factory

Business Models

- What is a business model?



BUSINESS MODEL CANVAS

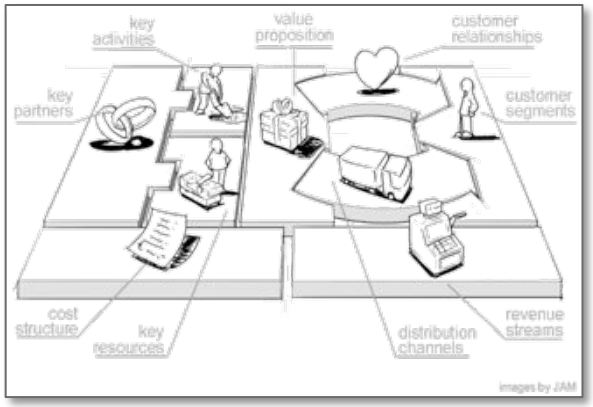


images by JAM

Courtesy: Alex Osterwalder, Business Model Generation

Change is always here

- Build to change!

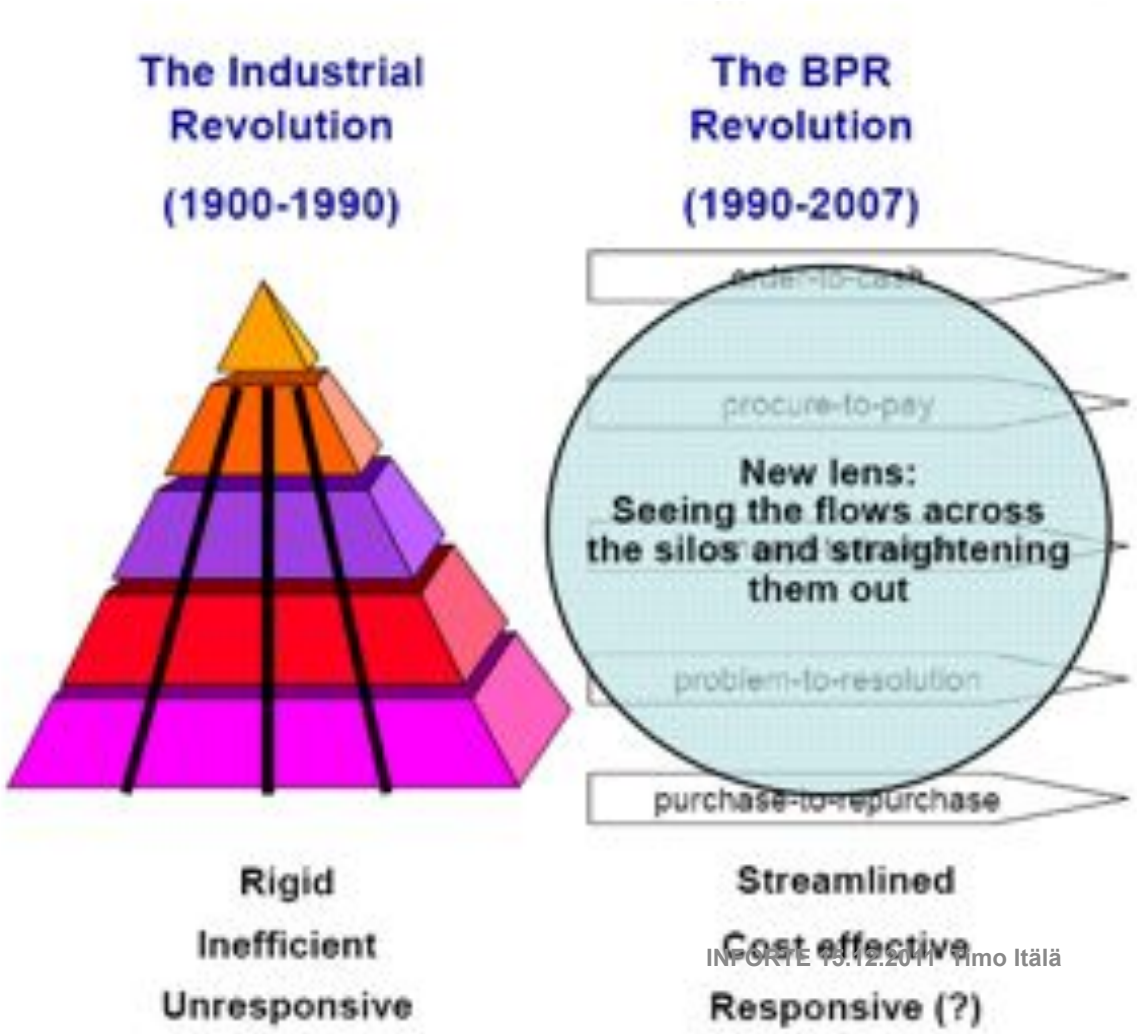


- Conflicting needs:
  - Build to last
  - Build to change

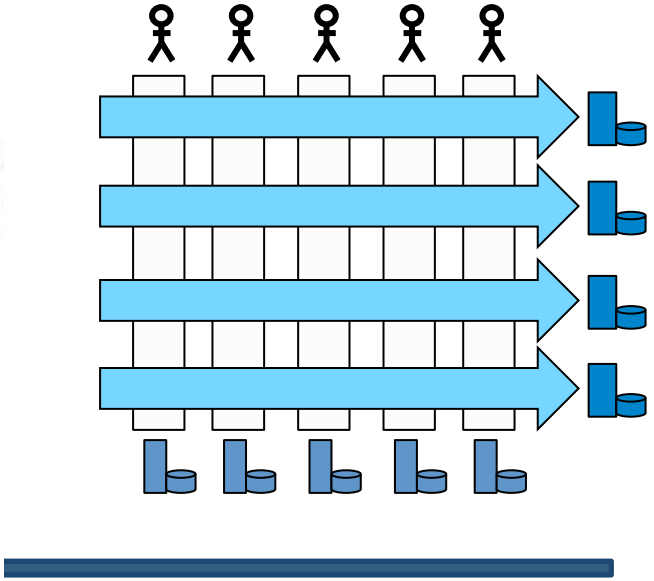
- Try to find out:
  - What is stable
  - What will change

Service Orientation

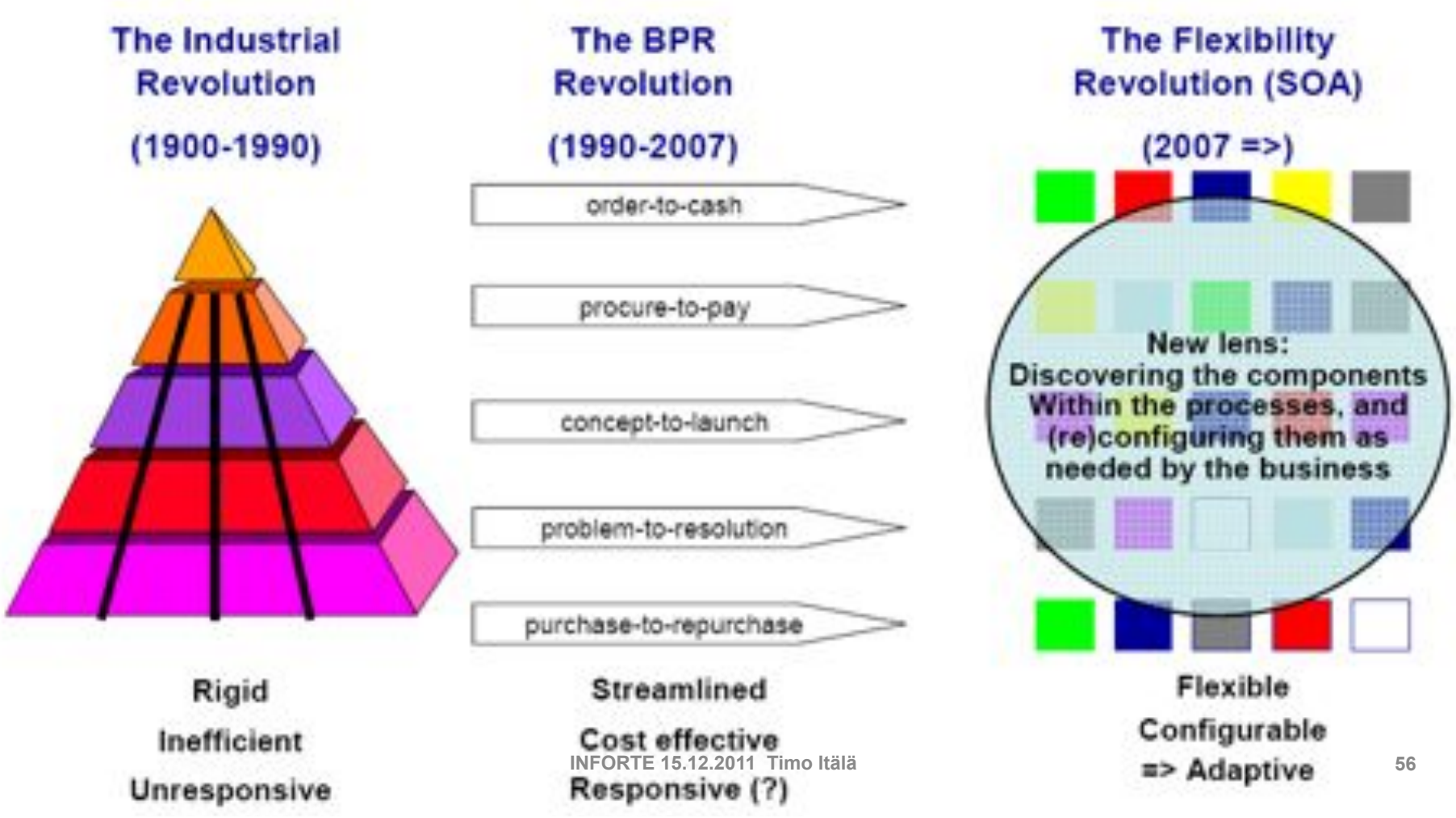
What is happening with processes...



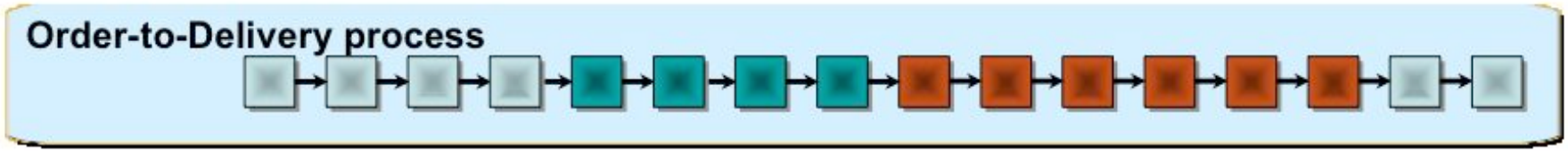
But: Have we moved from one set of silos (functions) to another set of silos (processes?)



Business Process Management (BPM): The *Third Wave*

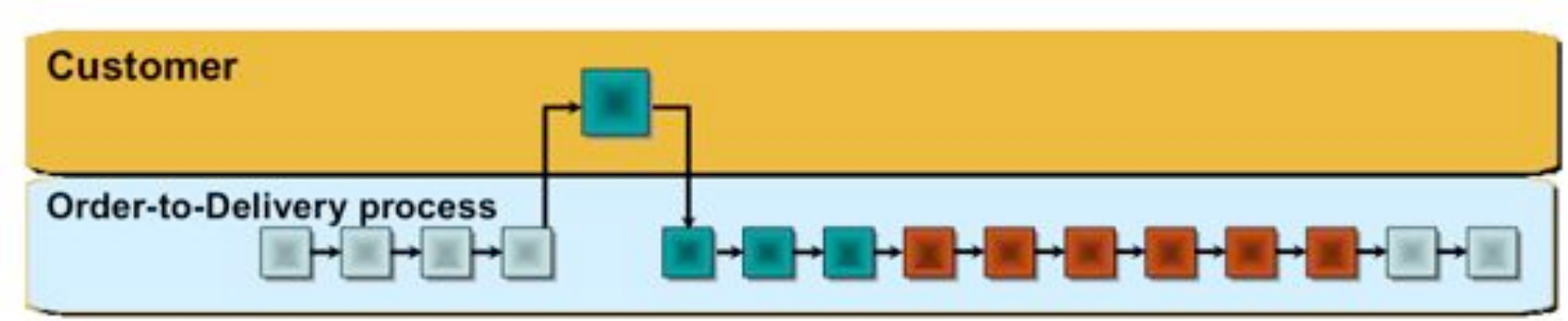


Our business process



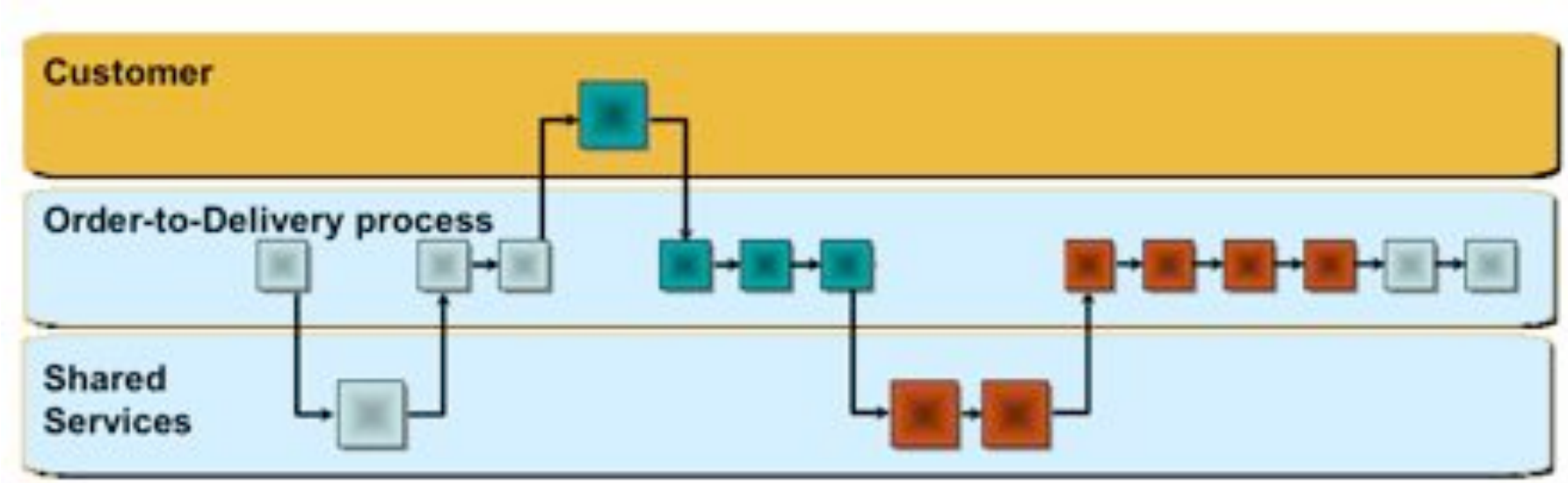
What if...

We ask the customer to do some of the work



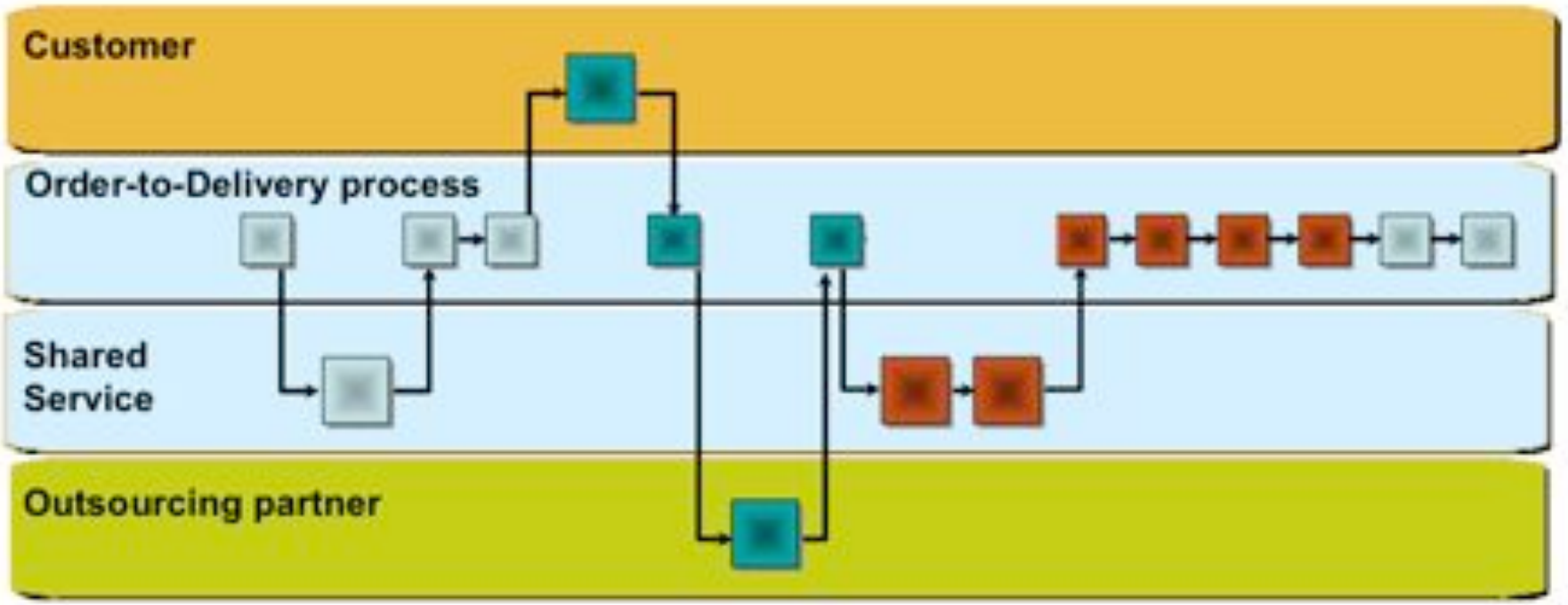
What if...

We want to share things we have



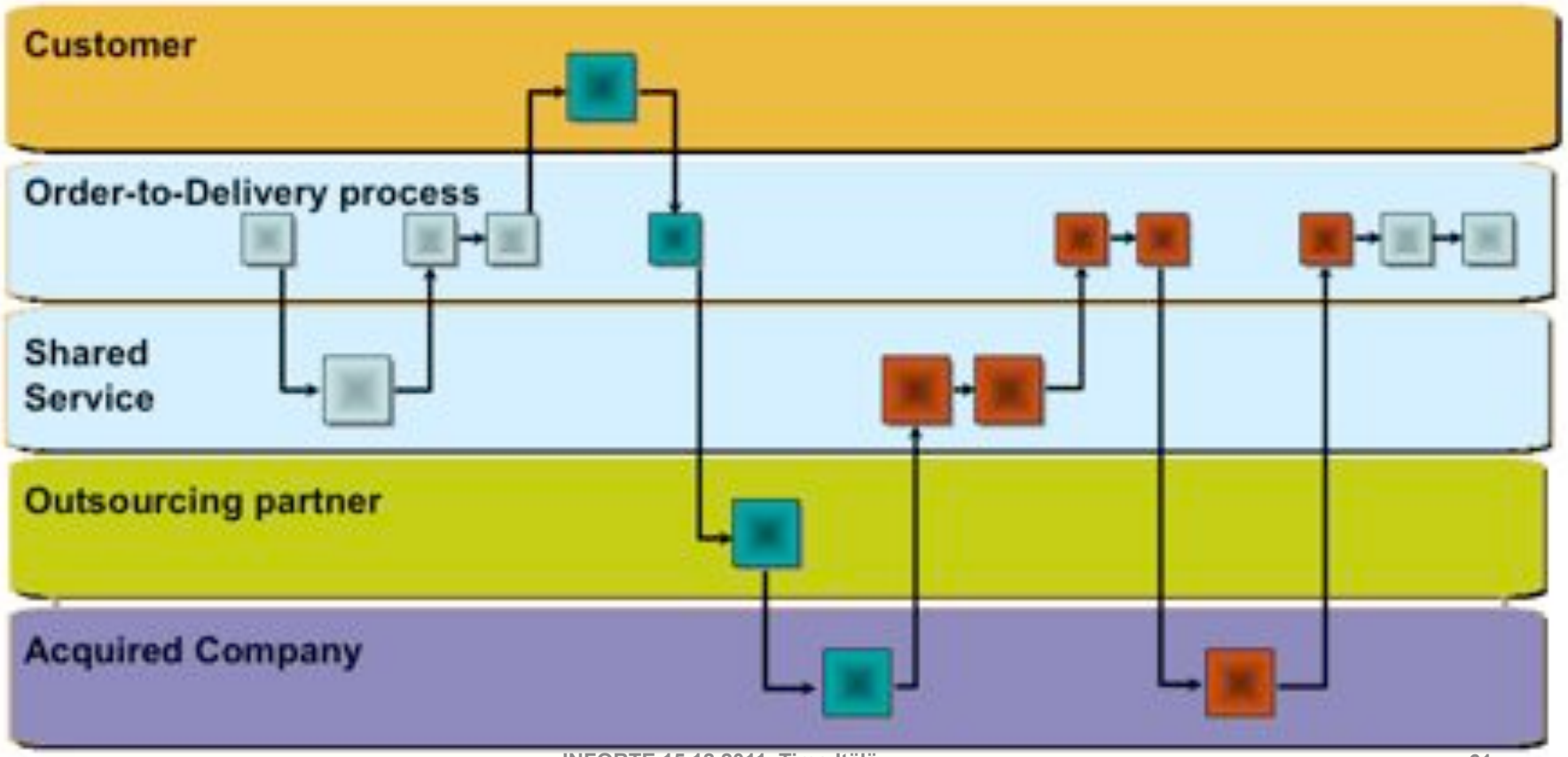
What if...

Some of our things are outsourced...



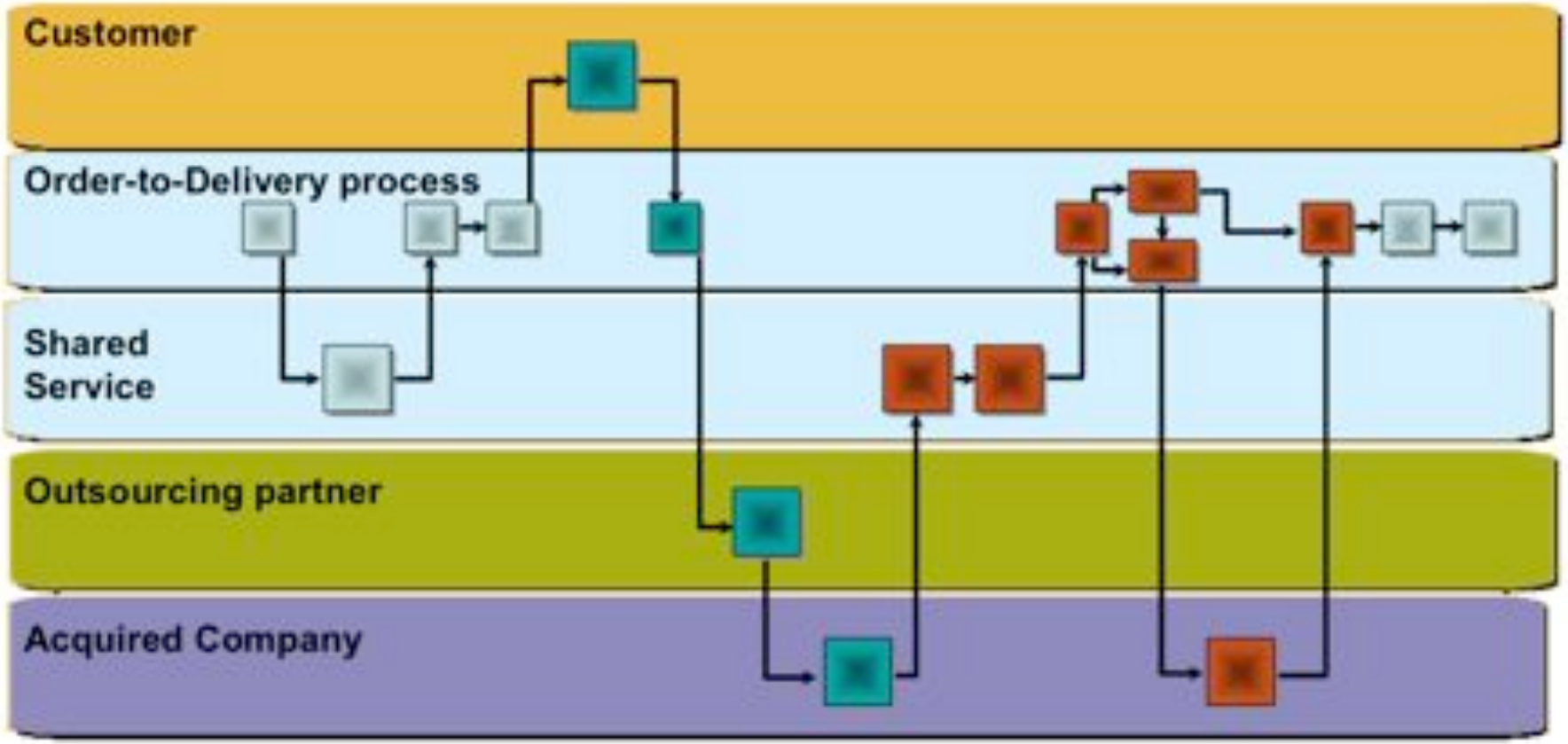
What if...

We then acquire a competitor who does certaing things better than we do!



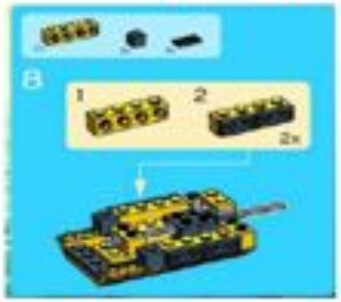
What if...

We then make changes to our brilliant process design on 18 months...



What if: Service Orientation

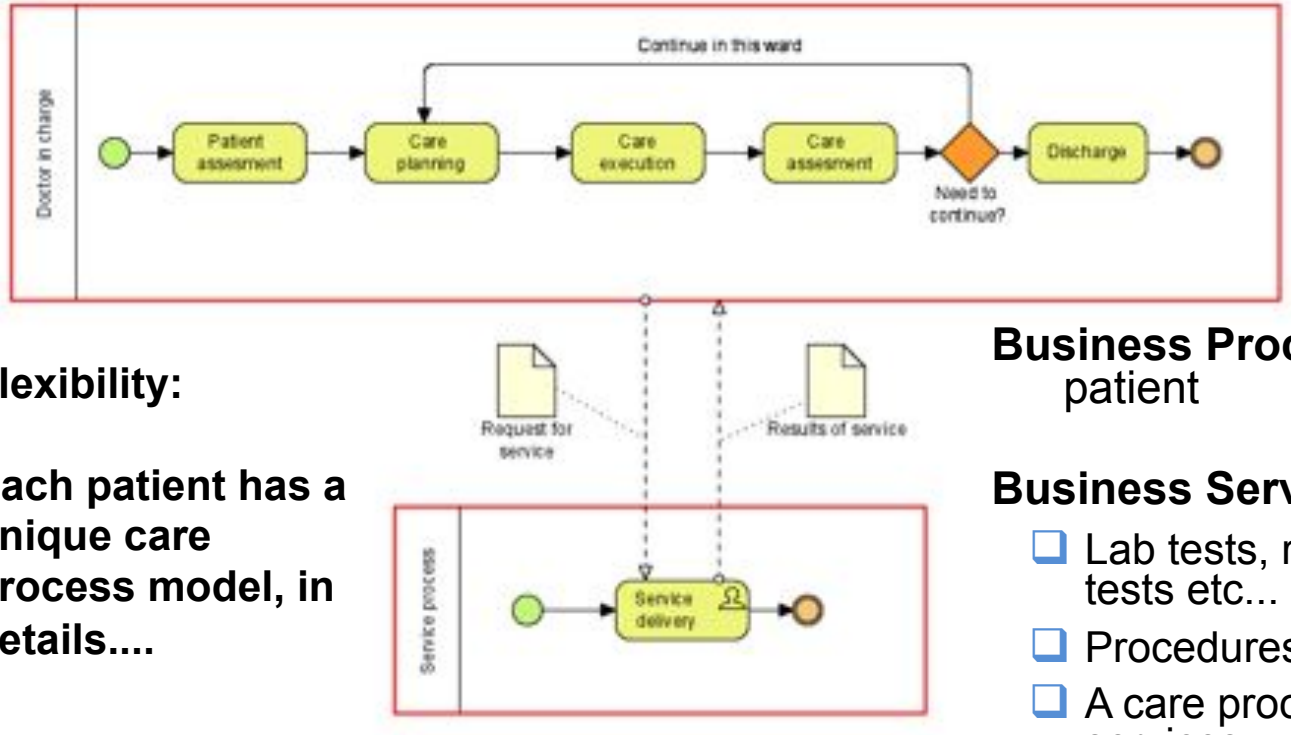
Service:
A **reusable business task** – e.g., check customer credit, create new account



Business Processes:
A way of integrating your **business as linked services** and the outcomes that they bring

Service oriented architecture (SOA):
An IT **architectural style** that supports service orientation

Example: Healthcare
Business Process and Business Services



Flexibility:

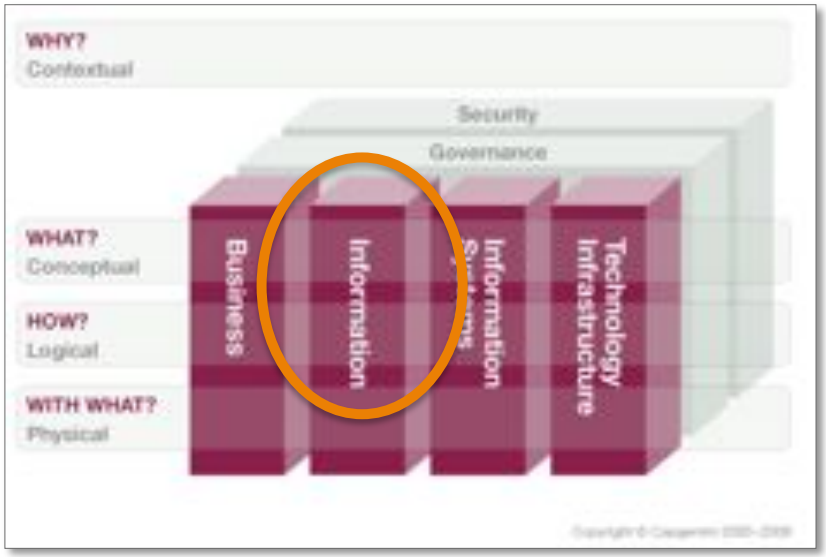
Each patient has a unique care process model, in details....

Business Process: Care Process of a patient

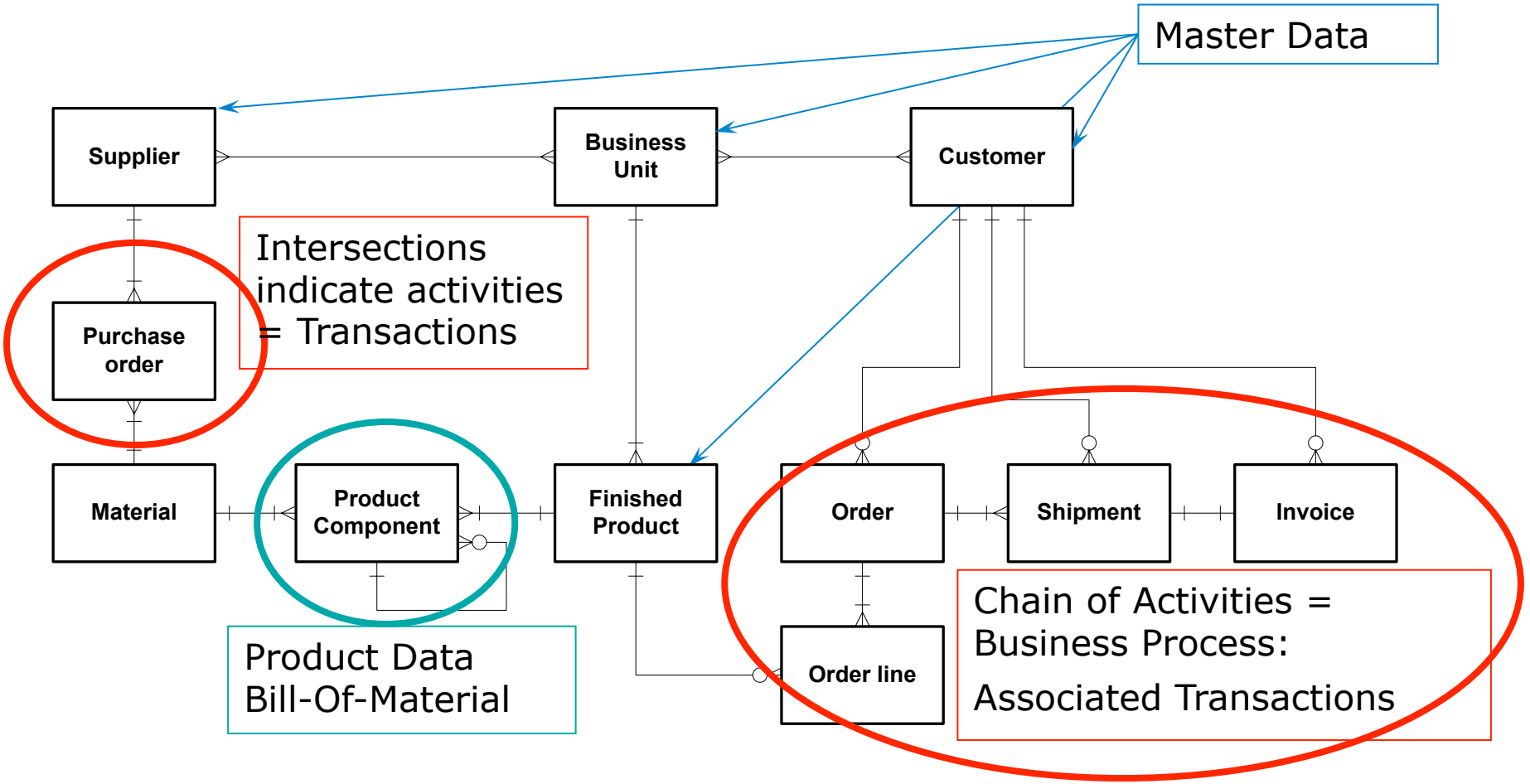
Business Services:

- Lab tests, radiology tests, endoscopy tests etc...
- Procedures, Medication, Therapies
- A care process consists of multiple services
- A service can be requested in any task of the process

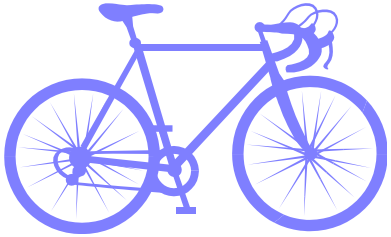
Information Architecture

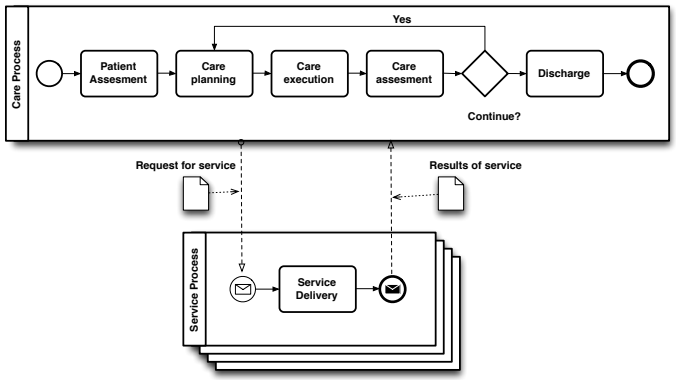


Business processes and data



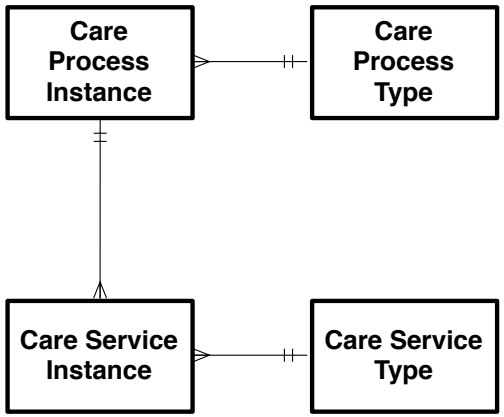
Data Model of Process and Services





Analogy:
Product Data Management

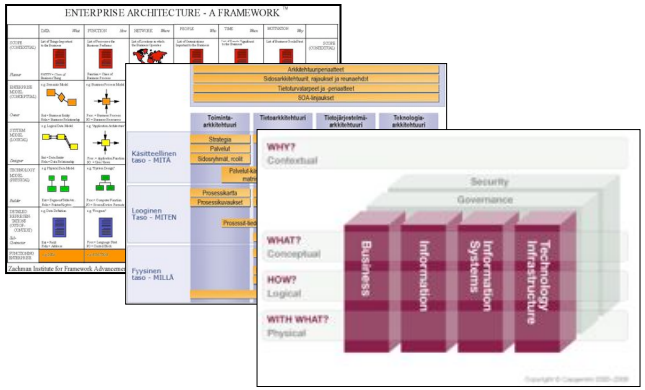
- Type = Kind of Bike (Product code)
- Instance = Individual Bike (serial number)
- Product Bill-Of-Materials

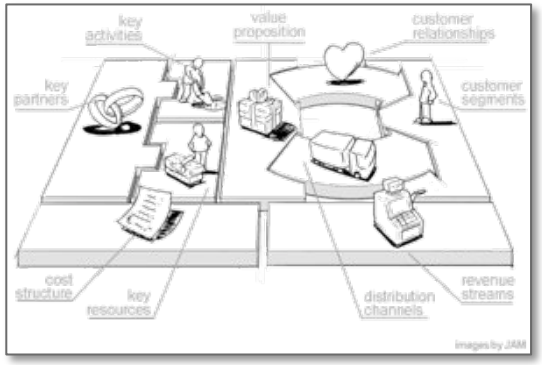


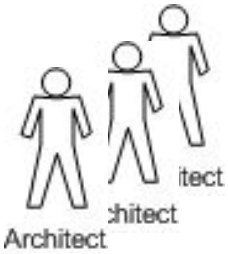
Process Data Management

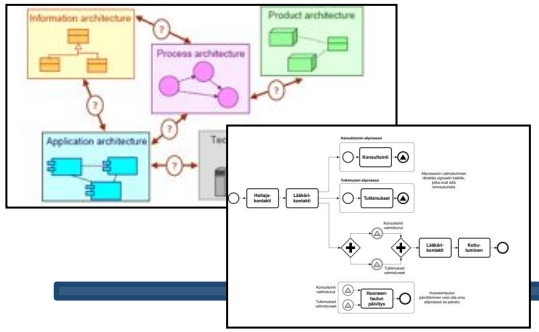
- Type = Kind of Process (Process Type Code)
- Instance = Individual execution of Process (Process Instance ID)
- Process Bill-Of-Materials!

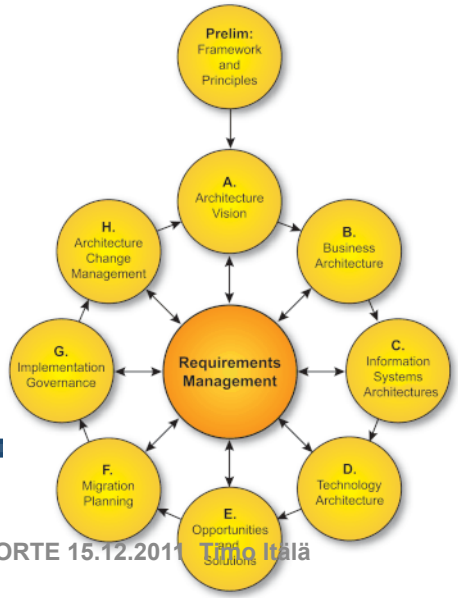
Conclusion:
Architecture to agility and stability!

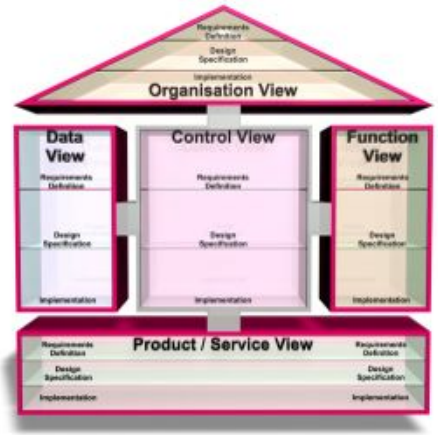












Thank You!

timo.itala@aalto.fi