Industrial Experiences with Viewpoints

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Industrial Viewpoint Experiences

- Background and Motivation
- Viewpoints and Views
- Viewpoint Sets
- General Experiences
- Further Work

Background and Motivation

- Report of practitioner experience using viewpoints and views
- Information systems domain
- Joint work with Nick Rozanski

Background and Motivation

- Architecture today is largely ad-hoc
  - Little standardisation in description
  - Difficult to compare and discuss alternatives
  - No process for developing architectures
  - Difficult to guide and mentor new architects

Background and Motivation

- Need a conceptual framework to
  - Organise the architectural design process
  - Allow classification of ideas
  - Capture knowledge for discussion and reuse
  - Provide a framework for learning

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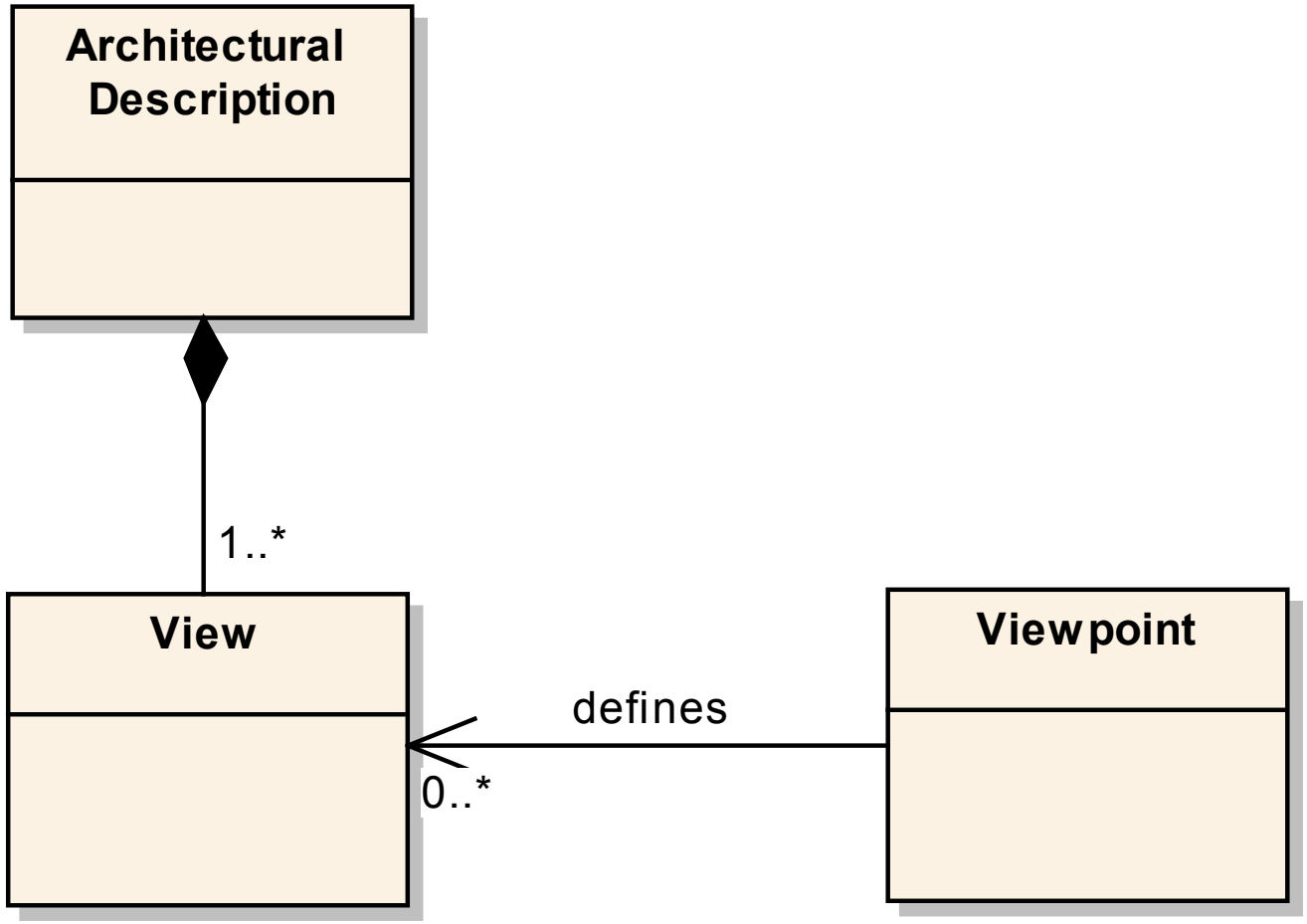
Viewpoints and Views

- A **view** is a *representation* of all or part of an *architecture*, from the perspective of one or more *concerns* which are held by one or more of its stakeholders.
- A **viewpoint** is a collection of *patterns, templates and conventions* for constructing one *type of view*. It defines the stakeholders whose concerns are reflected in the viewpoint, and guidelines and principles and template models for constructing its views.

[IEEE Standard 1471 – Recommended Practice for Architectural Description]

Viewpoints and Views



Viewpoints and Views

- Viewpoints provide
  - A *description* of an approach to software architecture
  - A *store* of knowledge and experience
  - A *guide* to the architect in unfamiliar territory
  - An *aide-memoir* to the experienced architect
- Views provide
  - A structure for description
  - A separation of concerns
  - Improved stakeholder communication

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Viewpoint Sets

- Philippe Kruchten ("4+1")
  - Logical, Process, Development, Physical
- Hofmeister, Nord and Soni ("Siemens")
  - Conceptual, Module, Execution, Code
- Garland and Anthony
  - Analysis Overall, Component, Context, …(14)
- RM-ODP
  - Enterprise, Information, Computational, Engineering, Technology

Investigation

- Usage (or considered usage) of each set during practice
  - Internet security software products
    - Software product development
  - Wholesale financial (“City”) systems
    - Bespoke development
  - Retail financial systems (customer service)
    - Integration programme

[No attempt made to duplicate experience]

4+1

- Positives
  - Simple, logical, easy to explain
  - Generic, good base for information systems
  - Independent of notation (UML the norm)
  - Aligns well with existing models (intuitive)
- Problems
  - Thin definitions
  - Data and operational concerns
  - Names (“process”, “logical”, “physical”)
  - No consistency rules

Siemens (H, N & S)

- Positives
  - Very well defined
    - Include tasks and pitfalls (“issues”) in viewpoints
  - Logical, easy to understand and explain
  - Use UML rather than own notation
  - Based on industrial practice
- Problems
  - Control system centric
  - Data, deployment and operational concerns
  - No mention of stakeholder groups
  - Limited consistency rules

Garland and Anthony

- Positives
  - Very well defined
    - Include purpose, applicability, stakeholders, models, advice and (some) pitfalls and solutions
  - Aimed at information systems
  - Use of UML makes modeling easier
  - Based on industrial practice
  - Explicit consideration of data
- Problems
  - Too many viewpoints (14 – fragmentation)
  - No operational concerns addressed
  - No consistency rules

RM-ODP

- Positives
  - Logical, easy to explain
  - Aimed at distributed information systems
  - Explicit consideration of data
  - ISO standardisation & research usage
- Problems
  - Little practitioner usage and definitions are daunting
  - Significant underlying architectural assumptions
  - RM-ODP specific modeling notations
  - No consideration of operational concerns
  - No consistency rules

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Positive Experiences

- Viewpoints and views work well
  - To structure the process
  - Separate concerns
  - Act as a source of knowledge/guidance
  - A framework for learning / mentoring
- Sound viewpoint sets
  - Well thought out
  - Sound basis for architecture

Criticisms

- No standardisation of viewpoint description
  - Different content as well as different presentation
- Lack of cross-view consistency rules

Suggested Content

- For the set
  - Overall model
  - Consistency rules
  - Presentation useful to novice and expert
- For each viewpoint
  - Concerns
  - Stakeholders (and their interest)
  - Activities (and process if appropriate)
  - Models (and applicability of each)
  - Pitfalls (with possible solutions)

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Further Work

- Our own information systems oriented set
  - Functional
  - Information
  - Concurrency
  - Development
  - Deployment
  - Support
  - Consistency rules
- Extension and evolution of “4+1”