



Dr. Hans-Peter Hoidn
Distinguished IT Architect (Open Group certified)

Enterprise IT Architectures

Lecture Overview & Introduction

<http://www.ifi.uzh.ch/en/rerg/courses/hs16/it-arch.html>

Introduction to the Course

Aim of the course

- **The course is providing an introduction to the work of an IT *Architect* in projects as it is done in the industry. The goal is to enable YOU to work in such a role and to judge and develop solution scenarios**
- ***Architectural Methods* are used to structure, describe, specify, and visualize architectures based on *business goals* as well as *functional* and *non-functional requirements***
- ***Enterprise Architecture* as well as *Governance* concepts provide a scope beyond projects on an enterprise level**
- **The course introduces into current important *Technology Concepts* like *SOA* (Service Oriented Architecture) and *BPM* (Business Process Management)**

Organization of the course

- **Lectures with some exercises and a *Term Paper* working out the architecture of a project including a proposal (to a fictitious CEO and CIO), which will be**
 - **Worked out in a group**
 - **Presented of the group**
 - **Group presentations will be either on December 2 or on December 9, every team member has to present a significant part (therefore must be present at this day)**
- **The lecture is in BIN 2.A.10 on Fridays from September 23 to December 16 at 12:15 to 13:45 including a break of approximately 5 minutes**
- **December 23 is reserved for the written exam if necessary**

Requirements for Obtaining the Credits

- **Contribution to the project presentation and presenting a part of this work in the class room lecture; attendance for the group's presentation is mandatory and the group must pass (counts 1/3 to the final evaluation)**

- **The (updated) presentation must be sent to hans-peter@hoidn.ch until December 16, 23:59**

- **Passing the exam (counts 2/3 to the final evaluation)**
 - **Either written (December 23)**
 - **Or 20 to 30 minutes oral exam for everybody (in December or January)**
 - **Preference is an oral exam**

Overview of the Course

- **Part 1 – Introduction, Role Play, What is IT Architecture, Key Aspects and Deliverables of Solution's IT Architecture (23.9. & 30.9. – Hans-Peter Hoidn)**
- **Part 2 – Introduction to the Term Paper (“Semesterarbeit”), Content of the Term Paper (07.10.2014 – Kai Schwidder)**
- **Part 3 – Information Systems Architecture and SOA (Service Oriented Architecture), Technical Architecture, Business Architecture and BPM (Business Process Management) (14.10 & 21.10. – Hans-Peter Hoidn)**
- **Part 4 – Key Aspects and Deliverables of Solution's IT Architecture in more detail, Functional and Non-Functional Requirements (28.10. to 18.11. – Kai Schwidder)**
- **Part 5 – EA (Enterprise Architecture) (2.11. – Hans-Peter Hoidn)**
- **Presentation of projects by Students (02.12. & 09.12.)**
- **Part 6 – Architecture Management and Remaining Selected Topics – on student's request (16.12 – Hans-Peter Hoidn)**
- **Exam (23.12. if written)**

Lecturers

- **Dr. Hans-Peter Hoidn**
retired from IBM
Distinguished Certified IT Architect (Opengroup)
hans-peter@hoidn.ch
- **Kai Schwidder**
Visionary Entrepreneur @ Talenra GmbH
kai@schwidder.com
- **Together about 70 years IT experience**

Hans-Peter Hoidn



- Retired from IBM, Coach for Architecture and Education, Consultant for IT Architecture and IT Strategy, Senior Architect
- Open Group certified Distinguished IT Architect
- Executive Architect in Global Business Integration “Tiger” Team until end of September 2012
- 11 years IBM and PwC
- Previously with UBS, Digital Equipment Corp, etc.
- Architect since about 25 years
- 40+ years in IT – started programming 1971
- Dr. sc. math ETH

three daughters; six grandchildren

Q & A – Next Steps

- **Q & A – Questions & Answers**

- **Next Steps**
 - Let us know when you intend to attend
 - Let us know the groups working together

- **Contact:**
 - hans-peter@hoidn.ch
 - +41 79 500 94 33

Questions



Role Play
YOUR New Job: IT Architect

The Course simulates some aspects of “real life”

- **You are now THE architect for a new project – the course is a pre-run of an architect’s work**
- **Beginning with an Introduction on main aspects of IT Architecture and what IT Architects do all day**
- **You will receive an RFP (Request for Proposal) in order to deliver a proposal for a project**
- **Then you will get to work with a real project using the methodology in a mentored environment**
- **You will present your results and provide the “term paper” (the presentation) to your “customer”**

Learning the Architecture Methodology

- **What is Architecture**
- **Key aspects of Architect' s Work**
- **How to handle Requirements (Qualities and Constraints)**
- **What are the main “Work Products”**
- **Working through a “Case Study”**

Applying the Architecture Methodology

- **YOU will be the IT Architect for a new solution, which is the problem to be solved and presented – in the Term Paper (Semesterarbeit)**
- **YOU will address business goals and handle functional and non-functional requirements**
- **YOU will model the solution, investigate boundary conditions and risks**
- **YOU will work out the proposal (team work !) and present to the “customer” (CEO and CIO)**

Technology Update

- **Service Oriented Architecture (SOA)**
 - **Services are providing business functionality to the users**
 - **Connectivity through Middleware**
 - **SOAP and REST**
 - **Enterprise Service Bus (ESB)**

- **Business Process Management (BPM)**
 - **Modeling processes such that they can be automated**

- **And additional topics**

Beyond Solution

- **Enterprise Architecture overseeing multiple solutions**
 - addressing the IT environment of the enterprise

- **Architecture Management / Governance**
 - Committees
 - Policies, Principles, Guidelines
 - Processes

In a Nutshell: IT Architecture

Positioning – it is for Solving Business Problems

- **Addressing:**
 - **Customer's Pain Points, Why and What he / she wants to achieve**
 - **Current situation (as-is) and the areas of action**
 - **Constraints, Plans, Decisions already taken**
 - **Sketch future situation (to-be)**

- **Using Architecture Methodology to**
 - **DOING THE RIGHT THINGS RIGHT**
 - **Defining scope and overview**
 - **Capturing as-is and developing to-be architectures**
 - **Architecting possible solutions**
 - **Specifying roadmaps**

IT Architecture – what is it ?

- **Architecture: “*Doing the right things right*”**
- **IT Architecture dealing with the building blocks of a solution (and in addition of the Enterprise IT Environment)**
- **Using some “work products”, like Context Diagram, AOD (Architectural Overview Diagram), Service Model, ...**
- **Using Reference Architectures like *SOA (Service Oriented Architecture)* implying some Architectural Decisions and making the architecture more specific**
- ***BPM (Business Process Management)* adds new IT Capabilities in order to manage Business Requirements**

IT Architecture – Definitions (I)

- **Following TOGAF there are two aspects:**
 - **A formal description of a system, or a detailed plan of the system at component level to guide its implementation**
 - **The structure of components, their inter-relationships, and the principles and guide-lines governing their design and evolution over time**

- **Common elements of most attempts to define architecture, in the context of IT and other systems:**
 - **The organization of an IT-System or IT-Systems**
 - **Breakdown of a system into its parts**
 - **The relationship between the parts (static and dynamic)**
 - **Decisions about the design of a system that are hard to change**

IT Architecture – Definitions (II)

- **Rechtin, The Art of Systems Architecting**
 - **The structure (in terms of components, connections, and constraints) of a product, process, or element.**
 - **Architecture is what architects produce: The set of information that defines a system's value, cost, and risk for the purposes of the systems sponsor.**

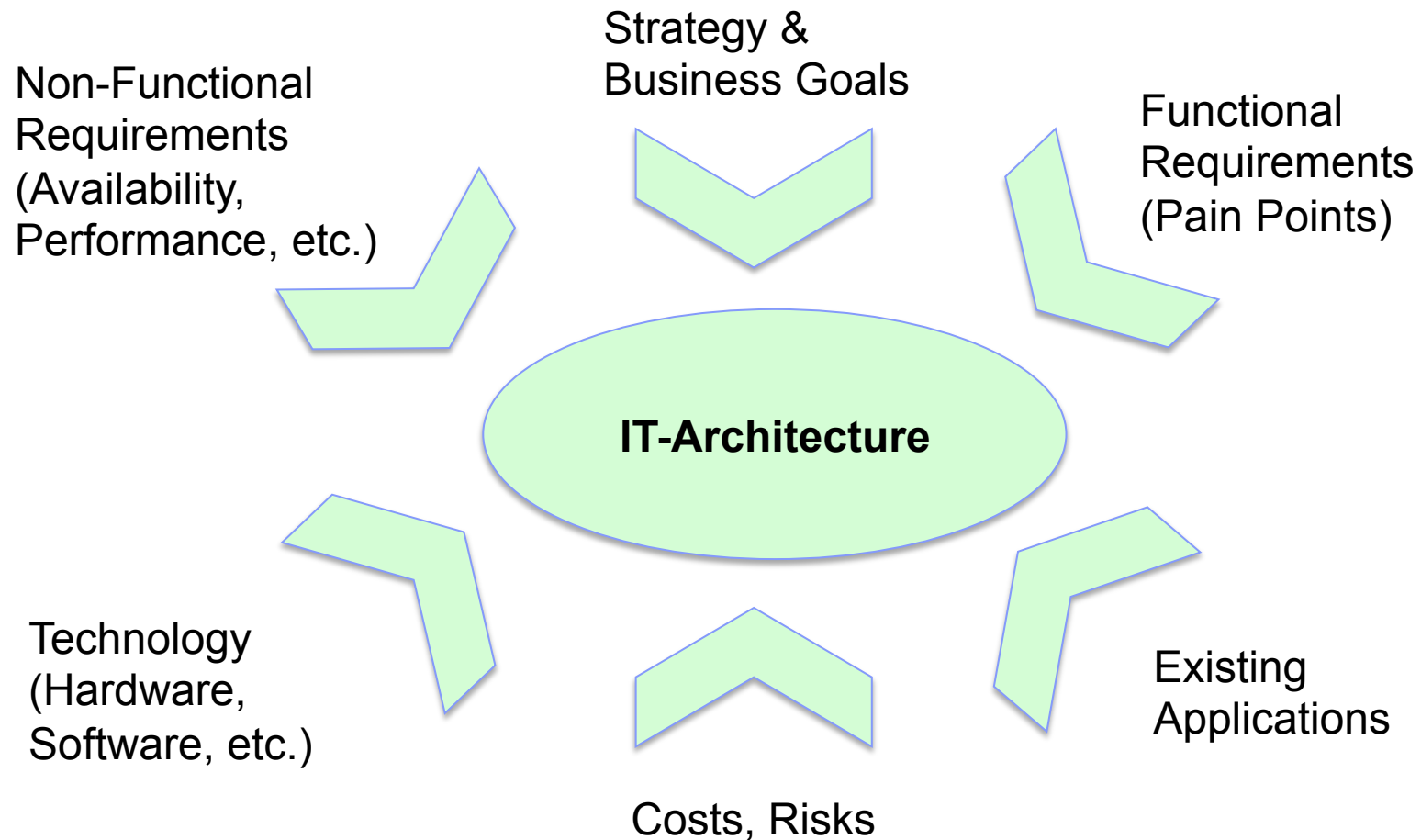
- **Must address**
 - **Function and quality, including aesthetics for the user (client / customer)**
 - **Feasibility and cost for the builder**

IT Architecture – Definitions (III)

- **Lankhorst, Enterprise Architecture at Work**
 - **Architecture is the art and science of designing complex structures, an indispensable instrument in controlling the complexity.**
 - **Is defined as a coherent whole of principles, methods, and models that are used in the design and realization of an enterprise’s organizational structure, business processes, information systems, and infrastructure.**

- **The term “IT Architecture” is defined slightly differently by various authors (after 5000 years of history “architecture” has not a crisp definition)**
 - **Thus we will use standards
(to be introduced in Lecture 2 – next week)**

Drivers of an IT-Architecture



Architectural Thinking at the solution architecture level leads to a complete systems architecture that serves multiple purposes.

- It *breaks down the complexity* of the IT System.
- It *analyzes the required functionality* to identify required technical components.
- It *provides a basis for the specification* of the physical computer systems.
- It *defines the structuring and strategy* for the connection of system elements.
- It *provides the rules* of composition and decomposition of system elements.
- It *assists in the analysis* of service level requirements to design a means of delivery.
- It *provides a decision trail*, which enables the system to evolve over time.

**It includes qualities
(nonfunctional requirements).**

- Performance and Capacity
- Availability
- Manageability
- Security
- Usability
- Portability
- Reliability
- Maintainability
- Scalability
- Safety
- Extensibility

It utilizes basic architectural principles.

- Separation of concerns
- Information hiding
- Design by interface
- Separation of interface and implementation
- Partitioning and distributing responsibilities

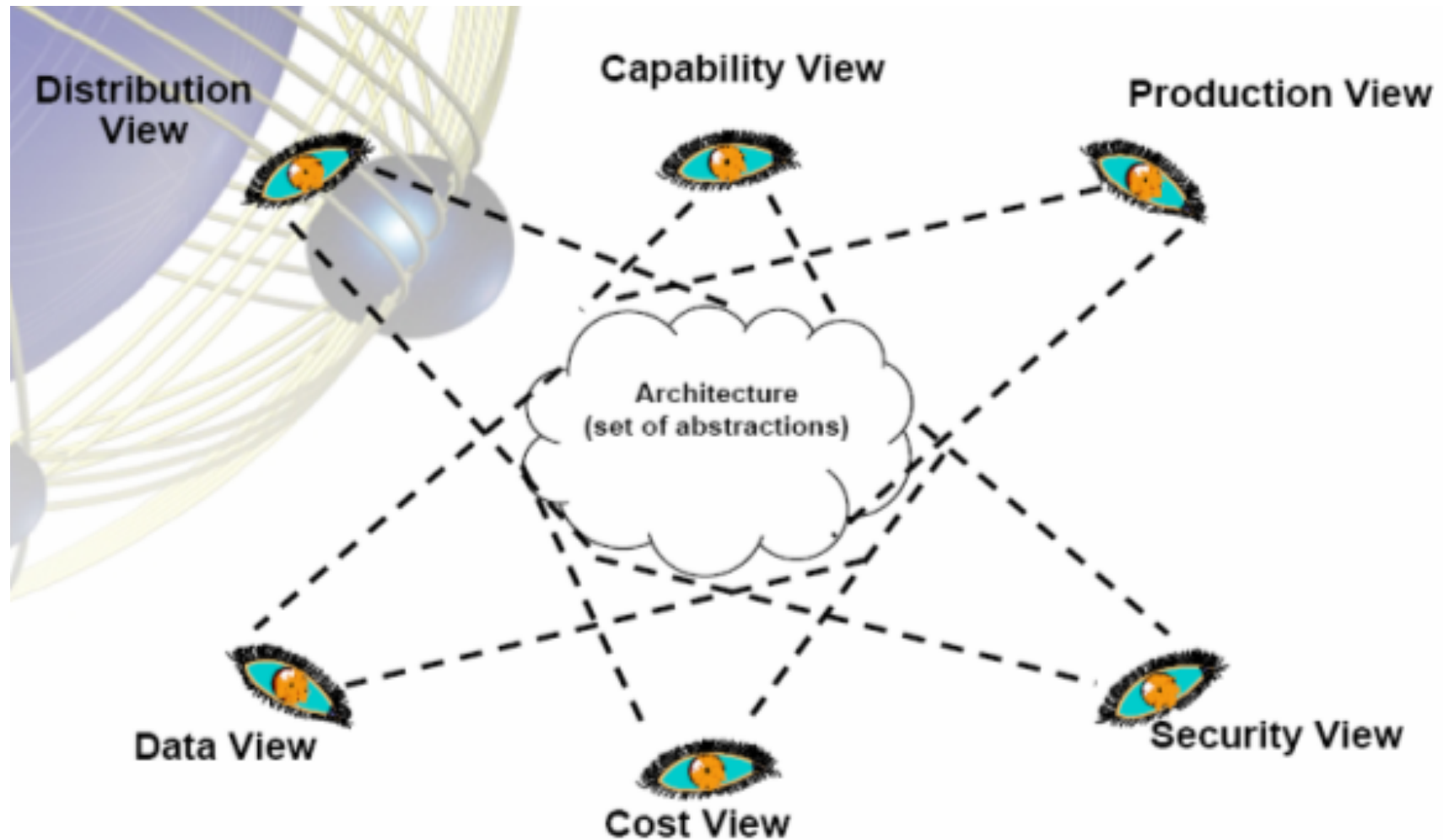
IT Architecture – Description

- A collection of **Work Products** to document an architecture
- Addressed to one or more **Stakeholders** to answer their **Concerns** about the system
- Organized into one or more **Views** of the system
- Each **View** addresses one or more **Concerns** of the **Stakeholders**
- A **View** is a way of looking at an architecture
- A **View** is what you see when you look at the architecture from a particular **Viewpoint**

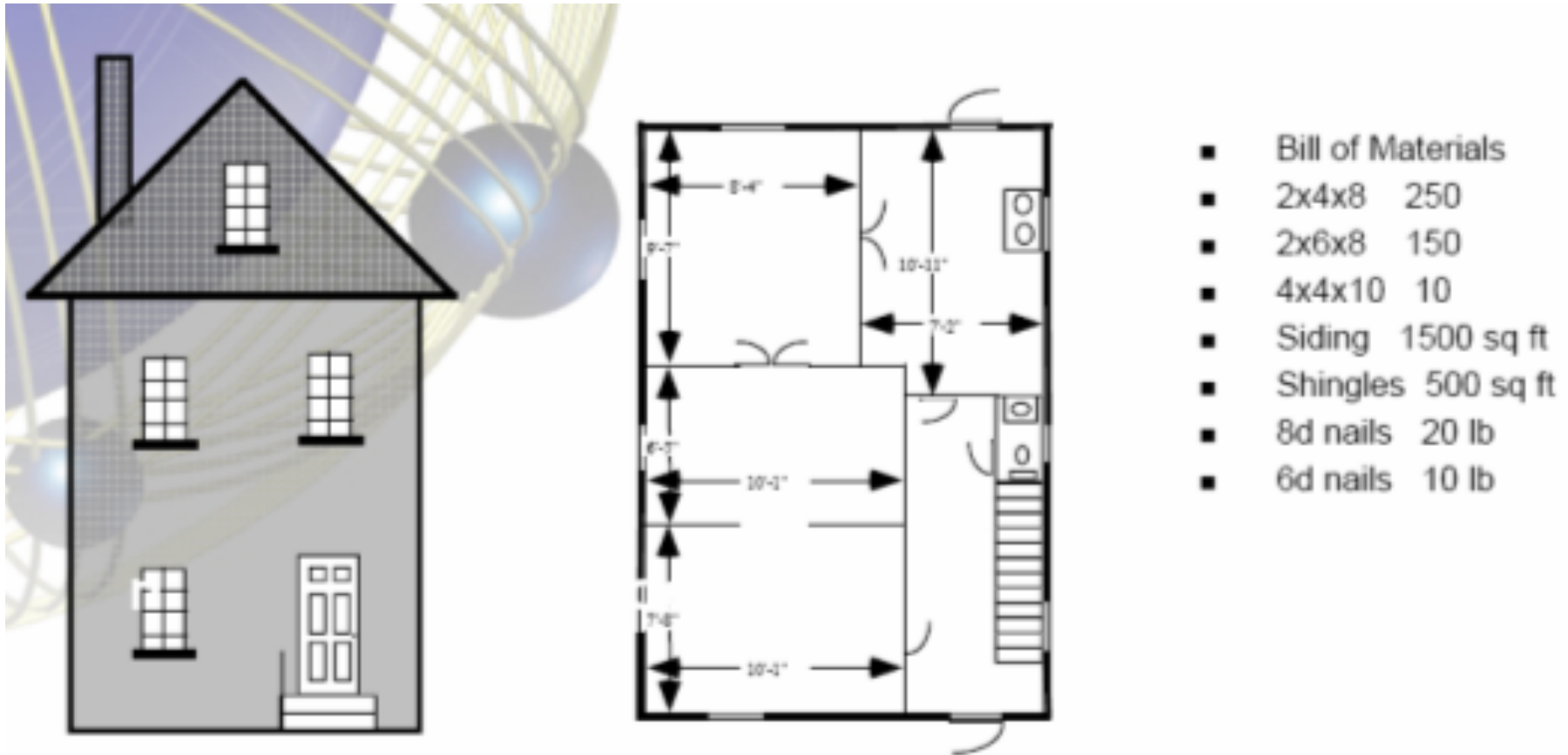
IT Architecture – Architectural Views

- **Enable the architecture to be communicated to, and understood by, all the stakeholders**
- **Enable stakeholders to verify that the system will address their concerns**
- **Examples**
 - **Scope description:** **Planner's view**
 - **Model of the business:** **Owner's view**
 - **Information system model:** **Designer's view**
 - **Technology model:** **Builder's view**
 - **Detailed blueprints:** **Subcontractor's view**

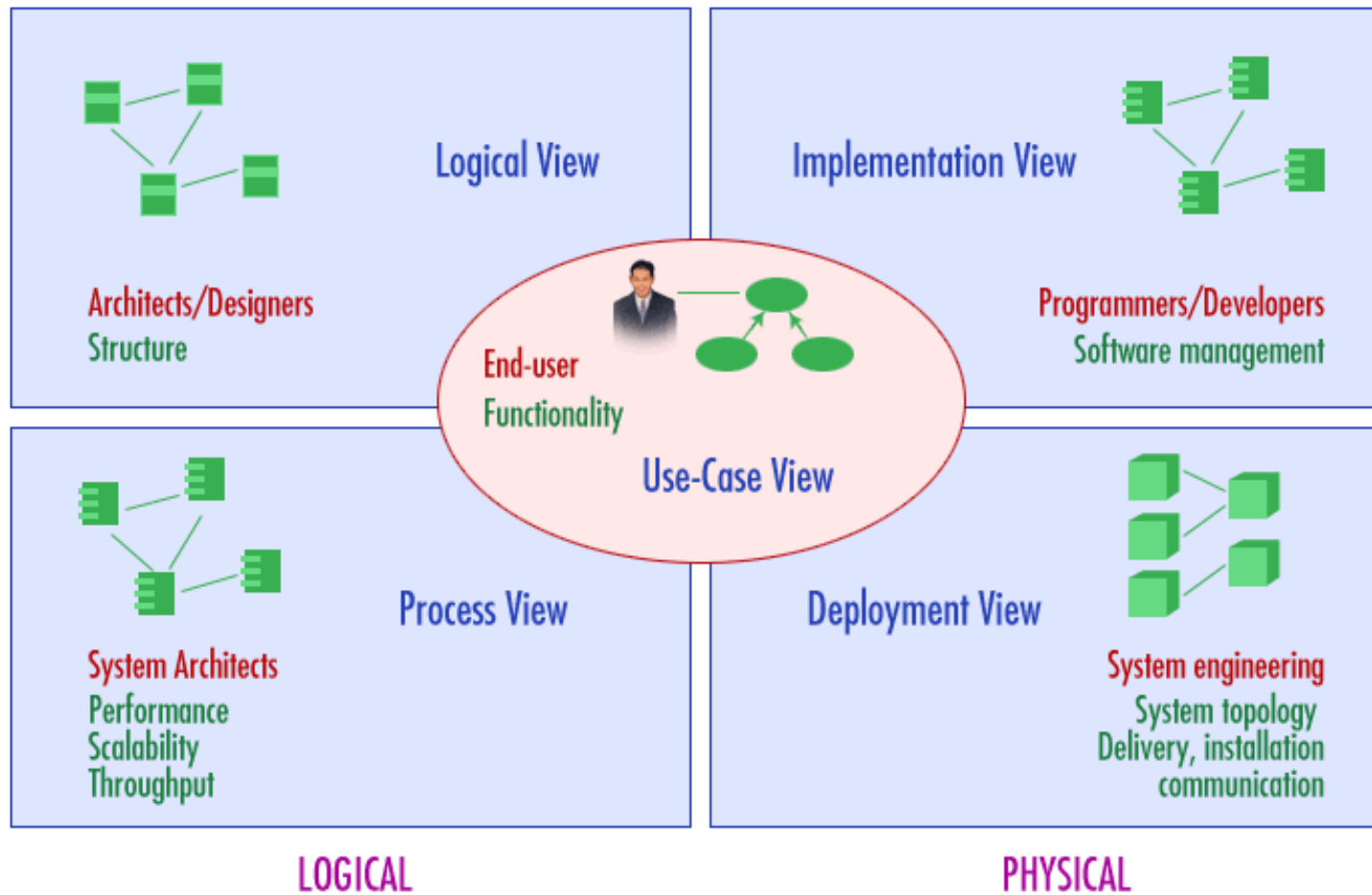
IT Architecture – Sample Views



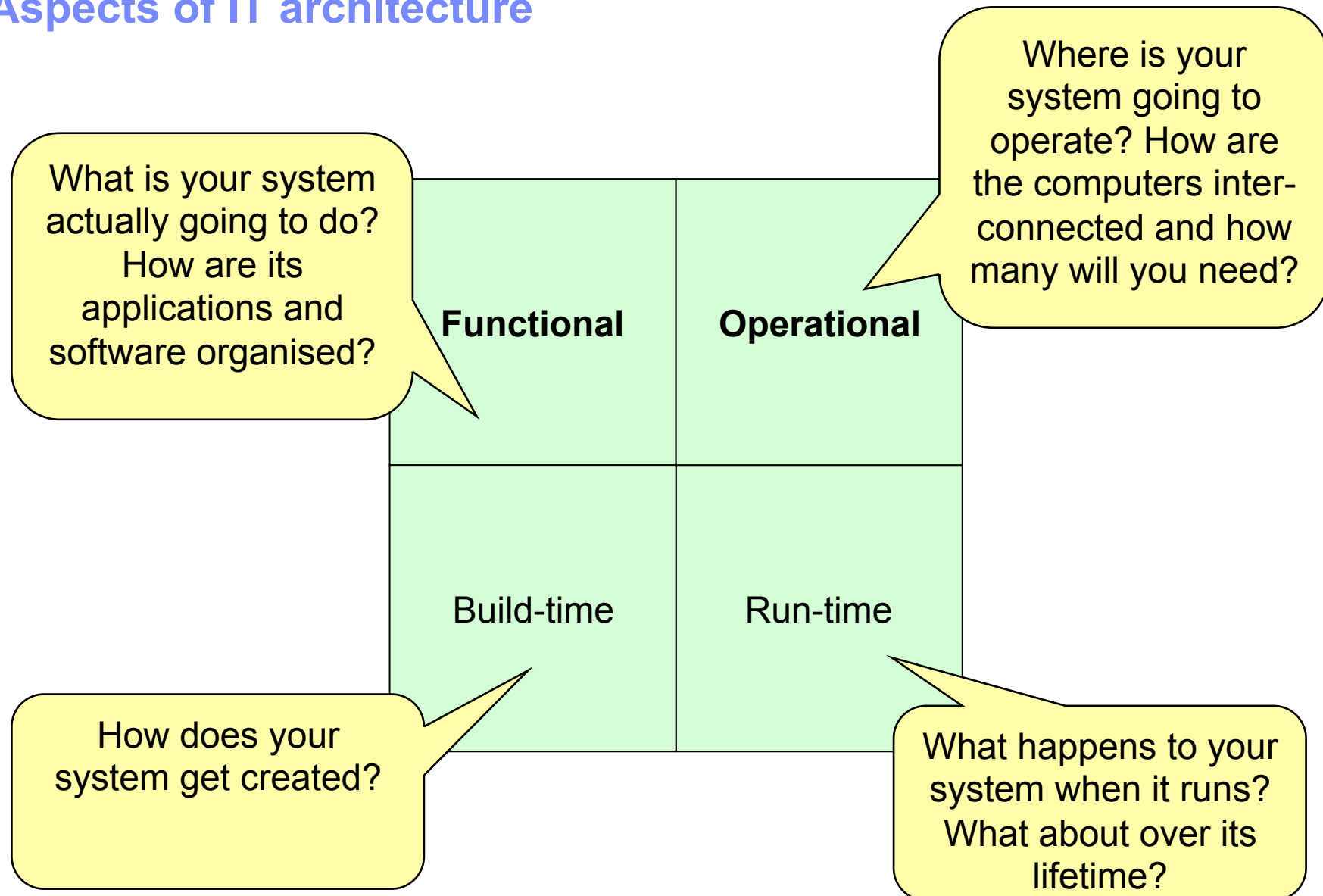
Analogy: Multiple views and models



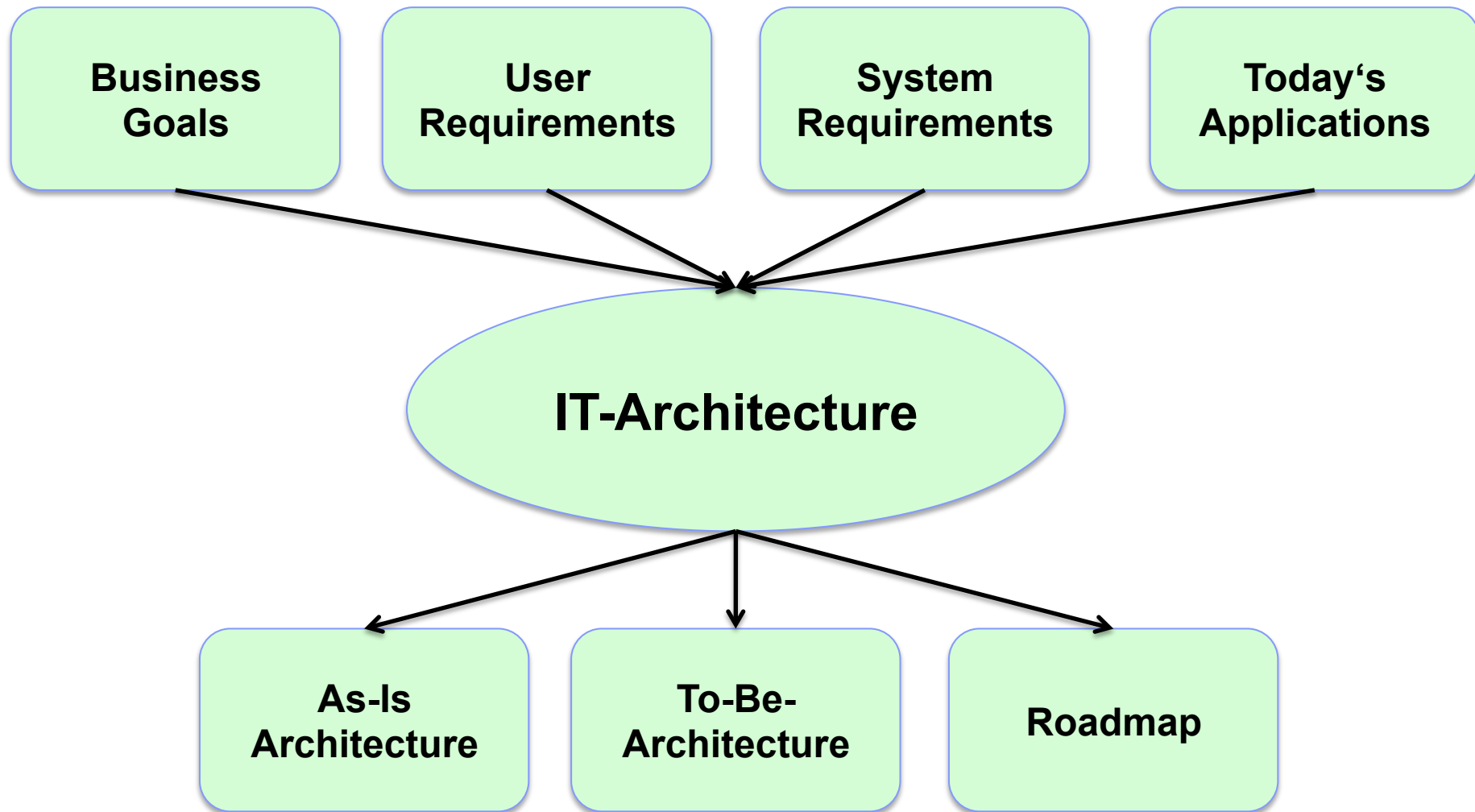
The 4+1 view model of software architecture (Kruchten)



Aspects of IT architecture



Architecture Overview



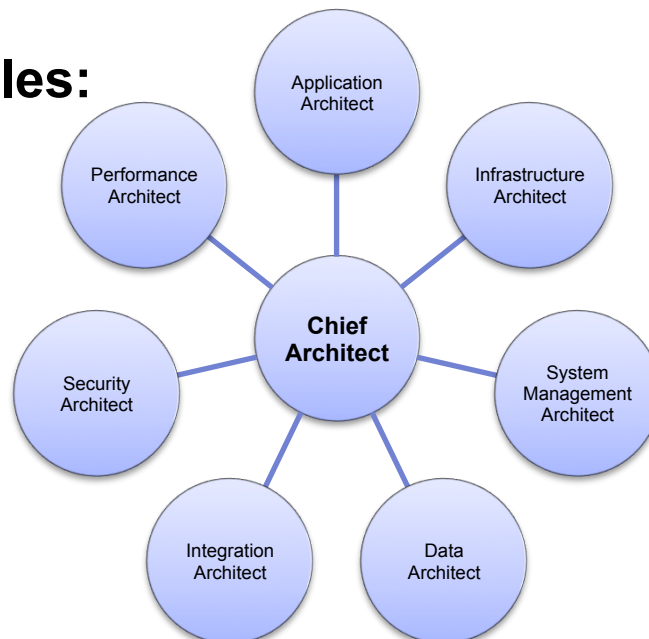
**In a Nutshell:
IT Architect Roles**

Architects – Overview

▪ IT Architects

- are technically competent system-level thinkers, guiding planned and economically efficient design processes to bring a system into existence
- Focus on system- and subsystem-level issues to establish a solid foundation for detailed design, particularly for large-scale efforts

▪ There are different roles:



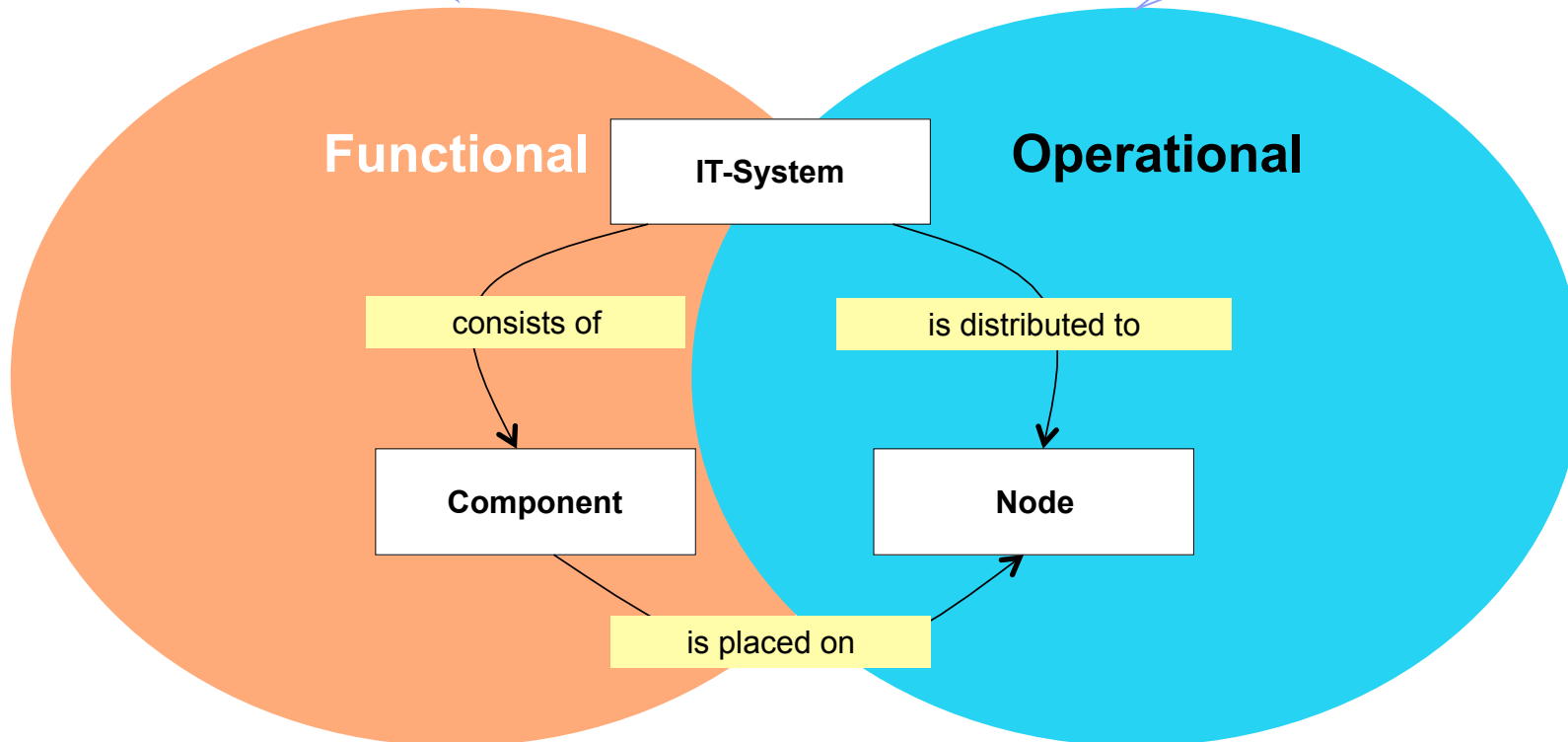
Chief Architect Roles and Responsibilities

- Provide the **technical leadership** necessary to implement or achieve a business strategy through an IT solution
- Carry end-to-end **technical solution responsibility**
- Carry the whole scope of the **problem to be solved**, and the **solution** in his/her head
- Technical management of **Requirements, Issues, Risks & Changes**
- Definition of applicable **Architectural Principles**
- Manage **reviews**
 - Work products and deliverables
 - Co-ordinating external reviewers, Quality Assurance
- **Internal**: Advise the program manager and project executive on all aspects of the technical solution
- **External**: Develop relationships with client technical executives

Enterprise IT Architectures

Application Architect

Infrastructure Architect
Technical Architect



Application Architect


- Defines **what the solution does**
- Responsible for the **Functional Aspects** of the system
- Key responsibilities
 - Understands how the business requirements can be met using application software, and defines what **application software packages** and / or **bespoke code** is needed
 - Develops and maintains **application architectures** and strategies and to ensure the design integrity of the application subsystem and that it meets the agreed requirements
 - Defines **high level data flows** between applications
 - Leads any **bespoke application development**
 - Leads the **configuration of the application software**

The **Application Architect** is responsible for the **Functional Aspects**, which include these key concepts:

- **Component**
 - **Modular unit of functionality which makes this functionality available through an interface**

 - **Subsystem**
 - **Any grouping of components in IT system**

 - **Interaction and Collaboration**
 - **Collaboration between components**
 - **Sequence of component operations**
 - **Exchanges between two components**
 - **Interface usage contract / protocol**

 - **Data**
- 
- Link between Use Cases,
and Components**
- Use Case Realizations**

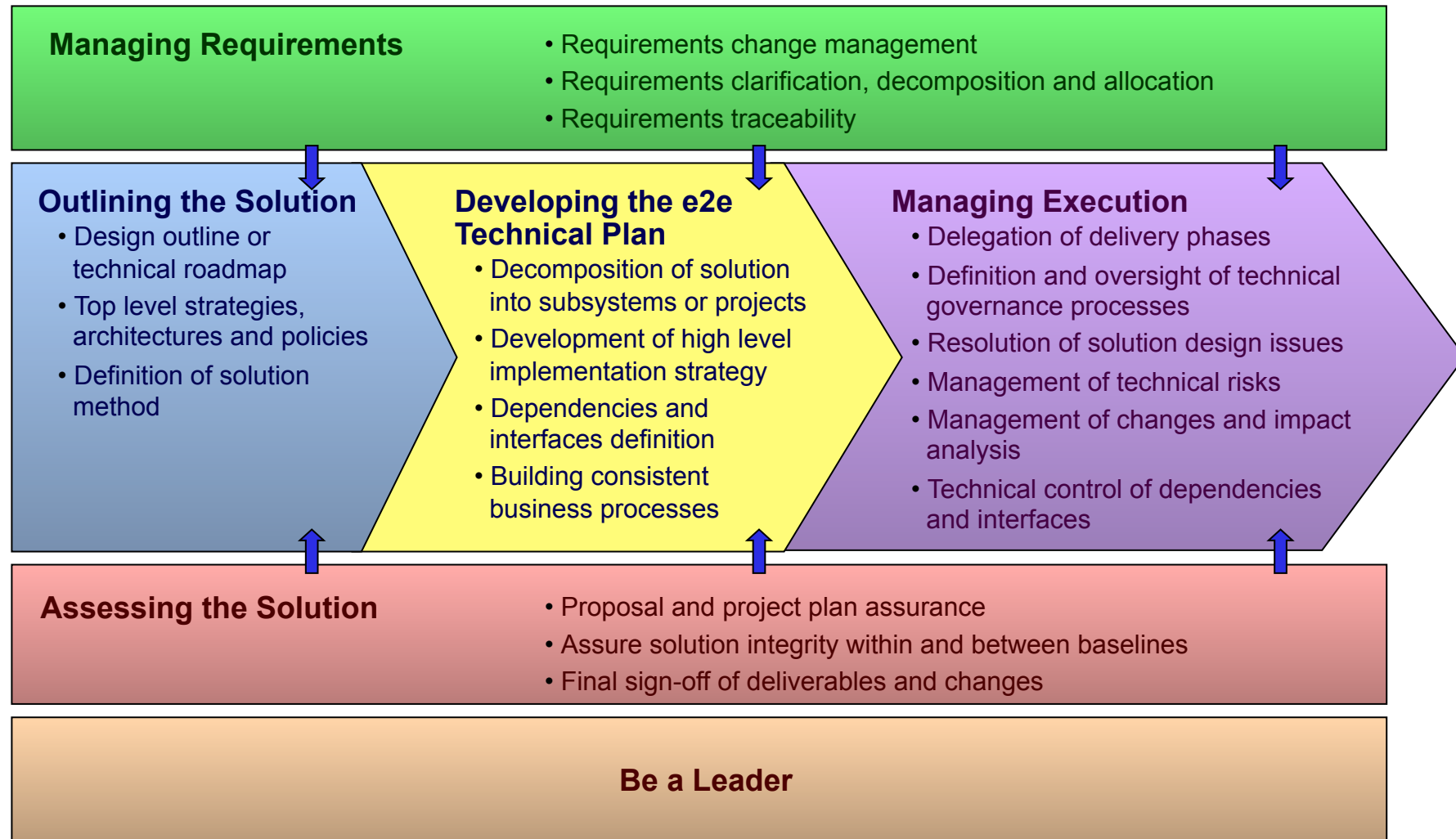
Infrastructure (or Technical) Architect

- **Defines the overall system shape**
 - What the **building blocks** are from which the solution will be made
 - How the **data and functionality** will be placed
 - **Responsible for the Operational Aspects of the system**
 - **Key responsibilities**
 - Establishes **non-functional and technical infrastructure requirements**
 - Defines the **infrastructure solution**
Networking, hardware configurations, system software, middleware
 - Performance, Capacity, Scalability
 - Availability, Recoverability
 - Systems Management, Service Levels
- Non-Functional Requirements**

The **Infrastructure Architect** is responsible for the **Operational Aspects**, which include these key concepts:

- **Node**
 - platform on which software executes
- **Location**
 - type of geographical area or position
- **Zone**
 - an area for which a common set of non-functional requirements can be defined
- **Connection**
 - physical data path between nodes (LAN, WAN, dial-up etc)
- **Deployment Unit**
 - one or more components placed together on a node
- **Non-functional Requirements (NFRs)**
 - **Service Level Requirement (SLR)** like performance, availability, etc.
 - **Constraints:** business / geography, IT Standards, current Infrastructure, etc.
- **Walkthrough**
 - description of the flow of a scenario starting from a user all the way through the system and back to the user

Architect's Responsibilities across the full life-cycle



“Architect” as a Profession

- **Certification program from Open Group**
 - Applying for a certification
 - Providing a package describing your architect work
 - Will be reviewed and possibly approved

- **HPH’s Personal Experiences**
 - Certified @ IBM as “Senior IT Architect” – once re-certified
 - Senior Certification @ IBM as “Executive Architect”
 - Re-Certification @ Open Group as “Distinguished IT Architect” (April 2013, April 2016)

Example of an IT Architect's Work

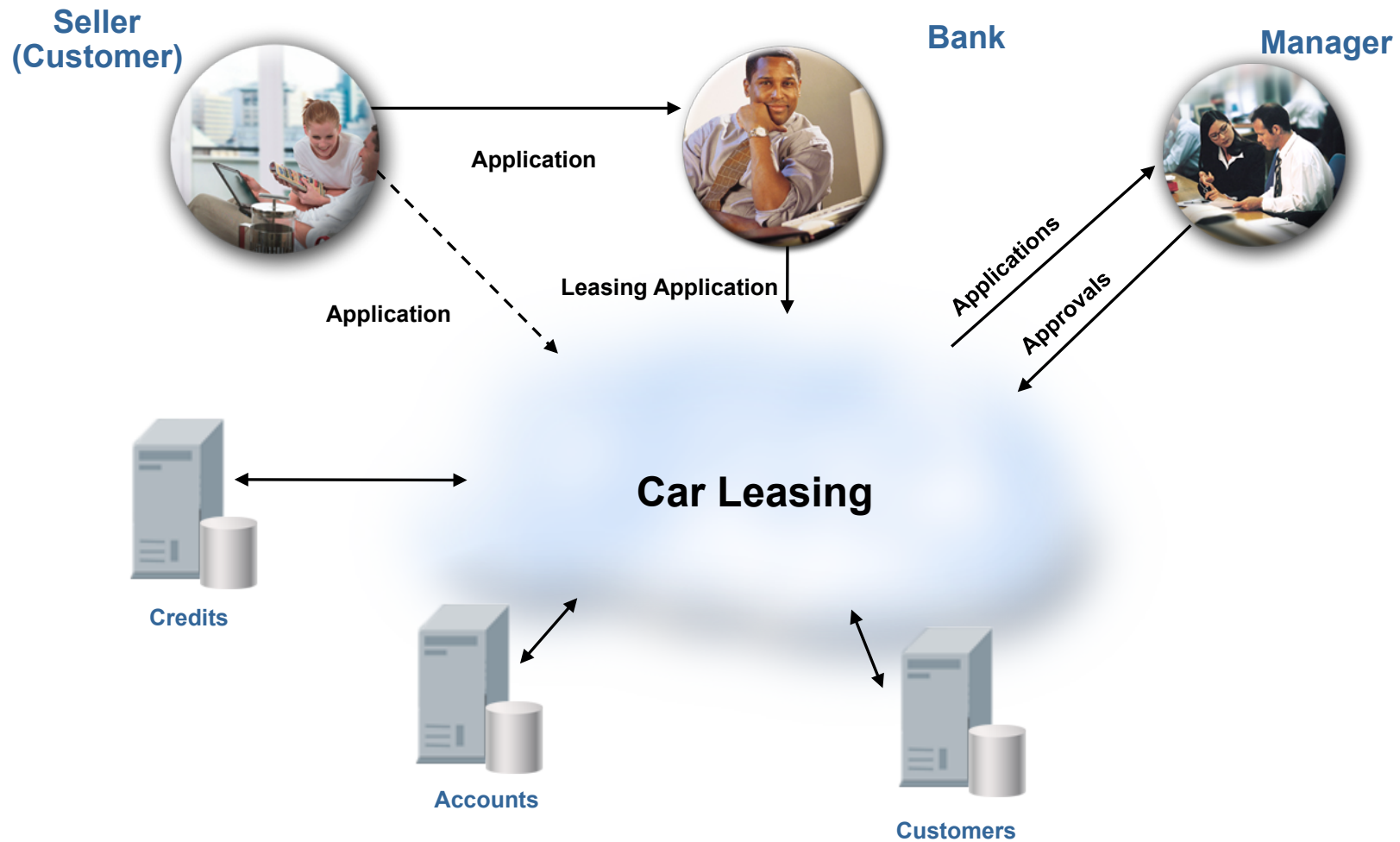
“Car Leasing” of a Bank: Situation and Customer’s Goals

- **The “Car Leasing” process is very, very slow and the bank is losing a lot of the business because clients are moving to the competition**
- **Major Goal for the IT Architect is the definition of a Pilot Project for better support of “Car Leasing”**
- **Characteristics: The work has to be done within one week, from the customer side Business People as well as IT people were involved.**
- **Major Results grouped in**
 - **Findings / Recommendations,**
 - **Pilot Project High level scope,**
 - **Next Steps Phase 1 and 2**
 - **Phase 1 Project Plan**

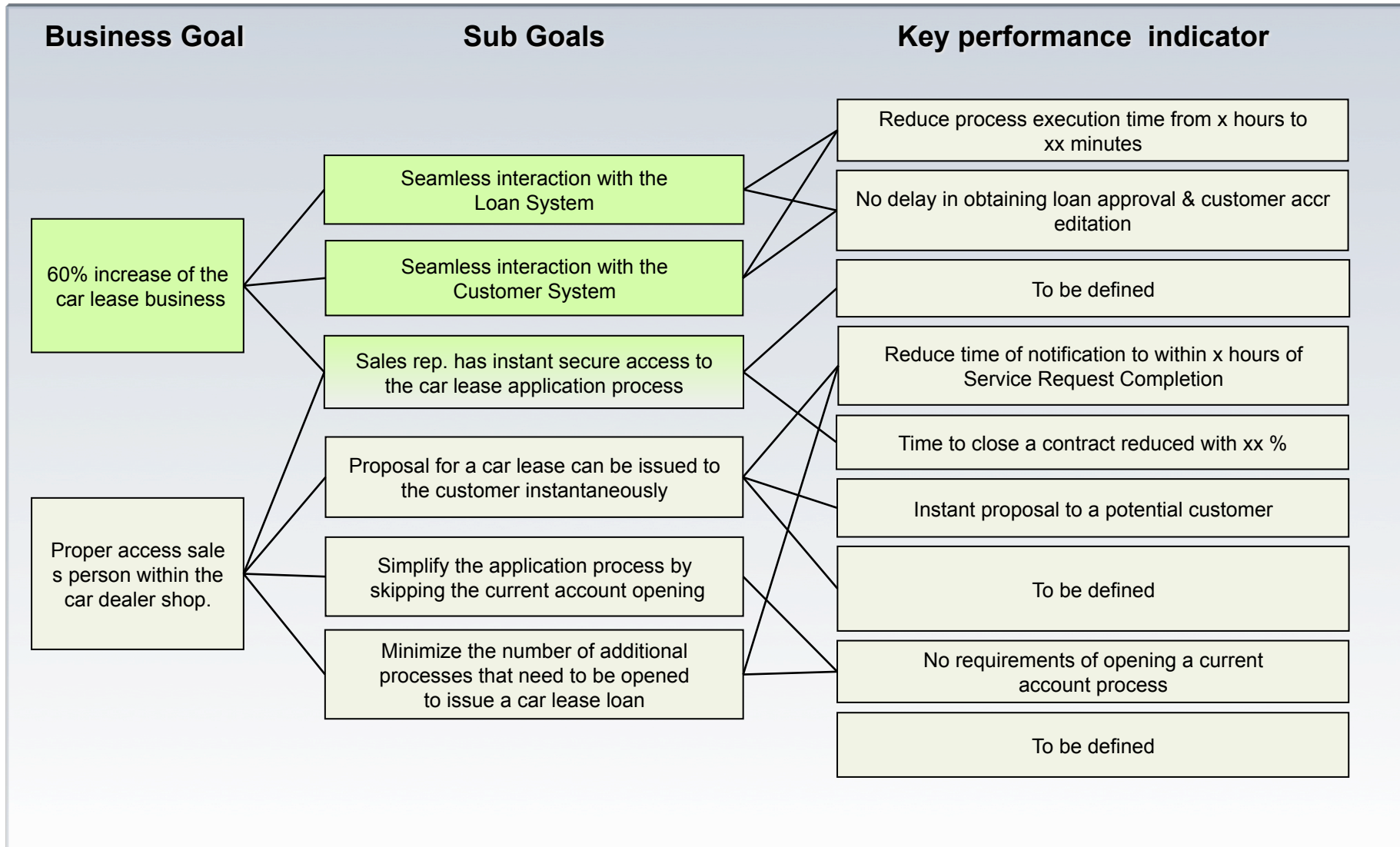
Example – an IT Architect at Work: Workshop Overview

Day	Agenda	Participants
Day 1	Introductions, Met LoB, which included Corporate, Retail & Risk Mgmt	Consultant / Business from Customer
Day 2	Met IT folks and discussed our findings, agreed on Pilot Project.	Consultant / IT from Customer
Day 3	Technical Deep Dive including pilot arch overview	Consultant / IT from Customer
Day 4	Develop initial recommendations	Consultant only – need access to participants
Day 5	Presentation draft of Findings & Recommendations	All Workshop Participants and Key Executive

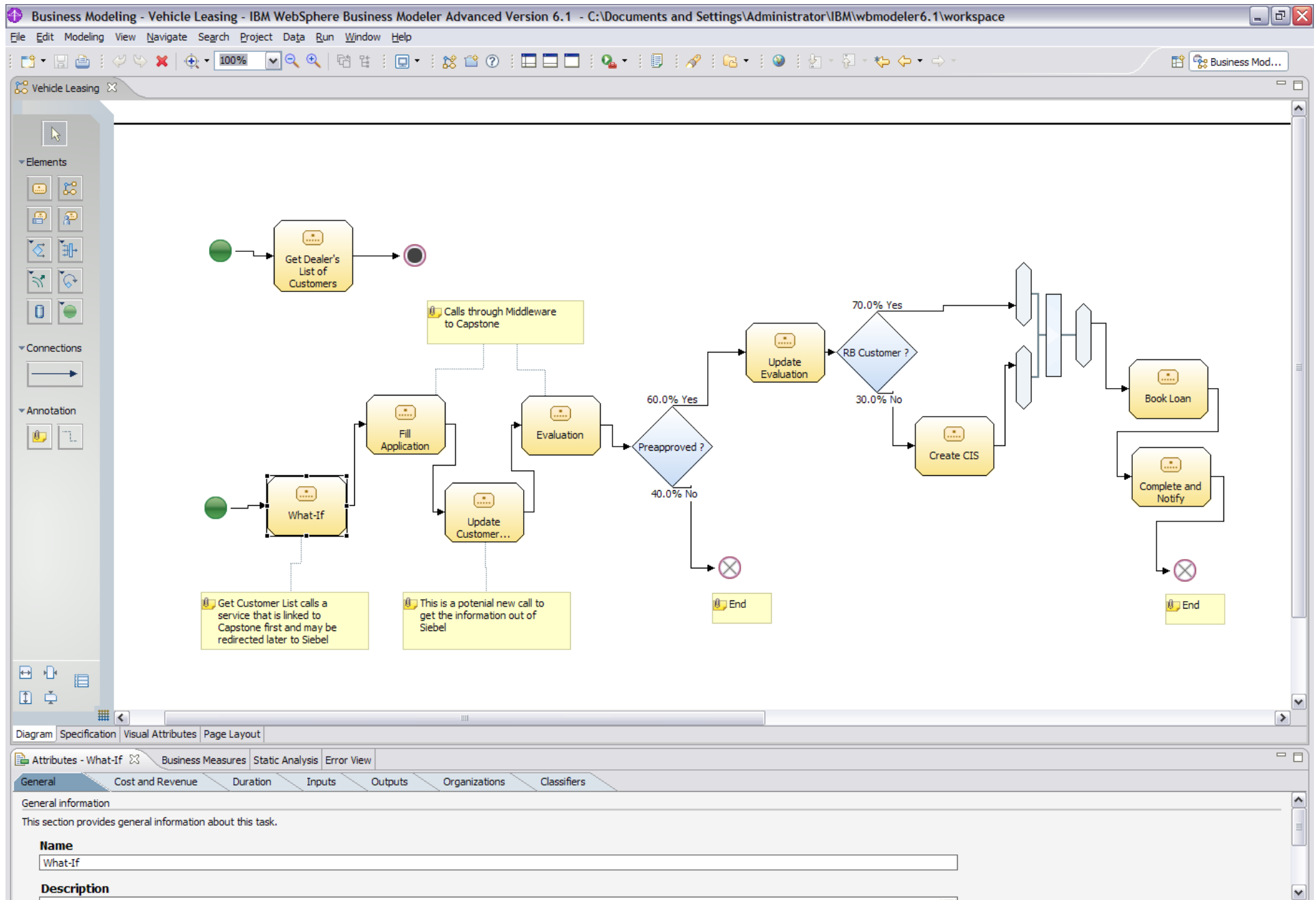
Show Case: Car Leasing



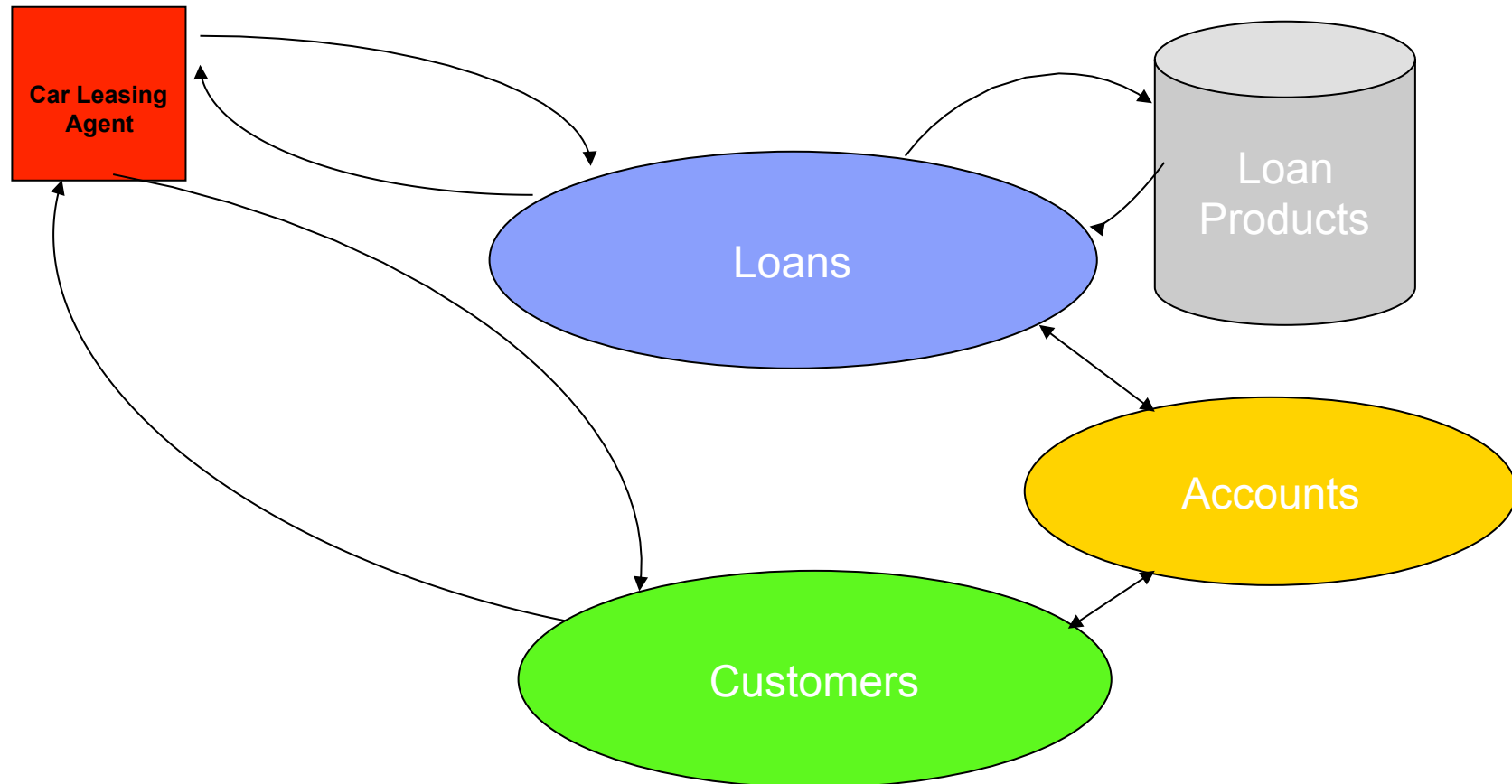
Example: Capturing Business Side



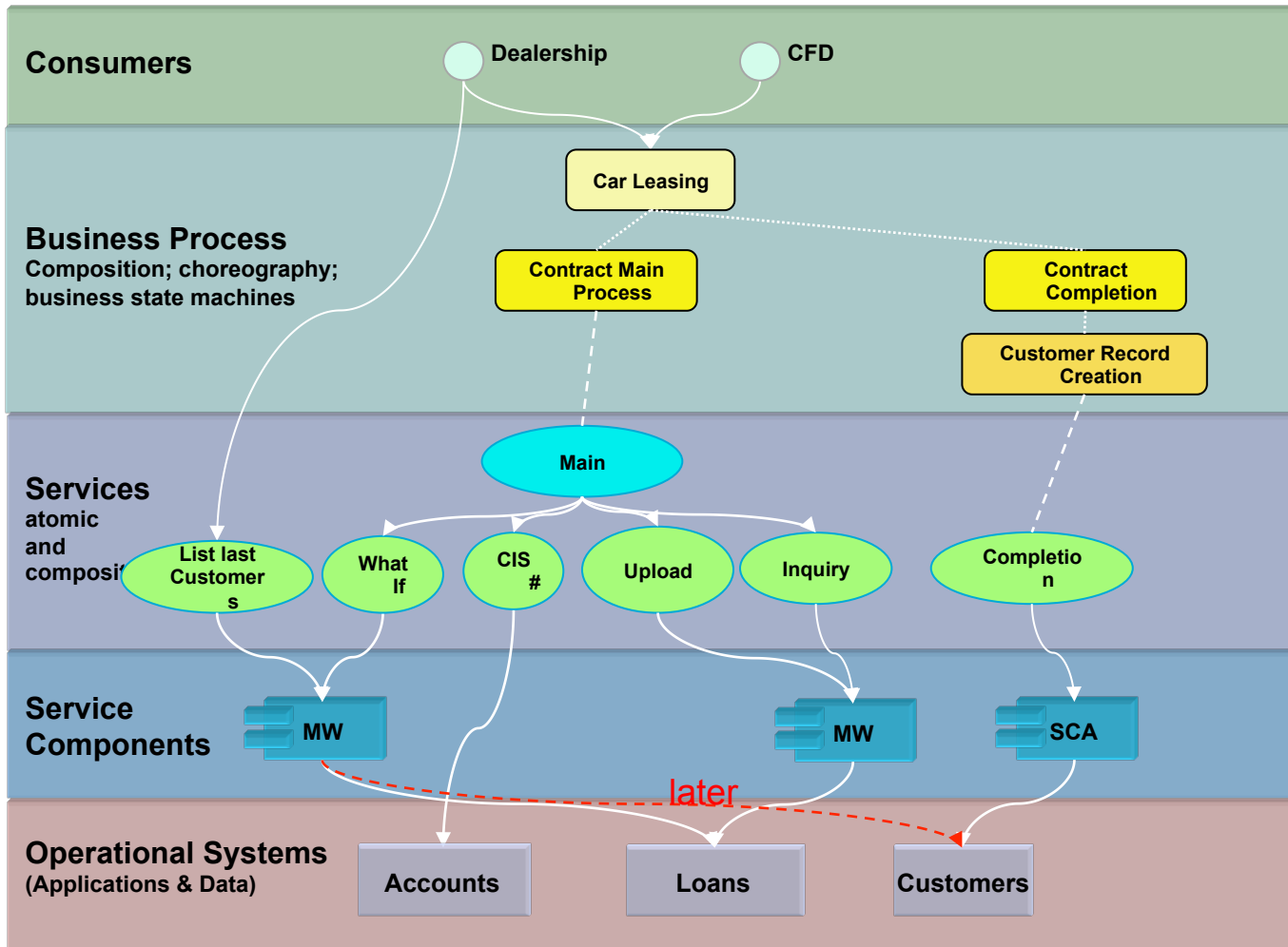
Enterprise IT Architectures



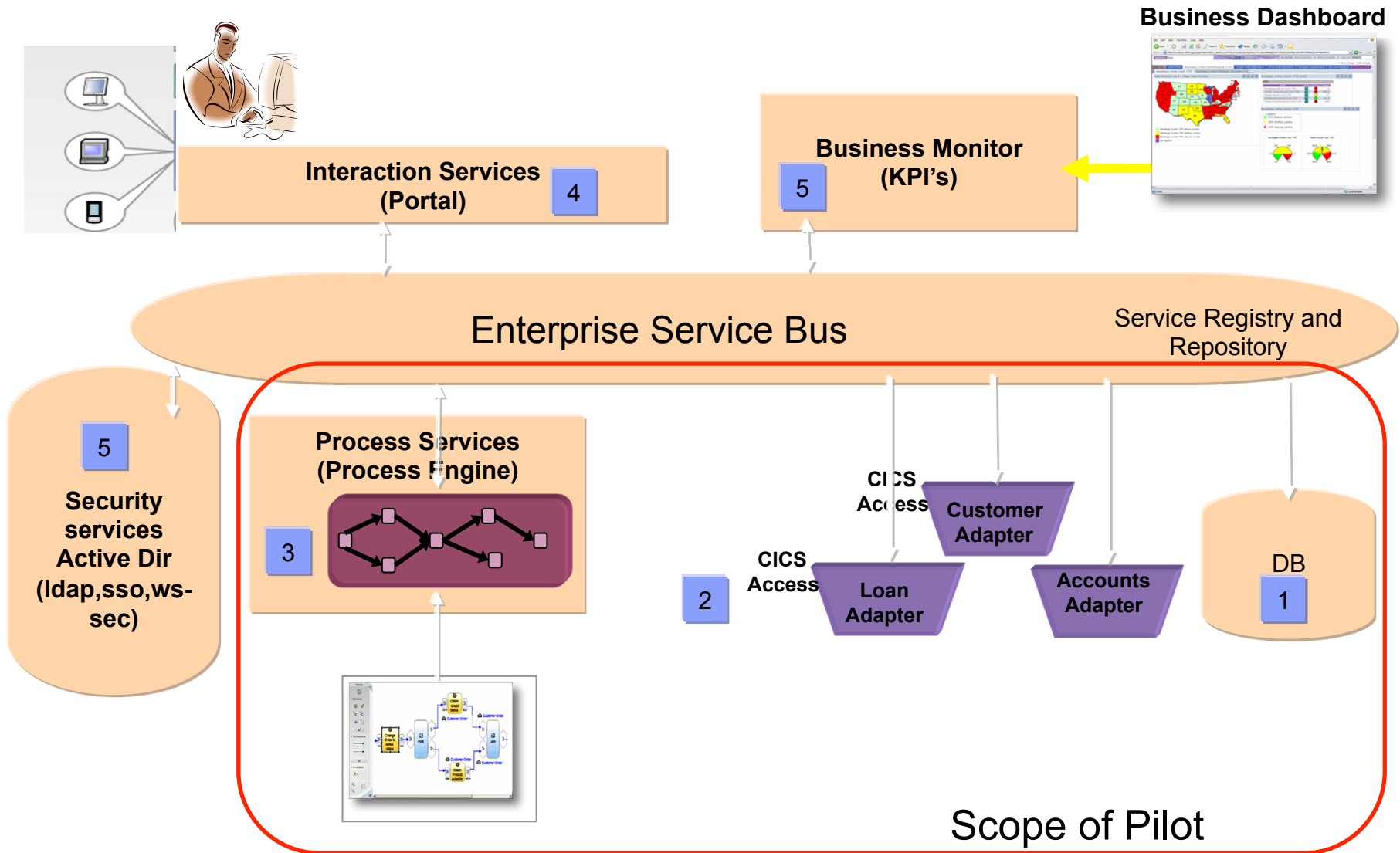
Example: Context Diagram – Car Leasing



Example: SOA Layered View – Car Leasing

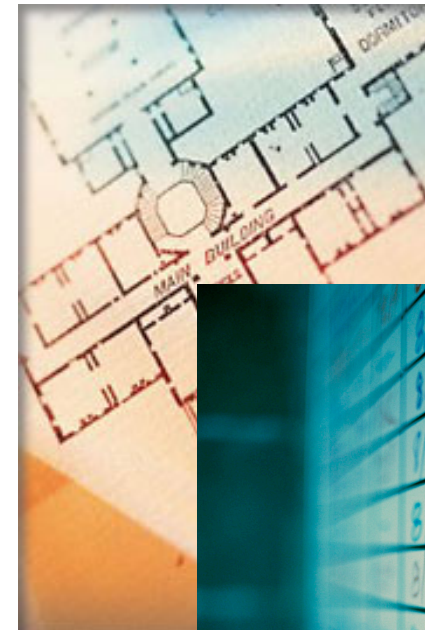


Example: Technical View – Car Leasing



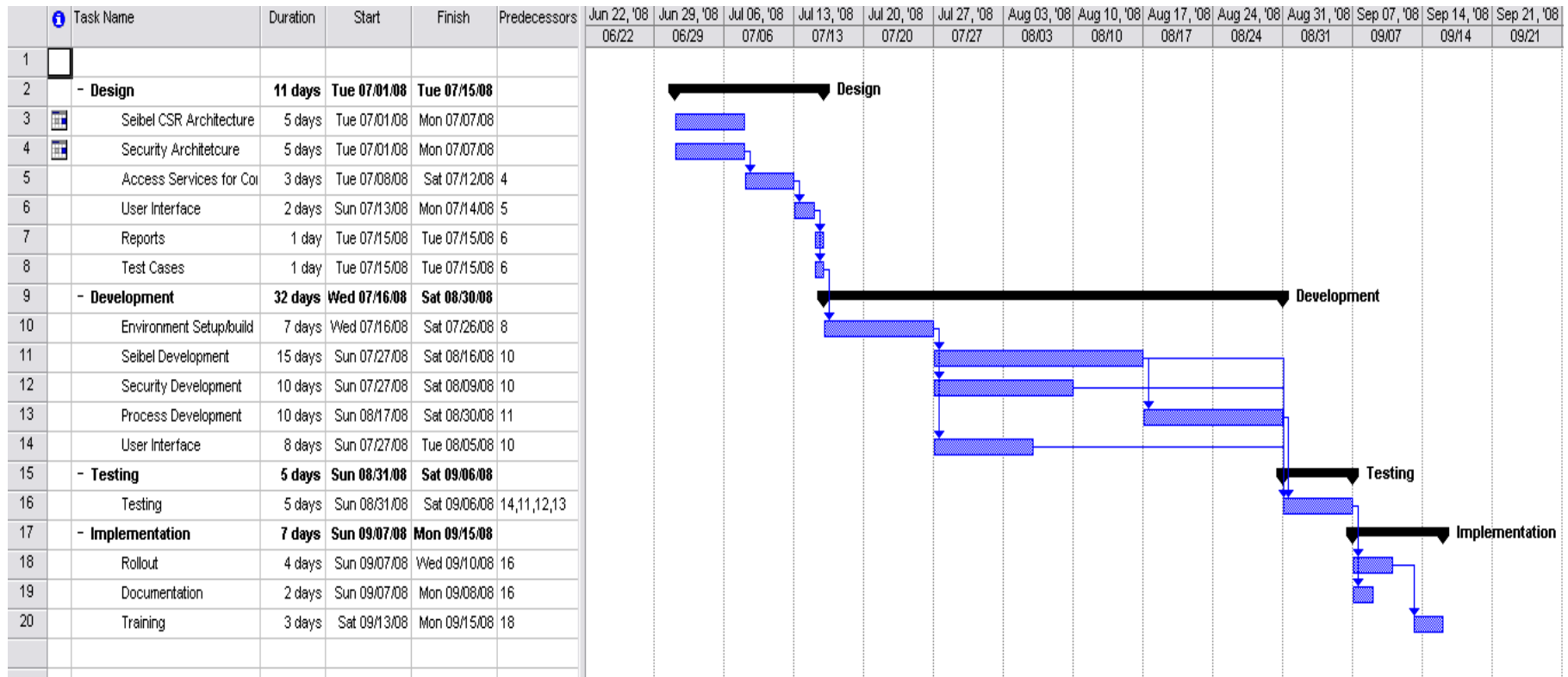
Example: Time Line – Car Leasing

- **Phase 1** Pilot project
 - Total duration 10 weeks
 - Estimated start July 2008
 - Estimated completion Mid September 2008
- **Phase 2** Pilot projects
 - Estimated total duration 1-4 months per process
 - - Extension and optimization of Car Lease
 - - New Credit Card process
 - - Document Archiving and Retrieval
 - - Consumer Loans



Enterprise IT Architectures

Example: Project Plan – Phase 1 Car Leasing



<http://www.ifi.uzh.ch/en/rerg/courses/hs16/it-arch.html>

Questions