

# Requirements for workflow-based EHR systems

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Results of a qualitative study



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Electronic Health Records  
are useless...

# Content

Project Background



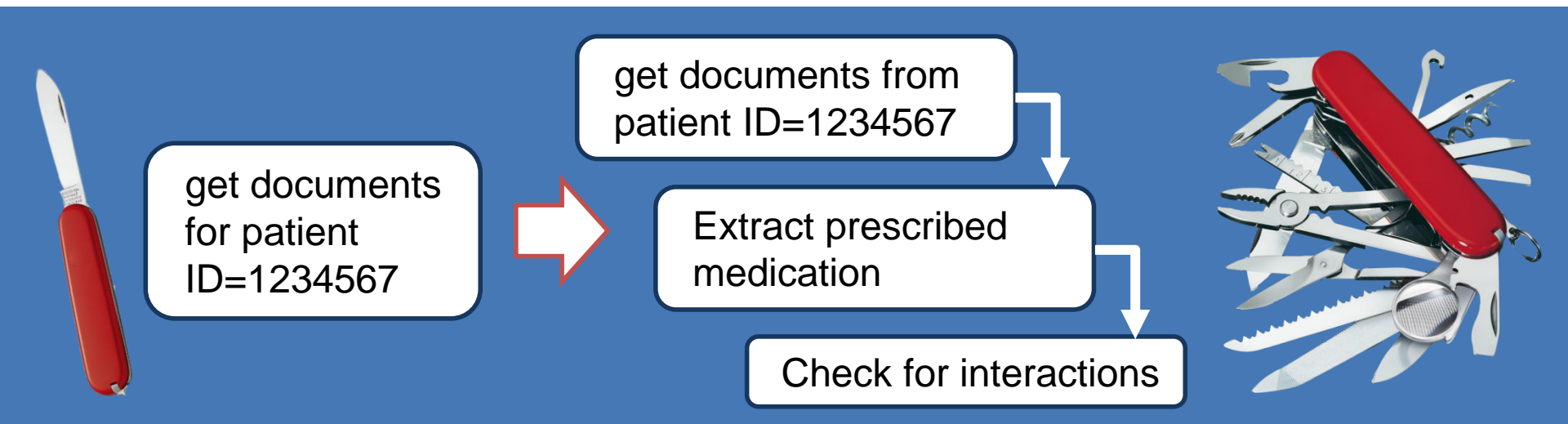
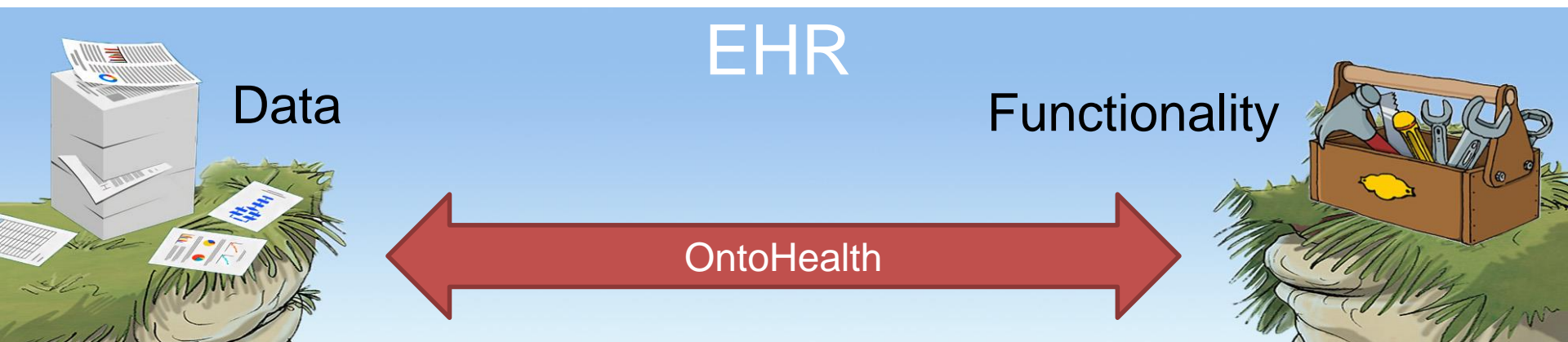
Objectives

Methods

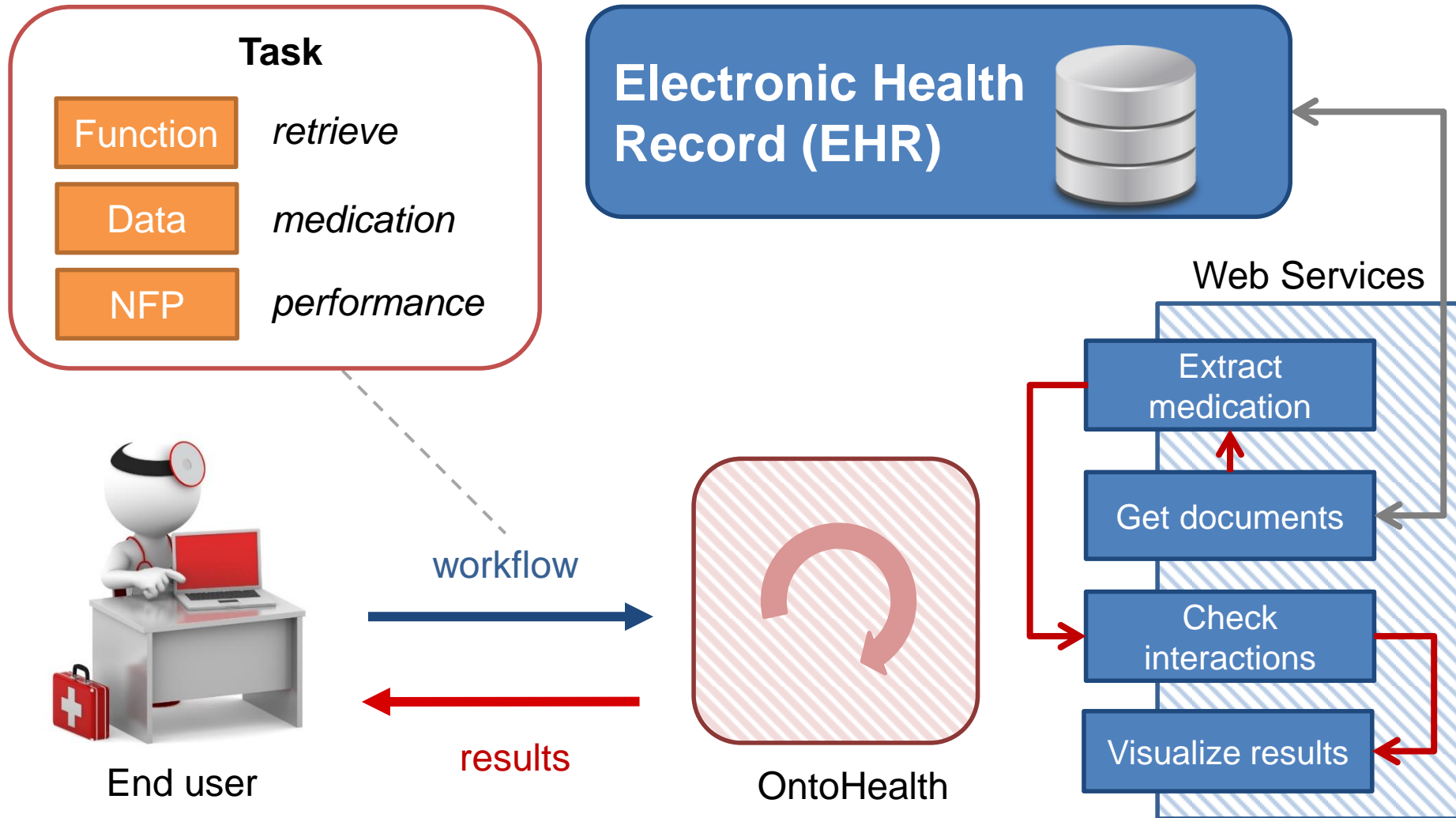
Results

Discussion

# OntoHealth



# Example



# Requirements Engineering

Systematic  
review

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graph TD; A[Systematic review] --> B[Direct observations]; B --> C[Experts interviews];
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- scientific literature, standards, best-practices,...
- Results: categorization of building blocks for clinical workflows (data-elements, actions, contexts)

Direct  
observations

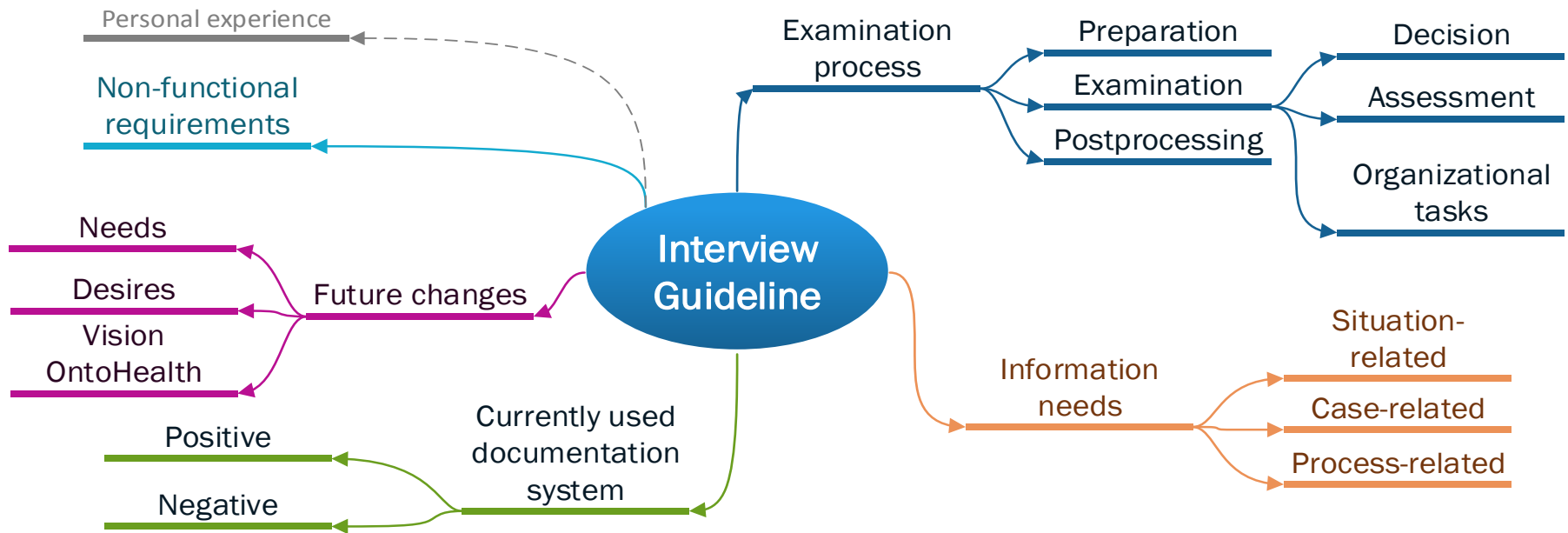
- EHR tasks during physician-patient contacts
- Analyzed process structure and information needs

Experts  
interviews

# Interviews - Objectives

- Validation of previous results
  - Literature analysis (information needs) und
  - observations (required functions, process-related requirements)
- Process-related requirements
- Information needs
- Functions
- Non-functional requirements

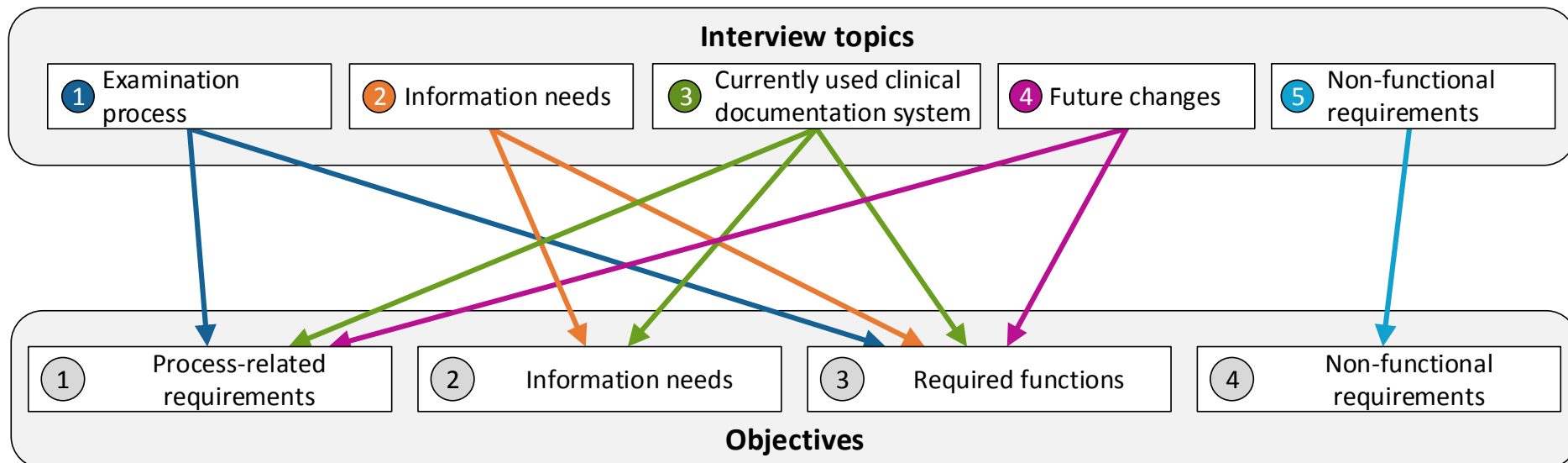
# Methods





# Methods

- Recruited contacts per telephone and email
- Conducted interviews personally in the participant's office
- Audio recorded all interviews
- Qualitative content analysis using MaxQDA<sup>1</sup>



<sup>1</sup> <http://www.maxqda.de/>

# Results

- 7 Interviews (m=5, f=2)
  - 4 Diabetes specialists from hospitals
  - 3 physicians from private practices
- Mean working experience: 19,7 years (range: 10-32)
- 526 annotated codes
- Main categories:
  - information needs during diabetes examination (N<sup>1</sup>=157)
  - process-related requirements (N=146)
  - required functions (N=113)
  - non-functional requirements (N=26)

<sup>1</sup> multiple assignments possible

# Results - Functions

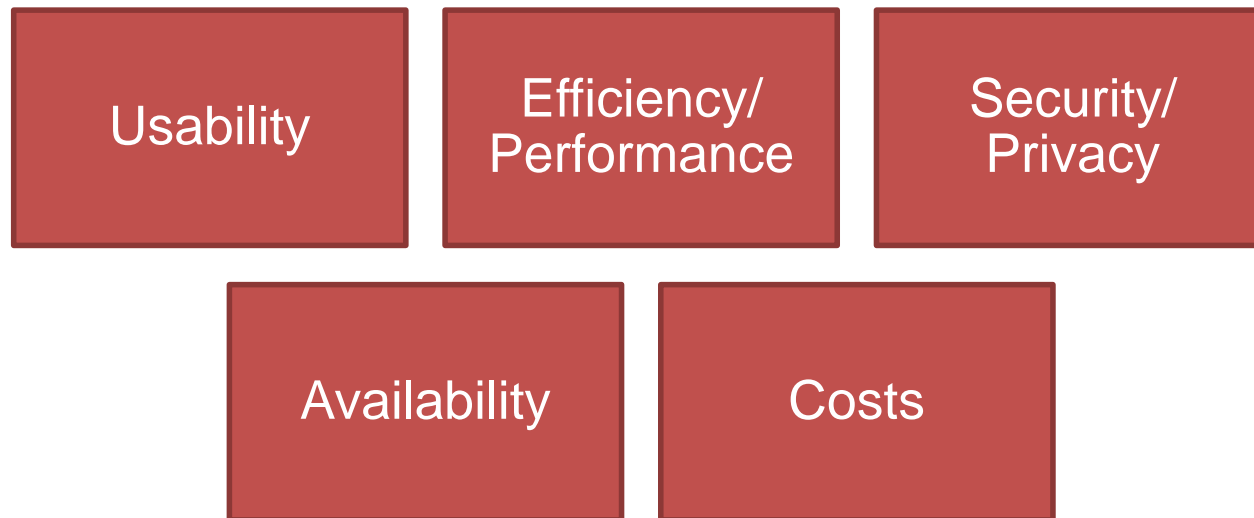
- „... cumbersome to interpret the results of other institution's reports”.
- “... where I need to read through the complete document to find e.g. the currently prescribed medication.”
- “... hard to find the interesting facts, like pathologic results”
- “The system now is very inflexible: I always get the same presentation, I'd like to chose different contents or functions to process the data ...”
- Needed functions
  - Information filtering (N<sup>1</sup>=11, NP<sup>2</sup>=5)
  - Templates for different situations (N=10, NP=5)
  - Flexible workflow management (N=9, NP=6)
  - Shared workflow (N=5, NP=4)

<sup>1</sup> Number of assigned Codes

<sup>2</sup> Number of interviewed persons giving that answer

# Results – Non-Functional Properties

- Important NFP for Service selection:



- OntoHealth utilization: User differences between hospitals and private practices

# Discussion

- Need for individual, flexible EHR access
  - Workflow support
  - Data flexibility
  - Functionality flexibility
- Non-functional properties for service selection
- Triangulation approach: involve different point of views
- Limitations
  - Limit on physician-patient contacts
  - Reduced number of physicians → natural saturation
  - QCA: Only one researcher

# Conclusion

*Workflow-based EHR Systems need to...*

## Flexibility

- ... offer flexibility in defining user needs (domain-specific definition)

## Individual Information

- ... provide the needed information in the right form, without unwanted details

## Situation related

- ...cover context- and case-specific information structures

## Modularity

- .... be based on modular approaches (SOA) flexible to dynamic changes

## Quality requirements

- ... propose user specified quality parameters for service-selection would facilitate the adaption of IT for certain user requirements

# Outlook

- Requirements are used for
  - Modelling the OntoHealth ontology “WISE-DM”
  - Defining Sample Services
  - Defining Sample Use-Cases and workflows



# Electronic Health Records are useless...

...if they don't comply with  
individual clinical workflows

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more Information:

**OntoHealth Project**

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