Requirement Engineering

Lecture 13: Tool Support

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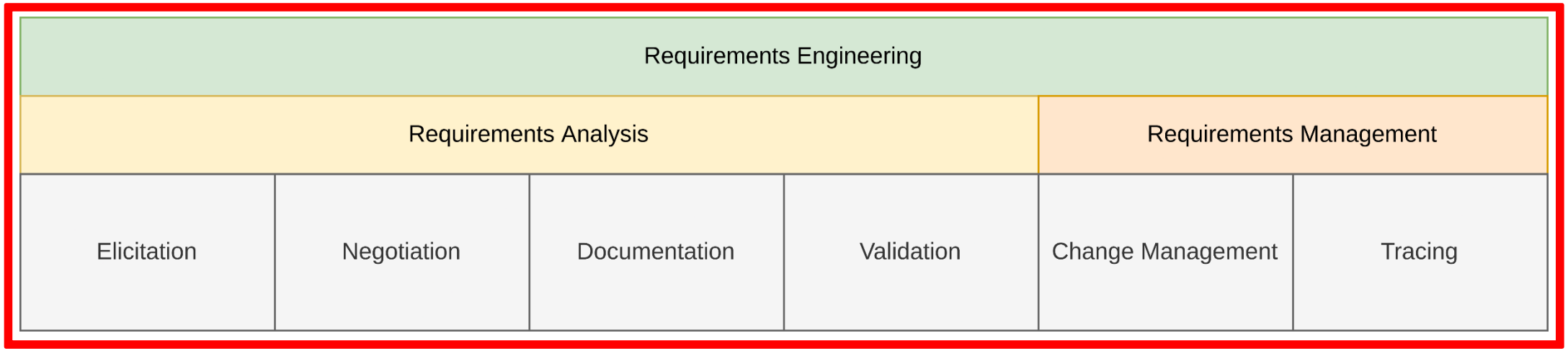
General Requirements Engineering Process

Overview



Lecture 13: Tool Support

Content

1. Tool Support in General
2. Requirements Management Tools
3. Introducing and Evaluating Tools

TOOL SUPPORT IN GENERAL

Tool Support in General

Motivation

- Integrate and process already existing information
- Information from requirements engineering
  - Natural language requirements, models, ...
- Information that is the basis of requirements
  - Minutes, goal documents, stakeholder lists, ...
- In practice mostly support of requirements management

Tool Support in General

Traceability between Tools

- Usually, multiple tools are used
- Interfaces for integration and traceability required
  - Should be either available or easy to create
- Should allow tracing changes
- Should allow managing the traces
- Vital to know where changes are propagated to

Tool Support in General

Reuse of Tools from System Development

- Tools for development can often be used for requirements engineering
  - Often offer ability to manage requirements
  - Examples:
    - Test management tools
    - Bug tracking tools
    - Configuration management tools
- Advantage
  - Requirements automatically integrated with developed artifacts
  - Interface between requirements management tool and development tool not required

Tool Support in General

Wikis in Requirements Engineering

- Wikis offer a simple to use and easy to access opportunity for collaboratively working on documents
- Interesting for glossaries
  - Each wiki page defines a glossary term
- Well suited if a lot of different stakeholders are involved

Tool Support in General

Visualization Tools

- Mind mapping tools to support brainstorming sessions
  - Presentation tools can help guide through meetings and for describing rough analysis
- GUI modeling tools for prototyping user interfaces
- Flow charting tools to depict processes and work-flows

Tool Support in General

„Everyday” Tools

- Mail clients, chat software, address books, online calendars vital for communication
- Project management and controlling tools also required for managing the requirements engineering process
- Help stakeholders with the coordination of tasks

REQUIREMENTS MANAGEMENT TOOLS

Requirements Management Tools

Properties

- Manage different types of information
  - Natural language requirements
  - Conceptual models
  - Sketches
  - Test plans
  - Change requests
- Manage logical relationships
  - Traceability
- Allow unique identification
  - Unique Ids for every artifact

Requirements Management Tools

Properties

- Editors for managed information
  - Multi-user access
  - Access control
  - Configuration management
  - Version management
- Different views on information
  - Developer view
  - Tester view
  - View on partial systems

Requirements Management Tools

Properties

- Organization of managed information
  - Grouping
  - Hierarchical structuring
  - Assigning attributes
  - Annotation with additional information
- Generation of reports and summaries
  - Reports of change requests
  - Reports on state of the requirements implementation
- Generation of appropriate outputs
  - Requirements document for a system release

Requirements Management Tools

Special Purpose Tools

- Comprehensive list:
  - http://www.volere.co.uk/tools.htm
- Examples
  - Enterprise Architect (Sparx Systems)
  - HP Quality Center
  - IBM Rational DOORS

Requirements Management Tools

Standard Office Tools

- Word processors, spreadsheet calculators
- Used in many projects due to multiple reasons

- Advantages
  - Are already available
  - No additional training required
  - Versatile
  - Well-suited for natural-language requirements
  - Adapted for requirements management, e.g., by using templates and predefined document formats
  - Allow traceability to some degree through hyperlinks

Requirements Management Tools

Standard Office Tools

- Disadvantages
  - Do not offer version control on the level of requirements
  - Do not directly support requirements engineering, e.g., traceability links often have to be maintained manually

- Drawbacks can be worked around
  - Still, the efficiency is lower than with a dedicated tool

INTRODUCING AND EVALUATING TOOLS

Introducing and Evaluating Tools

Before Introducing Tools

- Tools support existing processes
  - Process needs to be in place
  - Responsibilities must be clear
  - Techniques must be known
  - People must be able to follow all this

→ „Automating chaos just gives faster chaos“ (Dorothy Graham)

Introducing and Evaluating Tools

Before Introducing Tools

- Choice and introduction of tool costs resources
  - Licensing costs
  - Training costs
  - Customization costs
  - Support costs
  - Not only current, but possible future efforts
  - Adaption of already existing artifacts may further increase the costs

Introducing and Evaluating Tools

Before Introducing Tools

- Introduction into already started projects difficult
  - Structure in place
  - Existing concepts would have to be replaced
  - Effort and risk can be estimated
  - Often underestimated due to multiple factors
- Employee resistance
- Tool deficiencies

Introducing and Evaluating Tools

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Instead →

Introducing and Evaluating Tools

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Instead → pilot project

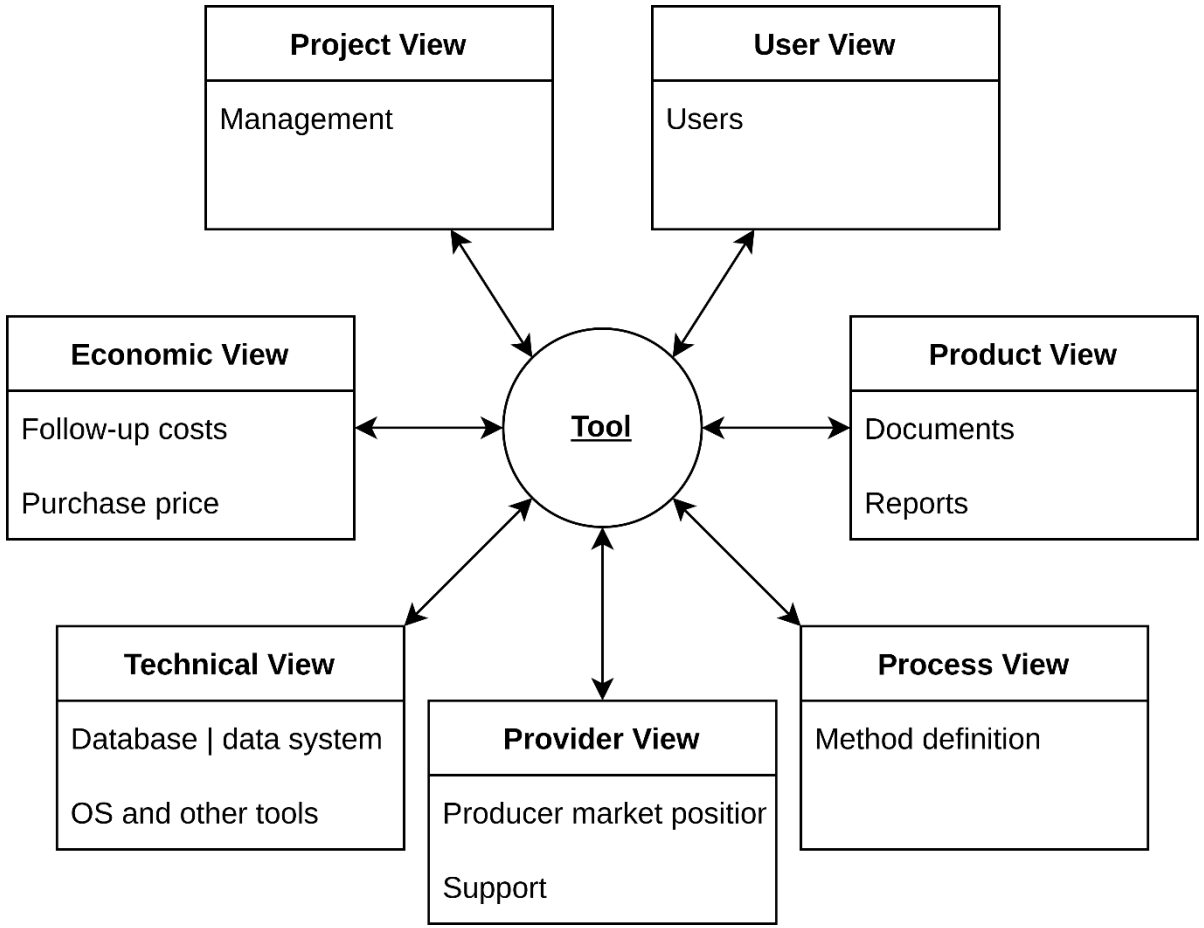
Introducing and Evaluating Tools

Evaluation of Tools

- Different perspectives matter for tools
  - Project view
  - User view
  - Product view
  - Process view
  - Provider view
  - Technical view
  - Economic view
- Should be taken into account when evaluating tools
  - Criteria for all views should be defined

Introducing and Evaluating Tools

Views on RE Tools



Based on K. Pohl, C. Rupp (2011) – Requirements Engineering Fundamentals: A study guide for Requirements Engineering Foundation Level

Introducing and Evaluating Tools

Views on Tools: Project View

- Extent to which a tool can support a project

- Project preparation
  - Definition of project-specific information types
  - Definition of project-specific document formats
- Project planning
  - Scope of milestones
  - How information managed by the tool pertains to milestones
- Project execution
  - Project control, e.g., completion of requirements

Introducing and Evaluating Tools

Views on Tools: User View

- Tool requirements from the user‘s perspective

- Tool usage
  - Access to appropriate functions required
- Mapping of roles
  - Stakeholders mapped to roles through user management and access rights
- Support of group work
  - Multiple users should be able to work collaboratively

Introducing and Evaluating Tools

Views on Tools: Product View

- Concerned with the functionalities possed by a tool
  - For example, for different documentation types

- Considerations
  - Supported document types
  - Views on requirements
  - Reports that can be generated
  - Traceability

Introducing and Evaluating Tools

Views on Tools: Process View

- From the perspective of method support
  - How does a tool support the application of a specific technique?

- Ability to document activities
- Method guidance
  - Strict and restrictive guidance (e.g., wizards)
  - Lenient guidance (e.g., suggestions and hints)
- Project-specific process model definition
  - e.g, phases

Introducing and Evaluating Tools

Views on Tools: Provider View

- Market position and services offered by the tool manufacturer
- Brand awareness and reputation often important criteria
- High costs and required long-term support require strong commitment

Introducing and Evaluating Tools

Views on Tools: Technical View

- Considers technical context

- Ability to integrate the tool with existing tools
  - Evaluate APIs
- Performance of the tool
  - Evaluate how long importing/exporting data takes
- Scalability
  - Maximum number of users/objects
- Hardware and software requirements

Introducing and Evaluating Tools

Views on Tools: Economic View

- Considers costs
  - Due to acquisition
  - Introduction
  - Maintenance
  - Integration costs
  - Operation costs
  - Method tailoring

SUMMARY

Summary

- Different kinds of tools available
  - Special RE tools vs. general purpose tools
- A good process comes before a good tool
- Whatever the tool, its use must be fitting for the process
- New tools should be introduced in a pilot
  - Evaluating new tools is time consuming

Questions?