



# RAModel: A Reference Model for Reference Architectures

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# Agenda

- Introduction
- Establishment of RAModel
- Structure of RAModel
- Application of RAModel
- Conclusions

# Introduction

- Reference architectures
  - **Special type** of software architecture
  - **Essence** of the architectures of a set of software systems
  - Guidance for the **development, standardization, and evolution** of systems
- Diversity of reference architectures
  - AUTOSAR
  - Continua and universAAL
  - OSGi
  - S3 and OASIS
- **Real evidence** of the **importance** of reference architectures for the software development

# Introduction

- Motivation
  - Currently, reference architectures are developed without an adequate attention, concern, or an a priori knowledge of what they should contain
  - Different formats regarding elements that they contain
  - Not all important information are presented
    - Examples: architectural decisions and a terminology widely adopted in the domain
  - No models for reference architectures which could be followed

# Introduction

- Goal of this work
  - To propose a reference model for reference architectures: **RAModel (Reference Architecture Model)**
  - RAModel presents **possibly all elements**, which could be contained in reference architectures.
  - RAModel intends to be **independent** from the **application domains** or purpose of such architectures.

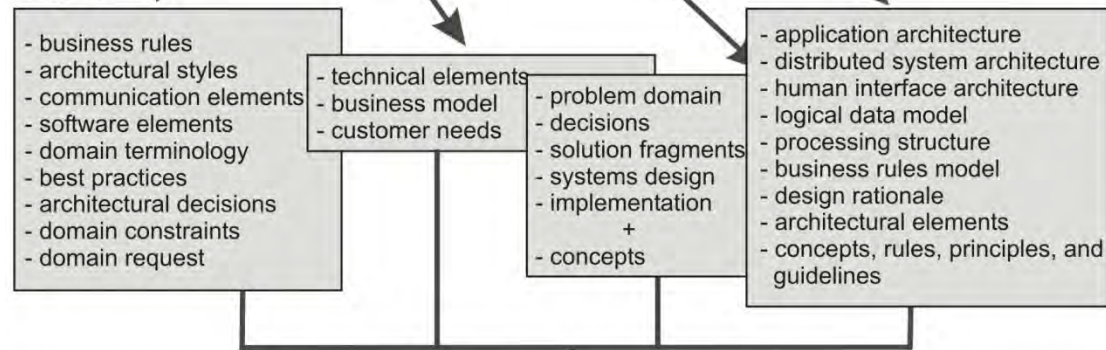
# Establishment of RAModel

## • Establishing RAModel

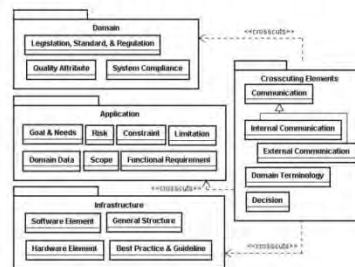
Step 1



Step 2



Step 3



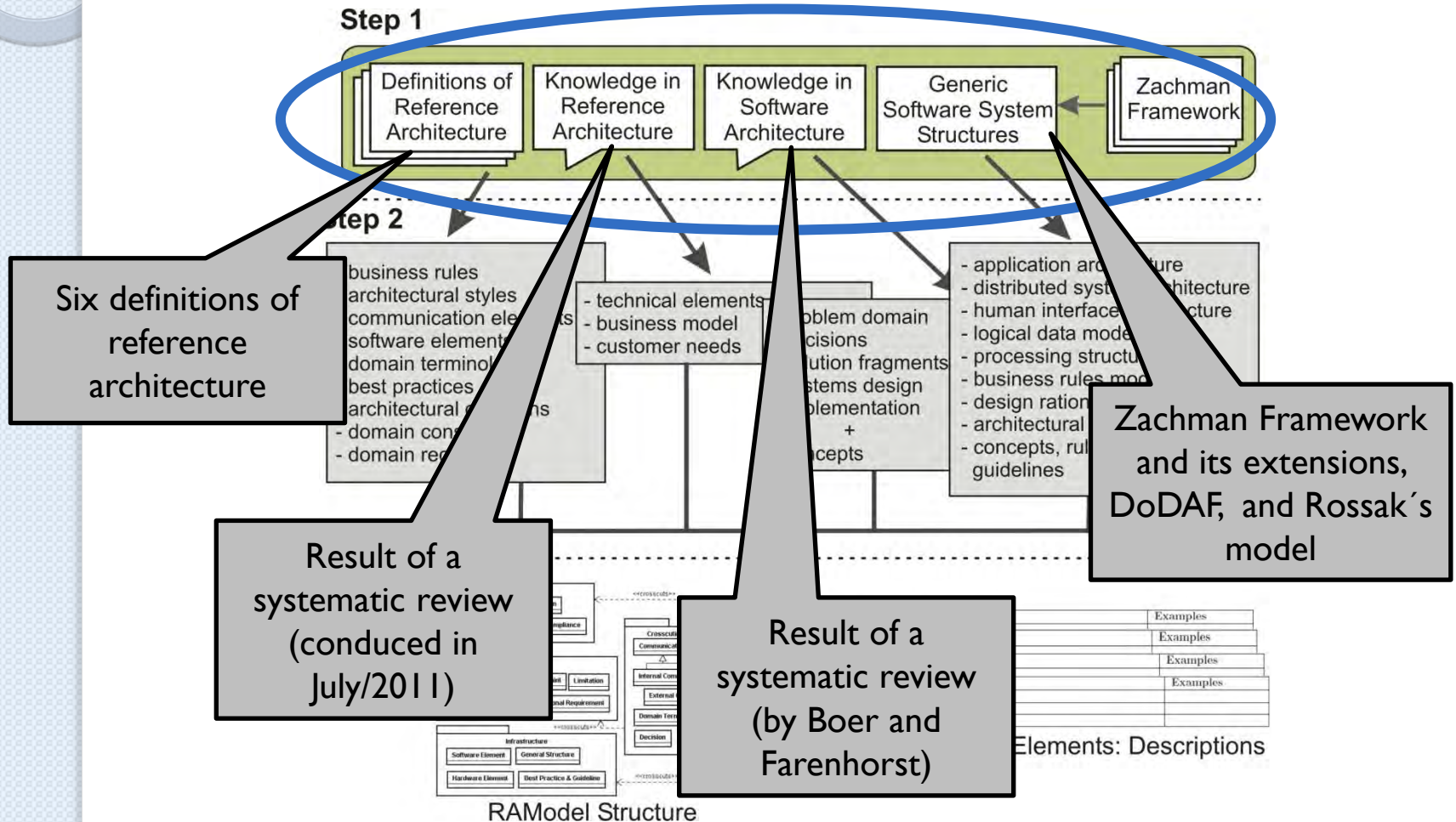
RAModel Structure

Element	Description	Examples
Element	Description	Examples
Element	Description	Examples
Element	Description	Examples
Element	Description	Examples

RAModel Elements: Descriptions

# Establishment of RAModel

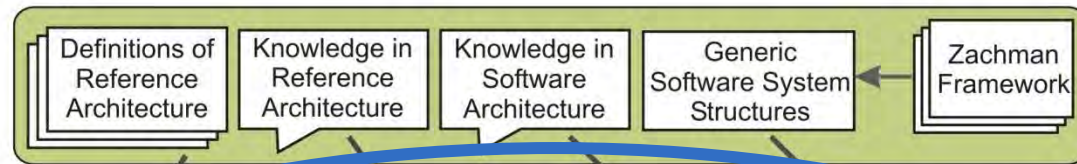
- Step I: Identification of Information Sources



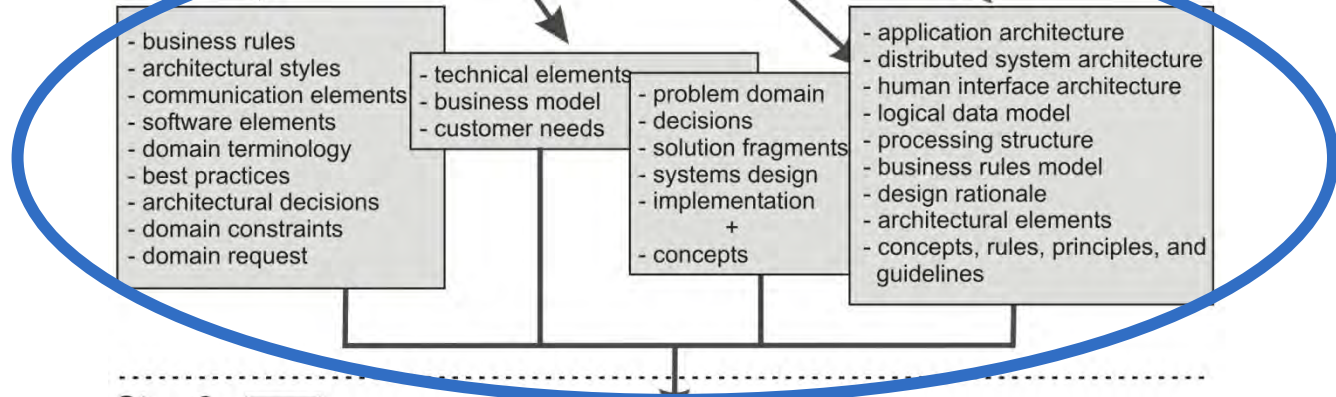
# Establishment of RAModel

- Step 2: Identification of Elements

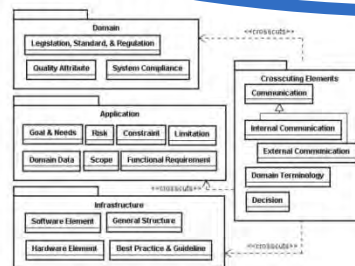
Step 1



Step 2



Step 3



RAModel Structure

Element	Description	Examples
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RAModel Elements: Descriptions



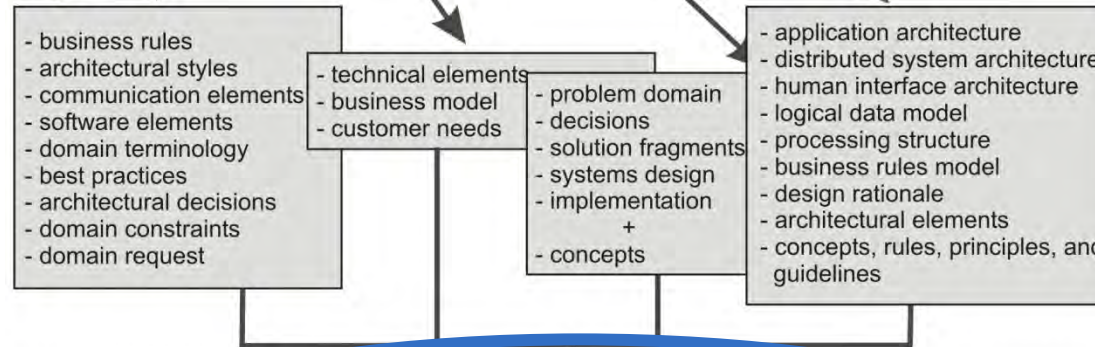
# Establishment of RAModel

- Step 3: Design of the RAModel

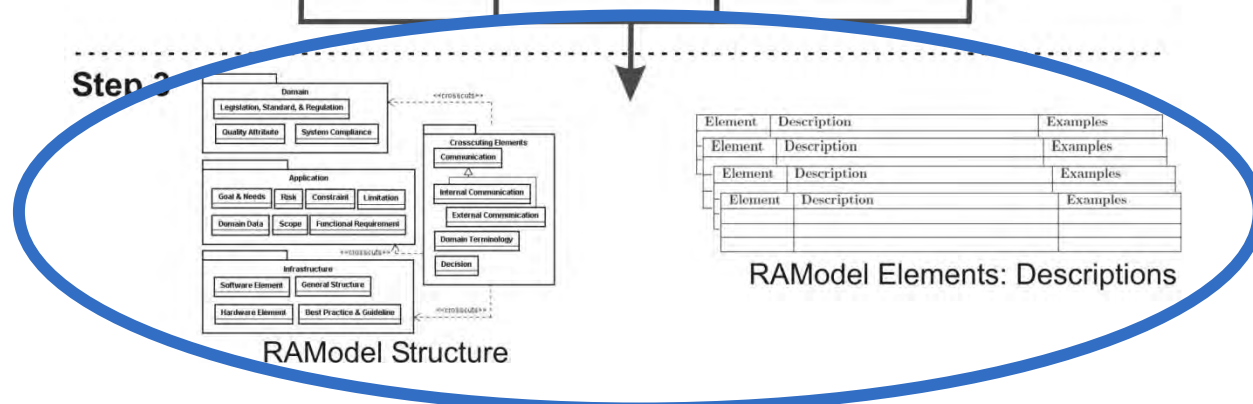
Step 1



Step 2



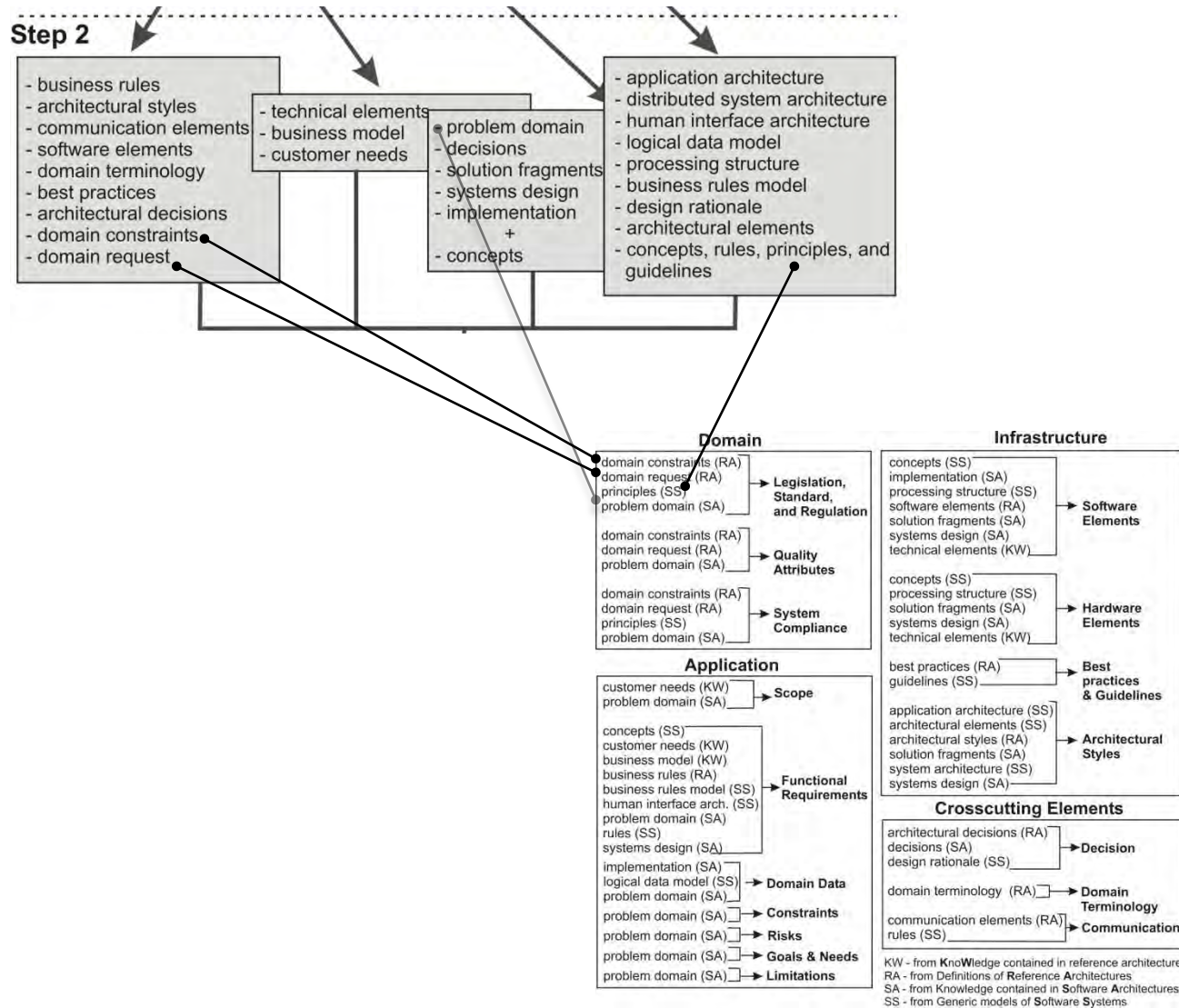
Step 3



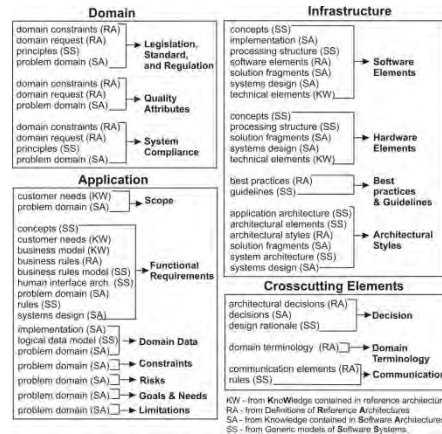
RAModel Structure

RAModel Elements: Descriptions

# Structure of RAModel

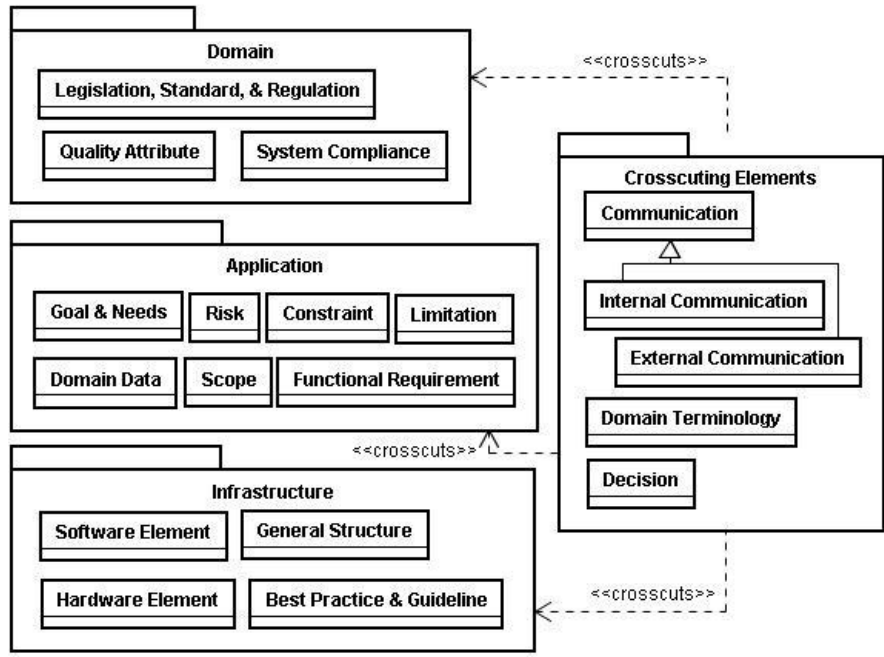


# Structure of RA Model



Element of the group Application	
Element	Description
Constraint	Constraints presented by the reference architecture and/or Elements of the group Domain

Element	Description
Legislations, standards, and regulations	Legislations, Laws, standards, and regulations existing in the domain that should be present in systems resulted from the reference architecture.
Quality attributes	Quality attributes, for instance, maintainability, portability, and scalability, that are desired in systems resulted from the reference architecture.
System compliance	Means to verify if systems developed from the reference architecture follow existing legislations, standards, and regulations.
Scope	Scope that is covered by the reference architecture, i.e., the set of systems developed based on the reference architecture.
General structure	General structure of the reference architecture, represented sometimes by using existing architectural styles.
Hardware elements	Elements of hardware, such as server and devices, which host systems resulted from the reference architecture.
Software elements	Elements of software present in the reference architecture, e.g., subsystems and classes, which could be used to develop software systems.



# Uses of RAModel

- Main perspectives of use:
  - **Analysis** of reference architectures
  - **Comparative analysis** of reference architectures
  - Basis for the **establishment** of reference architectures
  - Support to the **design of SPL**
- Case study:
  - Analysis of AUTOSAR

# Conclusions

- Contribution:
  - RAModel
    - A **reference model** for reference architectures
    - Interesting instrument to **understanding** reference architectures
    - Reduction in **effort** and **time** and improvement in **productivity**
- Future work
  - More **case studies** and **experiments**

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