Large Scale Software Design
Architecture description

Software for modelling and drawing

Magic Draw

Microsoft Visio

- **Part of Office 365**
- **Installed in classrooms**

Dia: http://sourceforge.net/projects/dia-installer/

ArgoUML: http://argouml.tigris.org/

WhiteStartUML: http://sourceforge.net/projects/whitestaruml/

On-line drawing: https://www.draw.io/

Architecture description

Meaning of the architectural description

Let’s assume that the implementation of the system and its architectural description are in contradiction. What is the architecture of the system?

Let’s assume that architecture and design documents are missing, and the designer are not available. What is the architecture of the system?

Architectural description is the key artefact that can be verified with respect of the requirements.

Correct abstraction level, style, correctness

Different viewpoints: tourist, orienteerer, discussion, locating (compare: coder, management, maintenance, subsystem designer).

Where is Amarante?

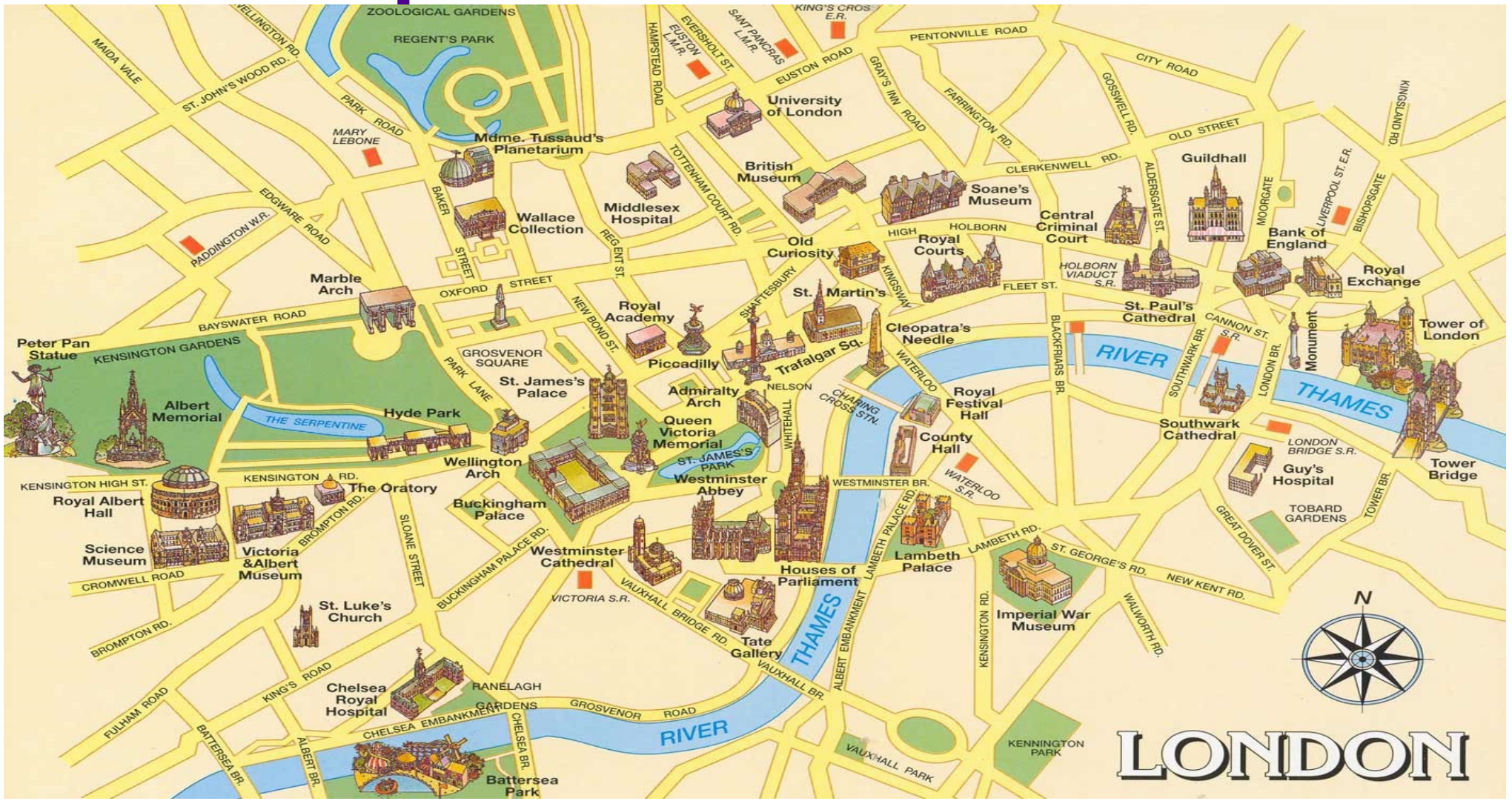
- **In Portugal or 60 km east of Porto or 2 km north of Cepelos near Lufrein.**

Where is Oravapolku in Tampere?

- **In Kaleva, next to Sorsapuisto playing field or next road from Nyyrikintie parallel to it**

Tampereen yliopisto
Tampere University

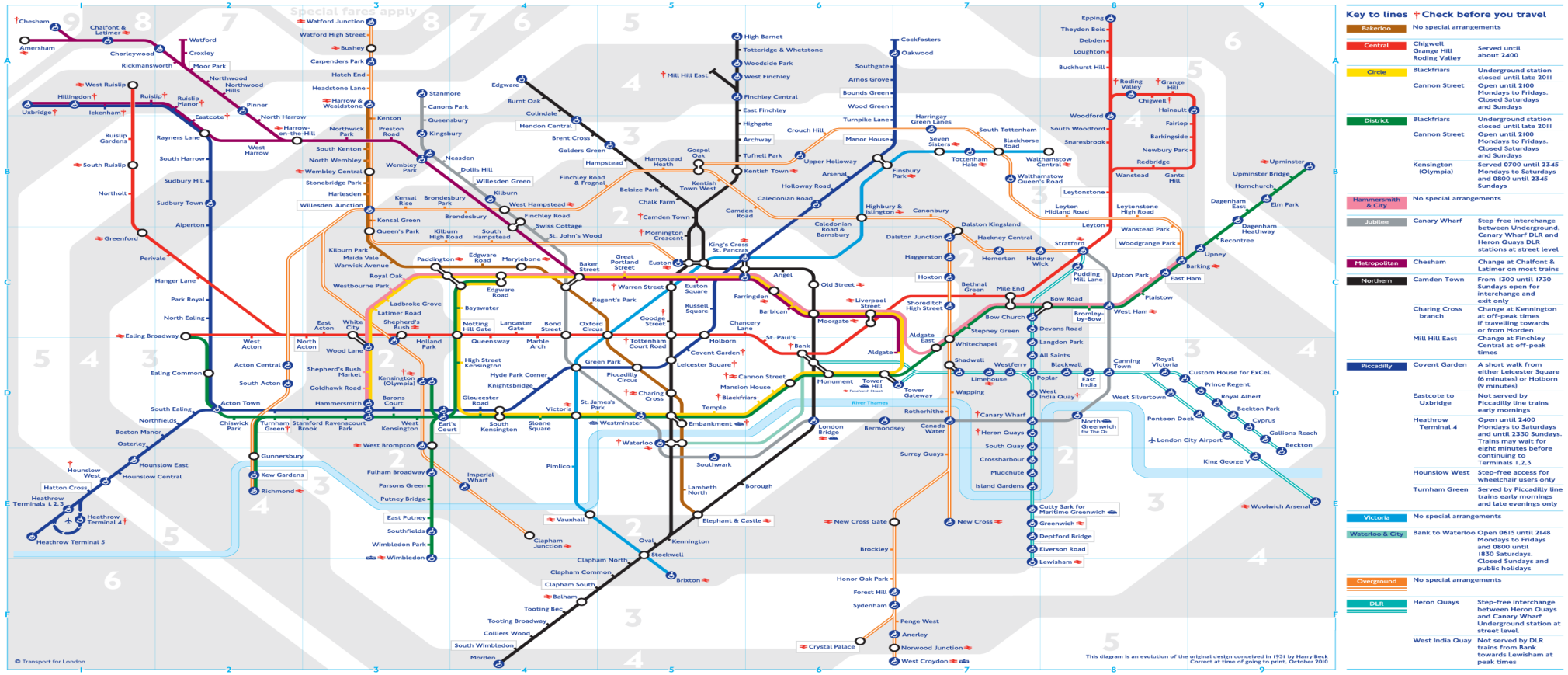
Tourist map of London



Tampereen yliopisto
Tampere University

The Tube of London

Tube map



MAYOR OF LONDON

Website tfl.gov.uk

24 hour travel information 0843 222 1234*

*You pay no more than 5p per minute if calling from a BT landline. There may be a connection charge. Charges from mobiles or other landline providers may vary.

Transport for London

Describing software architectures

Concepts of describing architectures

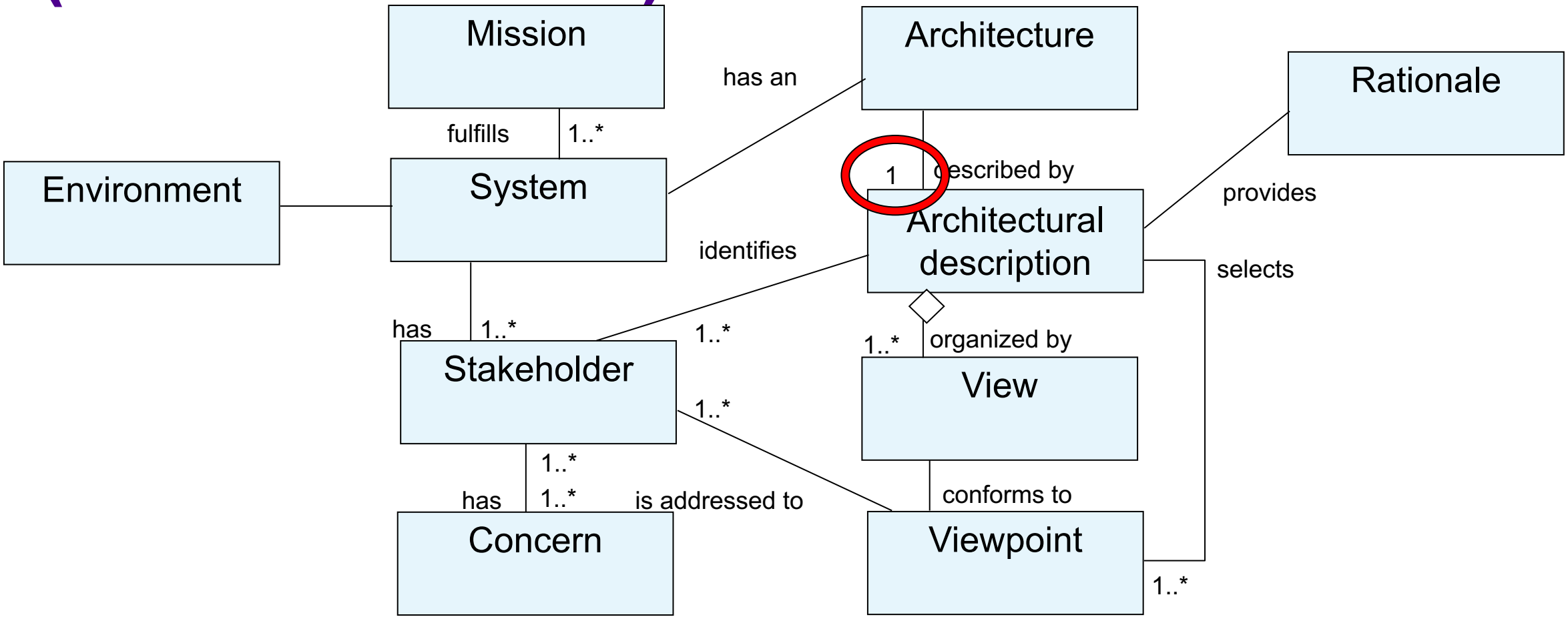
Architecture descriptions on different levels

Architectural viewpoints and description types

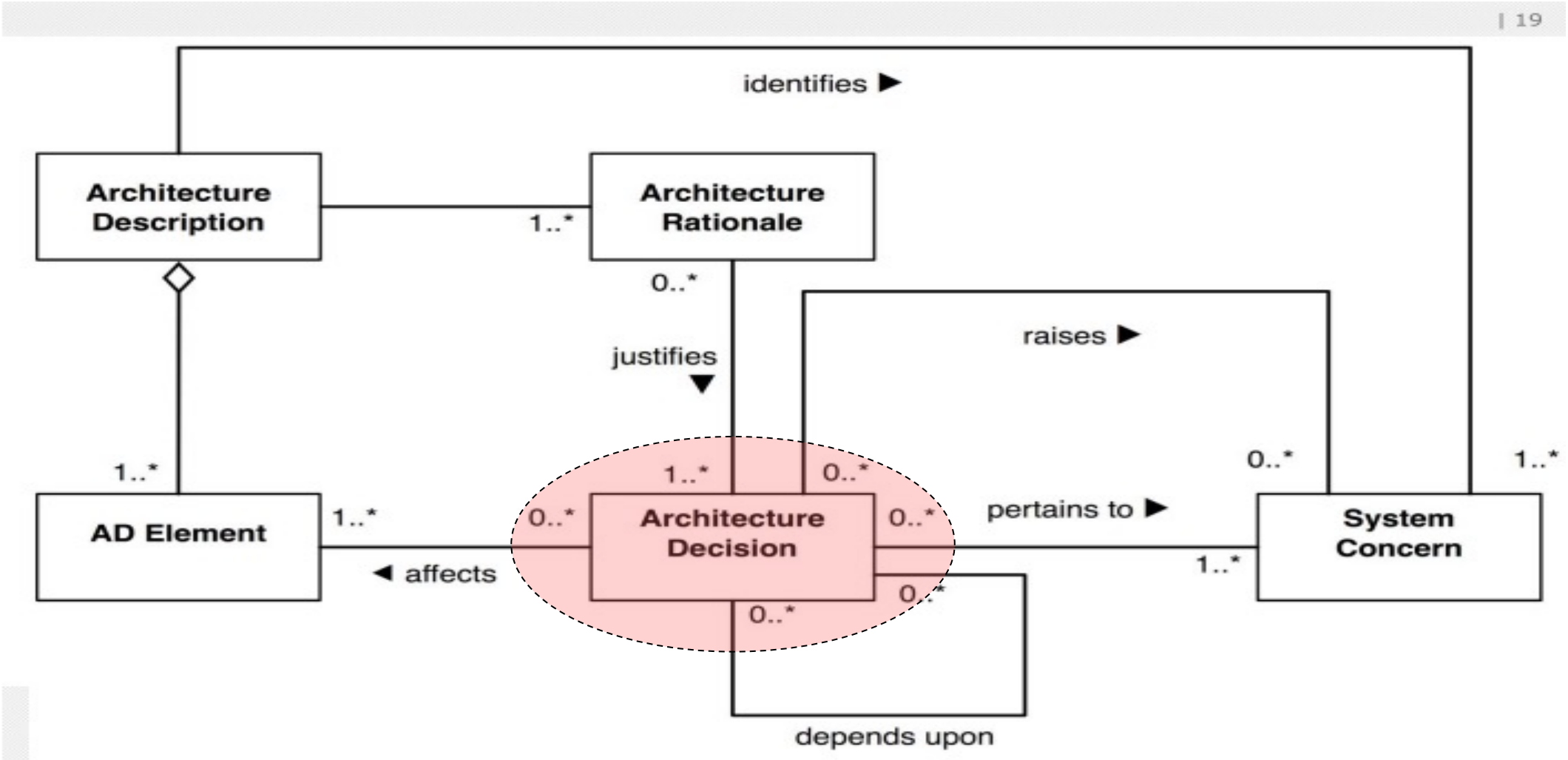
UML

Architectural documents

Concepts of architectural description (IEEE 1471-2000)



Amendment (ISO/IEC 42010)



Architecture decisions

Architecture can be understood as the sum of architectural level decisions (e.g. Bosch)

Architecture decisions can be given semi-formal representation

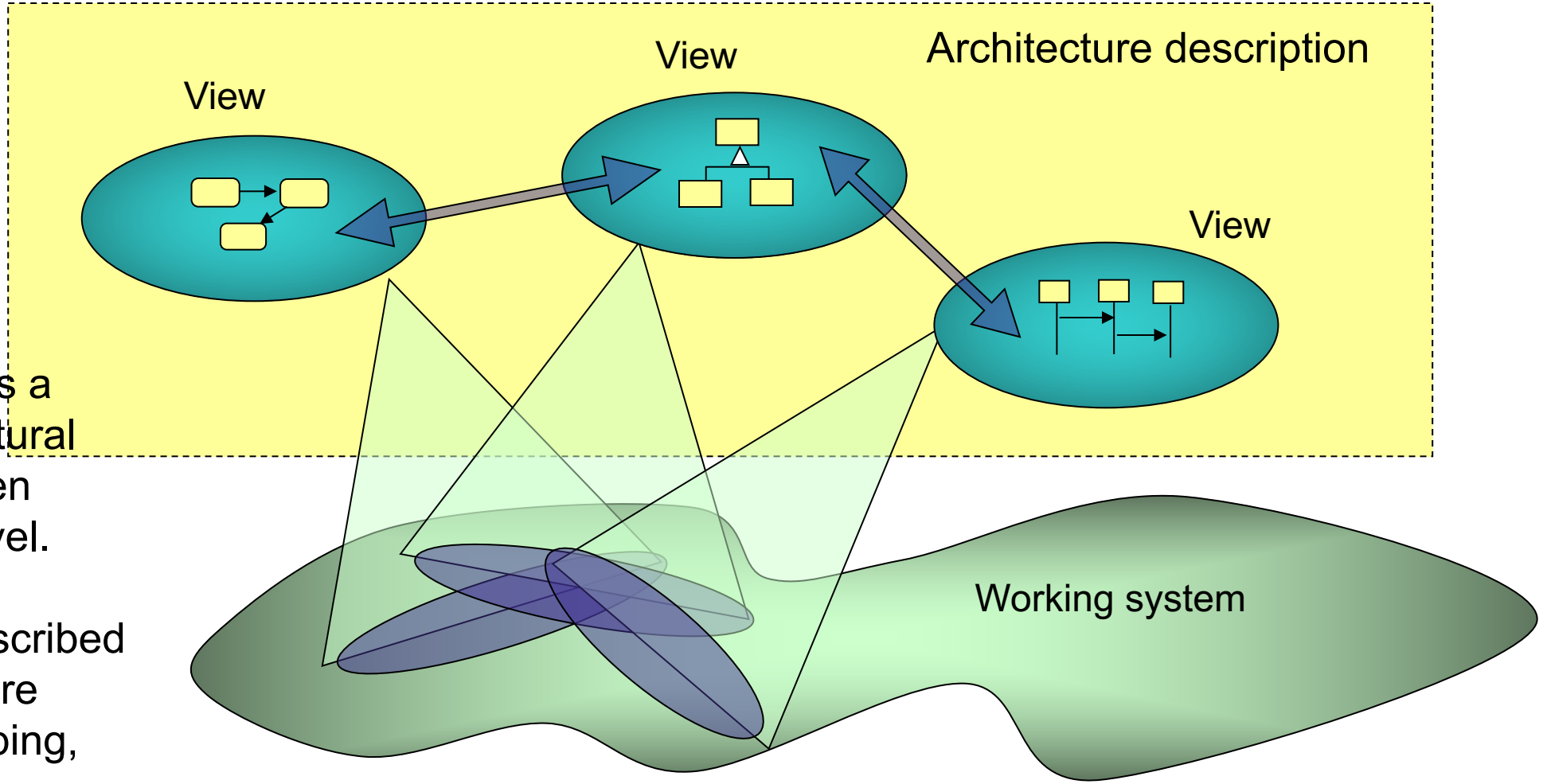
Architecture decisions affiliate usually to a requirement, concerns, limitation, etc.

There is always rationale behind the decision

The decisions should be included in the architectural description

Descriptions of architectural decisions are needed in architecture evaluations, too.

Views of architecture



View describes a given architectural thing on a given abstraction level.

The things described by the views are partly overlapping,

Architectural descriptions on different levels 1

Meta architecture: means to describe architectures.

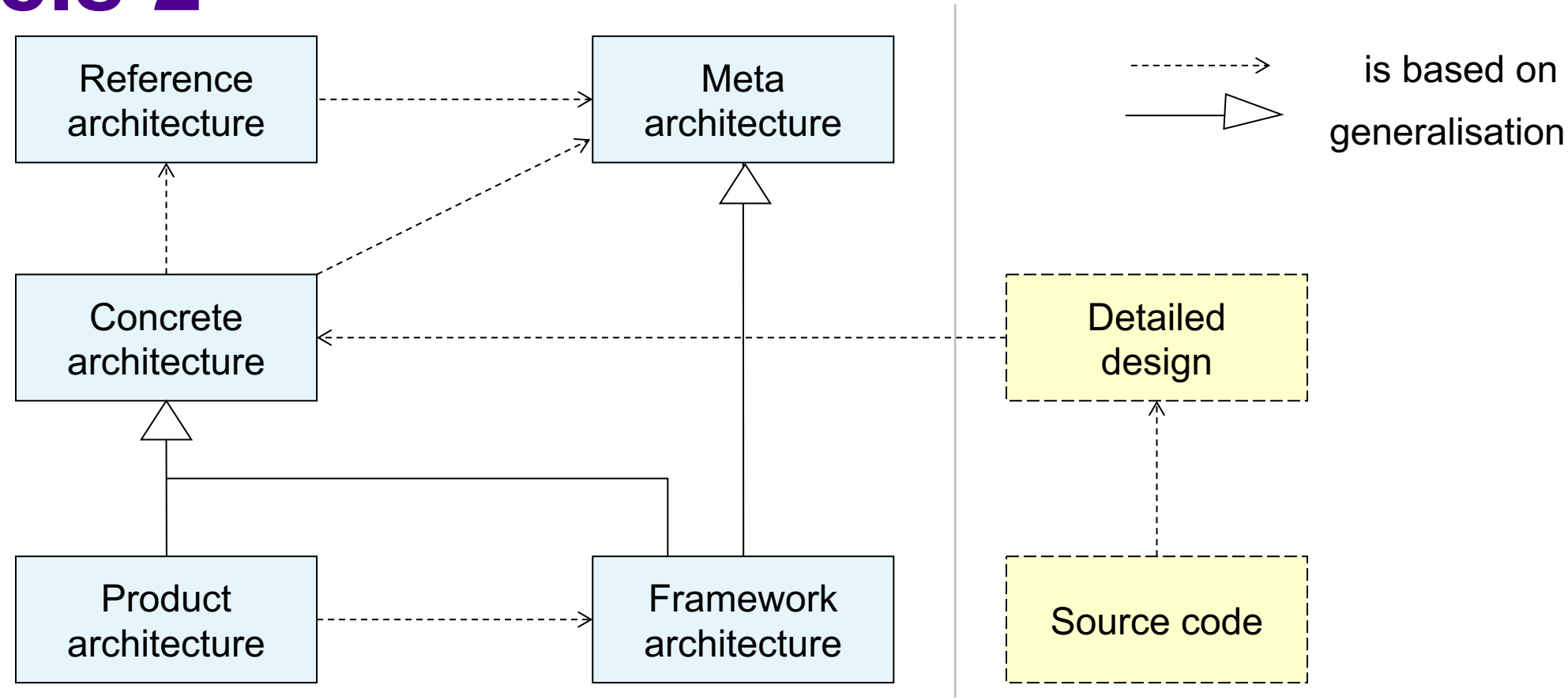
Reference architecture: model architecture for an application area.

Concrete architecture: architecture of a single system

Framework architecture: architecture of a product platform

Product architecture: architecture of a software product built on a product platform.

Architectural descriptions on different levels 2



Architectural viewpoints and description types (4+1)

Scenario views

- **Interaction with outside world (use case view)**

Logical views

- **Responsibilities of software units**

Process views

- **Processes and their interactions**

Development views

- **Assign system part to different developers**

Physical views

- **Distribution of the software to devices, network**

Plus one

Modification views

- **Extending and modification of the software**

Types of architecture descriptions

Structure – Behaviour

Static – Dynamic

Example – Defining

Depend on each other!

UML

UML can be used to describe architecture of the system

UML itself is not the topic of this course.

- **On Plus pages of the course, there are links to UML educational videos.**

Note: remember the different viewpoints!

Architectural documents

Tentative architecture document

- **Highlights the most critical solutions, alternative solutions and benefits and cons associated with them.**
- **Is used for tentative workload estimates, business decisions.**
- **Starting point for designing the system architecture**
- **Concrete (+ reference) architecture**

Architectural documents

System architecture document

- **The up-most level architecture of the system**
- **Is used for project planning, work estimates, designing for system-level testing, maintenance**
- **The basis for subsystem architecture design**
- **Concrete (+ meta) architecture**

Architectural documents

Subsystem architecture document

- **Architecture of the subsystem**
- **Is used for task planning, revised work estimations, unit testing plans, maintenance**
- **Basis for detailed design and implementation of subsystems.**
- **Concrete architecture**
- **E.g. Parts of MVC, web interface / server implementation, …**

Architectural documents

Interface documents

- **Description of the system interface, API**
- **Completes other architecture documents**
- **Is used**
  - as basis of component's design and implementation
  - to describe how other systems can call this system or how this system can be extended or used as part of other projects

Example: https://docs.mopidy.com/en/latest/api/

Architectural documents

Product framework architecture document

- **Architecture of the framework + rules how to build applications**
- **Is used in detailed design of the framework and to direct product development**
- **Concrete + meta architecture**

Architectural documents

Product architecture document

- **Using the framework + product-specific architecture solutions**
- **Is used for detailed design, testing and maintenance of the product.**
- **Concrete architecture**

Architectural documents

Reference architectures

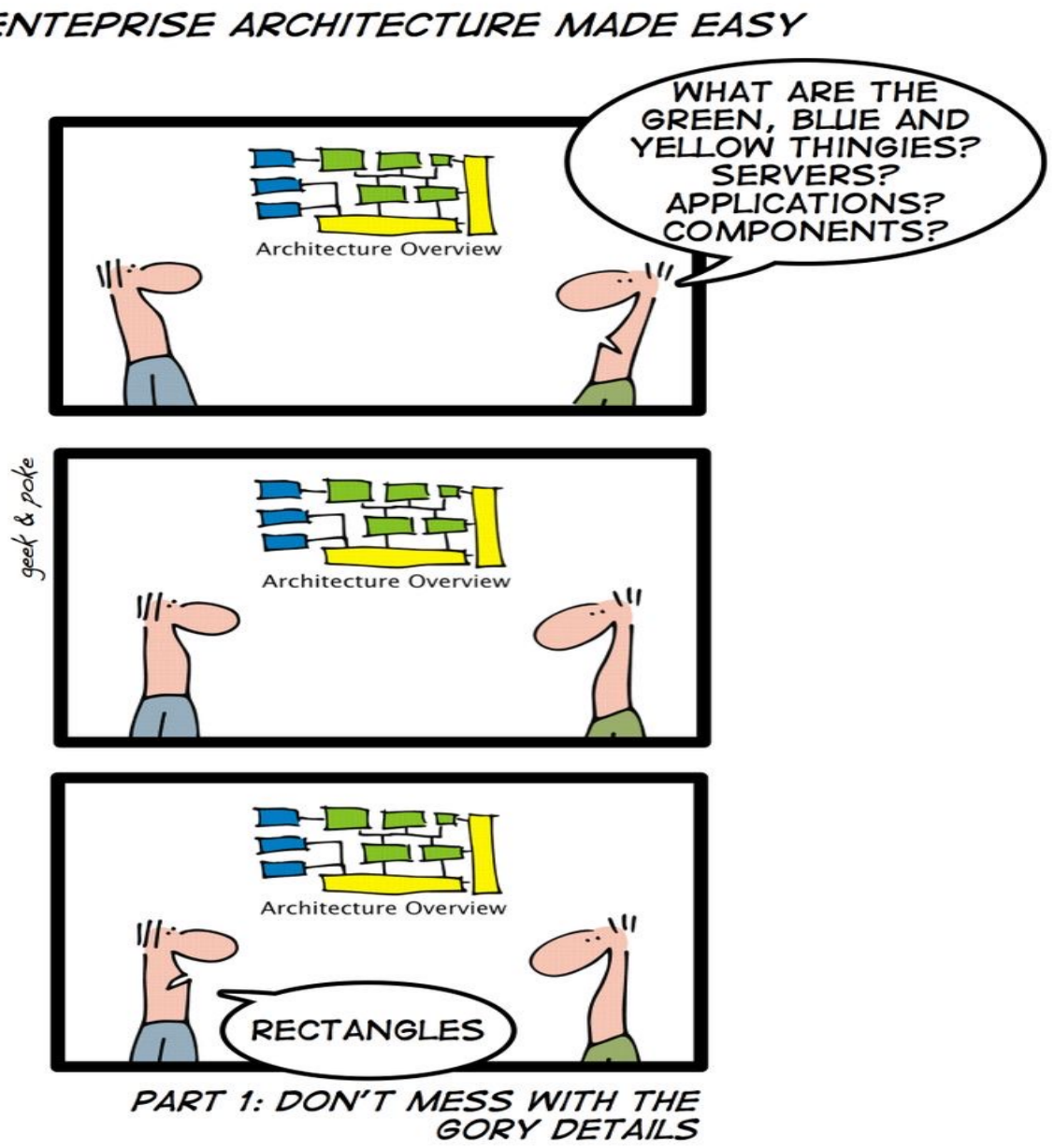
- **How does one utilise this architecture?**
- **What has to be taken into account, if you do something similar?**

Contents of architectural document

The following items (if applicable) should be included in the document:

- **Identity: what organisation, system, document**
- **Context: business objectives, stakeholders, development environment**
- **Requirements: essential requirements for the architecture**
- **Limitations**
- **Working environment**
- **Views: core of the description – views and models from the selected viewpoints**
- **Most important architectural decisions and their rationale**
- **Analysis: the results of the evaluation of the architecture**

Make it easy...


ENTEPRISE ARCHITECTURE MADE EASY
WHAT ARE THE GREEN, BLUE AND YELLOW THINGIES? SERVERS? APPLICATIONS? COMPONENTS?
Architecture Overview
geek & poke
Architecture Overview
Architecture Overview
RECTANGLES
PART 1: DON'T MESS WITH THE GORY DETAILS